

1 CCPP variables provided by model FV3 vs requested by pool of physics

1.1 List of variables

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GFS_coupling_type_instance
GFS_data_type
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GFS_data_type_instance_all_blocks
GFS_diag_type
GFS_diag_type_instance
GFS_grid_type
GFS_grid_type_instance
GFS_interstitial_type
GFS_interstitial_type_instance
GFS_interstitial_type_instance_all_threads
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GFS_radtend_type_instance
GFS_sfcprop_type
GFS_sfcprop_type_instance
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GFS_stateout_type_instance

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Monin_Obukhov_similarity_function_for_heat_at_2m
Monin_Obukhov_similarity_function_for_heat_at_2m_over_ice
Monin_Obukhov_similarity_function_for_heat_at_2m_over_land
Monin_Obukhov_similarity_function_for_heat_at_2m_over_ocean
Monin_Obukhov_similarity_function_for_heat_over_ice
Monin_Obukhov_similarity_function_for_heat_over_land
Monin_Obukhov_similarity_function_for_heat_over_ocean
Monin_Obukhov_similarity_function_for_momentum
Monin_Obukhov_similarity_function_for_momentum_at_10m
Monin_Obukhov_similarity_function_for_momentum_at_10m_over_ice
Monin_Obukhov_similarity_function_for_momentum_at_10m_over_land
Monin_Obukhov_similarity_function_for_momentum_at_10m_over_ocean
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accumulated_lwe_thickness_of_graupel_amount
accumulated_lwe_thickness_of_graupel_amount_in_bucket
accumulated_lwe_thickness_of_ice_amount
accumulated_lwe_thickness_of_ice_amount_in_bucket
accumulated_lwe_thickness_of_precipitation_amount
accumulated_lwe_thickness_of_precipitation_amount_in_bucket
accumulated_lwe_thickness_of_snow_amount
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aerosol_asymmetry_parameter_for_shortwave_bands_01_16
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aerosol_aware_parameter_shallow_convection
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aerosol_optical_properties_for_longwave_bands_01_16
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air_pressure_difference_between_midlayers
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air_temperature_lapse_rate_constant
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atmosphere_diffusivity_coefficient_factor
atmosphere_energy_content_at_Lagrangian_surface
atmosphere_energy_content_in_column
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atmosphere_heat_diffusivity_background
atmosphere_heat_diffusivity_background_maximum
atmosphere_heat_diffusivity_for_mynnpbl
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atmosphere_momentum_diffusivity_background
atmosphere_momentum_diffusivity_for_mynnpbl
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cloud_top_entrainment_instability_value
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cumulative_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
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flag_for_frozen_soil_physics
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flag_for_hydrostatic_heating_from_physics
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flag_for_nsstm_run
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flag_for_ozone_physics
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flag_for_precipitation_effect_on_radiation
flag_for_precipitation_partition_option
flag_for_precipitation_type
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surface_specific_humidity
surface_specific_humidity_for_MYJ_schemes
surface_specific_humidity_over_ice
surface_specific_humidity_over_land
surface_specific_humidity_over_ocean
surface_stability_parameter
surface_upward_latent_heat_flux_for_coupling
surface_upward_latent_heat_flux_for_coupling_interstitial
surface_upward_potential_latent_heat_flux
surface_upward_potential_latent_heat_flux_over_ice
surface_upward_potential_latent_heat_flux_over_land
surface_upward_potential_latent_heat_flux_over_ocean
surface_upward_sensible_heat_flux_for_coupling
surface_upward_sensible_heat_flux_for_coupling_interstitial
surface_upwelling_diffuse_near_infrared_shortwave_flux
surface_upwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step
surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux

surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_upwelling_direct_near_infrared_shortwave_flux
surface_upwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step
surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux
surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_upwelling_longwave_flux
surface_upwelling_longwave_flux_for_coupling
surface_upwelling_longwave_flux_for_coupling_interstitial
surface_upwelling_longwave_flux_over_ice_interstitial
surface_upwelling_longwave_flux_over_land_interstitial
surface_upwelling_longwave_flux_over_ocean_interstitial
surface_upwelling_shortwave_flux
surface_wind_enhancement_due_to_convection
surface_wind_stress
surface_wind_stress_over_ice
surface_wind_stress_over_land
surface_wind_stress_over_ocean
surface_x_momentum_flux_for_coupling
surface_x_momentum_flux_for_coupling_interstitial
surface_y_momentum_flux_for_coupling
surface_y_momentum_flux_for_coupling_interstitial
sw_fluxes_sfc
sw_fluxes_top_atmosphere
t_prime_q_prime
t_prime_squared
temperature_at_2m
temperature_at_2m_from_noahmp
temperature_at_zero_celsius
temperature_from_previous_timestep
temperature_tendency_due_to_dynamics
tendency_of_air_temperature_at_Lagrangian_surface

tendency_of_air_temperature_due_to_deep_convection_for_coupling_on_physics_timestep
tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_time_step
tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_timestep
tendency_of_air_temperature_due_to_longwave_heating_for_idea
tendency_of_air_temperature_due_to_longwave_heating_on_radiation_time_step
tendency_of_air_temperature_due_to_longwave_heating_on_radiation_timestep
tendency_of_air_temperature_due_to_model_physics
tendency_of_air_temperature_due_to_radiative_heating_assuming_clear_sky
tendency_of_air_temperature_due_to_radiative_heating_on_physics_time_step
tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_time_step
tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_timestep
tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_time_step
tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_timestep
tendency_of_air_temperature_due_to_ugwp
tendency_of_cloud_droplet_number_concentration_due_to_model_physics
tendency_of_cloud_water_due_to_convective_microphysics
tendency_of_graupel_mixing_ratio_due_to_model_physics
tendency_of_ice_cloud_water_mixing_ratio_due_to_model_physics
tendency_of_ice_friendly_aerosol_number_concentration_due_to_model_physics
tendency_of_ice_friendly_aerosols_at_surface
tendency_of_ice_number_concentration_due_to_model_physics
tendency_of_liquid_cloud_water_mixing_ratio_due_to_model_physics
tendency_of_lwe_thickness_of_precipitation_amount_for_coupling
tendency_of_lwe_thickness_of_snow_amount_for_coupling
tendency_of_ozone_mixing_ratio_due_to_model_physics
tendency_of_rain_water_mixing_ratio_due_to_microphysics
tendency_of_rain_water_mixing_ratio_due_to_model_physics
tendency_of_snow_water_mixing_ratio_due_to_model_physics
tendency_of_tracers_due_to_model_physics
tendency_of_turbulent_kinetic_energy_due_to_model_physics
tendency_of_vertically_diffused_tracer_concentration

tendency_of_water_friendly_aerosol_number_concentration_due_to_model_physics
tendency_of_water_friendly_aerosols_at_surface
tendency_of_water_vapor_specific_humidity_due_to_deep_convection_for_coupling_on_physics_timestep
tendency_of_water_vapor_specific_humidity_due_to_model_physics
tendency_of_x_wind_due_to_convective_gravity_wave_drag
tendency_of_x_wind_due_to_deep_convection_for_coupling_on_physics_timestep
tendency_of_x_wind_due_to_model_physics
tendency_of_x_wind_due_to_ugwp
tendency_of_y_wind_due_to_convective_gravity_wave_drag
tendency_of_y_wind_due_to_deep_convection_for_coupling_on_physics_timestep
tendency_of_y_wind_due_to_model_physics
tendency_of_y_wind_due_to_ugwp
theta_star
thickness_at_Lagrangian_surface
threshold_for_perturbed_vertical_velocity
threshold_volume_fraction_of_condensed_water_in_soil
time_integral_of_change_in_x_wind_due_to_mountain_blocking_drag
time_integral_of_change_in_x_wind_due_to_nonstationary_gravity_wave
time_integral_of_change_in_x_wind_due_to_orographic_gravity_wave_drag
time_integral_of_change_in_x_wind_due_to_turbulent_orographic_form_drag
time_integral_of_change_in_y_wind_due_to_nonstationary_gravity_wave
time_integral_of_height_of_launch_level_of_orographic_gravity_wave
time_integral_of_height_of_low_level_wave_breaking
time_integral_of_height_of_mountain_blocking
time_integral_of_momentum_flux_due_to_mountain_blocking_drag
time_integral_of_momentum_flux_due_to_nonstationary_gravity_wave
time_integral_of_momentum_flux_due_to_orographic_gravity_wave_drag
time_integral_of_momentum_flux_due_to_turbulent_orographic_form_drag
time_integral_of_x_stress_due_to_gravity_wave_drag
time_integral_of_y_stress_due_to_gravity_wave_drag
time_interval_for_maximum_hourly_fields

time_scale_for_rayleigh_damping
time_since_diagnostics_zeroed
time_step_for_dynamics
time_step_for_physics
time_step_for_radiation
time_step_for_remapping_for_fast_physics
tke_advect
tke_at_mass_points
tke_budget
tke_dissipative_heating_factor
top_layer_index_for_fast_physics
topflw_type
topfsw_type
total_accumulated_snowfall
total_cloud_fraction
total_runoff
tracer_concentration
tracer_concentration_save
tracer_concentration_updated_by_physics
transpiration_flux
triple_point_temperature_of_water
turb_oro_form_drag_flag
turbulent_kinetic_energy
turbulent_kinetic_energy_convective_transport_tracer
u_wind_component_at_viscous_sublayer_top
updraft_fraction_in_boundary_layer_mass_flux_scheme
updraft_velocity_tunable_parameter_1_CS
updraft_velocity_tunable_parameter_2_CS
upper_bound_on_max_albedo_over_deep_snow
upward_heat_flux_in_soil
upward_heat_flux_in_soil_over_ice

upward_heat_flux_in_soil_over_land
upward_heat_flux_in_soil_over_ocean
v_wind_component_at_viscous_sublayer_top
vegetation_area_fraction
vegetation_temperature
vegetation_type_classification
vegetation_type_classification_real
vegetation_type_dataset_choice
vertical_dimension
vertical_dimension_for_cappa_at_Lagrangian_surface
vertical_dimension_for_condensed_water_at_Lagrangian_surface
vertical_dimension_for_fast_physics
vertical_dimension_for_fast_physics_plus_one
vertical_dimension_for_thickness_at_Lagrangian_surface
vertical_dimension_minus_one
vertical_dimension_of_h2o_forcing_data
vertical_dimension_of_ozone_forcing_data
vertical_dimension_plus_one
vertical_index_at_cloud_base
vertical_index_at_cloud_top
vertical_index_at_top_of_atmosphere_boundary_layer
vertical_index_difference_between_inout_and_local
vertical_index_difference_between_layer_and_lower_bound
vertical_index_difference_between_layer_and_upper_bound
vertical_interface_dimension
vertical_sigma_coordinate_for_radiation_initialization
vertical_temperature_average_range_lower_bound
vertical_temperature_average_range_upper_bound
vertical_velocity_for_updraft
vertically_diffused_tracer_concentration
virtual_temperature_at_Lagrangian_surface

volume_fraction_of_condensed_water_in_soil_at_wilting_point
volume_fraction_of_frozen_soil_moisture_for_land_surface_model
volume_fraction_of_soil_moisture
volume_fraction_of_soil_moisture_for_land_surface_model
volume_fraction_of_unfrozen_soil_moisture
volume_fraction_of_unfrozen_soil_moisture_for_land_surface_model
volume_mixing_ratio_ccl4
volume_mixing_ratio_cfc11
volume_mixing_ratio_cfc113
volume_mixing_ratio_cfc12
volume_mixing_ratio_cfc22
volume_mixing_ratio_ch4
volume_mixing_ratio_co
volume_mixing_ratio_co2
volume_mixing_ratio_n2o
volume_mixing_ratio_o2
water_equivalent_accumulated_snow_depth
water_equivalent_accumulated_snow_depth_over_ice
water_equivalent_accumulated_snow_depth_over_land
water_equivalent_accumulated_snow_depth_over_ocean
water_friendly_aerosol_number_concentration
water_friendly_aerosol_number_concentration_updated_by_physics
water_storage_in_aquifer
water_storage_in_aquifer_and_saturated_soil
water_table_depth
water_table_recharge_when_deep
water_table_recharge_when_shallow
water_vapor_mixing_ratio_at_surface
water_vapor_specific_humidity
water_vapor_specific_humidity_at_Lagrangian_surface
water_vapor_specific_humidity_at_layer_for_radiation

water_vapor_specific_humidity_at_lowest_model_layer
water_vapor_specific_humidity_at_lowest_model_layer_for_diag
water_vapor_specific_humidity_at_lowest_model_layer_updated_by_physics
water_vapor_specific_humidity_at_previous_time_step
water_vapor_specific_humidity_save
water_vapor_specific_humidity_two_time_steps_back
water_vapor_specific_humidity_updated_by_physics
weight_for_momentum_at_viscous_sublayer_top
weight_for_potential_temperature_at_viscous_sublayer_top
weight_for_specific_humidity_at_viscous_sublayer_top
weights_for_stochastic_shum_perturbation
weights_for_stochastic_shum_perturbation_flipped
weights_for_stochastic_skeb_perturbation_of_x_wind
weights_for_stochastic_skeb_perturbation_of_x_wind_flipped
weights_for_stochastic_skeb_perturbation_of_y_wind
weights_for_stochastic_skeb_perturbation_of_y_wind_flipped
weights_for_stochastic_sppt_perturbation
weights_for_stochastic_sppt_perturbation_flipped
weights_for_stochastic_surface_physics_perturbation
wind_speed_at_lowest_model_layer
wood_mass
x_momentum_tendency_from_blocking_drag
x_momentum_tendency_from_form_drag
x_momentum_tendency_from_large_scale_gwd
x_momentum_tendency_from_small_scale_gwd
x_wind
x_wind_at_10m
x_wind_at_lowest_model_layer
x_wind_at_lowest_model_layer_for_diag
x_wind_at_lowest_model_layer_updated_by_physics
x_wind_save

x_wind_updated_by_physics
y_momentum_tendency_from_blocking_drag
y_momentum_tendency_from_form_drag
y_momentum_tendency_from_large_scale_gwd
y_momentum_tendency_from_small_scale_gwd
y_wind
y_wind_at_10m
y_wind_at_lowest_model_layer
y_wind_at_lowest_model_layer_for_diag
y_wind_at_lowest_model_layer_updated_by_physics
y_wind_save
y_wind_updated_by_physics
zenith_angle_temporal_adjustment_factor_for_shortwave_fluxes

1.2 Description of variables

CCPP_interstitial_type

long_name	definition of type CCPP_interstitial_type
units	DDT
rank	0
type	CCPP_interstitial_type
kind	
source	MODULE CCPP_typedefs
local_name	CCPP_interstitial_type
requested	NOT REQUESTED
physics set	

CCPP_interstitial_type_instance

long_name	instance of derived type CCPP_interstitial_type
units	DDT
rank	0
type	CCPP_interstitial_type
kind	
source	MODULE CCPP_data
local_name	CCPP_interstitial
requested	NOT REQUESTED
physics set	

GFS_cldprop_type

long_name	definition of type GFS_cldprop_type
units	DDT
rank	0
type	GFS_cldprop_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_cldprop_type
requested	NOT REQUESTED
physics set	

GFS_cldprop_type_instance

long_name	cloud fields needed by radiation from physics
units	DDT
rank	0
type	GFS_cldprop_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Cldprop
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run
physics set	slow_physics

GFS_control_type

long_name	definition of type GFS_control_type
units	DDT
rank	0
type	GFS_control_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_control_type
requested	NOT REQUESTED
physics set	

GFS_control_type_instance

long_name	instance of derived type GFS_control_type
units	DDT
rank	0
type	GFS_control_type
kind	
source	MODULE CCPP_data
local_name	GFS_Control
requested	GFS_abort_run GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_phys_reset_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
physics set	slow_physics

GFS_coupling_type

long_name	definition of type GFS_coupling_type
units	DDT
rank	0
type	GFS_coupling_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_coupling_type
requested	NOT REQUESTED
physics set	

GFS_coupling_type_instance

long_name	fields to/from coupling with other components (land/ice/ocean)
units	DDT
rank	0
type	GFS_coupling_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Coupling
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

GFS_data_type

long_name	definition of type GFS_data_type
units	DDT
rank	0
type	GFS_data_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_data_type
requested	NOT REQUESTED
physics set	

GFS_data_type_instance

long_name	instance of derived type GFS_data_type
units	DDT
rank	0
type	GFS_data_type
kind	
source	MODULE CCPP_data
local_name	GFS_Data(cdata%blk_no)
requested	NOT REQUESTED
physics set	

GFS_data_type_instance_all_blocks

long_name	instance of derived type GFS_data_type
units	DDT
rank	1
type	GFS_data_type
kind	
source	MODULE CCPP_data
local_name	GFS_Data
requested	GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run
physics set	slow_physics

GFS_diag_type

long_name	definition of type GFS_diag_type
units	DDT
rank	0
type	GFS_diag_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_diag_type
requested	NOT REQUESTED
physics set	

GFS_diag_type_instance

long_name	fields targeted for diagnostic output
units	DDT
rank	0
type	GFS_diag_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Intdiag
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run rrtmg_sw_post_run
physics set	slow_physics

GFS_grid_type

long_name	definition of type GFS_grid_type
units	DDT
rank	0
type	GFS_grid_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_grid_type
requested	NOT REQUESTED
physics set	

GFS_grid_type_instance

long_name	grid and interpolation related data
units	DDT
rank	0
type	GFS_grid_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Grid
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
physics set	slow_physics

GFS_interstitial_type

long_name	definition of type GFS_interstitial_type
units	DDT
rank	0
type	GFS_interstitial_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_interstitial_type
requested	NOT REQUESTED
physics set	

GFS_interstitial_type_instance

long_name	instance of derived type GFS_interstitial_type
units	DDT
rank	0
type	GFS_interstitial_type
kind	
source	MODULE CCPP_data
local_name	GFS_Interstitial(cdata%thrd_no)
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run
physics set	slow_physics

GFS_interstitial_type_instance_all_threads

long_name	instance of derived type GFS_interstitial_type
units	DDT
rank	1
type	GFS_interstitial_type
kind	
source	MODULE CCPP_data
local_name	GFS_Interstitial
requested	GFS_phys_time_vary_init
physics set	slow_physics

GFS_radtend_type

long_name	definition of type GFS_radtend_type
units	DDT
rank	0
type	GFS_radtend_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_radtend_type
requested	NOT REQUESTED
physics set	

GFS_radtend_type_instance

long_name	radiation tendencies needed in physics
units	DDT
rank	0
type	GFS_radtend_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Radtend
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
physics set	slow_physics

GFS_sfcprop_type

long_name	definition of type GFS_sfcprop_type
units	DDT
rank	0
type	GFS_sfcprop_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_sfcprop_type
requested	NOT REQUESTED
physics set	

GFS_sfcprop_type_instance

long_name	surface fields
units	DDT
rank	0
type	GFS_sfcprop_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run rrtmg_lw_pre_run rrtmg_sw_pre_run
physics set	slow_physics

GFS_statein_type

long_name	definition of type GFS_statein_type
units	DDT
rank	0
type	GFS_statein_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_statein_type
requested	NOT REQUESTED
physics set	

GFS_statein_type_instance

long_name	prognostic state data in from dycore
units	DDT
rank	0
type	GFS_statein_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Statein
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

GFS_stateout_type

long_name	definition of type GFS_stateout_type
units	DDT
rank	0
type	GFS_stateout_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_stateout_type
requested	NOT REQUESTED
physics set	

GFS_stateout_type_instance

long_name	prognostic state or tendencies return to dycore
units	DDT
rank	0
type	GFS_stateout_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Stateout
requested	NOT REQUESTED
physics set	

GFS_tbd_type

long_name	definition of type GFS_tbd_type
units	DDT
rank	0
type	GFS_tbd_type
kind	
source	MODULE GFS_typedefs
local_name	GFS_tbd_type
requested	NOT REQUESTED
physics set	

GFS_tbd_type_instance

long_name	to be determined data that doesn't fit in any one container
units	DDT
rank	0
type	GFS_tbd_type
kind	
source	MODULE GFS_typedefs TYPE GFS_data_type
local_name	GFS_Data(cdata%blk_no)%Tbd
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_rrtmg_pre_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat

long_name	Monin-Obukhov similarity function for heat
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%ffhh
requested	GFS_surface_composites_post_run hedmf_run moninshoc_run myjsfc_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

Monin-Obukhov_similarity_function_for_heat_at_2m

long_name	Monin-Obukhov similarity parameter for heat at 2m
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fh2
requested	GFS_surface_composites_post_run myjsfc_wrapper_run mynnsfc_wrapper_run sfc_diag_run
physics set	slow_physics

Monin-Obukhov_similarity_function_for_heat_at_2m_over_ice

long_name	Monin-Obukhov similarity parameter for heat at 2m over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fh2_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat_at_2m_over_land

long_name	Monin-Obukhov similarity parameter for heat at 2m over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fh2_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat_at_2m_over_ocean

long_name	Monin-Obukhov similarity parameter for heat at 2m over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fh2_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat_over_ice

long_name	Monin-Obukhov similarity function for heat over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffhh_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat_over_land

long_name	Monin-Obukhov similarity function for heat over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffhh_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_heat_over_ocean

long_name	Monin-Obukhov similarity function for heat over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffhh_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum

long_name	Monin-Obukhov similarity function for momentum
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%ffmm
requested	GFS_surface_composites_post_run hedmf_run moninshoc_run myjsfc_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_at_10m

long_name	Monin-Obukhov similarity parameter for momentum at 10m
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fm10
requested	GFS_surface_composites_post_run myjsfc_wrapper_run mynnsfc_wrapper_run sfc_diag_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_at_10m_over_ice

long_name	Monin-Obukhov similarity parameter for momentum at 10m over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fm10_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_at_10m_over_land

long_name	Monin-Obukhov similarity parameter for momentum at 10m over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fm10_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_at_10m_over_ocean

long_name	Monin-Obukhov similarity parameter for momentum at 10m over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fm10_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_over_ice

long_name	Monin-Obukhov similarity function for momentum over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffmm_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_over_land

long_name	Monin-Obukhov similarity function for momentum over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffmm_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

Monin_Obukhov_similarity_function_for_momentum_over_ocean

long_name	Monin-Obukhov similarity function for momentum over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ffmm_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

a_parameter_of_the_hybrid_coordinate

long_name	a parameter for sigma pressure level calculations
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ak
requested	cires_ugwp_init
physics set	slow_physics

accumulated_lwe_thickness_of_convective_precipitation_amount_cnvc90

long_name	accumulated convective rainfall amount for cnvc90 only
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%acv
requested	cnvc90_run
physics set	slow_physics

accumulated_lwe_thickness_of_graupel_amount

long_name accumulated graupel precipitation
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totgrp
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_graupel_amount_in_bucket

long_name accumulated graupel precipitation in bucket
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totgrpb
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_ice_amount

long_name accumulated ice precipitation
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totice
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_ice_amount_in_bucket

long_name accumulated ice precipitation in bucket
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%toticeb
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_precipitation_amount

long_name accumulated total precipitation
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totprcp
requested GFS_MP_generic_post_run
GFS_stochastics_run
physics set slow_physics

accumulated_lwe_thickness_of_precipitation_amount_in_bucket

long_name accumulated total precipitation in bucket
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totprcpb
requested GFS_MP_generic_post_run
GFS_stochastics_run
physics set slow_physics

accumulated_lwe_thickness_of_snow_amount

long_name accumulated snow precipitation
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totsnw
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_lwe_thickness_of_snow_amount_in_bucket

long_name accumulated snow precipitation in bucket
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%totsnwb
requested GFS_MP_generic_post_run
physics set slow_physics

accumulated_water_equivalent_of_frozen_precip

long_name snow water equivalent of run-total frozen precip
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%acsnow
requested NOT REQUESTED
physics set

adjusted_vertical_layer_dimension_for_radiation

long_name	adjusted number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%lmk
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

adjusted_vertical_level_dimension_for_radiation

long_name	adjusted number of vertical levels for radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%lmp
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

aerosol_asymmetry_parameter_for_longwave_bands_01_16

long_name aerosol asymmetry parameter for longwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faerlw(:,:,:,3)
requested GFS_rrtmg_pre_run
physics set slow_physics

aerosol_asymmetry_parameter_for_shortwave_bands_01_16

long_name aerosol asymmetry parameter for shortwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faersw(:,:,:,3)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

aerosol_aware_parameter_deep_convection

long_name aerosol-aware parameter inversely proportional to CCN number concentraion from Lim (2011) for deep conv.
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%asolfac_deep
requested samfdeepcnv_run
physics set slow_physics

aerosol_aware_parameter_shallow_convection

long_name	aerosol-aware parameter inversely proportional to CCN number concentraion from Lim (2011) for shal conv.
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%asolfac_shal
requested	samfshalcnv_run
physics set	slow_physics

aerosol_number_concentration_from_gocart_aerosol_climatology

long_name	GOCART aerosol climatology number concentration
units	kg-1?
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%aer_nm
requested	NOT REQUESTED
physics set	

aerosol_optical_depth_for_longwave_bands_01_16

long_name	aerosol optical depth for longwave bands 01-16
units	none
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%faerlw(:,:,:,1)
requested	GFS_rrtmg_pre_run rrtmg_lw_run
physics set	slow_physics

aerosol_optical_depth_for_shortwave_bands_01_16

long_name aerosol optical depth for shortwave bands 01-16
units none
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faersw(:, :, :, 1)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

aerosol_optical_properties_for_longwave_bands_01_16

long_name aerosol optical properties for longwave bands 01-16
units various
rank 4
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faerlw
requested GFS_rrtmg_setup_init
physics set slow_physics

aerosol_optical_properties_for_shortwave_bands_01_16

long_name aerosol optical properties for shortwave bands 01-16
units various
rank 4
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faersw
requested GFS_rrtmg_setup_init
physics set slow_physics

aerosol_single_scattering_albedo_for_longwave_bands_01_16

long_name aerosol single scattering albedo for longwave bands 01-16
units frac
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faerlw(:, :, :, 2)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
physics set slow_physics

aerosol_single_scattering_albedo_for_shortwave_bands_01_16

long_name aerosol single scattering albedo for shortwave bands 01-16
units frac
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%faersw(:, :, :, 2)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
physics set slow_physics

air_pressure

long_name	mean layer pressure
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prsl
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cires_ugwp_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run drag_suite_run gfdl_cloud_microphys_run gwdc_run gwdps_run h2ophys_run hedmf_run m_micro_run moninshoc_run mp_thompson_pre_run mp_thompson_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run ozphys_2015_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run shoc_run

air_pressure_at_interface

long_name	air pressure at model layer interfaces
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prsi
requested	GFS_MP_generic_post_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cires_ugwp_run cnvc90_run cs_conv_aw_adj_run cs_conv_run cu_ntiedtke_run drag_suite_run get_prs_fv3_run gwdc_run gwdps_run hedmf_run m_micro_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

air_pressure_at_interface_for_radiation_in_hPa

long_name air pressure at vertical interface for radiation calculation
units hPa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%plvl
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_pressure_at_layer_for_radiation_in_hPa

long_name air pressure at vertical layer for radiation calculation
units hPa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%plyr
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_pressure_at_lowest_model_layer

long_name	mean pressure at lowest model layer
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prsl(:,1)
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_cice_run sfc_diff_run sfc_nst_run sfc_ocean_run sfc_sice_run
physics set	slow_physics

air_pressure_difference_between_midlayers

long_name	air pressure difference between midlayers
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%del
requested	GFS_MP_generic_post_run cires_ugwp_run drag_suite_run get_prs_fv3_run gfdl_cloud_microphys_run gwdc_pre_run gwdc_run gwdps_run hedmf_run moninshoc_run ozphys_2015_run ozphys_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run zhaocarr_precpd_run
physics set	slow_physics

air_temperature

long_name	model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%tgrs
requested	GFS_stochastics_run GFS_suite_interstitial_2_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cires_ugwp_run cu_gf_driver_pre_run cu_gf_driver_run cu_ntiedtke_pre_run drag_suite_run get_prs_fv3_run gwdc_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnrad_pre_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

air_temperature_at_interface_for_radiation

long_name air temperature at vertical interface for radiation calculation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%tlvl
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_temperature_at_layer_for_radiation

long_name air temperature at vertical layer for radiation calculation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%tlyr
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

air_temperature_at_lowest_model_layer

long_name	mean temperature at lowest model layer
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%tgrs(:,1)
requested	GFS_surface_generic_post_run dcyc2t3_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_cice_run sfc_diff_run sfc_nst_run sfc_ocean_run sfc_sice_run
physics set	slow_physics

air_temperature_at_lowest_model_layer_for_diag

long_name	layer 1 temperature for diag
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%t1
requested	GFS_PBL_generic_post_run GFS_surface_generic_post_run
physics set	slow_physics

air_temperature_at_lowest_model_layer_updated_by_physics

long_name	temperature at lowest model layer updated by physics
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gt0(:,1)
requested	sfc_diag_run
physics set	slow_physics

air_temperature_at_previous_time_step

long_name	air temperature at previous time step
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, 3)
requested	NOT REQUESTED
physics set	

air_temperature_lapse_rate_constant

long_name	environmental air temperature lapse rate constant
units	K m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	rlapse
requested	sfc_nst_post_run
physics set	slow_physics

air_temperature_save

```
long_name    air temperature before entering a physics scheme
units        K
rank         2
type         real
kind         kind_phys
source       MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name   GFS_Interstitial(cdata%thrd_no)%save_t
requested    GFS_DCNV_generic_post_run
              GFS_DCNV_generic_pre_run
              GFS_MP_generic_post_run
              GFS_MP_generic_pre_run
              GFS_SCNV_generic_post_run
              GFS_SCNV_generic_pre_run
              cs_conv_aw_adj_run
              gwdc_pre_run
              mp_thompson_post_run
              mp_thompson_pre_run
physics set  slow_physics
```

air_temperature_two_time_steps_back

```
long_name    air temperature two time steps back
units        K
rank         2
type         real
kind         kind_phys
source       MODULE GFS_typedefs TYPE GFS_tbd_type
local_name   GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, 1)
requested    NOT REQUESTED
physics set
```

air_temperature_updated_by_physics

long_name	temperature updated by physics
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gt0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cs_conv_aw_adj_run cs_conv_run cu_gf_driver_post_run cu_gf_driver_run cu_ntiedtke_post_run cu_ntiedtke_run get_phi_fv3_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run m_micro_pre_run m_micro_run maximum_hourly_diagnostics_run mp_thompson_post_run mp_thompson_pre_run mp_thompson_run ozphys_2015_run ozphys_run samfdeepcnv_run samfshalcnv_run shoc_run zhaocarr_gscnd_run

angle_from_east_of_maximum_subgrid_orographic_variations

long_name	angle with_respect to east of maximum subgrid orographic variations
units	degrees
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%theta
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

anisotropy_of_subgrid_orography

long_name	anisotropy of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gamma
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

area_fraction_of_wet_canopy

long_name	area fraction of canopy that is wetted/snowed
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%fwetxy
requested	NOT REQUESTED
physics set	

array_dimension_of_2d_arrays_for_microphysics

long_name	number of 2D arrays needed for microphysics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%num_p2d
requested	GFS_rrtmg_setup_init
physics set	slow_physics

array_dimension_of_3d_arrays_for_microphysics

long_name	number of 3D arrays needed for microphysics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%num_p3d
requested	GFS_DCNV_generic_post_run GFS_SCNV_generic_post_run GFS_rrtmg_setup_init
physics set	slow_physics

array_dimension_of_random_number

long_name	second dimension of random number stream for RAS
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nrcm
requested	GFS_MP_generic_post_run
physics set	slow_physics

asymmetry_of_subgrid_orography

long_name	asymmetry of subgrid orography
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%oa4
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

atmosphere_boundary_layer_thickness

long_name	pbl height
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%hpbl
requested	cu_gf_driver_run drag_suite_run hedmf_run m_micro_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

atmosphere_diffusivity_coefficient_factor

long_name multiplicative constant for atmospheric diffusivities
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%moninq_fac
requested hedmf_init
hedmf_run
physics set slow_physics

atmosphere_energy_content_at_Lagrangian_surface

long_name atmosphere total energy at Lagrangian surface
units J m-2
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%te0
requested fv_sat_adj_run
physics set fast_physics

atmosphere_energy_content_in_column

long_name atmosphere total energy in columns
units J m-2
rank 2
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%te0_2d
requested fv_sat_adj_run
physics set fast_physics

atmosphere_heat_diffusivity

long_name diffusivity for heat
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dkt
requested GFS_PBL_generic_post_run
 hedmf_run
 moninshoc_run
 myjpbl_wrapper_run
physics set slow_physics

atmosphere_heat_diffusivity_background

long_name background vertical diffusion for heat q
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%zkzm_h
requested hedmf_run
 moninshoc_run
 myjpbl_wrapper_run
 satmedmfvdif_run
 satmedmfvdifq_run
physics set slow_physics

atmosphere_heat_diffusivity_background_maximum

long_name maximum background value of heat diffusivity
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%*xkzminv*
requested hedmf_run
 moninshoc_run
physics set slow_physics

atmosphere_heat_diffusivity_for_mynnpbl

long_name diffusivity for heat for MYNN PBL (defined for all mass levels)
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(*cdata%blk_no*)%Intdiag%*exch_h*
requested NOT REQUESTED
physics set

atmosphere_heat_diffusivity_from_shoc

long_name diffusivity for heat from the SHOC scheme
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(*cdata%blk_no*)%Tbd%*phy_f3d(:, :, GFS_Control%nahdshoc)*
requested NOT REQUESTED
physics set

atmosphere_momentum_diffusivity_background

long_name background vertical diffusion for momentum
units m2 s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%zkzm_m
requested hedmf_run
moninshoc_run
myjpbl_wrapper_run
satmedmfvdif_run
satmedmfvdifq_run
physics set slow_physics

atmosphere_momentum_diffusivity_for_mynnpbl

long_name diffusivity for momentum for MYNN PBL (defined for all mass levels)
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%exch_m
requested NOT REQUESTED
physics set

atmosphere_optical_thickness_due_to_ambient_aerosol_particles

long_name	vertical integrated optical depth for various aerosol species
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%aerodp
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init
physics set	slow_physics

b_parameter_of_the_hybrid_coordinate

long_name	b parameter for sigma pressure level calculations
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bk
requested	cires_ugwp_init
physics set	slow_physics

baseline_surface_roughness_length

long_name	baseline surface roughness length for momentum in meter
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_z0base
requested	NOT REQUESTED
physics set	

bounded_vegetation_area_fraction

long_name	areal fractional cover of green vegetation bounded on the bottom
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sigmaf
requested	GFS_surface_generic_pre_run
	lsm_noah_run
	noahmpdrv_run
	sfc_diff_run
physics set	slow_physics

bulk_richardson_number_at_lowest_model_level

long_name	bulk Richardson number at the surface
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rb
requested	GFS_surface_composites_post_run drag_suite_run hedmf_run moninshoc_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

bulk_richardson_number_at_lowest_model_level_over_ice

long_name	bulk Richardson number at the surface over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rb_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

bulk_richardson_number_at_lowest_model_level_over_land

long_name	bulk Richardson number at the surface over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rb_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

bulk_richardson_number_at_lowest_model_level_over_ocean

long_name	bulk Richardson number at the surface over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rb_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

canopy_air_temperature

long_name canopy air temperature
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%tahxy
requested NOT REQUESTED
physics set

canopy_air_vapor_pressure

long_name canopy air vapor pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%eahxy
requested NOT REQUESTED
physics set

canopy_intercepted_ice_mass

long_name canopy intercepted ice mass
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%canicexy
requested NOT REQUESTED
physics set

canopy_intercepted_liquid_water

long_name	canopy intercepted liquid water
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%canliqxy
requested	NOT REQUESTED
physics set	

canopy_upward_latent_heat_flux

long_name	canopy upward latent heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%evcw
requested	GFS_surface_generic_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
physics set	slow_physics

canopy_water_amount

long_name canopy water amount
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%canopy
requested lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

cappa_moist_gas_constant_at_Lagrangian_surface

long_name cappa(i,j,k) = rdgas / (rdgas + cvm(i)/(1.+r_vir*q(i,j,k,sphum)))
units none
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%cappa
requested fv_sat_adj_run
physics set fast_physics

ccn_number_concentration

long_name CCN number concentration
units kg-1?
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%ccn_nm
requested NOT REQUESTED
physics set

ccpp_block_number

long_name	number of block for explicit data blocking in CCPP
units	index
rank	0
type	integer
kind	
source	MODULE ccpp_types TYPE ccpp_t
local_name	cdata%blk_no
requested	NOT REQUESTED
physics set	

ccpp_error_flag

long_name	error flag for error handling in CCpp
units	flag
rank	0
type	integer
kind	
source	MODULE ccpp_types TYPE ccpp_t
local_name	cdata%errflg
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_abort_run GFS_checkland_run GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_finalize GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_finalize GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_stochastics_run GFS_suite_ini_fini_test_finalize GFS_suite_ini_fini_test_init GFS_suite_ini_fini_test_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run

ccpp_error_message

long_name	error message for error handling in CCpp
units	none
rank	0
type	character
kind	len=512
source	MODULE ccpp_types TYPE ccpp_t
local_name	cdata%errmsg
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_abort_run GFS_checkland_run GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_finalize GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_finalize GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_stochastics_run GFS_suite_ini_fini_test_finalize GFS_suite_ini_fini_test_init GFS_suite_ini_fini_test_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run

ccpp_loop_counter

long_name	loop counter for subcyclng loops in CCpp
units	index
rank	0
type	integer
kind	
source	MODULE ccpp_types TYPE ccpp_t
local_name	cdata%loop_cnt
requested	GFS_checkland_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run lsm_ruc_run myjsfc_wrapper_run mynnsfc_wrapper_run
physics set	slow_physics

ccpp_t

long_name	definition of type ccpp_t
units	DDT
rank	0
type	ccpp_t
kind	
source	MODULE ccpp_types
local_name	ccpp_t
requested	NOT REQUESTED
physics set	

ccpp_t_instance

long_name	instance of derived data type ccpp_t
units	DDT
rank	0
type	ccpp_t
kind	
source	MODULE CCPP_data
local_name	cdata
requested	NOT REQUESTED
physics set	

ccpp_thread_number

long_name	number of thread for threading in CCPP
units	index
rank	0
type	integer
kind	
source	MODULE ccpp_types TYPE ccpp_t
local_name	cdata%thrd_no
requested	NOT REQUESTED
physics set	

cell_area

long_name	area of the grid cell
units	m2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%area
requested	GFS_suite_interstitial_1_run cires_ugwp_run cu_gf_driver_run gfdl_cloud_microphys_run mp_thompson_pre_run myjpbl_wrapper_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

cell_area_for_fast_physics

long_name	area of the grid cell for fast physics
units	m2
rank	2
type	real
kind	kind_grid
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%area
requested	fv_sat_adj_run
physics set	fast_physics

cell_size

long_name	relative dx for the grid cell
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%dx
requested	NOT REQUESTED
physics set	

cellular_automata_finer_grid

long_name	cellular automata finer grid
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ncells
requested	NOT REQUESTED
physics set	

cellular_automata_lifetime

long_name	cellular automata lifetime
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nlives
requested	NOT REQUESTED
physics set	

cellular_automata_seed_frequency

long_name	cellular automata seed frequency in units of time steps
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nseed
requested	NOT REQUESTED
physics set	

cellular_automata_seed_probability

long_name	cellular automata seed probability
units	fraction
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nfracseed
requested	NOT REQUESTED
physics set	

characteristic_grid_length_scale

long_name	representative horizontal length scale of grid box
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dlength
requested	NOT REQUESTED
physics set	

choice_of_original_scale_aware_TKE_moist_EDMF_PBL

long_name choice of original scale-aware TKE moist EDMF PBL scheme
units none
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%isatmedmf_vdif
requested NOT REQUESTED
physics set

choice_of_scale_aware_TKE_moist_EDMF_PBL

long_name choice of scale-aware TKE moist EDMF PBL scheme
units none
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%isatmedmf
requested NOT REQUESTED
physics set

choice_of_updated_scale_aware_TKE_moist_EDMF_PBL

long_name choice of updated scale-aware TKE moist EDMF PBL scheme
units none
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%isatmedmf_vdifq
requested NOT REQUESTED
physics set

cloud_area_fraction

long_name fraction of grid box area in which updrafts occur
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cldf
requested NOT REQUESTED
physics set

cloud_area_fraction_for_radiation

long_name fraction of clouds for low, middle, high, total and BL
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cldsa
requested GFS_rrtmg_post_run
 GFS_rrtmg_pre_run
physics set slow_physics

cloud_base_mass_flux

long_name cloud base mass flux for CS convection
units kg m⁻² s⁻¹
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_fctd
requested NOT REQUESTED
physics set

cloud_condensed_water_conversion_threshold

long_name	water and ice minimum threshold for Zhao
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%wminco
requested	NOT REQUESTED
physics set	

cloud_condensed_water_mixing_ratio

long_name	moist (dry+vapor, no condensates) mixing ratio of cloud water (condensate)
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntcw)
requested	GFS_suite_interstitial_2_run mynnedmf_wrapper_run mynnrad_post_run mynnrad_pre_run mynnsfc_wrapper_run
physics set	slow_physics

cloud_condensed_water_mixing_ratio_at_lowest_model_layer

long_name moist (dry+vapor, no condensates) mixing ratio of cloud water at lowest model layer
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:,1,GFS_Control%ntcw)
requested NOT REQUESTED
physics set

cloud_condensed_water_mixing_ratio_at_surface

long_name moist cloud water mixing ratio at surface
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%clw_surf
requested NOT REQUESTED
physics set

cloud_condensed_water_mixing_ratio_convective_transport_tracer

long_name moist (dry+vapor, no condensates) mixing ratio of cloud water (condensate) in the convectively transported tracer a
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%clw(:, :, 2)
requested GFS_DCNV_generic_post_run
cs_conv_pre_run
cu_gf_driver_run
m_micro_pre_run
m_micro_run
shoc_run
zhaocarr_gscond_run
physics set slow_physics

cloud_condensed_water_mixing_ratio_save

long_name moist (dry+vapor, no condensates) mixing ratio of cloud water (condensate) before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%save_q(:, :, GFS_Control%ntcw)
requested GFS_suite_interstitial_3_run
GFS_suite_interstitial_4_run
cs_conv_pre_run
mynnrad_post_run
mynnrad_pre_run
physics set slow_physics

cloud_condensed_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of cloud condensed water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntcw)
requested gfdl_cloud_microphys_run
m_micro_pre_run
m_micro_run
mp_thompson_pre_run
mp_thompson_run
shoc_run
zhaocarr_gscond_run
zhaocarr_precpd_run
physics set slow_physics

cloud_condensed_water_specific_humidity_at_Lagrangian_surface

long_name cloud condensed water specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%q_con
requested fv_sat_adj_run
physics set fast_physics

cloud_decorrelation_length

long_name	cloud decorrelation length
units	km
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%de_lgth
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

cloud_droplet_number_concentration

long_name	number concentration of cloud droplets (liquid)
units	kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntlnc)
requested	NOT REQUESTED
physics set	

cloud_droplet_number_concentration_updated_by_physics

long_name number concentration of cloud droplets updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntlnc)
requested NOT REQUESTED
physics set

cloud_fraction_at_Lagrangian_surface

long_name cloud fraction at Lagrangian surface
units none
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%qc
requested fv_sat_adj_run
physics set fast_physics

cloud_fraction_for_MG

long_name cloud fraction used by Morrison-Gettelman MP
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%indcld)
requested NOT REQUESTED
physics set

cloud_fraction_updated_by_physics

long_name cloud fraction updated by physics
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntclamt)
requested gfdl_cloud_microphys_run
physics set slow_physics

cloud_graupel_specific_humidity_at_Lagrangian_surface

long_name cloud graupel specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%qg
requested fv_sat_adj_run
physics set fast_physics

cloud_ice_specific_humidity_at_Lagrangian_surface

long_name cloud ice specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%qi
requested fv_sat_adj_run
physics set fast_physics

cloud_ice_water_path

long_name layer cloud ice water path
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 4)
requested GFS_rrtmg_pre_run
mynnrad_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

cloud_liquid_water_path

long_name layer cloud liquid water path
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 2)
requested GFS_rrtmg_pre_run
mynnrad_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

cloud_liquid_water_specific_humidity_at_Lagrangian_surface

long_name	cloud liquid water specific humidity updated by fast physics at Lagrangian surface
units	kg kg-1
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%ql
requested	fv_sat_adj_run
physics set	fast_physics

cloud_optical_depth_layers_at_0p55mu_band

long_name	approx .55mu band layer cloud optical depth
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cldtausw
requested	GFS_rrtmg_post_run rrtmg_sw_run
physics set	slow_physics

cloud_optical_depth_layers_at_10mu_band

long_name	approx 10mu band layer cloud optical depth
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cldtaulw
requested	GFS_rrtmg_post_run rrtmg_lw_run
physics set	slow_physics

cloud_phase_transition_denominator

long_name denominator in cloud phase transition = $1/(tcr-tf)$
units K-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%tcrf
requested NOT REQUESTED
physics set

cloud_phase_transition_threshold_temperature

long_name threshold temperature below which cloud starts to freeze
units K
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%tcr
requested NOT REQUESTED
physics set

cloud_rain_specific_humidity_at_Lagrangian_surface

long_name cloud rain specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%qr
requested fv_sat_adj_run
physics set fast_physics

cloud_rain_water_path

long_name	cloud rain water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 6)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

cloud_snow_specific_humidity_at_Lagrangian_surface

long_name	cloud snow specific humidity updated by fast physics at Lagrangian surface
units	kg kg-1
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%qs
requested	fv_sat_adj_run
physics set	fast_physics

cloud_snow_water_path

long_name	cloud snow water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

cloud_specie_mix_flag

long_name	flag to activate mixing of cloud species
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bl_mynn_cloudmix
requested	NOT REQUESTED
physics set	

cloud_top_entrainment_instability_value

long_name	cloud top entrainment instability value
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ctei_r
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

cloud_work_function

long_name	cloud work function
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cld1d
requested	GFS_DCNV_generic_post_run cu_gf_driver_run samfdeepcnv_run
physics set	slow_physics

cloudpdf

long_name	flag to determine which cloud PDF to use
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bl_mynn_cloudpdf
requested	NOT REQUESTED
physics set	

cmpfsw_type

long_name	definition of type cmpfsw_type
units	DDT
rank	0
type	cmpfsw_type
kind	
source	MODULE module_radsw_parameters
local_name	cmpfsw_type
requested	NOT REQUESTED
physics set	

coefficient_c_0

long_name	coefficient 1 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%c_0
requested	sfc_nst_run
physics set	slow_physics

coefficient_c_d

long_name	coefficient 2 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%c_d
requested	sfc_nst_run
physics set	slow_physics

`coefficient_for_evaporation_of_rainfall`

long_name coeff for evaporation of largescale rain
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%evpc0
requested NOT REQUESTED
physics set

`coefficient_from_cloud_ice_to_snow`

long_name auto conversion coeff from ice to snow
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%psautco
requested NOT REQUESTED
physics set

`coefficient_from_cloud_water_to_rain`

long_name auto conversion coeff from cloud to rain
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%prautco
requested NOT REQUESTED
physics set

coefficient_w_0

long_name	coefficient 3 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%w_0
requested	sfc_nst_run
physics set	slow_physics

coefficient_w_d

long_name	coefficient 4 to calculate $d(T_z)/d(T_s)$
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%w_d
requested	sfc_nst_run
physics set	slow_physics

coefficients_for_aerosol_scavenging

long_name	array of aerosol scavenging coefficients
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%fscav
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

column_precipitable_water

long_name	precipitable water
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%pwat
requested	GFS_MP_generic_post_run
physics set	slow_physics

components_of_surface_downward_shortwave_fluxes

long_name	derived type for special components of surface downward shortwave fluxes
units	W m-2
rank	1
type	cmpfsw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%scmpsw
requested	GFS_rrtmg_post_run rrtmg_sw_post_run rrtmg_sw_run
physics set	slow_physics

conv_activity_counter

long_name	convective activity memory
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%cactiv
requested	NOT REQUESTED
physics set	

convective_available_potential_energy_for_coupling

long_name	convective available potential energy for coupling
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%cape
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

convective_cloud_cover

long_name convective cloud cover
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cnvc
requested GFS_DCNV_generic_post_run
GFS_SCNV_generic_post_run
cu_gf_driver_run
cu_ntiedtke_run
m_micro_pre_run
samfdeepcnv_run
samfshalcnv_run
physics set slow_physics

convective_cloud_cover_in_phy_f3d

long_name convective cloud cover in the phy_f3d array
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%ncnvc)
requested GFS_DCNV_generic_post_run
GFS_SCNV_generic_post_run
physics set slow_physics

convective_cloud_fraction_for_microphysics

long_name	convective cloud fraction for microphysics
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cf_upi
requested	cs_conv_run m_micro_pre_run m_micro_run samfdeepcnv_run
physics set	slow_physics

convective_cloud_switch

long_name	index used by cnvc90 (for convective clouds)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%clstp
requested	cnvc90_run
physics set	slow_physics

convective_cloud_volume_fraction

long_name	convective cloud volume fraction
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clcn
requested	cs_conv_run m_micro_pre_run m_micro_run samfdeepcnv_run
physics set	slow_physics

convective_cloud_water_mixing_ratio

long_name	moist convective cloud water mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cnvw
requested	GFS_DCNV_generic_post_run GFS_SCNV_generic_post_run cu_gf_driver_run cu_ntiedtke_run m_micro_pre_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

convective_cloud_water_mixing_ratio_in_phy_f3d

long_name convective cloud water mixing ratio in the phy_f3d array
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%ncnvw)
requested GFS_DCNV_generic_post_run
GFS_SCNV_generic_post_run
physics set slow_physics

convective_precipitation_rate_from_previous_timestep

long_name convective precipitation rate from previous timestep
units mm s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%draincprv
requested GFS_MP_generic_post_run
noahmpdrv_run
physics set slow_physics

convective_transportable_tracers

long_name	array to contain cloud water and other convective trans.	tracers
units	kg kg-1	
rank	3	
type	real	
kind	kind_phys	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type	
local_name	GFS_Interstitial(cdata%thrd_no)%clw	
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run cs_conv_run cu_ntiedtke_run samfdeepcnv_run samfshalcnv_run	
physics set	slow_physics	

convective_updraft_area_fraction

long_name	convective updraft area fraction	
units	frac	
rank	2	
type	real	
kind	kind_phys	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type	
local_name	GFS_Interstitial(cdata%thrd_no)%sigmafrac	
requested	NOT REQUESTED	
physics set		

convective_updraft_area_fraction_at_model_interfaces

long_name	convective updraft area fraction at model interfaces
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sigmatot
requested	NOT REQUESTED
physics set	

convexity_of_subgrid_orography

long_name	convexity of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%oc
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

cosine_of_latitude

long_name	cosine of latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%coslat
requested	cires_ugwp_run dcyc2t3_run
physics set	slow_physics

cosine_of_solar_declination_angle

long_name	cos of the solar declination angle
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

cosine_of_zenith_angle

long_name	mean cos of zenith angle over rad call period
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%coszen
requested	dcyc2t3_run rrtmg_sw_run
physics set	slow_physics

countergradient_mixing_term_for_temperature

long_name	countergradient mixing term for temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gamt
requested	hedmf_run myjpbl_wrapper_run
physics set	slow_physics

countergradient_mixing_term_for_water_vapor

long_name	countergradient mixing term for water vapor
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gamq
requested	hedmf_run myjpbl_wrapper_run
physics set	slow_physics

couple_sgs_clouds_to_radiation_flag

long_name	flag for coupling sgs clouds to radiation
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%icloud_bl
requested	NOT REQUESTED
physics set	

critical_cloud_top_entrainment_instability_criteria

long_name	critical cloud top entrainment instability criteria
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ctei_rm
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

critical_relative_humidity

long_name	critical relative humidity
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rhc
requested	GFS_suite_interstitial_3_run m_micro_run shoc_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

critical_relative_humidity_at_PBL_top

long_name	critical relative humidity at the PBL top
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%crtrh(2)
requested	GFS_suite_interstitial_3_run
physics set	slow_physics

critical_relative_humidity_at_surface

long_name critical relative humidity at the surface
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%crtrh(1)
requested GFS_suite_interstitial_3_run
physics set slow_physics

critical_relative_humidity_at_top_of_atmosphere

long_name critical relative humidity at the top of atmosphere
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%crtrh(3)
requested GFS_suite_interstitial_3_run
physics set slow_physics

cumulative_atmosphere_detrainment_convective_mass_flux

long_name cumulative detrainment mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%det_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_atmosphere_downdraft_convective_mass_flux`

long_name cumulative downdraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dwn_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_atmosphere_updraft_convective_mass_flux`

long_name cumulative updraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%upd_mf
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_canopy_upward_latent_heat_flu_multiplied_by_timestep`

long_name cumulative canopy upward latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%evcwa
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_change_in_ozone_concentration_due_to_overhead_ozone_column

long_name cumulative change in ozone concentration due to overhead ozone column
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 9)
requested ozphys_2015_run
ozphys_run
physics set slow_physics

cumulative_change_in_ozone_concentration_due_to_ozone_mixing_ratio

long_name cumulative change in ozone concentration due to ozone mixing ratio
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 7)
requested ozphys_2015_run
ozphys_run
physics set slow_physics

`cumulative_change_in_ozone_concentration_due_to_production_and_loss_rate`

long_name	cumulative change in ozone concentration due to production and loss rate
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 6)
requested	ozphys_2015_run
	ozphys_run
physics set	slow_physics

`cumulative_change_in_ozone_concentration_due_to_temperature`

long_name	cumulative change in ozone concentration due to temperature
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 8)
requested	ozphys_2015_run
	ozphys_run
physics set	slow_physics

`cumulative_change_in_ozone_mixing_ratio_due_to_PBL`

long_name	cumulative change in ozone mixing ratio due to PBL
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 5)
requested	GFS_PBL_generic_post_run
physics set	slow_physics

`cumulative_change_in_temperature_due_to_PBL`

<code>long_name</code>	cumulative change in temperature due to PBL
<code>units</code>	K
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 3)
<code>requested</code>	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run mynnedmf_wrapper_run
<code>physics set</code>	slow_physics

`cumulative_change_in_temperature_due_to_deep_convection`

<code>long_name</code>	cumulative change in temperature due to deep conv.
<code>units</code>	K
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 4)
<code>requested</code>	GFS_DCNV_generic_post_run GFS_suite_interstitial_2_run
<code>physics set</code>	slow_physics

`cumulative_change_in_temperature_due_to_longwave_radiation`

long_name cumulative change in temperature due to longwave radiation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 1)
requested GFS_suite_interstitial_2_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_microphysics`

long_name cumulative change in temperature due to microphysics
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 6)
requested GFS_MP_generic_post_run
GFS_suite_interstitial_2_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_orographic_gravity_wave_drag`

long_name cumulative change in temperature due to orographic gravity wave drag
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 7)
requested GFS_GWD_generic_post_run
GFS_GWD_generic_pre_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_shal_convection`

long_name cumulative change in temperature due to shal conv.
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 5)
requested GFS_SCNV_generic_post_run
GFS_suite_interstitial_2_run
physics set slow_physics

`cumulative_change_in_temperature_due_to_shortwave_radiation`

long_name cumulative change in temperature due to shortwave radiation
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dt3dt(:, :, 2)
requested GFS_suite_interstitial_2_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_PBL`

long_name cumulative change in water vapor specific humidity due to PBL
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 1)
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_deep_convection`

long_name cumulative change in water vapor specific humidity due to deep conv.
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 2)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_microphysics`

long_name cumulative change in water vapor specific humidity due to microphysics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 4)
requested GFS_MP_generic_post_run
physics set slow_physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_shal_convection`

long_name cumulative change in water vapor specific humidity due to shal conv.
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dq3dt(:, :, 3)
requested GFS_SCNV_generic_post_run
physics set slow_physics

cumulative_change_in_x_wind_due_to_PBL

long_name cumulative change in x wind due to PBL
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt(:, :, 1)
requested GFS_PBL_generic_post_run
mynnedmf_wrapper_run
physics set slow_physics

cumulative_change_in_x_wind_due_to_convective_gravity_wave_drag

long_name cumulative change in x wind due to convective gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt(:, :, 4)
requested NOT REQUESTED
physics set

cumulative_change_in_x_wind_due_to_deep_convection

long_name cumulative change in x wind due to deep convection
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_x_wind_due_to_orographic_gravity_wave_drag`

<code>long_name</code>	<code>cumulative change in x wind due to orographic gravity wave drag</code>
<code>units</code>	<code>m s-1</code>
<code>rank</code>	<code>2</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_diag_type</code>
<code>local_name</code>	<code>GFS_Data(cdata%blk_no)%Intdiag%du3dt(:, :, 2)</code>
<code>requested</code>	<code>GFS_GWD_generic_post_run</code> <code>GFS_PBL_generic_post_run</code> <code>mynnedmf_wrapper_run</code>
<code>physics set</code>	<code>slow_physics</code>

`cumulative_change_in_y_wind_due_to_PBL`

<code>long_name</code>	<code>cumulative change in y wind due to PBL</code>
<code>units</code>	<code>m s-1</code>
<code>rank</code>	<code>2</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_diag_type</code>
<code>local_name</code>	<code>GFS_Data(cdata%blk_no)%Intdiag%dv3dt(:, :, 1)</code>
<code>requested</code>	<code>GFS_PBL_generic_post_run</code> <code>mynnedmf_wrapper_run</code>
<code>physics set</code>	<code>slow_physics</code>

`cumulative_change_in_y_wind_due_to_convective_gravity_wave_drag`

long_name cumulative change in y wind due to convective gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dv3dt(:, :, 4)
requested NOT REQUESTED
physics set

`cumulative_change_in_y_wind_due_to_deep_convection`

long_name cumulative change in y wind due to deep convection
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dv3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
physics set slow_physics

`cumulative_change_in_y_wind_due_to_orographic_gravity_wave_drag`

long_name	cumulative change in y wind due to orographic gravity wave drag
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dv3dt(:, :, 2)
requested	GFS_GWD_generic_post_run GFS_PBL_generic_post_run mynnedmf_wrapper_run
physics set	slow_physics

`cumulative_cloud_work_function`

long_name	cumulative cloud work function (valid only with sas)
units	m2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%cldwrk
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

`cumulative_lwe_thickness_of_convective_precipitation_amount`

long_name	cumulative convective precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%cnvprcp
requested	GFS_MP_generic_post_run GFS_SCNV_generic_post_run GFS_stochastics_run
physics set	slow_physics

`cumulative_lwe_thickness_of_convective_precipitation_amount_in_bucket`

long_name	cumulative convective precipitation in bucket
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%cnvprcpb
requested	GFS_MP_generic_post_run GFS_SCNV_generic_post_run GFS_stochastics_run
physics set	slow_physics

`cumulative_snow_deposition_sublimation_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative latent heat flux from snow depo/subl multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%sbsnoa
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_snow_freezing_rain_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative latent heat flux due to snow and frz rain multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%snohfa
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_soil_upward_latent_heat_flux_multiplied_by_timestep`

long_name cumulative soil upward latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%evbsa
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc nir diff downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dnirdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc uv+vis diff dnwd sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvisdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc nir beam downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dnirbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc uv+vis beam dnwd sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvisbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_longwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc downward lw flux mulitplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dlwsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_downwelling_longwave_flux_multiplied_by_timestep

long_name cumulative surface downwelling LW flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dlwsfc
requested GFS_suite_interstitial_2_run
physics set slow_physics

cumulative_surface_downwelling_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dswsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_ground_heat_flux_multiplied_by_timestep

long_name cumulative groud conductive heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%gflux
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net nir diff downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nnirdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net uv+vis diff downward sw rad flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nvisdf_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net nir beam downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nnirbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep

long_name cumulative net uv+vis beam downward sw rad flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nvisbm_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_net_downward_longwave_flux_for_coupling_multiplied_by_timestep`

long_name cumulative net downward lw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nlwsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_net_downward_shortwave_flux_for_coupling_multiplied_by_timestep`

long_name cumulative net downward sw flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nlwsfc_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

`cumulative_surface_pressure_multiplied_by_timestep`

long_name cumulative surface pressure multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%psmean
requested GFS_suite_interstitial_2_run
physics set slow_physics

cumulative_surface_snow_area_fraction_multiplied_by_timestep

long_name cumulative surface snow area fraction multiplied by timestep
units s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%snowca
requested GFS_surface_generic_post_run
physics set slow_physics

cumulative_surface_upward_latent_heat_flux_for_coupling_multiplied_by_timestep

long_name cumulative sfc latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dqsfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

cumulative_surface_upward_latent_heat_flux_for_diag_multiplied_by_timestep

long_name cumulative sfc latent heat flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dqsfc
requested GFS_PBL_generic_post_run
mynnedmf_wrapper_run
physics set slow_physics

`cumulative_surface_upward_potential_latent_heat_flux_multiplied_by_timestep`

long_name	cumulative surface upward potential latent heat flux multiplied by timestep
units	W m-2 s
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%ep
requested	GFS_surface_generic_post_run
physics set	slow_physics

`cumulative_surface_upward_sensible_heat_flux_for_coupling_multiplied_by_timestep`

long_name	cumulative sfc sensible heat flux multiplied by timestep
units	W m-2 s
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%dtsfc_cpl
requested	GFS_PBL_generic_post_run
physics set	slow_physics

`cumulative_surface_upward_sensible_heat_flux_for_diag_multiplied_by_timestep`

long_name	cumulative sfc sensible heat flux multiplied by timestep
units	W m-2 s
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dtsfc
requested	GFS_PBL_generic_post_run
	mynnedmf_wrapper_run
physics set	slow_physics

`cumulative_surface_upwelling_longwave_flux_multiplied_by_timestep`

long_name cumulative surface upwelling LW flux multiplied by timestep
units W m-2 s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%ulwsfc
requested GFS_suite_interstitial_2_run
physics set slow_physics

`cumulative_surface_x_momentum_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc x momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dusfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_x_momentum_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc x momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dusfc
requested GFS_PBL_generic_post_run
m_micro_run
physics set slow_physics

`cumulative_surface_y_momentum_flux_for_coupling_multiplied_by_timestep`

long_name cumulative sfc y momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvsfc_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

`cumulative_surface_y_momentum_flux_for_diag_multiplied_by_timestep`

long_name cumulative sfc y momentum flux multiplied by timestep
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfc
requested GFS_PBL_generic_post_run
m_micro_run
physics set slow_physics

`cumulative_transpiration_flux_multiplied_by_timestep`

long_name cumulative total plant transpiration rate multiplied by timestep
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%transa
requested GFS_surface_generic_post_run
physics set slow_physics

date_and_time_at_model_initialization

long_name	initialization date and time
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%idat
requested	GFS_rrtmg_setup_run
	GFS_time_vary_pre_run
physics set	slow_physics

date_and_time_at_model_initialization_reordered

long_name	initial date with different size and ordering
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%idate
requested	GFS_rrtmg_setup_init
	GFS_time_vary_pre_run
physics set	slow_physics

daytime_points

long_name	daytime points
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%idxday
requested	rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

daytime_points_dimension

long_name	daytime points dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nday
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

deep_soil_temperature

long_name	deep soil temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tg3
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

density_of_fresh_water

long_name	density of fresh water
units	???
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%rho_h2o
requested	NOT REQUESTED
physics set	

density_of_frozen_precipitation

long_name	density of frozen precipitation
units	kg m-3
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%rhofr
requested	NOT REQUESTED
physics set	

depth_of_soil_levels_for_land_surface_model

long_name	depth of soil levels for land surface model
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zs
requested	NOT REQUESTED
physics set	

detrained_mass_flux

long_name	detrained mass flux
units	kg m-2 s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cnv_mfd
requested	cs_conv_run m_micro_run samfdeepcnv_run
physics set	slow_physics

`detrainment_and_precipitation_tunable_parameter_3_CS`

<code>long_name</code>	partition water between detrainment and precipitation (decrease for more precipitation)
<code>units</code>	m
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	GFS_Control%cs_parm(3)
<code>requested</code>	NOT REQUESTED
<code>physics set</code>	

`detrainment_and_precipitation_tunable_parameter_4_CS`

<code>long_name</code>	partition water between detrainment and precipitation (decrease for more precipitation)
<code>units</code>	m
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	GFS_Control%cs_parm(4)
<code>requested</code>	NOT REQUESTED
<code>physics set</code>	

`detrainment_conversion_parameter_deep_convection`

<code>long_name</code>	convective detrainment conversion parameter for deep conv.
<code>units</code>	m-1
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	GFS_Control%c1_deep
<code>requested</code>	samfdeepcnv_run
<code>physics set</code>	slow_physics

detrainment_conversion_parameter_shallow_convection

long_name	convective detrainment conversion parameter for shal conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%c1_shal
requested	samfshalcnv_run
physics set	slow_physics

dewpoint_temperature_at_2m

long_name	2 meter dewpoint temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dpt2m
requested	sfc_diag_post_run
physics set	slow_physics

diag_ugwp_flag

long_name	flag for CIRES UGWP Diagnostics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ldiag_ugwp
requested	cires_ugwp_post_run
	cires_ugwp_run
physics set	slow_physics

diagnostics_control_for_chemical_tracers

long_name	array to control diagnostics for chemical tracers
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntdiag
requested	NOT REQUESTED
physics set	

diffusivity_background_sigma_level

long_name	sigma threshold for background mom. diffusion
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%vkzm_s
requested	hedmf_run moninshoc_run myjpbl_wrapper_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

dimensionless_exner_function_at_lowest_model_interface

long_name	dimensionless Exner function at lowest model interface
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prsik(:,1)
requested	GFS_surface_generic_pre_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diff_run sfc_nst_run sfc_sice_run
physics set	slow_physics

dimensionless_exner_function_at_lowest_model_layer

long_name	dimensionless Exner function at lowest model layer
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prslk(:,1)
requested	GFS_surface_generic_pre_run myjpbl_wrapper_run myjsfc_wrapper_run sfc_diff_run sfc_nst_run sfc_sice_run
physics set	slow_physics

dimensionless_exner_function_at_model_interfaces

long_name	dimensionless Exner function at model layer interfaces
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prsik
requested	NOT REQUESTED
physics set	

dimensionless_exner_function_at_model_layers

long_name	dimensionless Exner function at model layer centers
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%prslk
requested	GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cires_ugwp_run drag_suite_run gwdps_run hedmf_run moninshoc_run mp_thompson_post_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

dissipation_estimate_of_air_temperature_at_model_layers

long_name	dissipation estimate model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%diss_est
requested	GFS_stochastics_run
physics set	slow_physics

diurnal_thermocline_layer_heat_content

long_name	heat content in diurnal thermocline layer
units	K m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xt
requested	sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

diurnal_thermocline_layer_thickness

long_name	diurnal thermocline layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xz
requested	sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

diurnal_thermocline_layer_x_current

long_name	u-current content in diurnal thermocline layer
units	m2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xu
requested	sfc_nst_run
physics set	slow_physics

diurnal_thermocline_layer_y_current

long_name	v-current content in diurnal thermocline layer
units	m2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xv
requested	sfc_nst_run
physics set	slow_physics

do_myjpbl

long_name flag to activate MYJ PBL scheme
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_myjpbl
requested NOT REQUESTED
physics set

do_myjsfc

long_name flag to activate MYJ surface layer scheme
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_myjsfc
requested NOT REQUESTED
physics set

do_mynnedmf

long_name flag to activate MYNN-EDMF
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_mynnedmf
requested NOT REQUESTED
physics set

do_mynnsfclay

long_name flag to activate MYNN surface layer
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_mynnsfclay
requested NOT REQUESTED
physics set

do_ugwp

long_name flag to activate CIRES UGWP
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_ugwp
requested cires_ugwp_init
 cires_ugwp_run
physics set slow_physics

dominant_freezing_rain_type

long_name dominant freezing rain type
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%tdomzr
requested GFS_MP_generic_post_run
physics set slow_physics

dominant_rain_type

long_name	dominant rain type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%tdomr
requested	GFS_MP_generic_post_run
physics set	slow_physics

dominant_sleet_type

long_name	dominant sleet type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%tdomip
requested	GFS_MP_generic_post_run
physics set	slow_physics

dominant_snow_type

long_name	dominant snow type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%tdoms
requested	GFS_MP_generic_post_run
physics set	slow_physics

downdraft_fraction_in_boundary_layer_mass_flux_scheme

long_name downdraft fraction in boundary layer mass flux scheme
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_dnfr
requested NOT REQUESTED
physics set

downdraft_fraction_reaching_surface_over_land_deep_convection

long_name downdraft fraction reaching surface over land for deep conv.
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%betal_deep
requested samfdeepcnv_run
physics set slow_physics

downdraft_fraction_reaching_surface_over_ocean_deep_convection

long_name downdraft fraction reaching surface over ocean for deep conv.
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%betas_deep
requested samfdeepcnv_run
physics set slow_physics

duration_of_sunshine

long_name	sunshine duration time
units	s
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%suntim
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

dynamics_to_physics_timestep_ratio

long_name	ratio of dynamics timestep to physics timestep
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%frain
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_SCNV_generic_post_run
physics set	slow_physics

eddy_mixing_due_to_ugwp

long_name	eddy mixing due to UGWP
units	m ² s ⁻¹
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gw_kdis
requested	cires_ugwp_run
physics set	slow_physics

edmf_flag

long_name flag to activate the mass-flux scheme
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_mynn_edmf
requested NOT REQUESTED
physics set

edmf_momentum_transport_flag

long_name flag to activate the transport of momentum
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_mynn_edmf_mom
requested NOT REQUESTED
physics set

edmf_partition_flag

long_name flag to partitioning og the MF and ED areas
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_mynn_edmf_part
requested NOT REQUESTED
physics set

edmf_tke_transport_flag

long_name flag to activate the transport of TKE
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_mynn_edmf_tke
requested NOT REQUESTED
physics set

effective_radius_of_stratiform_cloud_graupel_particle_in_um

long_name eff. radius of cloud graupel particle in micrometer
units um
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%ngeffr)
requested gfdl_cloud_microphys_run
 m_micro_run
physics set slow_physics

effective_radius_of_stratiform_cloud_ice_particle_in_um

long_name eff. radius of cloud ice water particle in micrometer
units um
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nleffr)
requested gfdl_cloud_microphys_run
 m_micro_run
 mp_thompson_run
physics set slow_physics

effective_radius_of_stratiform_cloud_liquid_water_particle_in_um

long_name eff. radius of cloud liquid water particle in micrometer
units um
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nleffr)
requested gfdl_cloud_microphys_run
 m_micro_run
 mp_thompson_run
physics set slow_physics

effective_radius_of_stratiform_cloud_rain_particle_in_um

long_name effective radius of cloud rain particle in micrometers
units um
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nreffr)
requested gfdl_cloud_microphys_run
 m_micro_run
physics set slow_physics

effective_radius_of_stratiform_cloud_snow_particle_in_um

long_name effective radius of cloud snow particle in micrometers
units um
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nseffr)
requested gfdl_cloud_microphys_run
 m_micro_run
 mp_thompson_run
physics set slow_physics

emdf_updraft_area

long_name updraft area from mass flux scheme
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_a
requested NOT REQUESTED
physics set

emdf_updraft_cloud_water

long_name updraft cloud water from mass flux scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_qc
requested NOT REQUESTED
physics set

emdf_updraft_entrainment_rate

long_name updraft entrainment rate from mass flux scheme
units s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_ent
requested NOT REQUESTED
physics set

emdf_updraft_theta_1

long_name updraft theta-1 from mass flux scheme
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_th1
requested NOT REQUESTED
physics set

emdf_updraft_total_water

long_name updraft total water from mass flux scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_qt
requested NOT REQUESTED
physics set

emdf_updraft_vertical_velocity

long_name updraft vertical velocity from mass flux scheme
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%edmf_w
requested NOT REQUESTED
physics set

ending_x_direction_index

long_name	ending X direction index
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%ie
requested	fv_sat_adj_run
physics set	fast_physics

ending_x_direction_index_domain

long_name	ending X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%ied
requested	fv_sat_adj_run
physics set	fast_physics

ending_y_direction_index

long_name	ending Y direction index
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%je
requested	fv_sat_adj_run
physics set	fast_physics

ending_y_direction_index_domain

long_name	ending X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%jed
requested	fv_sat_adj_run
physics set	fast_physics

entrainment_efficiency_tunable_parameter_9_CS

long_name	entrainment efficiency
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cs_parm(9)
requested	NOT REQUESTED
physics set	

entrainment_rate_coefficient_deep_convection

long_name	entrainment rate coefficient for deep convection
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%clam_deep
requested	samfdeepcnv_run
physics set	slow_physics

entrainment_rate_coefficient_shallow_convection

long_name	entrainment rate coefficient for shal conv.
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%clam_shal
requested	samfshalcnv_run
physics set	slow_physics

equation_of_time

long_name	equation of time (radian)
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%slag
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

equilibrium_soil_water_content

long_name	equilibrium soil water content
units	m3 m-3
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%smoiseq
requested	NOT REQUESTED
physics set	

explicit_rainfall_rate_from_previous_timestep

long_name	explicit rainfall rate previous timestep
units	mm s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%drainncprv
requested	GFS_MP_generic_post_run noahmpdrv_run
physics set	slow_physics

extra_top_layer

long_name	extra top layer for radiation
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs
local_name	LTP
requested	GFS_rrtmg_post_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

fast_soil_pool_mass_content_of_carbon

long_name short-lived carbon in shallow soil
units g m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%fastcpy
requested NOT REQUESTED
physics set

fine_root_mass

long_name fine root mass
units g m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%rtmassxy
requested NOT REQUESTED
physics set

finite_volume_mean_edge_pressure_raised_to_the_power_of_kappa

long_name finite-volume mean edge pressure raised to the power of kappa
units Pa**kappa
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%pkz
requested fv_sat_adj_run
physics set fast_physics

flag_TKE_dissipation_heating

long_name	flag for tke dissipative heating
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dsheat
requested	hedmf_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

flag_arakawa_wu_downdraft

long_name	AW scale-aware option in cs convection downdraft
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_awdd
requested	NOT REQUESTED
physics set	

flag_convective_tracer_transport

long_name	flag to enable tracer transport by updrafts/downdrafts[:,1] or subsidence[:,2]
units	flag
rank	2
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%otspt
requested	NOT REQUESTED
physics set	

flag_debug

long_name	control flag for debug
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%debug
requested	GFS_time_vary_pre_run
physics set	slow_physics

flag_deep_convection

long_name	flag indicating whether convection occurs in column (0 or 1)
units	flag
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kcnv
requested	cs_conv_run cu_gf_driver_run cu_ntiedtke_run gwdc_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

flag_diagnostics

long_name	logical flag for storing diagnostics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lssav
requested	GFS_DCNV_generic_post_run GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_suite_interstitial_2_run GFS_surface_generic_post_run GFS_time_vary_pre_run gwdc_post_run mynnedmf_wrapper_run sfc_diag_post_run
physics set	slow_physics

flag_diagnostics_3D

long_name	flag for 3d diagnostic fields
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ldiag3d
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_suite_interstitial_2_run gwdc_post_run h2ophys_run mynnedmf_wrapper_run ozphys_2015_run ozphys_run
physics set	slow_physics

flag_flip

long_name	vertical flip logical
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%flipv
requested	NOT REQUESTED
physics set	

flag_flux_form_CS

long_name	enable use of flux form of equations in CS scheme
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%flx_form
requested	NOT REQUESTED
physics set	

flag_for_2015_ozone_physics

long_name	flag for new (2015) ozone physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%oz_phys_2015
requested	ozphys_2015_init
physics set	slow_physics

flag_for_Arakawa_Wu_adjustment

long_name	flag for Arakawa Wu scale-aware adjustment
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_aw
requested	GFS_MP_generic_pre_run cs_conv_aw_adj_run cs_conv_post_run cs_conv_run
physics set	slow_physics

flag_for_CRICK_proof_cloud_water

long_name	flag for CRICK-Proof cloud water
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%crick_proof
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_Chikira_Sugiyama_deep_convection

long_name	flag for Chikira-Sugiyama convection
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cscnv
requested	GFS_DCNV_generic_post_run GFS_suite_interstitial_3_run cs_conv_aw_adj_run
physics set	slow_physics

flag_for_aerosol_convective_transport_and_PBL_diffusion

long_name	flag for aerosol convective transport and PBL diffusion
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%trans_aero
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

flag_for_aerosol_input_MG

long_name	flag for using aerosols in Morrison-Gettelman MP
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%aero_in
requested	NOT REQUESTED
physics set	

flag_for_aerosol_physics

long_name	flag for aerosol physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ltaerosol
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run mp_thompson_init mp_thompson_pre_run mp_thompson_run mynnedmf_wrapper_run
physics set	slow_physics

flag_for_canopy_heat_storage

long_name	flag for canopy heat storage parameterization
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lheatstrg
requested	lsm_noah_run noahmpdrv_run
physics set	slow_physics

flag_for_canopy_stomatal_resistance_option

long_name	choice for canopy stomatal resistance option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_crs
requested	NOT REQUESTED
physics set	

flag_for_cellular_automata

long_name	cellular automata main switch
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_ca
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run samfdeepcnv_run
physics set	slow_physics

flag_for_chemistry_coupling

long_name	flag controlling cplchm collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cplchm
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_suite_interstitial_4_run sfc_cice_run sfc_sice_run
physics set	slow_physics

flag_for_cice

long_name	flag for cice
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%flag_cice
requested	GFS_suite_interstitial_2_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run sfc_cice_run sfc_sice_run
physics set	slow_physics

flag_for_cloud_condensate_normalized_by_cloud_cover

long_name	flag for cloud condensate normalized by cloud cover
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ccnorm
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_cloud_effective_radii

long_name	flag for cloud effective radii calculations in GFDL microphysics
units	
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%effr_in
requested	gfdl_cloud_microphys_run
physics set	slow_physics

flag_for_combination_of_sppt_with_isppt_deep

long_name	switch for combination with isppt_deep.
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%isppt_deep
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
physics set	slow_physics

flag_for_convective_gravity_wave_drag

long_name	flag for convective gravity wave drag (gwd)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_cnvgwd
requested	GFS_DCNV_generic_pre_run gwdc_pre_run
physics set	slow_physics

flag_for_convective_transport_of_tracers

long_name	flag for convective transport of tracers
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%trans_trac
requested	GFS_suite_interstitial_3_run
physics set	slow_physics

flag_for_default_aerosol_effect_in_shortwave_radiation

long_name	default aerosol effect in sw only
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iaer
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_dynamic_vegetation_option

long_name	choice for dynamic vegetation option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_dveg
requested	NOT REQUESTED
physics set	

flag_for_fast_microphysics_energy_conservation

long_name	flag for fast microphysics energy conservation
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%fast_mp_consv
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_first_time_step

long_name	flag for first time step for time integration loop (cold/warmstart)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%first_time_step
requested	GFS_checkland_run GFS_phys_time_vary_run cu_gf_driver_pre_run cu_ntiedtke_pre_run lsm_ruc_run mynnedmf_wrapper_run mynnrad_post_run mynnrad_pre_run mynnsfc_wrapper_run
physics set	slow_physics

flag_for_flux_coupling

long_name	flag controlling cplflx collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cplflx
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_stochastics_run GFS_suite_interstitial_2_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run GFS_surface_generic_pre_run sfc_cice_run sfc_nst_pre_run sfc_sice_run
physics set	slow_physics

flag_for_fractional_grid

long_name	flag for fractional grid
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%frac_grid
requested	GFS_checkland_run GFS_suite_interstitial_2_run GFS_surface_composites_post_run GFS_surface_composites_pre_run
physics set	slow_physics

flag_for_frozen_soil_permeability_option

long_name	choice for frozen soil permeability option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_inf
requested	NOT REQUESTED
physics set	

flag_for_frozen_soil_physics

long_name	flag for frozen soil physics (RUC)
units	flag
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%flag_frsoil
requested	NOT REQUESTED
physics set	

flag_for_gaussian_spatial_filter

long_name	switch for gaussian spatial filter
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ca_smooth
requested	NOT REQUESTED
physics set	

flag_for_gfdl_microphysics_scheme

long_name	choice of GFDL microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_gfdl
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run gfdl_cloud_microphys_init lsm_ruc_run maximum_hourly_diagnostics_run mynnedmf_wrapper_run shoc_run
physics set	slow_physics

flag_for_global_cellular_automata

long_name	switch for global ca
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ca_global
requested	NOT REQUESTED
physics set	

flag_for_gravity_wave_drag

long_name flag for gravity wave drag (gwd)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_gwd
requested NOT REQUESTED
physics set

flag_for_ground_snow_surface_albedo_option

long_name choice for ground snow surface albedo option (see noahmp module for definition)
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%iopt_alb
requested NOT REQUESTED
physics set

flag_for_guess_run

long_name	flag for guess run
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%flag_guess
requested	GFS_checkland_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_nst_run
physics set	slow_physics

flag_for_hedmf

long_name	flag for hybrid edmf pbl scheme (moninedmf)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%hybedmf
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

flag_for_hydrostatic_heating_from_physics

long_name	flag for use of hydrostatic heating in physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%phys_hydrostatic
requested	gfdl_cloud_microphys_run
physics set	slow_physics

flag_for_hydrostatic_solver

long_name	flag for hydrostatic solver from dynamics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%hydrostatic
requested	gfdl_cloud_microphys_run
physics set	slow_physics

flag_for_hydrostatic_solver_for_fast_physics

long_name	flag for use the hydrostatic or nonhydrostatic solver for fast physics schemes
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%hydrostatic
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_in_ccn_forcing_for_morrison_gettelman_microphysics

long_name flag for IN and CCN forcing for morrison gettelman microphysics
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%iccn
requested NOT REQUESTED
physics set

flag_for_initial_time_date_control

long_name flag for initial conditions and forcing
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ictm
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_inline_cloud_fraction_calculation

long_name flag for the inline cloud fraction calculation
units flag
rank 0
type logical
kind
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%do_qa
requested fv_sat_adj_run
physics set fast_physics

```

flag_for_iteration
  long_name    flag for iteration
  units        flag
  rank         1
  type         logical
  kind
  source       MODULE GFS_typedefs TYPE GFS_interstitial_type
  local_name   GFS_Interstitial(cdata%thrd_no)%flag_iter
  requested    GFS_checkland_run
               GFS_surface_loop_control_part2_run
               lsm_noah_run
               lsm_ruc_run
               myjsfc_wrapper_run
               noahmpdrv_run
               sfc_cice_run
               sfc_diff_run
               sfc_nst_run
               sfc_ocean_run
               sfc_sice_run
  physics set  slow_physics

```

flag_for_land_surface_scheme

long_name	flag for land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsm
requested	GFS_MP_generic_post_run GFS_time_vary_pre_run lsm_ruc_run sfc_diag_post_run
physics set	slow_physics

flag_for_lower_boundary_soil_temperature_option

long_name	choice for lower boundary soil temperature option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_tbot
requested	NOT REQUESTED
physics set	

flag_for_lw_clouds_without_sub_grid_approximation

long_name	flag for lw clouds without sub-grid approximation
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%isubc_lw
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_mass_flux_deep_convection_scheme

long_name	flag for mass-flux deep convection scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imfdeepcnv
requested	GFS_suite_interstitial_4_run
physics set	slow_physics

flag_for_mass_flux_shallow_convection_scheme

long_name	flag for mass-flux shallow convection scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imfshalcnv
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_2_run cu_gf_driver_run
physics set	slow_physics

flag_for_max_random_overlap_clouds_for_longwave_radiation

long_name	lw: max-random overlap clouds
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iobr_lw
requested	GFS_rrtmg_setup_init
physics set	slow_physics

```
flag_for_max_random_overlap_clouds_for_shortwave_radiation
  long_name      sw:  max-random overlap clouds
  units          flag
  rank           0
  type           integer
  kind
  source         MODULE GFS_typedefs TYPE GFS_control_type
  local_name     GFS_Control%iovr_sw
  requested      GFS_rrtmg_setup_init
  physics set    slow_physics
```

flag_for_microphysics_scheme

long_name	choice of microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_rrtmg_setup_init GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run cs_conv_aw_adj_run cs_conv_run cu_gf_driver_run gfdl_cloud_microphys_init lsm_ruc_run m_micro_init maximum_hourly_diagnostics_run mp_thompson_init mynnedmf_wrapper_run samfdeepcnv_run shoc_run
physics set	slow_physics

flag_for_mom4_coupling

long_name	flag controls mom4 sea ice
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mom4ice
requested	NOT REQUESTED
physics set	

flag_for_moorthi_stratus

long_name	flag for moorthi approach for stratus
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mstrat
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

flag_for_morrison_gettelman_microphysics_scheme

long_name	choice of Morrison-Gettelman microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_mg
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run cs_conv_aw_adj_run m_micro_init samfdeepcnv_run shoc_run
physics set	slow_physics

flag_for_mountain_blocking

long_name	flag for mountain blocking
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%use_zmtnblk
requested	GFS_stochastics_run
physics set	slow_physics

flag_for_noah_land_surface_scheme

long_name	flag for NOAH land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsm_noah
requested	NOT REQUESTED
physics set	

flag_for_noahmp_land_surface_scheme

long_name	flag for NOAH MP land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsm_noahmp
requested	GFS_MP_generic_post_run GFS_time_vary_pre_run sfc_diag_post_run
physics set	slow_physics

flag_for_nsstm_run

long_name NSSTM flag: off/uncoupled/coupled=0/1/2
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%nstf_name(1)
requested GFS_surface_loop_control_part2_run
sfc_nst_post_run
sfc_nst_run
physics set slow_physics

flag_for_old_PBL_scheme

long_name flag for using old PBL schemes
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%old_monin
requested GFS_suite_interstitial_2_run
physics set slow_physics

flag_for_optical_property_for_liquid_clouds_for_shortwave_radiation

long_name sw optical property for liquid clouds
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%icliq_sw
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_output_of_longwave_heating_rate

long_name flag to output lw heating rate (Radtend%lwhc)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%lwhttr
requested NOT REQUESTED
physics set

flag_for_output_of_shortwave_heating_rate

long_name flag to output sw heating rate (Radtend%swhc)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%swhttr
requested NOT REQUESTED
physics set

flag_for_ozone_physics

long_name flag for old (2006) ozone physics
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%oz_phys
requested NOT REQUESTED
physics set

flag_for_pdf_for_morrison_gettelman_microphysics_scheme

long_name pdf flag for MG microphysics
units flag
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%pdfflag
requested NOT REQUESTED
physics set

flag_for_precipitation_effect_on_radiation

long_name radiation precip flag for Ferrier/Moorthi
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%norad_precip
requested GFS_rrtmg_setup_init
physics set slow_physics

flag_for_precipitation_partition_option

long_name choice for precipitation partition option (see noahmp module for definition)
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%iopt_snf
requested NOT REQUESTED
physics set

flag_for_precipitation_type

long_name	snow/rain flag for precipitation
units	flag
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%srflag
requested	GFS_MP_generic_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
	sfc_sice_run
physics set	slow_physics

flag_for_precipitation_type_algorithm

long_name	flag controls precip type algorithm
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cal_pre
requested	GFS_MP_generic_post_run
physics set	slow_physics

flag_for_radar_reflectivity

long_name	flag for radar reflectivity
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lradar
requested	gfdl_cloud_microphys_run maximum_hourly_diagnostics_run mp_thompson_run
physics set	slow_physics

flag_for_radiation_transfer_option

long_name	choice for radiation transfer option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_rad
requested	NOT REQUESTED
physics set	

flag_for_ras_deep_convection

long_name	flag for ras convection scheme
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ras
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

flag_for_reduced_drag_coefficient_over_sea

long_name	flag for reduced drag coeff. over sea
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%redrag
requested	sfc_diff_run
physics set	slow_physics

flag_for_restart

long_name	flag for restart (warmstart) or coldstart
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%restart
requested	NOT REQUESTED
physics set	

flag_for_ruc_land_surface_scheme

long_name	flag for RUC land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsm_ruc
requested	GFS_MP_generic_post_run lsm_ruc_run
physics set	slow_physics

flag_for_runoff_and_groundwater_option

long_name	choice for runoff and groundwater option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_run
requested	NOT REQUESTED
physics set	

flag_for_saturation_adjustment_for_microphysics_in_dynamics

long_name	flag for saturation adjustment for microphysics in dynamics
units	none
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%do_sat_adj
requested	fv_sat_adj_init
physics set	fast_physics

flag_for_scale_aware_Shinhong_PBL

long_name flag for scale-aware Shinhong PBL scheme
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%shinhong
requested GFS_PBL_generic_post_run
physics set slow_physics

flag_for_scale_aware_TKE_moist_EDMF_PBL

long_name flag for scale-aware TKE moist EDMF PBL scheme
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%satmedmf
requested GFS_PBL_generic_post_run
 GFS_PBL_generic_pre_run
 GFS_suite_interstitial_3_run
physics set slow_physics

flag_for_sgs_cellular_automata

long_name switch for sgs ca
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ca_sgs
requested NOT REQUESTED
physics set

flag_for_shallow_convection

long_name	flag for calling shallow convection
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%shal_cnv
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

flag_for_shoc

long_name	flag for SHOC
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_shoc
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cs_conv_aw_adj_run gfdl_cloud_microphys_init m_micro_pre_run shoc_run
physics set	slow_physics

flag_for_shoc_after_convection

long_name flag to execute SHOC after convection
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%shocaftcnv
requested NOT REQUESTED
physics set

flag_for_soil_and_snow_temperature_time_stepping_option

long_name choice for soil and snow temperature time stepping option (see noahmp module for definition)
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%iopt_stc
requested NOT REQUESTED
physics set

flag_for_soil_moisture_factor_stomatal_resistance_option

long_name choice for soil moisture factor for canopy stomatal resistance option (see noahmp module for definition)
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%iopt_btr
requested NOT REQUESTED
physics set

flag_for_solar_constant

long_name	use prescribed solar constant
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%isol
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_stochastic_shum_option

long_name	flag for stochastic shum option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_shum
requested	GFS_stochastics_run
physics set	slow_physics

flag_for_stochastic_skeb_option

long_name	flag for stochastic skeb option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_skeb
requested	GFS_stochastics_run
physics set	slow_physics

flag_for_stochastic_surface_perturbations

long_name	flag for stochastic surface perturbations option
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_sfcperfs
requested	GFS_surface_generic_pre_run
physics set	slow_physics

flag_for_stochastic_surface_physics_perturbations

long_name	flag for stochastic surface physics perturbations
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_sppt
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

flag_for_supercooled_liquid_water_option

long_name	choice for supercooled liquid water option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_frz
requested	NOT REQUESTED
physics set	

flag_for_surface_emissivity_control

long_name	surface emissivity control flag, use fixed value of 1
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iems
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_surface_layer_drag_coefficient_option

long_name	choice for surface layer drag coefficient option (see noahmp module for definition)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iopt_sfc
requested	NOT REQUESTED
physics set	

flag_for_surface_roughness_option_over_ocean

long_name	surface roughness options over ocean
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%sfc_z0_type
requested	sfc_diff_run
physics set	slow_physics

flag_for_sw_clouds_without_sub_grid_approximation

long_name	flag for sw clouds without sub-grid approximation
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%isubc_sw
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_tendency_of_air_temperature_at_Lagrangian_surface

long_name	flag for calculating tendency of air temperature due to fast physics
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%out_dt
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_the_last_step_of_k_split_remapping

long_name	flag for the last step of k-split remapping
units	flag
rank	0
type	logical
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%last_step
requested	fv_sat_adj_run
physics set	fast_physics

flag_for_thompson_microphysics_scheme

long_name	choice of Thompson microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_thompson
requested	GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run cu_gf_driver_run lsm_ruc_run maximum_hourly_diagnostics_run mp_thompson_init mynnedmf_wrapper_run
physics set	slow_physics

flag_for_using_climatology_albedo

long_name	flag for using climatology alb, based on sfc type
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ialb
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_using_prescribed_global_mean_co2_value

long_name	prescribed global mean value (old opernl)
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ico2
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_vertical_index_direction_control

long_name	iflip - is not the same as flipv
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iflip
requested	GFS_rrtmg_setup_init
physics set	slow_physics

flag_for_wave_coupling

long_name	flag controlling cplwav collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cplwav
requested	GFS_surface_generic_post_run
physics set	slow_physics

flag_for_wsm6_microphysics_scheme

long_name	choice of WSM6 microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_wsm6
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run mynnedmf_wrapper_run
physics set	slow_physics

flag_for_ysu

long_name	flag for YSU PBL scheme
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_ysu
requested	GFS_PBL_generic_post_run
physics set	slow_physics

flag_for_zhao_carr_microphysics_scheme

long_name	choice of Zhao-Carr microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_zhao_carr
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run shoc_run
physics set	slow_physics

flag_for_zhao_carr_pdf_microphysics_scheme

long_name	choice of Zhao-Carr microphysics scheme with PDF clouds
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imp_physics_zhao_carr_pdf
requested	GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run shoc_run
physics set	slow_physics

flag_idealized_physics

long_name	flag for idealized physics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsidea
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run mynnedmf_wrapper_run rayleigh_damp_run
physics set	slow_physics

flag_mg3_as_mg2

long_name	flag for controlling prep for Morrison-Gettelman microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%mg3_as_mg2
requested	NOT REQUESTED
physics set	

flag_nonzero_lake_surface_fraction

long_name	flag indicating presence of some lake surface area fraction
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%lake
requested	GFS_checkland_run
	GFS_surface_composites_pre_run
physics set	slow_physics

flag_nonzero_land_surface_fraction

long_name	flag indicating presence of some land surface area fraction
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dry
requested	GFS_PBL_generic_post_run GFS_checkland_run GFS_suite_interstitial_2_run GFS_surface_composites_inter_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run dcyc2t3_run lsm_noah_run lsm_ruc_run lsm_ruc_sfc_sice_post_run lsm_ruc_sfc_sice_pre_run noahmpdrv_run sfc_diag_post_run sfc_diff_run
physics set	slow_physics

flag_nonzero_ocean_surface_fraction

long_name	flag indicating presence of some ocean surface area fraction
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ocean
requested	GFS_checkland_run GFS_surface_composites_pre_run
physics set	slow_physics

flag_nonzero_sea_ice_surface_fraction

long_name	flag indicating presence of some sea ice surface area fraction
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%icy
requested	GFS_PBL_generic_post_run GFS_checkland_run GFS_suite_interstitial_2_run GFS_surface_composites_inter_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run dcyc2t3_run sfc_diff_run sfc_nst_post_run
physics set	slow_physics

flag_nonzero_wet_surface_fraction

long_name	flag indicating presence of some ocean or lake surface area fraction
units	flag
rank	1
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%wet
requested	GFS_PBL_generic_post_run GFS_checkland_run GFS_suite_interstitial_2_run GFS_surface_composites_inter_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run dcyc2t3_run sfc_diff_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

flag_print

long_name	control flag for diagnostic print out
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lprnt
requested	GFS_time_vary_pre_run cires_ugwp_run cs_conv_run drag_suite_run gwdc_run gwdps_run hedmf_run m_micro_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run rrtmg_lw_run rrtmg_sw_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

flag_reset_maximum_hourly_fields

long_name	flag for resetting maximum hourly fields
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%reset
requested	gfdl_cloud_microphys_run maximum_hourly_diagnostics_run
physics set	slow_physics

flag_shallow_convective_cloud

long_name	flag for shallow convective cloud
units	
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%shcnvcw
requested	GFS_SCNV_generic_post_run
physics set	slow_physics

flag_skip_macro

long_name	flag to skip cloud macrophysics in Morrison scheme
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%skip_macro
requested	NOT REQUESTED
physics set	

flag_to_calc_lw

long_name	logical flags for lw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lslwr
requested	GFS_time_vary_pre_run rrtmg_lw_run
physics set	slow_physics

flag_to_calc_sw

long_name	logical flags for sw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsswr
requested	GFS_rrtmg_setup_run GFS_time_vary_pre_run rrtmg_sw_run
physics set	slow_physics

forecast_date_and_time

long_name	current forecast date and time
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%jdat
requested	GFS_rrtmg_setup_run
	GFS_time_vary_pre_run
physics set	slow_physics

forecast_hour_of_the_day

long_name	time in hours after 00z at the current timestep
units	h
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%solhr
requested	GFS_time_vary_pre_run
	dcyc2t3_run
	sfc_nst_run
physics set	slow_physics

forecast_month

long_name	current forecast month
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%imn
requested	NOT REQUESTED
physics set	

forecast_time

long_name	current forecast time
units	h
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%fhour
requested	GFS_time_vary_pre_run cu_gf_driver_pre_run cu_ntiedtke_pre_run gwdc_run
physics set	slow_physics

forecast_time_at_previous_timestep

long_name forecast time at the previous timestep
units h
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%phour
requested GFS_time_vary_pre_run
physics set slow_physics

fraction_of_cellular_automata_for_deep_convection

long_name fraction of cellular automata for deep convection
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%ca_deep
requested GFS_DCNV_generic_pre_run
samfdeepcnv_run
physics set slow_physics

fraction_of_cloud_top_water_scavenged

long_name fraction of the tracer (cloud top water) that is scavenged by convection
units km-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%fswtr
requested NOT REQUESTED
physics set

`fraction_of_convective_cloud`

<code>long_name</code>	<code>fraction of convective cloud</code>
<code>units</code>	<code>frac</code>
<code>rank</code>	<code>1</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_cldprop_type</code>
<code>local_name</code>	<code>GFS_Data(cdata%blk_no)%Cldprop%cv</code>
<code>requested</code>	<code>cnvc90_run</code>
<code>physics set</code>	<code>slow_physics</code>

`fraction_of_grid_box_with_subgrid_orography_higher_than_critical_height`

<code>long_name</code>	<code>frac. of grid box with by subgrid orography higher than critical height</code>
<code>units</code>	<code>frac</code>
<code>rank</code>	<code>2</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_interstitial_type</code>
<code>local_name</code>	<code>GFS_Interstitial(cdata%thrd_no)%clx</code>
<code>requested</code>	<code>GFS_GWD_generic_pre_run</code>
	<code>cires_ugwp_run</code>
	<code>drag_suite_run</code>
	<code>gwdps_run</code>
<code>physics set</code>	<code>slow_physics</code>

fraction_of_tracer_scavenged

long_name	fraction of the tracer (aerosols) that is scavenged by convection
units	km-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%fscav
requested	NOT REQUESTED
physics set	

free_convection_layer_thickness

long_name	thickness of free convection layer (FCL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%d_conv
requested	sfc_nst_run
physics set	slow_physics

freezing_point_temperature_of_seawater

long_name	freezing point temperature of seawater
units	K
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_tice
requested	GFS_surface_composites_pre_run sfc_sice_run
physics set	slow_physics

frequency_for_longwave_radiation

long_name frequency for longwave radiation
units s
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%fhlwr
requested NOT REQUESTED
physics set

frequency_for_shortwave_radiation

long_name frequency for shortwave radiation
units s
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%fhsr
requested GFS_rrtmg_setup_run
 dcyc2t3_run
physics set slow_physics

frozen_cloud_threshold_temperature

long_name threshold temperature below which all cloud is ice
units K
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%tf
requested NOT REQUESTED
physics set

gas_constant_dry_air

long_name	ideal gas constant for dry air
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_rd
requested	GFS_PBL_generic_post_run cires_ugwp_run cu_gf_driver_run drag_suite_run gfdl_cloud_microphys_run gwdc_run gwdps_run lsm_noah_run lsm_ruc_run m_micro_init moninshoc_run mp_thompson_pre_run mp_thompson_run myjpbl_wrapper_run myjsfc_wrapper_run noahmpdrv_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run sfc_cice_run sfc_nst_run sfc_ocean_run sfc_sice_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

gas_constant_water_vapor

long_name	ideal gas constant for water vapor
units	J kg-1 K-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_rv
requested	cires_ugwp_run drag_suite_run gwdps_run lsm_ruc_run m_micro_init samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

gas_constants_for_multi_gases_physics

long_name	gas constants for multi gases physics
units	J kg-1 K-1
rank	1
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%rilist
requested	fv_sat_adj_init
physics set	fast_physics

gas_tracers_for_multi_gas_physics_at_Lagrangian_surface

long_name	gas tracers for multi gas physics at Lagrangian surface
units	kg kg-1
rank	4
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%qvi
requested	fv_sat_adj_run
physics set	fast_physics

geopotential

long_name	geopotential at model layer centers
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%phil
requested	GFS_surface_generic_pre_run cires_ugwp_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run drag_suite_run get_phi_fv3_run gwdps_run hedmf_run m_micro_run maximum_hourly_diagnostics_run moninshoc_run mp_thompson_pre_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

geopotential_at_interface

long_name	geopotential at model layer interfaces
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%phii
requested	GFS_MP_generic_post_run cires_ugwp_run cs_conv_run cu_ntiedtke_run drag_suite_run get_phi_fv3_run get_prs_fv3_run gfdl_cloud_microphys_run gwdps_run hedmf_run m_micro_run moninshoc_run mp_thompson_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

geopotential_difference_between_midlayers_divided_by_midlayer_virtual_temperature

long_name difference between mid-layer geopotentials divided by mid-layer virtual temperature
units m2 s-2 K-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%del_gz
requested get_phi_fv3_run
 get_prs_fv3_run
physics set slow_physics

gf_memory_counter

long_name Memory counter for GF
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%conv_act
requested NOT REQUESTED
physics set

graupel_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of graupel
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntgl)
requested NOT REQUESTED
physics set

graupel_mixing_ratio_updated_by_physics

long_name	moist (dry+vapor, no condensates) mixing ratio of graupel updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntgl)
requested	gfdl_cloud_microphys_run m_micro_post_run m_micro_pre_run mp_thompson_pre_run mp_thompson_run shoc_run
physics set	slow_physics

graupel_number_concentration

long_name	number concentration of graupel
units	kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntgnc)
requested	NOT REQUESTED
physics set	

graupel_number_concentration_updated_by_physics

long_name number concentration of graupel updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntgnc)
requested NOT REQUESTED
physics set

graupel_precipitation_rate_from_previous_timestep

long_name graupel precipitation rate from previous timestep
units mm s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%dgraupelprv
requested GFS_MP_generic_post_run
 noahmpdrv_run
physics set slow_physics

grav_settling

long_name flag to activate gravitational setting of fog
units flag
rank 0
type integer
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%grav_settling
requested NOT REQUESTED
physics set

gravitational_acceleration

long_name	gravitational acceleration
units	m s-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_g
requested	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_surface_generic_pre_run cires_ugwp_run cs_conv_aw_adj_run drag_suite_run gfdl_cloud_microphys_run gwdc_run gwdps_run lsm_noah_run lsm_ruc_run m_micro_init maximum_hourly_diagnostics_run moninshoc_run mp_thompson_pre_run mp_thompson_run myjpbl_wrapper_run myjsfc_wrapper_run ozphys_2015_run ozphys_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_run sfc_diff_run sfc_sice_run shinhongvdif_run shoc_run ysuvdif_run
physics_set	slow_physics

grid_sensitive_critical_cloud_top_entrainment_instability_criteria

long_name	grid sensitive critical cloud top entrainment instability criteria
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ctei_rml
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

grid_size_related_coefficient_used_in_scale_sensitive_schemes

long_name	grid size related coefficient used in scale-sensitive schemes
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%work1
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cs_conv_pre_run gwdc_pre_run zhaocarr_precpd_run
physics set	slow_physics

grid_size_related_coefficient_used_in_scale_sensitive_schemes_complement

long_name	complement to work1
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%work2
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run cs_conv_pre_run gwdc_pre_run
physics set	slow_physics

ground_temperature_for_noahmp

long_name	ground temperature for noahmp
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tgxy
requested	NOT REQUESTED
physics set	

gwd_opt

long_name	flag to choose gwd scheme
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%gwd_opt
requested	NOT REQUESTED
physics set	

h2o_forcing

long_name	water forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%h2opl
requested	h2ophys_run
physics set	slow_physics

heat_exchange_coefficient_for_MYJ_schemes

long_name	surface heat exchange_coefficient for MYJ schemes
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_akhs
requested	NOT REQUESTED
physics set	

height_above_ground_at_lowest_model_layer

long_name	layer 1 height above ground (not MSL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%zlvl
requested	GFS_surface_generic_pre_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

height_of_launch_level_of_orographic_gravity_wave

long_name	height of launch level of orographic gravity wave
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zogw
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

height_of_low_level_wave_breaking

long_name	height of drag due to low level wave breaking
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zlwb
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

height_of_mountain_blocking

long_name	height of mountain blocking drag
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zmtb
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

horizontal_block_size

long_name	for explicit data blocking: block sizes of all blocks
units	count
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%blksz
requested	NOT REQUESTED
physics set	

horizontal_dimension

long_name	horizontal dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%blksz2(cdata%blk_no)
requested	GFS_MP_generic_post_run cnvc90_run cs_conv_aw_adj_run cs_conv_post_run cs_conv_pre_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run dcyc2t3_run drag_suite_run get_phi_fv3_run get_prs_fv3_run gwdc_run gwdps_run h2ophys_run hedmf_run m_micro_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnrad_post_run mynnrad_pre_run mynnsfc_wrapper_run noahmpdrv_run ozphys_2015_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run satmedmfydif_run

horizontal_index_of_printed_column

long_name	horizontal index of printed column
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ipr
requested	cires_ugwp_run cs_conv_run drag_suite_run gwdc_run gwdps_run hedmf_run m_micro_run moninshoc_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

horizontal_loop_extent

long_name	horizontal loop extent
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%blksz(cdata%blk_no)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_checkland_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init GFS_stochastics_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_composites_inter_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run cires_ugwp_post_run cires_ugwp_run cnvc90_run cs_conv_run

ice_fraction_in_convective_tower

long_name ice fraction in convective tower
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cnv_fice
requested cs_conv_run
m_micro_run
samfdeepcnv_run
physics set slow_physics

ice_friendly_aerosol_number_concentration

long_name number concentration of ice-friendly aerosols
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntia)
requested NOT REQUESTED
physics set

ice_friendly_aerosol_number_concentration_updated_by_physics

long_name number concentration of ice-friendly aerosols updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntia)
requested NOT REQUESTED
physics set

ice_number_concentration

long_name number concentration of ice
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntinc)
requested NOT REQUESTED
physics set

ice_number_concentration_updated_by_physics

long_name number concentration of ice updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntinc)
requested NOT REQUESTED
physics set

ice_precipitation_rate_from_previous_timestep

long_name ice precipitation rate from previous timestep
units mm s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%diceprv
requested GFS_MP_generic_post_run
 noahmpdrv_run
physics set slow_physics

ice_supersaturation_threshold

long_name ice supersaturation parameter for PDF clouds
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%sup
requested NOT REQUESTED
physics set

ice_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of ice water
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntiw)
requested NOT REQUESTED
physics set

ice_water_mixing_ratio_convective_transport_tracer

long_name moist (dry+vapor, no condensates) mixing ratio of ice water in the convectively transported tracer array
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%clw(:, :, 1)
requested GFS_DCNV_generic_post_run
cs_conv_pre_run
cu_gf_driver_run
m_micro_pre_run
m_micro_run
shoc_run
zhaocarr_gscond_run
physics set slow_physics

ice_water_mixing_ratio_save

long_name cloud ice water mixing ratio before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%save_q(:, :, GFS_Control%ntiw)
requested GFS_suite_interstitial_3_run
GFS_suite_interstitial_4_run
cs_conv_pre_run
mynnrad_post_run
mynnrad_pre_run
physics set slow_physics

ice_water_mixing_ratio_updated_by_physics

long_name	moist (dry+vapor, no condensates) mixing ratio of ice water updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntiw)
requested	gfdl_cloud_microphys_run m_micro_post_run m_micro_pre_run m_micro_run mp_thompson_pre_run mp_thompson_run shoc_run
physics set	slow_physics

in_number_concentration

long_name	IN number concentration
units	kg-1?
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%in_nm
requested	NOT REQUESTED
physics set	

index_for_cloud_amount

long_name tracer index for cloud amount integer
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ntclamt
requested GFS_suite_interstitial_3_run
 GFS_suite_interstitial_4_run
 cs_conv_aw_adj_run
physics set slow_physics

index_for_cloud_fraction_in_3d_arrays_for_microphysics

long_name index of cloud fraction in phyf3d (used only for SHOC or MG)
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%indcld
requested NOT REQUESTED
physics set

index_for_cloud_liquid_water_effective_radius

long_name the index of cloud liquid water effective radius in phy_f3d
units
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%nleffr
requested NOT REQUESTED
physics set

index_for_convective_cloud_cover_in_phy_f3d

long_name the index of convective cloud cover in phy f3d
units
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ncnvc
requested NOT REQUESTED
physics set

index_for_convective_cloud_water_mixing_ratio_in_phy_f3d

long_name the index of convective cloud water mixing ratio in phy f3d
units
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ncnvw
requested NOT REQUESTED
physics set

index_for_diagnostic_printout

long_name horizontal index for point used for diagnostic printout
units
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ipt
requested GFS_time_vary_pre_run
physics set slow_physics

index_for_first_chemical_tracer

long_name	tracer index for first chemical tracer
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntchs
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

index_for_graupel

long_name	tracer index for graupel
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntgl
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run myjpbl_wrapper_run myjsfc_wrapper_run
physics set	slow_physics

index_for_graupel_effective_radius

long_name the index of graupel effective radius in phy_f3d
units
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ngeffr
requested NOT REQUESTED
physics set

index_for_graupel_number_concentration

long_name tracer index for graupel number concentration
units index
rank 0
type integer
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%ntgnc
requested GFS_PBL_generic_post_run
 GFS_PBL_generic_pre_run
 GFS_suite_interstitial_3_run
 GFS_suite_interstitial_4_run
physics set slow_physics

`index_for_ice_cloud_condensate`

<code>long_name</code>	tracer index for ice water
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	GFS_Control%ntiw
<code>requested</code>	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run myjpbl_wrapper_run myjsfc_wrapper_run shinhongvdif_run ysuvdif_run
<code>physics set</code>	slow_physics

`index_for_ice_cloud_condensate_vertical_diffusion_tracer`

<code>long_name</code>	index for ice cloud condensate in the vertically diffused tracer array
<code>units</code>	index
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_interstitial_type
<code>local_name</code>	GFS_Interstitial(cdata%thrd_no)%ntiwx
<code>requested</code>	NOT REQUESTED
<code>physics set</code>	

index_for_ice_cloud_number_concentration

long_name	tracer index for ice number concentration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntinc
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_4_run cu_gf_driver_run
physics set	slow_physics

index_for_ice_effective_radius

long_name	the index of ice effective radius in phy_f3d
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nieffr
requested	NOT REQUESTED
physics set	

index_for_ice_friendly_aerosols

long_name	tracer index for ice friendly aerosol
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntia
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

index_for_liquid_cloud_condensate

long_name	tracer index for cloud condensate (or liquid water)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntcw
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_rrtmg_setup_init GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run cs_conv_aw_adj_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

index_for_liquid_cloud_number_concentration

long_name	tracer index for liquid number concentration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntlnc
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_4_run cu_gf_driver_run
physics set	slow_physics

index_for_ozone

long_name	tracer index for ozone mixing ratio
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntoz
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_rrtmg_setup_init
physics set	slow_physics

index_for_rain_effective_radius

long_name	the index of rain effective radius in phy_f3d
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control% <i>n</i> reffr
requested	NOT REQUESTED
physics set	

index_for_rain_number_concentration

long_name	tracer index for rain number concentration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control% <i>n</i> trnc
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

index_for_rain_water

long_name	tracer index for rain water
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntrw
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run myjpbl_wrapper_run myjsfc_wrapper_run
physics set	slow_physics

index_for_snow_effective_radius

long_name	the index of snow effective radius in phy_f3d
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nseffr
requested	NOT REQUESTED
physics set	

index_for_snow_number_concentration

long_name	tracer index for snow number concentration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntsnc
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run
physics set	slow_physics

index_for_snow_water

long_name	tracer index for snow water
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntsw
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run myjpbl_wrapper_run myjsfc_wrapper_run
physics set	slow_physics

index_for_turbulent_kinetic_energy

long_name	tracer index for turbulent kinetic energy
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntke
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run cires_ugwp_run myjpbl_wrapper_run myjsfc_wrapper_run
physics set	slow_physics

index_for_turbulent_kinetic_energy_convective_transport_tracer

long_name	index for turbulent kinetic energy in the convectively transported tracer array
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ntk
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

index_for_turbulent_kinetic_energy_vertical_diffusion_tracer

long_name	index for turbulent kinetic energy in the vertically diffused tracer array
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ntkev
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run moninshoc_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

index_for_water_friendly_aerosols

long_name	tracer index for water friendly aerosol
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntwa
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

index_for_water_vapor

long_name	tracer index for water vapor (specific humidity)
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntqv
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
physics set	slow_physics

index_of_atmosphere_heat_diffusivity_from_shoc_in_phy_f3d

long_name	the index of diffusivity for heat from from SHOC in phy_f3d
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nahdshoc
requested	NOT REQUESTED
physics set	

index_of_dtlm_start

long_name	index to start dtlm run or not
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%ifd
requested	sfc_nst_run
physics set	slow_physics

index_of_highest_temperature_inversion

long_name	index of highest temperature inversion
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kinver
requested	GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run hedmf_run moninshoc_run myjpbl_wrapper_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

index_of_kinematic_buoyancy_flux_from_shoc_in_phy_f3d

long_name	the index of upward kinematic buoyancy flux from SHOC in phy_f3d
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nkbfshoc
requested	NOT REQUESTED
physics set	

index_of_subgrid_scale_cloud_fraction_from_shoc_in_phy_f3d

long_name	the index of subgrid-scale cloud fraction from from SHOC in phy_f3d
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nscfshoc
requested	NOT REQUESTED
physics set	

index_of_time_step

long_name	current forecast iteration
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%kdt
requested	GFS_MP_generic_post_run GFS_checkland_run GFS_time_vary_pre_run cires_ugwp_run cs_conv_run cu_gf_driver_pre_run cu_ntiedtke_pre_run drag_suite_run gwdps_run lsm_ruc_run m_micro_run mp_thompson_post_run mp_thompson_pre_run myjpbl_wrapper_run myjsfc_wrapper_run noahmpdrv_run sfc_nst_run
physics set	slow_physics

instantaneous_aerosol_column_mass_densities

long_name instantaneous aerosol column mass densities for pm2.5, black carbon, organic carbon, sulfate, dust, sea salt
units g m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%aecm
requested NOT REQUESTED
physics set

instantaneous_anthropogenic_and_biomass_burning_emissions

long_name instantaneous anthropogenic and biomass burning emissions for black carbon, organic carbon, and sulfur dioxide
units ug m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%abem
requested NOT REQUESTED
physics set


```

instantaneous_atmosphere_detrainment_convective_mass_flux
  long_name      (detrainment mass flux) * delt
  units          kg m-2
  rank           2
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_interstitial_type
  local_name     GFS_Interstitial(cdata%thrd_no)%dt_mf
  requested      GFS_DCNV_generic_post_run
                  cs_conv_run
                  cu_gf_driver_run
                  cu_ntiedtke_run
                  samfdeepcnv_run
                  samfshalcnv_run
  physics set    slow_physics

```

```

instantaneous_atmosphere_downdraft_convective_mass_flux
  long_name      (downdraft mass flux) * delt
  units          kg m-2
  rank           2
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_interstitial_type
  local_name     GFS_Interstitial(cdata%thrd_no)%dd_mf
  requested      GFS_DCNV_generic_post_run
                  cs_conv_run
                  cu_gf_driver_run
                  cu_ntiedtke_run
                  samfdeepcnv_run
  physics set    slow_physics

```

instantaneous_atmosphere_heat_diffusivity

long_name instantaneous atmospheric heat diffusivity
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dk
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_atmosphere_updraft_convective_mass_flux

long_name (updraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ud_mf
requested GFS_DCNV_generic_post_run
 cs_conv_run
 cu_gf_driver_run
 cu_ntiedtke_run
 samfdeepcnv_run
 samfshalcnv_run
physics set slow_physics

instantaneous_change_in_x_wind_due_to_mountain_blocking_drag

long_name instantaneous change in x wind due to mountain blocking drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dudt_mtb
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

instantaneous_change_in_x_wind_due_to_orographic_gravity_wave_drag

long_name instantaneous change in x wind due to orographic gw drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dudt_ogw
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

instantaneous_change_in_x_wind_due_to_turbulent_orographic_form_drag

long_name instantaneous change in x wind due to TOFD
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dudt_tms
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

instantaneous_convective_scale_wet_deposition

long_name instantaneous convective-scale wet deposition
units kg m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%wetdpc
requested NOT REQUESTED
physics set

instantaneous_cosine_of_zenith_angle

long_name	cosine of zenith angle at current time
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%xcosz
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_run noahmpdrv_run sfc_nst_run
physics set	slow_physics

instantaneous_dry_deposition

long_name	instantaneous dry deposition
units	kg m ⁻² s ⁻¹
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%drydep
requested	NOT REQUESTED
physics set	

instantaneous_dust_emission_flux

long_name instantaneous dust emission flux
units kg m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%duem
requested NOT REQUESTED
physics set

instantaneous_large_scale_wet_deposition

long_name instantaneous large-scale wet deposition
units kg m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%wetdpl
requested NOT REQUESTED
physics set

instantaneous_momentum_flux_due_to_mountain_blocking_drag

long_name instantaneous momentum flux due to mountain blocking drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%tau_mtb
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

instantaneous_momentum_flux_due_to_nonstationary_gravity_wave

long_name	instantaneous momentum flux due to nonstationary gravity waves
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tau_ngw
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

instantaneous_momentum_flux_due_to_orographic_gravity_wave_drag

long_name	instantaneous momentum flux due to orographic gravity wave drag
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tau_ogw
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

instantaneous_momentum_flux_due_to_turbulent_orographic_form_drag

long_name instantaneous momentum flux due to TOFD
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%tau_tofd
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

instantaneous_seasalt_emission_flux

long_name instantaneous sea salt emission flux
units kg m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%ssem
requested NOT REQUESTED
physics set

instantaneous_sedimentation

long_name instantaneous sedimentation
units kg m-2 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%sedim
requested NOT REQUESTED
physics set

instantaneous_specific_humidity_at_2m_for_coupling

long_name instantaneous Q2m
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%q2mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_air_pressure_for_coupling

long_name instantaneous sfc pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%psurfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling

long_name instantaneous sfc nir diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dnirdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous sfc uv+vis diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvisdfl_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling

long_name instantaneous sfc nir beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dnirbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous sfc uv+vis beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvisbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_longwave_flux_for_coupling

long_name instantaneous sfc downward lw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dlwsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_downwelling_shortwave_flux_for_coupling

long_name instantaneous sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dswsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_ground_heat_flux

long_name instantaneous sfc ground heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%gfluxi
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling

long_name instantaneous net nir diff sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nnirdfi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous net uv+vis diff downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nvisdifi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling

long_name instantaneous net nir beam sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nnirbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling

long_name instantaneous net uv+vis beam downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nvisbmi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_longwave_flux_for_coupling

long_name instantaneous net sfc downward lw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nlwsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_net_downward_shortwave_flux_for_coupling

long_name instantaneous net sfc downward sw flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nswsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_potential_evaporation

long_name instantaneous sfc potential evaporation
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%epi
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_surface_skin_temperature_for_coupling

long_name instantaneous sfc temperature
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%tsfci_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

```

instantaneous_surface_upward_latent_heat_flux
    long_name    surface upward latent heat flux
    units        W m-2
    rank         1
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_interstitial_type
    local_name   GFS_Interstitial(cdata%thrd_no)%dqsfc1
    requested    GFS_PBL_generic_post_run
                hedmf_run
                moninshoc_run
                myjpbl_wrapper_run
                mynnedmf_wrapper_run
                satmedmfvdif_run
                satmedmfvdifq_run
                shinhongvdif_run
                ysuvdif_run
    physics set  slow_physics

```

```

instantaneous_surface_upward_latent_heat_flux_for_coupling
    long_name    instantaneous sfc latent heat flux
    units        W m-2
    rank         1
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_coupling_type
    local_name   GFS_Data(cdata%blk_no)%Coupling%dqsfc1_cpl
    requested    GFS_PBL_generic_post_run
    physics set  slow_physics

```

instantaneous_surface_upward_latent_heat_flux_for_diag

long_name instantaneous sfc latent heat flux multiplied by timestep
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dqsfc1
requested GFS_PBL_generic_post_run
 mynnedmf_wrapper_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux

long_name surface upward sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dtsfc1
requested GFS_PBL_generic_post_run
 hedmf_run
 moninshoc_run
 myjpbl_wrapper_run
 mynnedmf_wrapper_run
 satmedmfvdif_run
 satmedmfvdifq_run
 shinhongvdif_run
 ysuvdif_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux_for_chemistry_coupling

long_name instantaneous upward sensible heat flux for chemistry coupling
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%ushfsfci
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux_for_coupling

long_name instantaneous sfc sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dtsfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_upward_sensible_heat_flux_for_diag

long_name instantaneous sfc sensible heat flux multiplied by timestep
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtsfci
requested GFS_PBL_generic_post_run
 mynnedmf_wrapper_run
physics set slow_physics

instantaneous_surface_x_momentum_flux

long_name x momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dusfc1
requested GFS_PBL_generic_post_run
 hedmf_run
 m_micro_run
 moninshoc_run
 myjpbl_wrapper_run
 satmedmfvdif_run
 satmedmfvdifq_run
 shinhongvdif_run
 ysuvdif_run
physics set slow_physics

instantaneous_surface_x_momentum_flux_for_coupling

long_name instantaneous sfc x momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dusfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_x_momentum_flux_for_diag

long_name	instantaneous sfc x momentum flux multiplied by timestep
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dusfci
requested	GFS_PBL_generic_post_run
physics set	slow_physics

instantaneous_surface_y_momentum_flux

long_name	y momentum flux
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dvsfci
requested	GFS_PBL_generic_post_run
	hedmf_run
	m_micro_run
	moninshoc_run
	myjpbl_wrapper_run
	satmedmfvdif_run
	satmedmfvdifq_run
	shinhongvdif_run
	ysuvdif_run
physics set	slow_physics

instantaneous_surface_y_momentum_flux_for_coupling

long_name instantaneous sfc y momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvsfci_cpl
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_surface_y_momentum_flux_for_diag

long_name instantaneous sfc y momentum flux multiplied by timestep
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfci
requested GFS_PBL_generic_post_run
physics set slow_physics

instantaneous_temperature_at_2m_for_coupling

long_name instantaneous T2m
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%t2mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_water_vapor_specific_humidity_tendency_due_to_convection

long_name instantaneous moisture tendency due to convection
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dqdti
requested GFS_SCNV_generic_post_run
 GFS_suite_interstitial_4_run
physics set slow_physics

instantaneous_x_stress_due_to_gravity_wave_drag

long_name zonal surface stress due to orographic gravity wave drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dusfcg
requested GFS_GWD_generic_post_run
 cires_ugwp_run
 drag_suite_run
 gwdc_post_run
 gwdc_run
 gwdps_run
physics set slow_physics

instantaneous_x_wind_at_10m_for_coupling

long_name instantaneous U10m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%u10mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

instantaneous_y_stress_due_to_gravity_wave_drag

long_name meridional surface stress due to orographic gravity wave drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dvsfcg
requested GFS_GWD_generic_post_run
 cires_ugwp_run
 drag_suite_run
 gwdc_post_run
 gwdc_run
 gwdps_run
physics set slow_physics

instantaneous_y_wind_at_10m_for_coupling

long_name instantaneous V10m
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%v10mi_cpl
requested GFS_surface_generic_post_run
physics set slow_physics

integrated_x_momentum_flux_from_blocking_drag

long_name integrated x momentum flux from blocking drag
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dusfc_bl
requested NOT REQUESTED
physics set

integrated_x_momentum_flux_from_form_drag

long_name integrated x momentum flux from form drag
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dusfc_fd
requested NOT REQUESTED
physics set

integrated_x_momentum_flux_from_large_scale_gwd

long_name integrated x momentum flux from large scale gwd
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dusfc_ls
requested NOT REQUESTED
physics set

integrated_x_momentum_flux_from_small_scale_gwd

long_name integrated x momentum flux from small scale gwd
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dusfc_ss
requested NOT REQUESTED
physics set

integrated_y_momentum_flux_from_blocking_drag

long_name integrated y momentum flux from blocking drag
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfc_bl
requested NOT REQUESTED
physics set

integrated_y_momentum_flux_from_form_drag

long_name integrated y momentum flux from form drag
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfc_fd
requested NOT REQUESTED
physics set

integrated_y_momentum_flux_from_large_scale_gwd

long_name integrated y momentum flux from large scale gwd
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfc_ls
requested NOT REQUESTED
physics set

integrated_y_momentum_flux_from_small_scale_gwd

long_name integrated y momentum flux from small scale gwd
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvsfc_ss
requested NOT REQUESTED
physics set

inverse_scaling_factor_for_critical_relative_humidity

long_name	inverse scaling factor for critical relative humidity
units	rad2 m-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dxinv
requested	GFS_suite_interstitial_1_run
physics set	slow_physics

iounit_log

long_name	fortran unit number for logfile
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%logunit
requested	cires_ugwp_init gfdl_cloud_microphys_init
physics set	slow_physics

iounit_namelist

long_name	fortran unit number for file opens
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nlunit
requested	cires_ugwp_init gfdl_cloud_microphys_init lsm_noah_init lsm_ruc_init noahmpdrv_init
physics set	slow_physics

joules_per_calorie_constant

long_name	joules per calorie constant
units	J cal-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_jcal
requested	noahmpdrv_run sfc_nst_run
physics set	slow_physics

julian_day

long_name	julian day
units	days
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%julian
requested	GFS_time_vary_pre_run
	noahmpdrv_run
physics set	slow_physics

k_level_of_highest_reaching_plume

long_name	k-level of highest reaching plume
units	count
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%ktop_shallow
requested	NOT REQUESTED
physics set	

kappa_dry_for_fast_physics

long_name	modified kappa for fast physics
units	none
rank	0
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%akap
requested	fv_sat_adj_run
physics set	fast_physics

kind_INTEGER

long_name	definition of kind_INTEGER
units	none
rank	0
type	integer
kind	
source	MODULE machine
local_name	kind_INTEGER
requested	NOT REQUESTED
physics set	

kind_LOGICAL

long_name	definition of kind_LOGICAL
units	none
rank	0
type	integer
kind	
source	MODULE machine
local_name	kind_LOGICAL
requested	NOT REQUESTED
physics set	

kind_dyn

long_name	definition of kind_dyn
units	none
rank	0
type	integer
kind	
source	MODULE machine
local_name	kind_dyn
requested	NOT REQUESTED
physics set	

kind_grid

long_name	definition of kind_grid
units	none
rank	0
type	integer
kind	
source	MODULE machine
local_name	kind_grid
requested	NOT REQUESTED
physics set	

kind_phys

long_name	definition of kind_phys
units	none
rank	0
type	integer
kind	
source	MODULE machine
local_name	kind_phys
requested	NOT REQUESTED
physics set	

kinematic_buoyancy_flux_from_shoc

long_name	upward kinematic buoyancy flux from the SHOC scheme
units	K m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nkbfshoc)
requested	NOT REQUESTED
physics set	

kinematic_surface_latent_heat_flux

long_name	kinematic surface latent heat flux
units	m s-1 kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_elflx
requested	NOT REQUESTED
physics set	

kinematic_surface_upward_latent_heat_flux

long_name	kinematic surface upward latent heat flux
units	kg kg-1 m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%evap
requested	GFS_surface_composites_post_run cu_gf_driver_run cu_ntiedtke_run hedmf_run moninshoc_run myjpbl_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

kinematic_surface_upward_latent_heat_flux_over_ice

long_name kinematic surface upward latent heat flux over ice
units kg kg-1 m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%evap_ice
requested GFS_surface_composites_post_run
sfc_cice_run
sfc_sice_run
physics set slow_physics

kinematic_surface_upward_latent_heat_flux_over_land

long_name kinematic surface upward latent heat flux over land
units kg kg-1 m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%evap_land
requested GFS_surface_composites_post_run
lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

kinematic_surface_upward_latent_heat_flux_over_ocean

long_name	kinematic surface upward latent heat flux over ocean
units	kg kg-1 m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%evap_ocean
requested	GFS_PBL_generic_post_run GFS_surface_composites_post_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

kinematic_surface_upward_sensible_heat_flux

long_name	kinematic surface upward sensible heat flux
units	K m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%hflx
requested	GFS_PBL_generic_post_run GFS_surface_composites_post_run cu_gf_driver_run cu_ntiedtke_run hedmf_run moninshoc_run myjpbl_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

kinematic_surface_upward_sensible_heat_flux_over_ice

long_name kinematic surface upward sensible heat flux over ice
units K m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%hflx_ice
requested GFS_surface_composites_post_run
sfc_cice_run
sfc_sice_run
physics set slow_physics

kinematic_surface_upward_sensible_heat_flux_over_land

long_name kinematic surface upward sensible heat flux over land
units K m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%hflx_land
requested GFS_surface_composites_post_run
lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

kinematic_surface_upward_sensible_heat_flux_over_ocean

long_name	kinematic surface upward sensible heat flux over ocean
units	K m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%hflx_ocean
requested	GFS_PBL_generic_post_run GFS_surface_composites_post_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

lake_area_fraction

long_name	fraction of horizontal grid area occupied by lake
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%lakefrac
requested	GFS_checkland_run GFS_surface_composites_post_run GFS_surface_composites_pre_run myjsfc_wrapper_run
physics set	slow_physics

lake_ice_minimum

long_name minimum lake ice value
units ???
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%min_lakeice
requested GFS_surface_composites_pre_run
 sfc_sice_run
physics set slow_physics

lake_water_storage

long_name lake water storage
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%wslakexy
requested NOT REQUESTED
physics set

land_area_fraction

long_name	fraction of horizontal grid area occupied by land
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%landfrac
requested	GFS_checkland_run GFS_surface_composites_post_run GFS_surface_composites_pre_run myjsfc_wrapper_run
physics set	slow_physics

land_area_fraction_for_microphysics

long_name	land area fraction used in microphysics schemes
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%frland
requested	GFS_suite_interstitial_2_run GFS_surface_composites_pre_run gfdl_cloud_microphys_run m_micro_run
physics set	slow_physics

largest_cloud_top_vertical_index_encountered_thus_far

long_name	largest cloud top vertical index encountered thus far
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%acvt
requested	cnvc90_run
physics set	slow_physics

latent_heat_of_fusion_of_water_at_0C

long_name	latent heat of fusion
units	J kg-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_hfus
requested	m_micro_init
	noahmpdrv_run
	satmedmfvdif_run
	satmedmfvdifq_run
	sfc_nst_run
	shoc_run
physics set	slow_physics

latent_heat_of_vaporization_of_water_at_0C

long_name	latent heat of evaporation/sublimation
units	J kg-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_hvap
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run lsm_noah_run lsm_ruc_run m_micro_init moninshoc_run noahmpdrv_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run sfc_cice_run sfc_nst_run sfc_ocean_run sfc_sice_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

latitude

long_name	latitude
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%xlats
requested	GFS_MP_generic_post_run GFS_suite_interstitial_3_run ciros_ugwp_run m_micro_run noahmpdrv_run
physics set	slow_physics

latitude_degree

long_name	latitude in degrees
units	degree
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%xlats_d
requested	ciros_ugwp_run
physics set	slow_physics

latitude_index_in_debug_printouts

long_name	latitude index in debug printouts
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%latidxprnt
requested	NOT REQUESTED
physics set	

layer_bottom_depth_from_snow_surface

long_name	depth from the top of the snow surface at the bottom of the layer
units	m
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zsnsoxy
requested	NOT REQUESTED
physics set	

layer_pressure_thickness_for_radiation

long_name	layer pressure thickness on radiation levels
units	hPa
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%delr
requested	GFS_rrtmg_pre_run mynnrad_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

layer_thickness_for_radiation

long_name	layer thickness on radiation levels
units	km
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dzlyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

leaf_area_index

long_name	leaf area index
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xlaixy
requested	NOT REQUESTED
physics set	

leaf_mass

long_name	leaf mass
units	g m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%lfmassxy
requested	NOT REQUESTED
physics set	

level_of_dividing_streamline

long_name	level of the dividing streamline
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%zmtnbck
requested	GFS_stochastics_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

limit_for_temperature_tendency_for_microphysics

long_name	temperature tendency limiter per physics time step
units	K s-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ttendlim
requested	NOT REQUESTED
physics set	

liquid_water_density

long_name density of liquid water
units kg m-3
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs
local_name rhowater
requested NOT REQUESTED
physics set

local_condensed_water_number_concentration

long_name number concentration of condensed water local to physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ncpl
requested NOT REQUESTED
physics set

local_graupel_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of graupel local to physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%qgl
requested NOT REQUESTED
physics set

local_graupel_number_concentration

long_name number concentration of graupel local to physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ncgl
requested NOT REQUESTED
physics set

local_ice_number_concentration

long_name number concentration of ice local to physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ncpi
requested NOT REQUESTED
physics set

local_rain_number_concentration

long_name number concentration of rain local to physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ncpr
requested NOT REQUESTED
physics set

local_rain_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of rain water local to physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%qrn
requested NOT REQUESTED
physics set

local_snow_number_concentration

long_name number concentration of snow local to physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ncps
requested NOT REQUESTED
physics set

local_snow_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of snow water local to physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%qsnw
requested NOT REQUESTED
physics set

log_pressure_at_Lagrangian_surface

long_name	logarithm of pressure at Lagrangian surface
units	Pa
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%peln
requested	fv_sat_adj_run
physics set	fast_physics

longitude

long_name	longitude
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%xlon
requested	GFS_MP_generic_post_run dcyc2t3_run m_micro_run sfc_nst_post_run sfc_nst_run
physics set	slow_physics

lower_bound_of_snow_vertical_dimension_for_land_surface_model

long_name	lower bound of of snow-related arrays for land surface model
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsnow_lsm_lbound
requested	NOT REQUESTED
physics set	

lw_fluxes_sfc

long_name	lw radiation fluxes at sfc
units	W m-2
rank	1
type	sfcflw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%sfcflw
requested	rrtmg_lw_run
physics set	slow_physics

lw_fluxes_top_atmosphere

long_name	lw radiation fluxes at top
units	W m-2
rank	1
type	topflw_type
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%topflw
requested	rrtmg_lw_run
physics set	slow_physics

`lwe_thickness_of_convective_precipitation_amount_for_coupling`

long_name	total convective precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%rainc_cpl
requested	GFS_MP_generic_post_run
physics set	slow_physics

`lwe_thickness_of_convective_precipitation_amount_from_previous_timestep`

long_name	convective_precipitation_amount from previous timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%raincprv
requested	GFS_MP_generic_post_run
	lsm_ruc_run
physics set	slow_physics

`lwe_thickness_of_convective_precipitation_amount_on_dynamics_timestep`

<code>long_name</code>	convective rain at this time step
<code>units</code>	m
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_diag_type
<code>local_name</code>	GFS_Data(cdata%blk_no)%Intdiag%rainc
<code>requested</code>	GFS_DCNV_generic_post_run GFS_MP_generic_post_run GFS_SCNV_generic_post_run GFS_stochastics_run cnvc90_run
<code>physics set</code>	slow_physics

`lwe_thickness_of_deep_convective_precipitation_amount`

<code>long_name</code>	deep convective rainfall amount on physics timestep
<code>units</code>	m
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_interstitial_type
<code>local_name</code>	GFS_Interstitial(cdata%thrd_no)%raincd
<code>requested</code>	GFS_DCNV_generic_post_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run samfdeepcnv_run
<code>physics set</code>	slow_physics

lwe_thickness_of_explicit_precipitation_amount

long_name explicit precipitation (rain, ice, snow, graupel, ...) on physics timestep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%prcpmp
requested GFS_MP_generic_post_run
 cs_conv_aw_adj_run
 gfdl_cloud_microphys_run
 m_micro_run
 mp_thompson_run
 zhaocarr_precpd_run
physics set slow_physics

lwe_thickness_of_explicit_rain_amount

long_name explicit rain on physics timestep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%rainmp
requested GFS_MP_generic_post_run
 gfdl_cloud_microphys_run
 mp_thompson_run
physics set slow_physics

lwe_thickness_of_explicit_rainfall_amount_from_previous_timestep

long_name	explicit rainfall from previous timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%rainncprv
requested	GFS_MP_generic_post_run
	lsm_ruc_run
physics set	slow_physics

lwe_thickness_of_graupel_amount

long_name	explicit graupel fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%graupelmp
requested	GFS_MP_generic_post_run
	gfdl_cloud_microphys_run
	mp_thompson_run
physics set	slow_physics

lwe_thickness_of_graupel_amount_from_previous_timestep

long_name	graupel amount from previous timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%graupelprv
requested	GFS_MP_generic_post_run
	lsm_ruc_run
physics set	slow_physics

lwe_thickness_of_graupel_amount_on_dynamics_timestep

long_name	graupel fall at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%graupel
requested	GFS_MP_generic_post_run
	m_micro_post_run
physics set	slow_physics

lwe_thickness_of_ice_amount

long_name	explicit ice fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%icemp
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run mp_thompson_run
physics set	slow_physics

lwe_thickness_of_ice_amount_from_previous_timestep

long_name	ice amount from previous timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%iceprv
requested	GFS_MP_generic_post_run lsm_ruc_run
physics set	slow_physics

lwe_thickness_of_ice_amount_on_dynamics_timestep

long_name	ice fall at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%ice
requested	GFS_MP_generic_post_run
	m_micro_post_run
physics set	slow_physics

lwe_thickness_of_moist_convective_adj_precipitation_amount

long_name	adjusted moist convective rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%rainmcdj
requested	NOT REQUESTED
physics set	

lwe_thickness_of_precipitation_amount_for_coupling

long_name	total rain precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%rain_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

lwe_thickness_of_precipitation_amount_on_dynamics_timestep

long_name	total rain at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%rain
requested	GFS_MP_generic_post_run GFS_stochastics_run cires_ugwp_run
physics set	slow_physics

lwe_thickness_of_shallow_convective_precipitation_amount

long_name	shallow convective rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%raincs
requested	GFS_SCNV_generic_post_run samfshalcnv_run
physics set	slow_physics

lwe_thickness_of_snow_amount

long_name	explicit snow fall on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowmp
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run mp_thompson_run
physics set	slow_physics

lwe_thickness_of_snow_amount_for_coupling

long_name	total snow precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%snow_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

lwe_thickness_of_snow_amount_from_previous_timestep

long_name	snow amount from previous timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snowprv
requested	GFS_MP_generic_post_run lsm_ruc_run
physics set	slow_physics

lwe_thickness_of_snow_amount_on_dynamics_timestep

long_name	snow fall at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%snow
requested	GFS_MP_generic_post_run
	m_micro_post_run
physics set	slow_physics

magnitude_of_perturbation_of_heat_to_momentum_roughness_length_ratio

long_name	magnitude of perturbation of heat to momentum roughness length ratio
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%pertz
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_leaf_area_index

long_name	magnitude of perturbation of leaf area index
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%pertlai
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_momentum_roughness_length

long_name	magnitude of perturbation of momentum roughness length
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%pertz0
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_soil_type_b_parameter

long_name	magnitude of perturbation of soil type b parameter
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%pertshc
requested	GFS_surface_generic_pre_run
physics set	slow_physics

magnitude_of_perturbation_of_vegetation_fraction

long_name	magnitude of perturbation of vegetation fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%pertveg
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

magnitude_of_surface_albedo_perturbation

long_name magnitude of surface albedo perturbation
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%pertalb
requested NOT REQUESTED
physics set

map_of_block_column_number_to_global_i_index

long_name map of local index ix to global index i for this block
units none
rank 1
type integer
kind
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%imap
requested NOT REQUESTED
physics set

map_of_block_column_number_to_global_j_index

long_name map of local index ix to global index j for this block
units none
rank 1
type integer
kind
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%jmap
requested NOT REQUESTED
physics set

mass_fraction_of_convective_cloud_ice

long_name	mass fraction of convective cloud ice water
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qicn
requested	cs_conv_run m_micro_pre_run m_micro_run samfdeepcnv_run
physics set	slow_physics

mass_fraction_of_convective_cloud_liquid_water

long_name	mass fraction of convective cloud liquid water
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qlcn
requested	cs_conv_run m_micro_pre_run m_micro_run samfdeepcnv_run
physics set	slow_physics

maximum_column_heating_rate

long_name maximum heating rate in column
units K s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cumabs
requested NOT REQUESTED
physics set

maximum_critical_relative_humidity

long_name maximum critical relative humidity
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%rhcmx
requested GFS_suite_interstitial_3_run
physics set slow_physics

maximum_mass_flux

long_name maximum mass flux within a column
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%maxMF
requested NOT REQUESTED
physics set

maximum_reflectivity_at_1km_agl_over_maximum_hourly_time_interval

long_name maximum reflectivity at 1km agl over maximum hourly time interval
units dBZ
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%refdmax
requested maximum_hourly_diagnostics_run
physics set slow_physics

maximum_reflectivity_at_minus10c_over_maximum_hourly_time_interval

long_name maximum reflectivity at minus10c over maximum hourly time interval
units dBZ
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%refdmax263k
requested maximum_hourly_diagnostics_run
physics set slow_physics

maximum_relative_humidity_at_2m_over_maximum_hourly_time_interval

long_name maximum relative humidity at 2m over maximum hourly time interval
units %
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%rh02max
requested maximum_hourly_diagnostics_run
physics set slow_physics

maximum_scaling_factor_for_critical_relative_humidity

long_name	maximum scaling factor for critical relative humidity
units	m2 rad-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dxmax
requested	NOT REQUESTED
physics set	

maximum_specific_humidity_at_2m

long_name	maximum specific humidity at 2m height
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%spfhmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_subgrid_orography

long_name	maximum of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%elvmax
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

maximum_temperature_at_2m

long_name	max temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%tmpmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_temperature_at_2m_over_maximum_hourly_time_interval

long_name	maximum temperature at 2m over maximum hourly time interval
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%t02max
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

maximum_u_wind_at_10m_over_maximum_hourly_time_interval

long_name	maximum u wind at 10m over maximum hourly time interval
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%u10max
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

maximum_updraft_velocity_at_cloud_base

long_name	maximum updraft velocity at cloud base
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%wcbmax
requested	NOT REQUESTED
physics set	

maximum_v_wind_at_10m_over_maximum_hourly_time_interval

long_name	maximum v wind at 10m over maximum hourly time interval
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%v10max
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

maximum_vegetation_area_fraction

long_name	max fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%shdmax
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

maximum_wind_at_10m

long_name	maximum wind speed at 10 m
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%wind10mmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_wind_at_10m_over_maximum_hourly_time_interval

long_name	maximum wind at 10m over maximum hourly time interval
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%spd10max
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

maximum_x_wind_at_10m

long_name	maximum x wind at 10 m
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%u10mmax
requested	sfc_diag_post_run
physics set	slow_physics

maximum_y_wind_at_10m

long_name	maximum y wind at 10 m
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%v10mmax
requested	sfc_diag_post_run
physics set	slow_physics

mean_change_over_depth_in_sea_water_temperature

long_name	mean of dT(z) (zsea1 to zsea2)
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dtzm
requested	sfc_nst_post_run
physics set	slow_physics

mean_effective_radius_for_ice_cloud

long_name	mean effective radius for ice cloud
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 5)
requested	GFS_rrtmg_pre_run mynnrad_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_effective_radius_for_liquid_cloud

long_name	mean effective radius for liquid cloud
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 3)
requested	GFS_rrtmg_pre_run mynnrad_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_effective_radius_for_rain_drop

long_name	mean effective radius for rain drop
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 7)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_effective_radius_for_snow_flake

long_name	mean effective radius for snow flake
units	micron
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 9)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

mean_nir_albedo_with_weak_cosz_dependency

long_name	mean nir albedo with weak cosz dependency
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%alnwf
requested	NOT REQUESTED
physics set	

mean_vis_albedo_with_weak_cosz_dependency

long_name	mean vis albedo with weak cosz dependency
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%alvwf
requested	NOT REQUESTED
physics set	

mg_allow_supersat_after_sed

long_name	allow supersaturation after sedimentation for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%sed_supersat
requested	NOT REQUESTED
physics set	

mg_autoconversion_size_threshold_ice_snow

long_name	autoconversion size threshold for cloud ice to snow for MG microphysics
units	um
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_dcs
requested	NOT REQUESTED
physics set	

mg_bergeron_efficiency_factor

long_name	bergeron efficiency factor for MG microphysics
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_berg_eff_factor
requested	NOT REQUESTED
physics set	

mg_cloud_water_variance

long_name	cloud water relative variance for MG microphysics
units	
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_qcvar
requested	NOT REQUESTED
physics set	

mg_drop_concentration_constant

long_name	droplet concentration constant for MG microphysics
units	m-3
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_ncnst
requested	NOT REQUESTED
physics set	

mg_flag_drop_concentration_constant

long_name	flag for constant droplet concentration for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_nccons
requested	NOT REQUESTED
physics set	

mg_flag_for_cloud_ice_processes

long_name	flag for cloud ice processes for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_cldice
requested	NOT REQUESTED
physics set	

mg_flag_for_gmao_ice_formulation

long_name flag for gmao ice formulation
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_do_ice_gmao
requested NOT REQUESTED
physics set

mg_flag_for_graupel

long_name flag for graupel for MG microphysics (hail possible if false)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_do_graupel
requested NOT REQUESTED
physics set

mg_flag_for_hail

long_name flag for hail for MG microphysics (graupel possible if false)
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_do_hail
requested NOT REQUESTED
physics set

mg_flag_for_heterogeneous_freezing

long_name	flag for heterogeneous freezing for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%hetfrz_classnuc
requested	NOT REQUESTED
physics set	

mg_flag_for_liu_liquid_treatment

long_name	flag for liu liquid treatment
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_do_liq_liu
requested	NOT REQUESTED
physics set	

mg_flag_for_sb2001_autoconversion

long_name	flag for SB 2001 autoconversion or accretion for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%do_sb_physics
requested	NOT REQUESTED
physics set	

mg_flag_for_uniform_subcolumns

long_name	flag for uniform subcolumns for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%microp_uniform
requested	NOT REQUESTED
physics set	

mg_flag_graupel_concentration_constant

long_name	flag for constant graupel concentration for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_ngcons
requested	NOT REQUESTED
physics set	

mg_flag_ice_concentration_constant

long_name	flag for constant ice concentration for MG microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_nicons
requested	NOT REQUESTED
physics set	

mg_graupel_concentration_constant

long_name graupel concentration constant for MG microphysics
units m-3
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_ngnst
requested NOT REQUESTED
physics set

mg_ice_concentration_constant

long_name ice concentration constant for MG microphysics
units m-3
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_ninst
requested NOT REQUESTED
physics set

mg_minimum_cloud_condensed_water_and_ice_mixing_ratio

long_name minimum cloud condensed water and ice mixing ratio in MG macro clouds
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_qcmin
requested NOT REQUESTED
physics set

mg_minimum_cloud_condensed_water_mixing_ratio

long_name	minimum cloud condensed water mixing ratio in MG macro clouds
units	kg kg-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_qcmin(1)
requested	NOT REQUESTED
physics set	

mg_minimum_ice_mixing_ratio

long_name	minimum ice mixing ratio in MG macro clouds
units	kg kg-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_qcmin(2)
requested	NOT REQUESTED
physics set	

mg_minimum_rh_for_ice

long_name	relative humidity threshold parameter for nucleating ice for MG microphysics
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%mg_rhmini
requested	NOT REQUESTED
physics set	

mg_time_scale_for_autoconversion_of_ice

long_name autoconversion time scale for ice for MG microphysics
units s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_ts_auto_ice
requested NOT REQUESTED
physics set

mg_tuning_factor_for_alphas

long_name tuning factor for alphas (alpha = 1 - critical relative humidity)
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_alf
requested NOT REQUESTED
physics set

mg_type_of_precip_fraction_method

long_name type of precip fraction method for MG microphysics (in_cloud or max_overlap)
units none
rank 0
type character
kind len=16
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%mg_precip_frac_method
requested NOT REQUESTED
physics set

minimum_relytive_humidity_at_2m_over_maximum_hourly_time_interval

long_name	minumum relative humidity at 2m over maximum hourly time interval
units	%
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%rh02min
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

minimum_scaling_factor_for_critical_relative_humidity

long_name	minimum scaling factor for critical relative humidity
units	m2 rad-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dxmin
requested	GFS_suite_interstitial_1_run
physics set	slow_physics

minimum_sea_ice_concentration

long_name	minimum sea ice concentration
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	cimin
requested	GFS_surface_composites_pre_run
physics set	slow_physics

minimum_specific_humidity_at_2m

long_name	minimum specific humidity at 2m height
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%spfhmin
requested	sfc_diag_post_run
physics set	slow_physics

minimum_temperature_at_2m

long_name	min temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%tmpmin
requested	sfc_diag_post_run
physics set	slow_physics

minimum_temperature_at_2m_over_maximum_hourly_time_interval

long_name	minumum temperature at 2m over maximum hourly time interval
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%t02min
requested	maximum_hourly_diagnostics_run
physics set	slow_physics

minimum_vegetation_area_fraction

long_name	min fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%shdmin
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

mix_total_water_flag

long_name	flag to mix total water or individual species
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bl_mynn_mixqt
requested	NOT REQUESTED
physics set	

`mixing_length`

<code>long_name</code>	mixing length in meters
<code>units</code>	m
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs TYPE GFS_tbd_type
<code>local_name</code>	GFS_Data(cdata%blk_no)%Tbd%el_pbl
<code>requested</code>	NOT REQUESTED
<code>physics set</code>	

`mixing_length_flag`

<code>long_name</code>	flag to determine which mixing length form to use
<code>units</code>	flag
<code>rank</code>	0
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_control_type
<code>local_name</code>	GFS_Control%bl_mynn_mixlength
<code>requested</code>	NOT REQUESTED
<code>physics set</code>	

`model_layer_number_at_cloud_base`

<code>long_name</code>	vertical indices for low, middle and high cloud bases
<code>units</code>	index
<code>rank</code>	2
<code>type</code>	integer
<code>kind</code>	
<code>source</code>	MODULE GFS_typedefs TYPE GFS_interstitial_type
<code>local_name</code>	GFS_Interstitial(cdata%thrd_no)%mbota
<code>requested</code>	GFS_rrtmg_post_run GFS_rrtmg_pre_run
<code>physics set</code>	slow_physics

model_layer_number_at_cloud_top

long_name vertical indices for low, middle and high cloud tops
units index
rank 2
type integer
kind
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%mtopa
requested GFS_rrtmg_post_run
 GFS_rrtmg_pre_run
physics set slow_physics

moisture_from_previous_timestep

long_name moisture from previous time step
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%prevsq
requested NOT REQUESTED
physics set

moisture_tendency_due_to_dynamics

long_name moisture tendency due to dynamics only
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%forceq
requested NOT REQUESTED
physics set

momentum_exchange_coefficient_for_MYJ_schemes

long_name surface momentum exchange_coefficient for MYJ schemes
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_akms
requested NOT REQUESTED
physics set

momentum_transport_reduction_factor_pgf_deep_convection

long_name reduction factor in momentum transport due to deep conv. induced pressure gradient force
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%pgcon_deep
requested samfdeepcnv_run
physics set slow_physics

momentum_transport_reduction_factor_pgf_shallow_convection

long_name reduction factor in momentum transport due to shal conv. induced pressure gradient force
units frac
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%pgcon_shal
requested samfshalcnv_run
physics set slow_physics

mpi_comm

long_name	MPI communicator
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%communicator
requested	NOT REQUESTED
physics set	

mpi_rank

long_name	current MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%me
requested	GFS_checkland_run GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_time_vary_pre_run cires_ugwp_init cires_ugwp_run cs_conv_run cu_gf_driver_init cu_ntiedtke_init drag_suite_run gfdl_cloud_microphys_init gwdps_run h2ophys_run lsm_noah_init lsm_ruc_init lsm_ruc_run moninshoc_run mp_thompson_init mp_thompson_post_run mp_thompson_pre_run mp_thompson_run myjpbl_wrapper_run myjsfc_wrapper_run noahmpdrv_init ozphys_2015_run ozphys_run shoc_run physics set slow_physics

mpi_rank_for_fast_physics

long_name	current MPI-rank for fast physics schemes
units	index
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%mpirank
requested	fv_sat_adj_init
physics set	fast_physics

mpi_root

long_name	master MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%master
requested	GFS_checkland_run GFS_time_vary_pre_run cires_ugwp_init cires_ugwp_run cu_gf_driver_init cu_ntiedtke_init drag_suite_run gfdl_cloud_microphys_init lsm_ruc_run mp_thompson_init mp_thompson_post_run mp_thompson_pre_run mp_thompson_run
physics set	slow_physics

mpi_root_for_fast_physics

long_name	master MPI-rank for fast physics schemes
units	index
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%mpiroot
requested	fv_sat_adj_init
physics set	fast_physics

mpi_size

long_name	number of MPI tasks in communicator
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntasks
requested	NOT REQUESTED
physics set	

multiplication_factors_for_convective_gravity_wave_drag

long_name	multiplication factor for convective GWD
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cgwf
requested	cires_ugwp_init gwdc_pre_run
physics set	slow_physics

multiplication_factors_for_mountain_blocking_and_orographic_gravity_wave_drag

long_name	multiplication factors for cdmf and gwd
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cdmbgwd
requested	cires_ugwp_init cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

namelist_filename

long_name	namelist filename
units	none
rank	0
type	character
kind	len=64
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%fn_nml
requested	cires_ugwp_init gfdl_cloud_microphys_init
physics set	slow_physics

`namelist_filename_for_internal_file_reads`

<code>long_name</code>	<code>namelist filename for internal file reads</code>
<code>units</code>	<code>none</code>
<code>rank</code>	<code>1</code>
<code>type</code>	<code>character</code>
<code>kind</code>	<code>len=256</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_control_type</code>
<code>local_name</code>	<code>GFS_Control%input_nml_file</code>
<code>requested</code>	<code>cires_ugwp_init</code> <code>gfdl_cloud_microphys_init</code>
<code>physics set</code>	<code>slow_physics</code>

`natural_log_of_h2o_forcing_data_pressure_levels`

<code>long_name</code>	<code>natural log of h2o forcing data pressure levels</code>
<code>units</code>	<code>log(Pa)</code>
<code>rank</code>	<code>1</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_interstitial_type</code>
<code>local_name</code>	<code>GFS_Interstitial(cdata%thrd_no)%h2o_pres</code>
<code>requested</code>	<code>h2ophys_run</code>
<code>physics set</code>	<code>slow_physics</code>

`natural_log_of_ozone_forcing_data_pressure_levels`

<code>long_name</code>	<code>natural log of ozone forcing data pressure levels</code>
<code>units</code>	<code>log(Pa)</code>
<code>rank</code>	<code>1</code>
<code>type</code>	<code>real</code>
<code>kind</code>	<code>kind_phys</code>
<code>source</code>	<code>MODULE GFS_typedefs TYPE GFS_interstitial_type</code>
<code>local_name</code>	<code>GFS_Interstitial(cdata%thrd_no)%oz_pres</code>
<code>requested</code>	<code>ozphys_2015_run</code> <code>ozphys_run</code>
<code>physics set</code>	<code>slow_physics</code>

netcdf_float_fillvalue

long_name	definition of NetCDF float FillValue
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	huge
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

nondimensional_snow_age

long_name	non-dimensional snow age
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%taussxy
requested	NOT REQUESTED
physics set	

nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep

long_name	total precipitation amount in each time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tprcp
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_composites_post_run GFS_surface_composites_pre_run
physics set	slow_physics

nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep_over_ice

long_name	total precipitation amount in each time step over ice
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tprcp_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_sice_run
physics set	slow_physics

nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep_over_land

long_name	total precipitation amount in each time step over land
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tprcp_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run lsm_noah_run noahmpdrv_run
physics set	slow_physics

nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep_over_ocean

long_name	total precipitation amount in each time step over ocean
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tprcp_ocean
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_nst_run
physics set	slow_physics

normalized_soil_wetness

long_name	normalized soil wetness
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%wet1
requested	lsm_noah_run
	noahmpdrv_run
physics set	slow_physics

normalized_soil_wetness_for_land_surface_model

long_name	normalized soil wetness for lsm
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%wetness
requested	NOT REQUESTED
physics set	

number_concentration_of_cloud_liquid_water_particles_for_detrainment

long_name droplet number concentration in convective detrainment
units m-3
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cnv_ndrop
requested cs_conv_run
 m_micro_run
 samfdeepcnv_run
physics set slow_physics

number_concentration_of_ice_crystals_for_detrainment

long_name crystal number concentration in convective detrainment
units m-3
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cnv_nice
requested cs_conv_run
 m_micro_run
 samfdeepcnv_run
physics set slow_physics

number_of_3d_arrays_associated_with_pdf_based_clouds

long_name	number of 3d arrays associated with pdf based clouds/mp
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%npdf3d
requested	GFS_DCNV_generic_post_run GFS_SCNV_generic_post_run GFS_rrtmg_setup_init
physics set	slow_physics

number_of_aerosol_bands_for_longwave_radiation

long_name	number of aerosol bands for longwave radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nbdlw
requested	NOT REQUESTED
physics set	

number_of_aerosol_bands_for_shortwave_radiation

long_name	number of aerosol bands for shortwave radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nbdsw
requested	NOT REQUESTED
physics set	

number_of_aerosol_output_fields_for_longwave_radiation

long_name	number of aerosol output fields for longwave radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nf_aelw
requested	NOT REQUESTED
physics set	

number_of_aerosol_output_fields_for_shortwave_radiation

long_name	number of aerosol output fields for shortwave radiation
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nf_aesw
requested	NOT REQUESTED
physics set	

number_of_aerosol_tracers_MG

long_name	number of aerosol tracers for Morrison Gettelman MP
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntrcaer
requested	NOT REQUESTED
physics set	

number_of_aerosol_tracers_for_convection

long_name	number of aerosol tracers transported/scavenged by convection
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%itc
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_blocks

long_name	for explicit data blocking: number of blocks
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nblks
requested	NOT REQUESTED
physics set	

number_of_chemical_tracers

long_name	number of chemical tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntchm
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_chemical_tracers_for_diagnostics

long_name	number of chemical tracers for diagnostic output
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%ntchmdiag
requested	NOT REQUESTED
physics set	

number_of_cloud_condensate_types

long_name	number of cloud condensate types
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ncnd
requested	NOT REQUESTED
physics set	

number_of_cloud_types_CS

long_name	number of cloud types in Chikira-Sugiyama scheme
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nctp
requested	NOT REQUESTED
physics set	

number_of_coefficients_in_h2o_forcing_data

long_name	number of coefficients in h2o forcing data
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%h2o_coeff
requested	h2ophys_run
physics set	slow_physics

number_of_coefficients_in_ozone_forcing_data

long_name	number of coefficients in ozone forcing data
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%oz_coeff
requested	ozphys_2015_run ozphys_run
physics set	slow_physics

number_of_coefficients_in_ozone_forcing_data_plus_five

long_name	number of coefficients in ozone forcing data plus five
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%oz_coeffp5
requested	NOT REQUESTED
physics set	

number_of_convective_3d_cloud_fields

long_name	number of convective 3d clouds fields
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ncnvcld3d
requested	GFS_DCNV_generic_post_run GFS_SCNV_generic_post_run
physics set	slow_physics

number_of_days_in_year

long_name	number of days in a year
units	days
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%yearlen
requested	GFS_time_vary_pre_run
	noahmpdrv_run
physics set	slow_physics

number_of_dust_bins_for_diagnostics

long_name	number of dust bins for diagnostics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%ndust
requested	NOT REQUESTED
physics set	

number_of_equatorial_longitude_points

long_name	number of global points in x-dir (i) along the equator
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lonr
requested	cires_ugwp_init cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

number_of_fields_in_phyf2d

long_name	total number of variables for phyf2d
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntot2d
requested	NOT REQUESTED
physics set	

number_of_fields_in_phyf3d

long_name	total number of variables for phyf3d
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntot3d
requested	NOT REQUESTED
physics set	

number_of_frozen_precipitation_species

long_name	number of frozen precipitation species
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%fprcp
requested	NOT REQUESTED
physics set	

number_of_gases_for_multi_gases_physics

long_name	number of gases for multi gases physics
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%ngas
requested	fv_sat_adj_init fv_sat_adj_run
physics set	fast_physics

number_of_ghost_zones

long_name	number of ghost zones defined in fv_mp
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%ng
requested	fv_sat_adj_run
physics set	fast_physics

number_of_hydrometeors

long_name	choice of cloud scheme / number of hydrometeors
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ncl
requested	GFS_MP_generic_post_run cs_conv_aw_adj_run cs_conv_pre_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_independent_cellular_automata

long_name	number of independent cellular automata
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nca
requested	NOT REQUESTED
physics set	

number_of_iterations_to_spin_up_cellular_automata

long_name	number of iterations to spin up the ca
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nspinup
requested	NOT REQUESTED
physics set	

number_of_latitude_points

long_name	number of global points in y-dir (j) along the meridian
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%latr
requested	cires_ugwp_init
physics set	slow_physics

number_of_lines_of_namelist_filename_for_internal_file_reads

long_name	lines in namelist file for internal file reads
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%input_nml_file_length
requested	NOT REQUESTED
physics set	

number_of_plumes

long_name	number of plumes per grid column
units	count
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%nupdraft
requested	NOT REQUESTED
physics set	

number_of_seasalt_bins_for_diagnostics

long_name	number of seasalt bins for diagnostics
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%nseasalt
requested	NOT REQUESTED
physics set	

number_of_snow_layers

long_name	number of snow layers
units	count
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snowxy
requested	NOT REQUESTED
physics set	

number_of_species_for_aerosol_optical_depth

long_name	number of species for output aerosol optical depth plus total
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nspc1
requested	NOT REQUESTED
physics set	

number_of_statistical_measures_of_subgrid_orography

long_name	number of topographic variables in GWD
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nmtvr
requested	GFS_GWD_generic_pre_run cires_ugwp_run gwdps_run
physics set	slow_physics

number_of_surface_perturbations

long_name	number of surface perturbations
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nsfcpert
requested	GFS_surface_generic_pre_run
physics set	slow_physics

number_of_tile

long_name	tile number
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%tile_num
requested	NOT REQUESTED
physics set	

number_of_timesteps_between_longwave_radiation_calls

long_name	number of timesteps between longwave radiation calls
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nslwr
requested	GFS_time_vary_pre_run
physics set	slow_physics

number_of_timesteps_between_shortwave_radiation_calls

long_name	number of timesteps between shortwave radiation calls
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nsswr
requested	GFS_time_vary_pre_run
physics set	slow_physics

number_of_timesteps_between_surface_cycling_calls

long_name	number of timesteps between surface cycling calls
units	
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nscyc
requested	GFS_time_vary_pre_run
physics set	slow_physics

number_of_total_tracers

long_name	total number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tracers_total
requested	GFS_suite_interstitial_4_run
	cu_ntiedtke_run
physics set	slow_physics

number_of_tracers

long_name	number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntrac
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cires_ugwp_run cs_conv_aw_adj_run cs_conv_pre_run cu_gf_driver_run myjsfc_wrapper_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

number_of_tracers_for_CS

long_name	number of convectively transported tracers in Chikira-Sugiyama deep conv. scheme
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ncstrac
requested	NOT REQUESTED
physics set	

number_of_tracers_for_cloud_condensate

long_name	number of tracers for cloud condensate
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nncl
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run cs_conv_aw_adj_run moninshoc_run
physics set	slow_physics

number_of_tracers_for_convective_transport

long_name	number of tracers for convective transport
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nn
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run cs_conv_run
physics set	slow_physics

number_of_tracers_for_samf

long_name	number of tracers for scale-aware mass flux schemes
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nsamftrac
requested	samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

number_of_tracers_plus_one

long_name	number of tracers plus one
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntracp1
requested	NOT REQUESTED
physics set	

number_of_tracers_scavenged

long_name	number of tracers scavenged
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nscav
requested	NOT REQUESTED
physics set	

number_of_vertical_diffusion_tracers

long_name	number of tracers to diffuse vertically
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%nvdiff
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run hedmf_run moninshoc_run myjpbl_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

number_of_vertical_layers_for_radiation_calculations

long_name	number of vertical levels for radiation calculations
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%levr
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init rayleigh_damp_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

number_of_vertical_layers_for_radiation_calculations_plus_one

long_name	number of vertical levels for radiation calculations + 1
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%levrp1
requested	NOT REQUESTED
physics set	

number_of_water_species

long_name	number of water species
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%nwat
requested	fv_sat_adj_init
physics set	fast_physics

number_of_water_tracers

long_name	number of water-related tracers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tracers_water
requested	NOT REQUESTED
physics set	

ocean_mixed_layer_thickness

long_name	mixed layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zm
requested	sfc_nst_run
physics set	slow_physics

omega

long_name	layer mean vertical velocity
units	Pa s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%vvl
requested	cu_gf_driver_run cu_ntiedtke_run gfdl_cloud_microphys_run m_micro_run mp_thompson_run mynnedmf_wrapper_run samfdeepcnv_run samfshalcnv_run shoc_run
physics set	slow_physics

omp_threads

long_name	number of OpenMP threads available for physics schemes
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nthreads
requested	GFS_diagtoscreen_run GFS_interstitialtoscreen_run GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run mp_thompson_init
physics set	slow_physics

omp_threads_for_fast_physics

long_name	number of OpenMP threads available for fast physics schemes
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%nthreads
requested	fv_sat_adj_run
physics set	fast_physics

orography

long_name	orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%oro
requested	cires_ugwp_run sfc_nst_post_run
physics set	slow_physics

orography_unfiltered

long_name	unfiltered orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%oro_uf
requested	cires_ugwp_run sfc_nst_post_run
physics set	slow_physics

ozone_concentration_at_layer_for_radiation

long_name	ozone concentration layer
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%olvr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

ozone_concentration_updated_by_physics

long_name	ozone concentration updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0(:,:,GFS_Control%ntoz)
requested	ozphys_2015_run ozphys_run
physics set	slow_physics

ozone_forcing

long_name	ozone forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%ozpl
requested	ozphys_2015_run ozphys_run
physics set	slow_physics

ozone_mixing_ratio

long_name	ozone mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntoz)
requested	NOT REQUESTED
physics set	

perturbation_of_heat_to_momentum_roughness_length_ratio

long_name	perturbation of heat to momentum roughness length ratio
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zt1d
requested	GFS_surface_generic_pre_run sfc_diff_run
physics set	slow_physics

perturbation_of_leaf_area_index

long_name	perturbation of leaf area index
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%xlai1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

perturbation_of_momentum_roughness_length

long_name	perturbation of momentum roughness length
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%z01d
requested	GFS_surface_generic_pre_run
	sfc_diff_run
physics set	slow_physics

perturbation_of_soil_type_b_parameter

long_name	perturbation of soil type "b" parameter
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%bexp1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

perturbation_of_vegetation_fraction

long_name	perturbation of vegetation fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%veg1d
requested	GFS_surface_generic_pre_run
	lsm_noah_run
physics set	slow_physics

pi

long_name	ratio of a circle's circumference to its diameter
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_pi
requested	GFS_suite_interstitial_4_run cires_ugwp_run drag_suite_run gwdc_run lsm_ruc_run sfc_nst_run shoc_run
physics set	slow_physics

potential_temperature_at_2m

long_name	2 meter potential temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%th2m
requested	NOT REQUESTED
physics set	

potential_temperature_at_viscous_sublayer_top

long_name	potential temperature at viscous sublayer top over water
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_thz0
requested	NOT REQUESTED
physics set	

prandtl_number

long_name	turbulent Prandtl number
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%prnum
requested	NOT REQUESTED
physics set	

pressure_at_bottom_of_convective_cloud

long_name	convective cloud bottom pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_cldprop_type
local_name	GFS_Data(cdata%blk_no)%Cldprop%cvb
requested	cnvc90_run
physics set	slow_physics

pressure_at_top_of_convective_cloud

long_name	convective cloud top pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_cldprop_type
local_name	GFS_Data(cdata%blk_no)%Cldprop%cvt
requested	cnvc90_run
physics set	slow_physics

pressure_cutoff_for_rayleigh_damping

long_name	pressure level from which Rayleigh Damping is applied
units	Pa
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%prslrd0
requested	cires_ugwp_init
	rayleigh_damp_run
physics set	slow_physics

pressure_thickness_at_Lagrangian_surface

long_name	pressure thickness at Lagrangian surface
units	Pa
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%delp
requested	fv_sat_adj_run
physics set	fast_physics

q_prime_squared

long_name	water vapor fluctuation squared
units	kg ² kg ⁻²
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%qsq
requested	NOT REQUESTED
physics set	

radar_reflectivity_10cm

long_name	instantaneous refl_10cm
units	dBZ
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%refl_10cm
requested	gfdl_cloud_microphys_run maximum_hourly_diagnostics_run mp_thompson_run
physics set	slow_physics

rain_conversion_parameter_deep_convection

long_name	convective rain conversion parameter for deep conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%c0s_deep
requested	samfdeepcnv_run
physics set	slow_physics

rain_conversion_parameter_shallow_convection

long_name	convective rain conversion parameter for shal conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%c0s_shal
requested	samfshalcnv_run
physics set	slow_physics

rain_evaporation_coefficient_deep_convection

long_name	convective rain evaporation coefficient for deep conv.
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%evfact_deep
requested	samfdeepcnv_run
physics set	slow_physics

rain_evaporation_coefficient_over_land_deep_convection

long_name	convective rain evaporation coefficient over land for deep conv.
units	frac
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%evfactl_deep
requested	samfdeepcnv_run
physics set	slow_physics

rain_number_concentration

long_name	number concentration of rain
units	kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntrnc)
requested	NOT REQUESTED
physics set	

rain_number_concentration_updated_by_physics

long_name	number concentration of rain updated by physics
units	kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntrnc)
requested	NOT REQUESTED
physics set	

rain_water_mixing_ratio

long_name moist (dry+vapor, no condensates) mixing ratio of rain water
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntrw)
requested NOT REQUESTED
physics set

rain_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of rain water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntrw)
requested gfdl_cloud_microphys_run
m_micro_post_run
m_micro_pre_run
mp_thompson_pre_run
mp_thompson_run
shoc_run
physics set slow_physics

random_number_array

long_name	random number array (0-1)
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%rann
requested	GFS_MP_generic_post_run
physics set	slow_physics

ratio_of_dry_air_to_water_vapor_gas_constants

long_name	rd/rv
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_eps
requested	lsm_noah_run
	noahmpdrv_run
	samfdeepcnv_run
	samfshalcnv_run
	satmedmfvdif_run
	satmedmfvdifq_run
	sfc_diag_post_run
	sfc_diag_run
	sfc_diff_run
	sfc_nst_run
	sfc_ocean_run
	sfc_sice_run
	shinhongvdif_run
	ysuvdif_run
physics set	slow_physics

ratio_of_dry_air_to_water_vapor_gas_constants_minus_one

long_name	(rd/rv) - 1
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_epsm1
requested	lsm_noah_run
	noahmpdrv_run
	samfdeepcnv_run
	samfshalcnv_run
	satmedmfvdif_run
	satmedmfvdifq_run
	sfc_diag_post_run
	sfc_diag_run
	sfc_diff_run
	sfc_nst_run
	sfc_ocean_run
	sfc_sice_run
physics set	slow_physics

ratio_of_exner_function_between_midlayer_and_interface_at_lowest_model_layer

long_name	Exner function ratio bt midlayer and interface at 1st layer
units	ratio
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%work3
requested	GFS_surface_generic_pre_run lsm_noah_run myjpbl_wrapper_run noahmpdrv_run sfc_diag_run sfc_diff_run sfc_nst_run sfc_ocean_run sfc_sice_run
physics set	slow_physics

ratio_of_snowfall_to_rainfall

long_name	snow ratio: ratio of snow to total precipitation (explicit only)
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%sr
requested	GFS_MP_generic_post_run gfdl_cloud_microphys_run m_micro_run mp_thompson_run zhaocarr_precpd_run
physics set	slow_physics

```

ratio_of_vapor_to_dry_air_gas_constants_minus_one
  long_name      (rv/rd) - 1 (rv = ideal gas constant for water vapor)
  units          none
  rank           0
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs
  local_name     con_fvirt
  requested      GFS_PBL_generic_post_run
                  cires_ugwp_run
                  drag_suite_run
                  gfdl_cloud_microphys_run
                  gwdc_run
                  lsm_noah_run
                  lsm_ruc_run
                  moninshoc_run
                  noahmpdrv_run
                  samfdeepcnv_run
                  samfshalcnv_run
                  satmedmfvdif_run
                  satmedmfvdifq_run
                  sfc_cice_run
                  sfc_diff_run
                  sfc_nst_run
                  sfc_ocean_run
                  sfc_sice_run
                  shinhongvdif_run
                  shoc_run
                  ysuvdif_run
  physics set    slow_physics

```

ratio_of_vapor_to_dry_air_gas_constants_minus_one_default_kind

long_name zvir=rv/rd-1.0
units none
rank 0
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%zvir
requested fv_sat_adj_run
physics set fast_physics

ratio_of_wind_at_lowest_model_layer_and_wind_at_10m

long_name ratio of sigma level 1 wind and 10m wind
units ratio
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%f10m
requested sfc_diag_run
physics set slow_physics

reciprocal_of_obukhov_length

long_name one over obukhov length
units m-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%rmol
requested NOT REQUESTED
physics set

sea_area_fraction

long_name fraction of horizontal grid area occupied by ocean
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%oceanfrac
requested GFS_PBL_generic_post_run
 GFS_checkland_run
 GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
 myjsfc_wrapper_run
physics set slow_physics

sea_ice_concentration

long_name ice fraction over open water
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%fice
requested GFS_PBL_generic_post_run
 GFS_suite_interstitial_2_run
 GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
 GFS_surface_generic_pre_run
 lsm_ruc_run
 myjsfc_wrapper_run
 sfc_sice_run
physics set slow_physics

sea_ice_minimum

long_name	minimum sea ice value
units	???
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%min_seaice
requested	GFS_surface_composites_pre_run
physics set	slow_physics

sea_ice_temperature

long_name	sea ice surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tisfc
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run
physics set	slow_physics

sea_ice_temperature_interstitial

long_name	sea ice surface skin temperature use as interstitial
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run lsm_ruc_run sfc_sice_run
physics set	slow_physics

sea_ice_thickness

long_name	sea ice thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%hice
requested	GFS_surface_composites_post_run GFS_surface_generic_pre_run sfc_sice_run
physics set	slow_physics

sea_land_ice_mask

long_name	sea/land/ice mask (=0/1/2)
units	flag
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%islmsk
requested	GFS_checkland_run GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run cu_gf_driver_run cu_ntiedtke_run gfdl_cloud_microphys_run lsm_ruc_run samfdeepcnv_run samfshalcnv_run sfc_sice_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

sea_land_ice_mask_cice

long_name sea/land/ice mask cice (=0/1/2)
units flag
rank 1
type integer
kind
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%islmsk_cice
requested GFS_surface_generic_pre_run
 sfc_sice_run
physics set slow_physics

sea_land_ice_mask_in

long_name sea/land/ice mask input (=0/1/2)
units flag
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%slimskin_cpl
requested GFS_surface_generic_pre_run
physics set slow_physics

sea_land_ice_mask_real

long_name landmask: sea/land/ice=0/1/2
units flag
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%slmsk
requested GFS_checkland_run
GFS_suite_interstitial_1_run
drag_suite_run
myjpbl_wrapper_run
myjsfc_wrapper_run
mynnedmf_wrapper_run
mynnrad_pre_run
mynnsfc_wrapper_run
physics set slow_physics

sea_surface_reference_temperature

long_name sea surface reference temperature
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%tref
requested sfc_nst_post_run
sfc_nst_pre_run
sfc_nst_run
physics set slow_physics

sea_surface_temperature

long_name	sea surface temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tsfco
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run
physics set	slow_physics

sea_water_reference_density

long_name	sea water reference density
units	kg m-3
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_rhw0
requested	sfc_nst_run
physics set	slow_physics

sea_water_salinity

long_name	salinity content in diurnal thermocline layer
units	ppt m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xs
requested	sfc_nst_run
physics set	slow_physics

seconds_elapsed_since_model_initialization

long_name	seconds elapsed since model initialization
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%sec
requested	GFS_time_vary_pre_run
physics set	slow_physics

seed_for_random_number_generation_in_cellular_automata_scheme

long_name	seed for random number generation in ca scheme
units	none
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%iseed_ca
requested	NOT REQUESTED
physics set	

seed_random_numbers_lw

long_name	random seeds for sub-column cloud generators lw
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%icsdlw
requested	rrtmg_lw_run
physics set	slow_physics

seed_random_numbers_sw

long_name	random seeds for sub-column cloud generators sw
units	none
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%icsdsw
requested	rrtmg_sw_run
physics set	slow_physics

sensible_heat_flux_due_to_rainfall

long_name	sensible heat flux due to rainfall
units	W
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%grain
requested	sfc_nst_run
physics set	slow_physics

sensitivity_of_dtl_heat_content_to_surface_temperature

long_name	d(xt)/d(ts)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xtts
requested	sfc_nst_run
physics set	slow_physics

sensitivity_of_dtl_thickness_to_surface_temperature

long_name	d(xz)/d(ts)
units	m K-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xzts
requested	sfc_nst_run
physics set	slow_physics

sfcflw_type

long_name	definition of type sfcflw_type
units	DDT
rank	0
type	sfcflw_type
kind	
source	MODULE module_radlw_parameters
local_name	sfcflw_type
requested	NOT REQUESTED
physics set	

sfcfsw_type

long_name	definition of type sfcfsw_type
units	DDT
rank	0
type	sfcfsw_type
kind	
source	MODULE module_radsw_parameters
local_name	sfcfsw_type
requested	NOT REQUESTED
physics set	

shoc_flag_for_optional_surface_TKE_dissipation

long_name	flag for alt. TKE diss. near surface in SHOC (>0 = ON)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%shoc_parm(5)
requested	NOT REQUESTED
physics set	

shoc_implicit_TKE_integration_uncentering_term

long_name	uncentering term for TKE integration in SHOC
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%shoc_parm(4)
requested	NOT REQUESTED
physics set	

shoc_tke_dissipation_pressure_threshold

long_name pressure below which extra TKE diss. is applied in SHOC
units Pa
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%shoc_parm(1)
requested NOT REQUESTED
physics set

shoc_tke_dissipation_tunable_parameter

long_name mult. tuning parameter for TKE diss. in SHOC
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%shoc_parm(2)
requested NOT REQUESTED
physics set

shoc_tke_dissipation_tunable_parameter_near_surface

long_name mult. tuning parameter for TKE diss. at surface in SHOC
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%shoc_parm(3)
requested NOT REQUESTED
physics set

sine_of_latitude

long_name	sine of latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_grid_type
local_name	GFS_Data(cdata%blk_no)%Grid%sinlat
requested	cires_ugwp_run dcyc2t3_run sfc_nst_run
physics set	slow_physics

sine_of_solar_declination_angle

long_name	sin of the solar declination angle
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%sdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
physics set	slow_physics

slope_of_subgrid_orography

long_name	slope of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sigma
requested	GFS_GWD_generic_pre_run cires_ugwp_run drag_suite_run gwdps_run
physics set	slow_physics

slow_soil_pool_mass_content_of_carbon

long_name	stable carbon in deep soil
units	g m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%stblcpy
requested	NOT REQUESTED
physics set	

smallest_cloud_base_vertical_index_encountered_thus_far

long_name	smallest cloud base vertical index encountered thus far
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%acvb
requested	cnvc90_run
physics set	slow_physics

snow_albedo_at_previous_time_step

long_name	snow albedo at previous time step
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%alboldxy
requested	NOT REQUESTED
physics set	

snow_deposition_sublimation_upward_latent_heat_flux

long_name latent heat flux from snow depo/subl
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%sbsno
requested GFS_surface_generic_post_run
 lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
physics set slow_physics

snow_freezing_rain_upward_latent_heat_flux

long_name latent heat flux due to snow and frz rain
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%snohf
requested GFS_surface_generic_post_run
 lsm_noah_run
 noahmpdrv_run
physics set slow_physics

snow_layer_ice

long_name	snow layer ice
units	mm
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snicxy
requested	NOT REQUESTED
physics set	

snow_layer_liquid_water

long_name	snow layer liquid water
units	mm
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snliqxy
requested	NOT REQUESTED
physics set	

snow_mass_at_previous_time_step

long_name	snow mass at previous time step
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%sneqvoxy
requested	NOT REQUESTED
physics set	

snow_number_concentration

long_name number concentration of snow
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntsnc)
requested NOT REQUESTED
physics set

snow_number_concentration_updated_by_physics

long_name number concentration of snow updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntsnc)
requested NOT REQUESTED
physics set

snow_precipitation_rate_at_surface

long_name snow precipitation rate at surface
units mm s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%qsnowxy
requested NOT REQUESTED
physics set

snow_precipitation_rate_from_previous_timestep

long_name	snow precipitation rate from previous timestep
units	mm s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%dsnowprv
requested	GFS_MP_generic_post_run
	noahmpdrv_run
physics set	slow_physics

snow_temperature

long_name	snow_temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tsnoxy
requested	NOT REQUESTED
physics set	

snow_temperature_bottom_first_layer

long_name	snow temperature at the bottom of the first snow layer
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tsnow
requested	NOT REQUESTED
physics set	

snow_vertical_dimension_for_land_surface_model

long_name	maximum number of snow layers for land surface model
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsnow_lsm
requested	NOT REQUESTED
physics	set

snow_water_mixing_ratio

long_name	moist (dry+vapor, no condensates) mixing ratio of snow water
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntsw)
requested	NOT REQUESTED
physics	set

snow_water_mixing_ratio_updated_by_physics

long_name moist (dry+vapor, no condensates) mixing ratio of snow water updated by physics
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntsw)
requested gfdl_cloud_microphys_run
m_micro_post_run
m_micro_pre_run
mp_thompson_pre_run
mp_thompson_run
shoc_run
physics set slow_physics

soil_moisture_content

long_name soil moisture
units kg m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%soilm
requested lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

soil_temperature

long_name	soil temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%stc
requested	lsm_noah_run lsm_ruc_run lsm_ruc_sfc_sice_post_run lsm_ruc_sfc_sice_pre_run noahmpdrv_run sfc_sice_run
physics set	slow_physics

soil_temperature_for_land_surface_model

long_name	soil temperature for land surface model
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tslb
requested	NOT REQUESTED
physics set	

soil_type_classification

long_name	soil type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%soiltype
requested	GFS_checkland_run GFS_surface_generic_pre_run lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

soil_type_classification_real

long_name	soil type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%stype
requested	GFS_checkland_run GFS_surface_generic_pre_run
physics set	slow_physics

soil_type_dataset_choice

long_name	soil type dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%isot
requested	GFS_checkland_run GFS_surface_generic_pre_run lsm_noah_init lsm_noah_run lsm_ruc_init lsm_ruc_run noahmpdrv_init
physics set	slow_physics

soil_upward_latent_heat_flux

long_name	soil upward latent heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%evbs
requested	GFS_surface_generic_post_run lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

soil_vertical_dimension

long_name	number of soil layers
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsoil
requested	lsm_noah_run lsm_ruc_run lsm_ruc_sfc_sice_post_run lsm_ruc_sfc_sice_pre_run noahmpdrv_run sfc_sice_run
physics set	slow_physics

soil_vertical_dimension_for_land_surface_model

long_name	number of soil layers internal to land surface model
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%lsoil_lsm
requested	NOT REQUESTED
physics set	

soil_water_content_between_soil_bottom_and_water_table

long_name	soil water content between the bottom of the soil and the water table
units	m3 m-3
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%smcwtdxy
requested	NOT REQUESTED
physics set	

solar_constant

long_name	solar constant (sun-earth distant adjusted)
units	W m-2
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%solcon
requested	GFS_rrtmg_setup_run
	rrtmg_sw_run
physics set	slow_physics

specific_heat_capacities_for_multi_gases_physics

long_name	specific heat capacities for multi gases physics
units	J kg-1 K-1
rank	1
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%cpilist
requested	fv_sat_adj_init
physics set	fast_physics

specific_heat_of_dry_air_at_constant_pressure

long_name	specific heat of dry air at constant pressure
units	J kg-1 K-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_cp
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run cires_ugwp_run drag_suite_run gwdc_post_run gwdc_run gwdps_run lsm_noah_run lsm_ruc_run m_micro_init moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run noahmpdrv_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run satmedmfvdif_run satmedmfvdifq_run sfc_cice_run sfc_diag_run sfc_nst_run sfc_ocean_run sfc_sice_run shinhongvdif_run shoc_run ysuvdif_run
physics set	slow_physics

`specific_heat_of_liquid_water_at_constant_pressure`

<code>long_name</code>	specific heat of liquid water at constant pressure
<code>units</code>	J kg ⁻¹ K ⁻¹
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs
<code>local_name</code>	con_cliq
<code>requested</code>	samfdeepcnv_run samfshalcnv_run
<code>physics set</code>	slow_physics

`specific_heat_of_water_vapor_at_constant_pressure`

<code>long_name</code>	specific heat of water vapor at constant pressure
<code>units</code>	J kg ⁻¹ K ⁻¹
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE GFS_typedefs
<code>local_name</code>	con_cvap
<code>requested</code>	samfdeepcnv_run samfshalcnv_run
<code>physics set</code>	slow_physics

specific_humidity_at_2m

long_name	2 meter specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%q2m
requested	GFS_surface_generic_post_run maximum_hourly_diagnostics_run mynnsfc_wrapper_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

specific_humidity_at_2m_from_noahmp

long_name	2 meter specific humidity from noahmp
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%q2mp
requested	noahmpdrv_run sfc_diag_post_run
physics set	slow_physics

specific_humidity_at_viscous_sublayer_top

long_name specific humidity at_viscous sublayer top over water
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_qz0
requested NOT REQUESTED
physics set

stability_function_for_heat

long_name stability function for heat
units none
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%Sh3D
requested NOT REQUESTED
physics set

standard_atmospheric_pressure

long_name standard atmospheric pressure
units Pa
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs
local_name con_p0
requested cires_ugwp_init
physics set slow_physics

standard_deviation_of_subgrid_orography

long_name	standard deviation of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%hprime(:,1)
requested	cires_ugwp_run drag_suite_run gwdps_run myjpbl_wrapper_run
physics set	slow_physics

start_index_of_other_tracers

long_name	beginning index of the non-water tracer species
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tracers_start_index
requested	NOT REQUESTED
physics set	

starting_x_direction_index

long_name	starting X direction index
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%is
requested	fv_sat_adj_run
physics set	fast_physics

starting_x_direction_index_domain

long_name	starting X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%isd
requested	fv_sat_adj_run
physics set	fast_physics

starting_y_direction_index

long_name	starting Y direction index
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%js
requested	fv_sat_adj_run
physics set	fast_physics

starting_y_direction_index_domain

long_name	starting X direction index for domain
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%jsd
requested	fv_sat_adj_run
physics set	fast_physics

statistical_measures_of_subgrid_orography

long_name	orographic metrics
units	various
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%hprime
requested	GFS_GWD_generic_pre_run
physics set	slow_physics

stefan_boltzmann_constant

long_name	Stefan-Boltzmann constant
units	W m ⁻² K ⁻⁴
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_sbc
requested	sfc_nst_run sfc_sice_run
physics set	slow_physics

stem_area_index

long_name	stem area index
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%xsaixy
requested	NOT REQUESTED
physics set	

stem_mass

long_name	stem mass
units	g m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%stmassxy
requested	NOT REQUESTED
physics set	

sub_layer_cooling_amount

long_name	sub-layer cooling amount
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%dt_cool
requested	sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

sub_layer_cooling_thickness

long_name	sub-layer cooling thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%z_c
requested	sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

subgrid_cloud_fraction_pbl

long_name	subgrid cloud fraction from PBL scheme
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%CLDFRA_BL
requested	NOT REQUESTED
physics set	

subgrid_cloud_mixing_ratio_pbl

long_name	subgrid cloud cloud mixing ratio from PBL scheme
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%QC_BL
requested	NOT REQUESTED
physics set	

subgrid_scale_cloud_fraction_from_shoc

long_name	subgrid-scale cloud fraction from the SHOC scheme
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, GFS_Control%nscfshoc)
requested	NOT REQUESTED
physics set	

subsurface_runoff_flux

long_name	subsurface runoff flux
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%drain
requested	GFS_surface_generic_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
physics set	slow_physics

surface_air_pressure

long_name	surface pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%pgr
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_surface_generic_post_run cu_gf_driver_run lsm_noah_run maximum_hourly_diagnostics_run mynnedmf_wrapper_run mynnsfc_wrapper_run noahmpdrv_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run sfc_diag_post_run sfc_diag_run sfc_diff_run sfc_nst_run sfc_ocean_run sfc_sice_run shinhongvdif_run ysuvdif_run zhaocarr_gscond_run
physics set	slow_physics

surface_air_pressure_at_previous_time_step

long_name surface air pressure at previous time step
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f2d(:,2)
requested NOT REQUESTED
physics set

surface_air_pressure_diag

long_name surface air pressure diagnostic
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%psurf
requested GFS_suite_interstitial_1_run
physics set slow_physics

surface_air_pressure_two_time_steps_back

long_name surface air pressure two time steps back
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f2d(:,1)
requested NOT REQUESTED
physics set

surface_air_temperature_for_radiation

long_name	lowest model layer air temperature for radiation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsfa
requested	GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_pre_run
physics set	slow_physics

surface_albedo_due_to_UV_and_VIS_diffused

long_name	surface albedo due to UV+VIS diffused beam
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sfcalb(:,4)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

surface_albedo_due_to_UV_and_VIS_direct

long_name	surface albedo due to UV+VIS direct beam
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sfcalb(:,3)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

surface_albedo_due_to_near_IR_diffused

long_name	surface albedo due to near IR diffused beam
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sfcalb(:,2)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

surface_albedo_due_to_near_IR_direct

long_name	surface albedo due to near IR direct beam
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%sfcalb(:,1)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
physics set	slow_physics

surface_albedo_perturbation

long_name	surface albedo perturbation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%alb1d
requested	GFS_rrtmg_pre_run rrtmg_sw_pre_run
physics set	slow_physics

surface_condensation_mass

long_name	surface condensation mass
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%cndm_surf
requested	NOT REQUESTED
physics set	

surface_diffused_shortwave_albedo

long_name	mean surface diffused sw albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%sfalb
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

surface_downwelling_diffuse_near_infrared_shortwave_flux

long_name surface downwelling diffuse near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjnirdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir diff sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nirdfdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux

long_name surface downwelling diffuse ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjvisdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis diff sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%visdfdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_near_infrared_shortwave_flux

long_name surface downwelling beam near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjnirbmd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir beam sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nirbmdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux

long_name surface downwelling beam ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjvisbmd
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis beam sw downward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%visbmdi
requested dcyc2t3_run
physics set slow_physics

surface_downwelling_longwave_flux

long_name surface downwelling longwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dlwsfci
requested GFS_suite_interstitial_2_run
 GFS_surface_composites_inter_run
 GFS_surface_generic_post_run
 dcyc2t3_run
 lsm_ruc_run
physics set slow_physics

surface_downwelling_longwave_flux_absorbed_by_ground

long_name total sky surface downward longwave flux absorbed by the ground
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gabsbdlw
requested NOT REQUESTED
physics set

surface_downwelling_longwave_flux_absorbed_by_ground_over_ice

long_name	total sky surface downward longwave flux absorbed by the ground over ice
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gabsbdlw_ice
requested	GFS_surface_composites_inter_run
	sfc_sice_run
physics set	slow_physics

surface_downwelling_longwave_flux_absorbed_by_ground_over_land

long_name	total sky surface downward longwave flux absorbed by the ground over land
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gabsbdlw_land
requested	GFS_surface_composites_inter_run
	lsm_noah_run
	noahmpdrv_run
physics set	slow_physics

surface_downwelling_longwave_flux_absorbed_by_ground_over_ocean

long_name	total sky surface downward longwave flux absorbed by the ground over ocean
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gabsbdlw_ocean
requested	GFS_surface_composites_inter_run
	sfc_nst_run
physics set	slow_physics

surface_downwelling_longwave_flux_on_radiation_time_step

long_name	total sky sfc downward lw flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%sfcdlw
requested	dcyc2t3_run
physics set	slow_physics

surface_downwelling_shortwave_flux

long_name	surface downwelling shortwave flux at current time
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dswsfci
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_post_run dcyc2t3_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_sice_run
physics set	slow_physics

surface_downwelling_shortwave_flux_on_radiation_time_step

long_name	total sky sfc downward sw flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%sfcdsw
requested	dcyc2t3_run
physics set	slow_physics

surface_drag_coefficient_for_heat_and_moisture_for_noahmp

long_name surface exchange coeff heat
moisture for noahmp
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%chxy
requested NOT REQUESTED
physics set

surface_drag_coefficient_for_heat_and_moisture_in_air

long_name surface exchange coeff heat
moisture
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cdq
requested GFS_surface_composites_post_run
 myjpbl_wrapper_run
 myjsfc_wrapper_run
 mynnsfc_wrapper_run
physics set slow_physics

surface_drag_coefficient_for_heat_and_moisture_in_air_over_ice

long_name	surface exchange coeff heat
moisture over ice	
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cdq_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_cice_run sfc_diff_run sfc_sice_run
physics set	slow_physics

surface_drag_coefficient_for_heat_and_moisture_in_air_over_land

long_name	surface exchange coeff heat
moisture over land	
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cdq_land
requested	GFS_surface_composites_post_run lsm_noah_run lsm_ruc_run myjsfc_wrapper_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

```

surface_drag_coefficient_for_heat_and_moisture_in_air_over_ocean
  long_name      surface exchange coeff heat
  moisture over ocean
  units          none
  rank           1
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_interstitial_type
  local_name     GFS_Interstitial(cdata%thrd_no)%cdq_ocean
  requested      GFS_surface_composites_post_run
                  myjsfc_wrapper_run
                  sfc_diff_run
                  sfc_nst_run
                  sfc_ocean_run
  physics set    slow_physics

```

```

surface_drag_coefficient_for_momentum_for_noahmp
  long_name      surface drag coefficient for momentum for noahmp
  units          none
  rank           1
  type           real
  kind           kind_phys
  source         MODULE GFS_typedefs TYPE GFS_sfcprop_type
  local_name     GFS_Data(cdata%blk_no)%Sfcprop%cmxy
  requested      NOT REQUESTED
  physics set

```

surface_drag_coefficient_for_momentum_in_air

long_name	surface exchange coeff for momentum
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cd
requested	GFS_surface_composites_post_run myjpbl_wrapper_run myjsfc_wrapper_run mynnsfc_wrapper_run
physics set	slow_physics

surface_drag_coefficient_for_momentum_in_air_over_ice

long_name	surface exchange coeff for momentum over ice
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cd_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_cice_run sfc_diff_run sfc_sice_run
physics set	slow_physics

surface_drag_coefficient_for_momentum_in_air_over_land

long_name	surface exchange coeff for momentum over land
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cd_land
requested	GFS_surface_composites_post_run lsm_noah_run lsm_ruc_run myjsfc_wrapper_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

surface_drag_coefficient_for_momentum_in_air_over_ocean

long_name	surface exchange coeff for momentum over ocean
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cd_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

surface_drag_mass_flux_for_heat_and_moisture_in_air

long_name thermal exchange coefficient
units kg m-2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%chh
requested GFS_surface_composites_post_run
physics set slow_physics

surface_drag_mass_flux_for_heat_and_moisture_in_air_over_ice

long_name thermal exchange coefficient over ice
units kg m-2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%chh_ice
requested GFS_surface_composites_post_run
 sfc_cice_run
 sfc_sice_run
physics set slow_physics

```

surface_drag_mass_flux_for_heat_and_moisture_in_air_over_land
    long_name    thermal exchange coefficient over land
    units        kg m-2 s-1
    rank         1
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_interstitial_type
    local_name   GFS_Interstitial(cdata%thrd_no)%chh_land
    requested    GFS_surface_composites_post_run
                lsm_noah_run
                lsm_ruc_run
                noahmpdrv_run
    physics set  slow_physics

```

```

surface_drag_mass_flux_for_heat_and_moisture_in_air_over_ocean
    long_name    thermal exchange coefficient over ocean
    units        kg m-2 s-1
    rank         1
    type         real
    kind         kind_phys
    source       MODULE GFS_typedefs TYPE GFS_interstitial_type
    local_name   GFS_Interstitial(cdata%thrd_no)%chh_ocean
    requested    GFS_surface_composites_post_run
                sfc_nst_run
                sfc_ocean_run
    physics set  slow_physics

```


surface_drag_wind_speed_for_momentum_in_air

long_name	momentum exchange coefficient
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%cmm
requested	GFS_surface_composites_post_run mynnedmf_wrapper_run mynnsfc_wrapper_run
physics set	slow_physics

surface_drag_wind_speed_for_momentum_in_air_over_ice

long_name	momentum exchange coefficient over ice
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cmm_ice
requested	GFS_surface_composites_post_run sfc_cice_run sfc_sice_run
physics set	slow_physics

surface_drag_wind_speed_for_momentum_in_air_over_land

long_name	momentum exchange coefficient over land
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cmm_land
requested	GFS_surface_composites_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
physics set	slow_physics

surface_drag_wind_speed_for_momentum_in_air_over_ocean

long_name	momentum exchange coefficient over ocean
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%cmm_ocean
requested	GFS_surface_composites_post_run
	sfc_nst_run
	sfc_ocean_run
physics set	slow_physics

surface_exchange_coefficient_for_heat

long_name surface exchange coefficient for heat
units W m-2 K-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%flhc
requested NOT REQUESTED
physics set

surface_exchange_coefficient_for_heat_at_2m

long_name exchange coefficient for heat at 2 meters
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%chs2
requested NOT REQUESTED
physics set

surface_exchange_coefficient_for_moisture

long_name surface exchange coefficient for moisture
units kg m-2 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%flqc
requested NOT REQUESTED
physics set

surface_exchange_coefficient_for_moisture_at_2m

long_name exchange coefficient for moisture at 2 meters
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%cqs2
requested NOT REQUESTED
physics set

surface_friction_velocity

long_name boundary layer parameter
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%uustar
requested GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
 myjpbl_wrapper_run
 myjsfc_wrapper_run
 mynnedmf_wrapper_run
 mynnsfc_wrapper_run
physics set slow_physics

surface_friction_velocity_drag

long_name friction velocity isolated for momentum only
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%ustm
requested NOT REQUESTED
physics set

surface_friction_velocity_over_ice

long_name surface friction velocity over ice
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%uustar_ice
requested GFS_surface_composites_post_run
GFS_surface_composites_pre_run
myjsfc_wrapper_run
sfc_diff_run
physics set slow_physics

surface_friction_velocity_over_land

long_name	surface friction velocity over land
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%uustar_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

surface_friction_velocity_over_ocean

long_name	surface friction velocity over ocean
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%uustar_ocean
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

surface_geopotential_at_Lagrangian_surface

long_name	surface geopotential at Lagrangian surface
units	m2 s-2
rank	2
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%phis
requested	fv_sat_adj_run
physics set	fast_physics

surface_ground_temperature_for_radiation

long_name	surface ground temperature for radiation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsfg
requested	GFS_rrtmg_pre_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw_pre_run
physics set	slow_physics

surface_latent_heat

long_name latent heating at the surface (pos = up)
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%lh
requested NOT REQUESTED
physics set

surface_layer_evaporation_switch

long_name surface layer evaporation switch
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_chkqlm
requested NOT REQUESTED
physics set

surface_longwave_emissivity

long_name surface lw emissivity in fraction
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name GFS_Data(cdata%blk_no)%Radtend%semis
requested GFS_surface_composites_pre_run
rrtmg_lw_run
physics set slow_physics

surface_longwave_emissivity_over_ice_interstitial

long_name surface lw emissivity in fraction over ice (temporary use as interstitial)
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%semis_ice
requested GFS_surface_composites_inter_run
GFS_surface_composites_pre_run
dcyc2t3_run
sfc_sice_run
physics set slow_physics

surface_longwave_emissivity_over_land_interstitial

long_name surface lw emissivity in fraction over land (temporary use as interstitial)
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%semis_land
requested GFS_surface_composites_inter_run
GFS_surface_composites_pre_run
dcyc2t3_run
lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

surface_longwave_emissivity_over_ocean_interstitial

long_name surface lw emissivity in fraction over ocean (temporary use as interstitial)
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%semis_ocean
requested GFS_surface_composites_inter_run
GFS_surface_composites_pre_run
dcyc2t3_run
sfc_nst_run
physics set slow_physics

surface_midlayer_air_temperature_in_longwave_radiation

long_name surface air temp during lw calculation
units K
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name GFS_Data(cdata%blk_no)%Radtend%tsflw
requested dcyc2t3_run
physics set slow_physics

surface_net_downwelling_shortwave_flux

long_name	surface net downwelling shortwave flux at current time
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%nswsfci
requested	dcyc2t3_post_run dcyc2t3_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_nst_run sfc_sice_run
physics set	slow_physics

surface_net_downwelling_shortwave_flux_on_radiation_time_step

long_name	total sky sfc netsw flx into ground
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%sfcnsf
requested	dcyc2t3_run
physics set	slow_physics

surface_roughness_length

long_name	surface roughness length
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zorl
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

surface_roughness_length_over_ice_interstitial

long_name	surface roughness length over ice (temporary use as interstitial)
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zorl_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

surface_roughness_length_over_land

long_name	surface roughness length over land
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zorll
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run
physics set	slow_physics

surface_roughness_length_over_land_interstitial

long_name	surface roughness length over land (temporary use as interstitial)
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zorl_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run lsm_noah_run lsm_ruc_run myjsfc_wrapper_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

surface_roughness_length_over_ocean

long_name	surface roughness length over ocean
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zorlo
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run
physics set	slow_physics

surface_roughness_length_over_ocean_interstitial

long_name	surface roughness length over ocean (temporary use as interstitial)
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%zorl_ocean
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

surface_runoff

long_name	surface water runoff (from lsm)
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%srunoff
requested	GFS_surface_generic_post_run lsm_ruc_run
physics set	slow_physics

surface_runoff_flux

long_name	surface runoff flux
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%runoff
requested	GFS_surface_generic_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
physics set	slow_physics

surface_skin_temperature

long_name	surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tsfc
requested	GFS_MP_generic_post_run GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run GFS_surface_generic_pre_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_run
physics set	slow_physics

surface_skin_temperature_after_iteration

long_name	surface skin temperature after iteration
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsurf
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_pre_run
physics set	slow_physics

surface_skin_temperature_after_iteration_over_ice

long_name	surface skin temperature after iteration over ice
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsurf_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_diff_run
physics set	slow_physics

surface_skin_temperature_after_iteration_over_land

long_name	surface skin temperature after iteration over land
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsurf_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

surface_skin_temperature_after_iteration_over_ocean

long_name	surface skin temperature after iteration over ocean
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsurf_ocean
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_diff_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

surface_skin_temperature_for_nsst

long_name	ocean surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tseal
requested	sfc_nst_pre_run sfc_nst_run
physics set	slow_physics

surface_skin_temperature_over_ice_interstitial

long_name	surface skin temperature over ice (temporary use as interstitial)
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsfc_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run dcyc2t3_run sfc_diff_run sfc_sice_run
physics set	slow_physics

surface_skin_temperature_over_land

long_name	surface skin temperature over land
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tsfc1
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run
physics set	slow_physics

surface_skin_temperature_over_land_interstitial

long_name	surface skin temperature over land (temporary use as interstitial)
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsfc_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run dcyc2t3_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

surface_skin_temperature_over_ocean_interstitial

long_name	surface skin temperature over ocean (temporary use as interstitial)
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%tsfc_ocean
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run GFS_surface_generic_post_run dcyc2t3_run lsm_ruc_run sfc_diff_run sfc_nst_post_run sfc_nst_pre_run sfc_ocean_run
physics set	slow_physics

surface_slope_classification

long_name	surface slope type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%slopetype
requested	GFS_checkland_run GFS_surface_generic_pre_run lsm_noah_run noahmpdrv_run
physics set	slow_physics

surface_slope_classification_real

long_name	sfc slope type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%slope
requested	GFS_checkland_run
	GFS_surface_generic_pre_run
physics set	slow_physics

surface_snow_area_fraction

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowc
requested	GFS_surface_generic_post_run
	lsm_noah_run
	noahmpdrv_run
physics set	slow_physics

surface_snow_area_fraction_over_land

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%sncovr
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

surface_snow_melt

long_name	snow melt during timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowmt
requested	sfc_sice_run
physics set	slow_physics

surface_snow_thickness_water_equivalent

long_name	water equivalent snow depth
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snowd
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run myjpbl_wrapper_run mynnsfc_wrapper_run
physics set	slow_physics

surface_snow_thickness_water_equivalent_over_ice

long_name	water equivalent snow depth over ice
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowd_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_diff_run sfc_sice_run
physics set	slow_physics

surface_snow_thickness_water_equivalent_over_land

long_name	water equivalent snow depth over land
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowd_land
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

surface_snow_thickness_water_equivalent_over_ocean

long_name	water equivalent snow depth over ocean
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%snowd_ocean
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_diff_run
physics set	slow_physics

surface_specific_humidity

long_name	surface air saturation specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qss
requested	GFS_surface_composites_post_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run sfc_diag_run
physics set	slow_physics

surface_specific_humidity_for_MYJ_schemes

long_name	surface air saturation specific humidity for MYJ schemes
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_qsfc
requested	NOT REQUESTED
physics set	

surface_specific_humidity_over_ice

long_name	surface air saturation specific humidity over ice
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qss_ice
requested	GFS_surface_composites_post_run sfc_cice_run sfc_sice_run
physics set	slow_physics

surface_specific_humidity_over_land

long_name	surface air saturation specific humidity over land
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qss_land
requested	GFS_surface_composites_post_run lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

surface_specific_humidity_over_ocean

long_name	surface air saturation specific humidity over ocean
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%qss_ocean
requested	GFS_surface_composites_post_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

surface_stability_parameter

long_name	monin obukhov surface stability parameter
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%zol
requested	NOT REQUESTED
physics set	

surface_upward_latent_heat_flux_for_coupling

long_name	sfc latent heat flux input for coupling
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%dqsfcin_cpl
requested	GFS_surface_generic_pre_run
physics set	slow_physics

surface_upward_latent_heat_flux_for_coupling_interstitial

long_name	surface latent heat flux for coupling interstitial
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dqsfc_cice
requested	GFS_PBL_generic_post_run GFS_surface_generic_pre_run sfc_cice_run
physics set	slow_physics

surface_upward_potential_latent_heat_flux

long_name	surface upward potential latent heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ep1d
requested	GFS_surface_composites_post_run GFS_surface_generic_post_run
physics set	slow_physics

surface_upward_potential_latent_heat_flux_over_ice

long_name	surface upward potential latent heat flux over ice
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ep1d_ice
requested	GFS_surface_composites_post_run GFS_surface_composites_pre_run sfc_sice_run
physics set	slow_physics

surface_upward_potential_latent_heat_flux_over_land

long_name	surface upward potential latent heat flux over land
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ep1d_land
requested	GFS_surface_composites_post_run lsm_noah_run noahmpdrv_run
physics set	slow_physics

surface_upward_potential_latent_heat_flux_over_ocean

long_name	surface upward potential latent heat flux over ocean
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%ep1d_ocean
requested	GFS_surface_composites_post_run sfc_nst_run sfc_ocean_run
physics set	slow_physics

surface_upward_sensible_heat_flux_for_coupling

long_name	sfc sensible heat flux input
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%dtstfcin_cpl
requested	GFS_surface_generic_pre_run
physics set	slow_physics

surface_upward_sensible_heat_flux_for_coupling_interstitial

long_name sfc sensible heat flux for coupling interstitial
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dtsfc_cice
requested GFS_PBL_generic_post_run
 GFS_surface_generic_pre_run
 sfc_cice_run
physics set slow_physics

surface_upwelling_diffuse_near_infrared_shortwave_flux

long_name surface upwelling diffuse near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjnirdfu
requested GFS_surface_generic_post_run
 dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir diff sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nirdfui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux

long_name surface upwelling diffuse ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjvisdfu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis diff sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%visdfui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_near_infrared_shortwave_flux

long_name surface upwelling beam near-infrared shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjnirbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step

long_name sfc nir beam sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nirbmu
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux

long_name surface upwelling beam ultraviolet plus visible shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjvisbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step

long_name sfc uv+vis beam sw upward flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%visbmui
requested dcyc2t3_run
physics set slow_physics

surface_upwelling_longwave_flux

long_name surface upwelling longwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%ulwsfci
requested GFS_suite_interstitial_2_run
GFS_surface_generic_post_run
physics set slow_physics

surface_upwelling_longwave_flux_for_coupling

long_name surface upwelling LW flux for coupling
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%ulwsfcin_cpl
requested GFS_suite_interstitial_2_run
GFS_surface_generic_pre_run
physics set slow_physics

surface_upwelling_longwave_flux_for_coupling_interstitial

long_name surface upwelling longwave flux for coupling_interstitial
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%ulwsfc_cice
requested GFS_surface_generic_pre_run
physics set slow_physics

surface_upwelling_longwave_flux_over_ice_interstitial

long_name surface upwelling longwave flux at current time over ice (temporary use as interstitial)
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjsfcuw_ice
requested GFS_suite_interstitial_2_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_longwave_flux_over_land_interstitial

long_name surface upwelling longwave flux at current time over land (temporary use as interstitial)
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjsfcuw_land
requested GFS_suite_interstitial_2_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_longwave_flux_over_ocean_interstitial

long_name surface upwelling longwave flux at current time over ocean (temporary use as interstitial)
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%adjsfculw_ocean
requested GFS_suite_interstitial_2_run
GFS_surface_generic_post_run
dcyc2t3_run
physics set slow_physics

surface_upwelling_shortwave_flux

long_name surface upwelling shortwave flux at current time
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%uswsfci
requested dcyc2t3_post_run
physics set slow_physics

surface_wind_enhancement_due_to_convection

long_name surface wind enhancement due to convection
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f2d(:,GFS_Control%num_p2d)
requested GFS_surface_generic_pre_run
 mynnsfc_wrapper_run
physics set slow_physics

surface_wind_stress

long_name surface wind stress
units m2 s-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%stress
requested GFS_surface_composites_post_run
 hedmf_run
 moninshoc_run
 myjsfc_wrapper_run
 mynnsfc_wrapper_run
 satmedmfvdif_run
 satmedmfvdifq_run
 shinhongvdif_run
 ysuvdif_run
physics set slow_physics

surface_wind_stress_over_ice

long_name	surface wind stress over ice
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%stress_ice
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_cice_run sfc_diff_run
physics set	slow_physics

surface_wind_stress_over_land

long_name	surface wind stress over land
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%stress_land
requested	GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run
physics set	slow_physics

surface_wind_stress_over_ocean

long_name	surface wind stress over ocean
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%stress_ocean
requested	GFS_PBL_generic_post_run GFS_surface_composites_post_run myjsfc_wrapper_run sfc_diff_run sfc_nst_run
physics set	slow_physics

surface_x_momentum_flux_for_coupling

long_name	sfc x momentum flux for coupling
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%dusfcin_cpl
requested	GFS_surface_generic_pre_run
physics set	slow_physics

surface_x_momentum_flux_for_coupling_interstitial

long_name sfc x momentum flux for coupling interstitial
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dusfc_cice
requested GFS_PBL_generic_post_run
 GFS_surface_generic_pre_run
 sfc_cice_run
physics set slow_physics

surface_y_momentum_flux_for_coupling

long_name sfc y momentum flux for coupling
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%dvsfcin_cpl
requested GFS_surface_generic_pre_run
physics set slow_physics

surface_y_momentum_flux_for_coupling_interstitial

long_name sfc y momentum flux for coupling interstitial
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dvsfc_cice
requested GFS_PBL_generic_post_run
GFS_surface_generic_pre_run
sfc_cice_run
physics set slow_physics

sw_fluxes_sfc

long_name sw radiation fluxes at sfc
units W m-2
rank 1
type sfcsw_type
kind
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name GFS_Data(cdata%blk_no)%Radtend%sfcsw
requested rrtmg_sw_run
physics set slow_physics

sw_fluxes_top_atmosphere

long_name sw radiation fluxes at toa
units W m-2
rank 1
type topfsw_type
kind
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%topfsw
requested rrtmg_sw_run
physics set slow_physics

t_prime_q_prime

long_name	covariance of temperature and moisture
units	K kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%cov
requested	NOT REQUESTED
physics set	

t_prime_squared

long_name	temperature fluctuation squared
units	K2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%tsq
requested	NOT REQUESTED
physics set	

temperature_at_2m

long_name	2 meter temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%t2m
requested	GFS_surface_generic_post_run maximum_hourly_diagnostics_run mynnsfc_wrapper_run sfc_diag_post_run sfc_diag_run
physics set	slow_physics

temperature_at_2m_from_noahmp

long_name	2 meter temperature from noahmp
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%t2mmp
requested	noahmpdrv_run sfc_diag_post_run
physics set	slow_physics

temperature_at_zero_celsius

long_name	temperature at 0 degrees Celsius
units	K
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_t0c
requested	samfdeepcnv_run samfshalcnv_run sfc_sice_run
physics set	slow_physics

temperature_from_previous_timestep

long_name	temperature from previous time step
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%prevst
requested	NOT REQUESTED
physics set	

temperature_tendency_due_to_dynamics

long_name	temperature tendency due to dynamics only
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%forcet
requested	NOT REQUESTED
physics set	

tendency_of_air_temperature_at_Lagrangian_surface

long_name	air temperature tendency due to fast physics at Lagrangian surface
units	K s-1
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%dt
requested	fv_sat_adj_run
physics set	fast_physics

tendency_of_air_temperature_due_to_deep_convection_for_coupling_on_physics_timestep

long_name	tendency of air temperature due to deep convection
units	K
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%tconvtend
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_time_step

long_name clear sky heating rate due to longwave radiation
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%htlw0
requested dcyc2t3_run
 rrtmg_lw_post_run
 rrtmg_lw_run
physics set slow_physics

tendency_of_air_temperature_due_to_longwave_heating_assuming_clear_sky_on_radiation_timestep

long_name clear sky lw heating rates
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name GFS_Data(cdata%blk_no)%Radtend%lwhe
requested NOT REQUESTED
physics set

tendency_of_air_temperature_due_to_longwave_heating_for_idea

long_name	idea sky lw heating rates
units	K s-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%lwhtd
requested	GFS_suite_interstitial_2_run
physics set	slow_physics

tendency_of_air_temperature_due_to_longwave_heating_on_radiation_time_step

long_name	total sky heating rate due to longwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%htlwc
requested	dcyc2t3_run hedmf_run mynnedmf_wrapper_run rrtmg_lw_post_run rrtmg_lw_run satmedmfvdif_run satmedmfvdifq_run ysuvdif_run
physics set	slow_physics

tendency_of_air_temperature_due_to_longwave_heating_on_radiation_timestep

long_name	total sky lw heating rate
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%htrlw
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run m_micro_run mynnedmf_wrapper_run
physics set	slow_physics

tendency_of_air_temperature_due_to_model_physics

long_name	air temperature tendency due to model physics
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dtdt
requested	GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run cires_ugwp_post_run cires_ugwp_run dcyc2t3_run drag_suite_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run mynnedmf_wrapper_run rayleigh_damp_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

tendency_of_air_temperature_due_to_radiative_heating_assuming_clear_sky

long_name clear sky radiative (shortwave + longwave) heating rate at current time
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dtdtc
requested GFS_MP_generic_post_run
 GFS_suite_interstitial_1_run
 dcyc2t3_run
physics set slow_physics

tendency_of_air_temperature_due_to_radiative_heating_on_physics_time_step

long_name temp. change due to radiative heating per time step
units K
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%dtdtr
requested GFS_MP_generic_post_run
 GFS_stochastics_run
 GFS_surface_generic_pre_run
physics set slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_time_step

long_name clear sky heating rates due to shortwave radiation
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%htsw0
requested dcyc2t3_run
 rrtmg_sw_post_run
 rrtmg_sw_run
physics set slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_assuming_clear_sky_on_radiation_timestep

long_name clear sky sw heating rates
units K s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_radtend_type
local_name GFS_Data(cdata%blk_no)%Radtend%swhc
requested NOT REQUESTED
physics set

tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_time_step

long_name	total sky heating rate due to shortwave radiation
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%htswc
requested	dcyc2t3_run hedmf_run rrtmg_sw_post_run rrtmg_sw_run satmedmfvdif_run satmedmfvdifq_run ysuvdif_run
physics set	slow_physics

tendency_of_air_temperature_due_to_shortwave_heating_on_radiation_timestep

long_name	total sky sw heating rate
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_radtend_type
local_name	GFS_Data(cdata%blk_no)%Radtend%htrsw
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run m_micro_run mynnedmf_wrapper_run
physics set	slow_physics

tendency_of_air_temperature_due_to_ugwp

long_name	air temperature tendency due to UGWP
units	K s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gw_dtdt
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

tendency_of_cloud_droplet_number_concentration_due_to_model_physics

long_name	number concentration of cloud droplets (liquid) tendency due to model physics
units	kg-1 s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntlnc)
requested	NOT REQUESTED
physics set	

tendency_of_cloud_water_due_to_convective_microphysics

long_name tendency of cloud water due to convective microphysics
units kg m⁻² s⁻¹
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%cnv_dqldt
requested cs_conv_run
m_micro_run
samfdeepcnv_run
physics set slow_physics

tendency_of_graupel_mixing_ratio_due_to_model_physics

long_name moist (dry+vapor, no condensates) mixing ratio of graupel tendency due to model physics
units kg kg⁻¹ s⁻¹
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntgl)
requested NOT REQUESTED
physics set

tendency_of_ice_cloud_water_mixing_ratio_due_to_model_physics

long_name cloud condensed water mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntiw)
requested NOT REQUESTED
physics set

tendency_of_ice_friendly_aerosol_number_concentration_due_to_model_physics

long_name number concentration of ice-friendly aerosols tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntia)
requested NOT REQUESTED
physics set

tendency_of_ice_friendly_aerosols_at_surface

long_name instantaneous ice-friendly sfc aerosol source
units kg-1 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nifa2d
requested NOT REQUESTED
physics set

tendency_of_ice_number_concentration_due_to_model_physics

long_name number concentration of ice tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntinc)
requested NOT REQUESTED
physics set

tendency_of_liquid_cloud_water_mixing_ratio_due_to_model_physics

long_name cloud condensed water mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntcw)
requested NOT REQUESTED
physics set

tendency_of_lwe_thickness_of_precipitation_amount_for_coupling

long_name	change in rain_cpl (coupling_type)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%drain_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

tendency_of_lwe_thickness_of_snow_amount_for_coupling

long_name	change in show_cpl (coupling_type)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%dsnow_cpl
requested	GFS_MP_generic_post_run GFS_stochastics_run GFS_surface_generic_pre_run
physics set	slow_physics

tendency_of_ozone_mixing_ratio_due_to_model_physics

long_name ozone mixing ratio tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntoz)
requested NOT REQUESTED
physics set

tendency_of_rain_water_mixing_ratio_due_to_microphysics

long_name tendency of rain water mixing ratio due to microphysics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%rainp
requested NOT REQUESTED
physics set

tendency_of_rain_water_mixing_ratio_due_to_model_physics

long_name moist (dry+vapor, no condensates) mixing ratio of rain water tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntrw)
requested NOT REQUESTED
physics set

tendency_of_snow_water_mixing_ratio_due_to_model_physics

long_name	moist (dry+vapor, no condensates) mixing ratio of snow water tendency due to model physics
units	kg kg-1 s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntsw)
requested	NOT REQUESTED
physics set	

tendency_of_tracers_due_to_model_physics

long_name	updated tendency of the tracers due to model physics
units	kg kg-1 s-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dqdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

tendency_of_turbulent_kinetic_energy_due_to_model_physics

long_name	turbulent kinetic energy tendency due to model physics
units	J s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntke)
requested	cires_ugwp_run
physics set	slow_physics

tendency_of_vertically_diffused_tracer_concentration

long_name	updated tendency of the tracers due to vertical diffusion in PBL scheme
units	kg kg-1 s-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dvdfttra
requested	GFS_PBL_generic_post_run hedmf_run moninshoc_run myjpbl_wrapper_run satmedmfvdif_run satmedmfvdifq_run
physics set	slow_physics

tendency_of_water_friendly_aerosol_number_concentration_due_to_model_physics

long_name number concentration of water-friendly aerosols tendency due to model physics
units kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntwa)
requested NOT REQUESTED
physics set

tendency_of_water_friendly_aerosols_at_surface

long_name instantaneous water-friendly sfc aerosol source
units kg-1 s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%nwfa2d
requested NOT REQUESTED
physics set

tendency_of_water_vapor_specific_humidity_due_to_deep_convection_for_coupling_on_physics_timestep

long_name tendency of specific humidity due to deep convection
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%qconvtend
requested GFS_DCNV_generic_post_run
physics set slow_physics

tendency_of_water_vapor_specific_humidity_due_to_model_physics

long_name water vapor specific humidity tendency due to model physics
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%dqdt(:, :, GFS_Control%ntqv)
requested NOT REQUESTED
physics set

tendency_of_x_wind_due_to_convective_gravity_wave_drag

long_name zonal wind tendency due to convective gravity wave drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gwdcu
requested NOT REQUESTED
physics set

tendency_of_x_wind_due_to_deep_convection_for_coupling_on_physics_timestep

long_name tendency_of_x_wind_due_to_deep_convection
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_coupling_type
local_name GFS_Data(cdata%blk_no)%Coupling%uconvtend
requested GFS_DCNV_generic_post_run
physics set slow_physics

tendency_of_x_wind_due_to_model_physics

long_name	zonal wind tendency due to model physics
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dudt
requested	GFS_GWD_generic_post_run GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run cires_ugwp_post_run cires_ugwp_run drag_suite_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run mynnedmf_wrapper_run rayleigh_damp_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

tendency_of_x_wind_due_to_ugwp

long_name	zonal wind tendency due to UGWP
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gw_dudt
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

tendency_of_y_wind_due_to_convective_gravity_wave_drag

long_name	meridional wind tendency due to convective gravity wave drag
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gwdcv
requested	NOT REQUESTED
physics set	

tendency_of_y_wind_due_to_deep_convection_for_coupling_on_physics_timestep

long_name	tendency_of_y_wind_due_to_deep_convection
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%vconvtend
requested	GFS_DCNV_generic_post_run
physics set	slow_physics

tendency_of_y_wind_due_to_model_physics

long_name	meridional wind tendency due to model physics
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%dvdt
requested	GFS_GWD_generic_post_run GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run cires_ugwp_post_run cires_ugwp_run drag_suite_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run mynnedmf_wrapper_run rayleigh_damp_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

tendency_of_y_wind_due_to_ugwp

long_name	meridional wind tendency due to UGWP
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gw_dvdt
requested	cires_ugwp_post_run cires_ugwp_run
physics set	slow_physics

theta_star

long_name	temperature flux divided by ustar (temperature scale)
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%mol
requested	NOT REQUESTED
physics set	

thickness_at_Lagrangian_surface

long_name	thickness at Lagrangian_surface
units	m
rank	3
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%delz
requested	fv_sat_adj_run
physics set	fast_physics

threshold_for_perturbed_vertical_velocity

long_name	threshold used for perturbed vertical velocity
units	m s-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nthresh
requested	NOT REQUESTED
physics set	

threshold_volume_fraction_of_condensed_water_in_soil

long_name	soil moisture threshold (volumetric)
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%smcref2
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

time_integral_of_change_in_x_wind_due_to_mountain_blocking_drag

long_name time integral of change in x wind due to mountain blocking drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt_mtb
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

time_integral_of_change_in_x_wind_due_to_nonstationary_gravity_wave

long_name time integral of change in x wind due to NGW
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt_ngw
requested cires_ugwp_post_run
physics set slow_physics

time_integral_of_change_in_x_wind_due_to_orographic_gravity_wave_drag

long_name time integral of change in x wind due to orographic gw drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt_ogw
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

time_integral_of_change_in_x_wind_due_to_turbulent_orographic_form_drag

long_name time integral of change in x wind due to TOFD
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%du3dt_tms
requested cires_ugwp_post_run
 cires_ugwp_run
physics set slow_physics

time_integral_of_change_in_y_wind_due_to_nonstationary_gravity_wave

long_name time integral of change in y wind due to NGW
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dv3dt_ngw
requested cires_ugwp_post_run
physics set slow_physics

time_integral_of_height_of_launch_level_of_orographic_gravity_wave

long_name time integral of height of launch level of orographic gravity wave
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%zogw
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_height_of_low_level_wave_breaking`

long_name time integral of height of drag due to low level wave breaking
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%zlwb
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_height_of_mountain_blocking`

long_name time integral of height of mountain blocking drag
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%zmtb
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_momentum_flux_due_to_mountain_blocking_drag`

long_name time integral of momentum flux due to mountain blocking drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%tau_mtb
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_momentum_flux_due_to_nonstationary_gravity_wave`

long_name time integral of momentum flux due to nonstationary gravity waves
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%tau_ngw
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_momentum_flux_due_to_orographic_gravity_wave_drag`

long_name time integral of momentum flux due to orographic gravity wave drag
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%tau_ogw
requested cires_ugwp_post_run
physics set slow_physics

`time_integral_of_momentum_flux_due_to_turbulent_orographic_form_drag`

long_name time integral of momentum flux due to TOFD
units Pa
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%tau_tofd
requested cires_ugwp_post_run
physics set slow_physics

time_integral_of_x_stress_due_to_gravity_wave_drag

long_name vertically integrated u change by OGWD
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dugwd
requested GFS_GWD_generic_post_run
gwdc_post_run
physics set slow_physics

time_integral_of_y_stress_due_to_gravity_wave_drag

long_name vertically integrated v change by OGWD
units Pa s
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dvgwd
requested GFS_GWD_generic_post_run
gwdc_post_run
physics set slow_physics

time_interval_for_maximum_hourly_fields

long_name reset time interval for maximum hourly fields
units s
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%avg_max_length
requested NOT REQUESTED
physics set

time_scale_for_rayleigh_damping

long_name	time scale for Rayleigh damping in days
units	d
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ral_ts
requested	cires_ugwp_init rayleigh_damp_run
physics set	slow_physics

time_since_diagnostics_zeroed

long_name	time since diagnostics variables have been zeroed
units	h
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%zhour
requested	GFS_time_vary_pre_run
physics set	slow_physics

time_step_for_dynamics

long_name	dynamics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dtf
requested	GFS_DCNV_generic_post_run GFS_GWD_generic_post_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_PBL_generic_post_run GFS_rrtmg_setup_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_4_run GFS_surface_generic_post_run cires_ugwp_post_run cs_conv_run dcyc2t3_run gwdc_post_run lsm_noah_run lsm_ruc_run mynnedmf_wrapper_run noahmpdrv_run sfc_diag_post_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run
physics set	slow_physics

time_step_for_physics

long_name	physics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ntp
requested	GFS_MP_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run GFS_time_vary_pre_run cires_ugwp_init cires_ugwp_run cs_conv_run cu_gf_driver_pre_run cu_gf_driver_run cu_ntiedtke_pre_run cu_ntiedtke_run drag_suite_run gfdl_cloud_microphys_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run h2ophys_run hedmf_run m_micro_post_run m_micro_run moninshoc_run mp_thompson_post_run mp_thompson_run myjpbl_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run ozphys_2015_run ozphys_run rayleigh_damp_run samfdecomp_run

time_step_for_radiation

long_name	radiation time step
units	s
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%raddt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

time_step_for_remapping_for_fast_physics

long_name	remapping time step
units	s
rank	0
type	real
kind	kind_dyn
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%mdt
requested	fv_sat_adj_run
physics set	fast_physics

tke_advect

long_name	flag for activating TKE advection
units	flag
rank	0
type	logical
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bl_mynn_tkeadvect
requested	NOT REQUESTED
physics set	

tke_at_mass_points

long_name	2 x tke at mass points
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%qke
requested	NOT REQUESTED
physics set	

tke_budget

long_name	flag for activating TKE budget
units	flag
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%bl_mynn_tkebudget
requested	NOT REQUESTED
physics set	

tke_dissipative_heating_factor

long_name	tke dissipative heating factor
units	none
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%dspfac
requested	NOT REQUESTED
physics set	

top_layer_index_for_fast_physics

long_name	top_layer_index_for_gfdl_mp
units	index
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%kmp
requested	fv_sat_adj_init
	fv_sat_adj_run
physics set	fast_physics

topflw_type

long_name	definition of type topflw_type
units	DDT
rank	0
type	topflw_type
kind	
source	MODULE module_radlw_parameters
local_name	topflw_type
requested	NOT REQUESTED
physics set	

topfsw_type

long_name	definition of type topfsw_type
units	DDT
rank	0
type	topfsw_type
kind	
source	MODULE module_radsw_parameters
local_name	topfsw_type
requested	NOT REQUESTED
physics set	

total_accumulated_snowfall

long_name	run-total snow accumulation on the ground
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snowfallac
requested	NOT REQUESTED
physics set	

total_cloud_fraction

long_name	layer total cloud fraction
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%clouds(:, :, 1)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run mynnrad_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

total_runoff

long_name	total water runoff
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%runoff
requested	GFS_surface_generic_post_run
	lsm_ruc_run
physics set	slow_physics

tracer_concentration

long_name	model layer mean tracer concentration
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%qgrs
requested	GFS_PBL_generic_pre_run
	GFS_suite_stateout_reset_run
	GFS_suite_stateout_update_run
	cires_ugwp_run
	myjsfc_wrapper_run
	shinhongvdif_run
	ysuvdif_run
physics set	slow_physics

tracer_concentration_save

long_name	tracer concentration before entering a physics scheme
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%save_q
requested	GFS_MP_generic_pre_run cs_conv_aw_adj_run
physics set	slow_physics

tracer_concentration_updated_by_physics

long_name	tracer concentration updated by physics
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0
requested	GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cs_conv_aw_adj_run cu_gf_driver_run
physics set	slow_physics

transpiration_flux

long_name	total plant transpiration rate
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%trans
requested	GFS_surface_generic_post_run
	lsm_noah_run
	lsm_ruc_run
	noahmpdrv_run
physics set	slow_physics

triple_point_temperature_of_water

long_name	triple point temperature of water
units	K
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs
local_name	con_ttp
requested	NOT REQUESTED
physics set	

turb_oro_form_drag_flag

long_name flag for turbulent orographic form drag
units flag
rank 0
type logical
kind
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%do_tofd
requested cires_ugwp_run
physics set slow_physics

turbulent_kinetic_energy

long_name turbulent kinetic energy
units J
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntke)
requested cires_ugwp_run
mynnedmf_wrapper_run
physics set slow_physics

turbulent_kinetic_energy_convective_transport_tracer

long_name turbulent kinetic energy in the convectively transported tracer array
units m2 s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%clw(:, :, GFS_Interstitial(cdata%thrd_no)%ntk)
requested NOT REQUESTED
physics set

u_wind_component_at_viscous_sublayer_top

long_name u wind component at viscous sublayer top over water
units m s-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_uz0
requested NOT REQUESTED
physics set

updraft_fraction_in_boundary_layer_mass_flux_scheme

long_name updraft fraction in boundary layer mass flux scheme
units none
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%bl_upfr
requested NOT REQUESTED
physics set

updraft_velocity_tunable_parameter_1_CS

long_name tunable parameter 1 for Chikira-Sugiyama convection
units m s-1
rank 0
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_control_type
local_name GFS_Control%cs_parm(1)
requested NOT REQUESTED
physics set

updraft_velocity_tunable_parameter_2_CS

long_name	tunable parameter 2 for Chikira-Sugiyama convection
units	m s-1
rank	0
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%cs_parm(2)
requested	NOT REQUESTED
physics set	

upper_bound_on_max_albedo_over_deep_snow

long_name	maximum snow albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%snoalb
requested	lsm_noah_run lsm_ruc_run noahmpdrv_run
physics set	slow_physics

upward_heat_flux_in_soil

long_name	soil heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gflx
requested	GFS_surface_composites_post_run
	GFS_surface_generic_post_run
physics set	slow_physics

upward_heat_flux_in_soil_over_ice

long_name	soil heat flux over ice
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gflx_ice
requested	GFS_surface_composites_post_run
	GFS_surface_composites_pre_run
	sfc_sice_run
physics set	slow_physics

upward_heat_flux_in_soil_over_land

long_name soil heat flux over land
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gflx_land
requested GFS_surface_composites_post_run
lsm_noah_run
lsm_ruc_run
noahmpdrv_run
physics set slow_physics

upward_heat_flux_in_soil_over_ocean

long_name soil heat flux over ocean
units W m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gflx_ocean
requested GFS_surface_composites_post_run
sfc_nst_run
sfc_ocean_run
physics set slow_physics

v_wind_component_at_viscous_sublayer_top

long_name	v wind component at viscous sublayer top over water
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_tbd_type
local_name	GFS_Data(cdata%blk_no)%Tbd%phy_myj_vz0
requested	NOT REQUESTED
physics set	

vegetation_area_fraction

long_name	areal fractional cover of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%vfrac
requested	GFS_surface_generic_pre_run
	lsm_ruc_run
physics set	slow_physics

vegetation_temperature

long_name	vegetation temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%tvxy
requested	NOT REQUESTED
physics set	

vegetation_type_classification

long_name	vegetation type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%vegtype
requested	GFS_checkland_run GFS_surface_generic_pre_run lsm_noah_run lsm_ruc_run noahmpdrv_run sfc_diff_run
physics set	slow_physics

vegetation_type_classification_real

long_name	vegetation type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name	GFS_Data(cdata%blk_no)%Sfcprop%vtype
requested	GFS_checkland_run GFS_surface_generic_pre_run
physics set	slow_physics

vegetation_type_dataset_choice

long_name	land use dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%ivegsrsc
requested	GFS_checkland_run
	GFS_surface_generic_pre_run
	lsm_noah_init
	lsm_noah_run
	lsm_ruc_init
	lsm_ruc_run
	noahmpdrv_init
	sfc_diff_run
physics set	slow_physics

vertical_dimension

long_name	number of vertical levels
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%levs
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_GWD_generic_pre_run GFS_MP_generic_post_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_4_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_pre_run cires_ugwp_init cires_ugwp_post_run cires_ugwp_run cnvc90_run cs_conv_aw_adj_run cs_conv_post_run cs_conv_pre_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run dcyc2t3_run drag_suite_run get_phi_fv3_run get_prs_fv3_run

vertical_dimension_for_cappa_at_Lagrangian_surface

long_name	vertical dimension for cappa at Lagrangian surface
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npzcappa
requested	NOT REQUESTED
physics set	

vertical_dimension_for_condensed_water_at_Lagrangian_surface

long_name	vertical dimension for condensed water at Lagrangian surface
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npzq_con
requested	NOT REQUESTED
physics set	

vertical_dimension_for_fast_physics

long_name	number of vertical levels for fast physics
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npz
requested	fv_sat_adj_run
physics set	fast_physics

vertical_dimension_for_fast_physics_plus_one

long_name	number of vertical levels for fast physics plus one
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npzp1
requested	NOT REQUESTED
physics set	

vertical_dimension_for_thickness_at_Lagrangian_surface

long_name	vertical dimension for thickness at Lagrangian surface
units	count
rank	0
type	integer
kind	
source	MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name	CCPP_interstitial%npzdelz
requested	fv_sat_adj_run
physics set	fast_physics

vertical_dimension_minus_one

long_name	number of vertical levels minus one
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%levsm1
requested	NOT REQUESTED
physics set	

vertical_dimension_of_h2o_forcing_data

long_name	number of vertical layers in h2o forcing data
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%levh2o
requested	h2ophys_run
physics set	slow_physics

vertical_dimension_of_ozone_forcing_data

long_name	number of vertical layers in ozone forcing data
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%levozp
requested	ozphys_2015_run
	ozphys_run
physics set	slow_physics

vertical_dimension_plus_one

long_name	number of vertical levels plus one
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%levsp1
requested	NOT REQUESTED
physics set	

vertical_index_at_cloud_base

long_name	vertical index at cloud base
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kbot
requested	cnvc90_run cu_gf_driver_run cu_ntiedtke_run gwdc_pre_run gwdc_run m_micro_run samfdeepcnv_run samfshalcnv_run
physics set	slow_physics

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vertical_index_at_cloud_top
    long_name    vertical index at cloud top
    units        index
    rank         1
    type         integer
    kind
    source       MODULE GFS_typedefs TYPE GFS_interstitial_type
    local_name   GFS_Interstitial(cdata%thrd_no)%ktop
    requested    cnvc90_run
                cu_gf_driver_run
                cu_ntiedtke_run
                gwdc_pre_run
                gwdc_run
                samfdeepcnv_run
                samfshalcnv_run
    physics set  slow_physics

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vertical_index_at_top_of_atmosphere_boundary_layer

long_name	vertical index at top atmospheric boundary layer
units	index
rank	1
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kpbl
requested	GFS_suite_interstitial_3_run
	cires_ugwp_run
	drag_suite_run
	gwdps_run
	hedmf_run
	moninshoc_run
	myjpbl_wrapper_run
	mynnedmf_wrapper_run
	satmedmfvdif_run
	satmedmfvdifq_run
	shinhongvdif_run
	ysuvdif_run
physics set	slow_physics

vertical_index_difference_between_inout_and_local

long_name	vertical index difference between in/out and local
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kd
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
physics set	slow_physics

vertical_index_difference_between_layer_and_lower_bound

long_name	vertical index difference between layer and lower bound
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kb
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

vertical_index_difference_between_layer_and_upper_bound

long_name	vertical index difference between layer and upper bound
units	index
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%kt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
physics set	slow_physics

vertical_interface_dimension

long_name	vertical interface dimension
units	count
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%levi
requested	NOT REQUESTED
physics set	

vertical_sigma_coordinate_for_radiation_initialization

long_name	vertical sigma coordinate for radiation initialization
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%si
requested	GFS_rrtmg_setup_init
physics set	slow_physics

vertical_temperature_average_range_lower_bound

long_name	zsea1 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nstf_name(4)
requested	sfc_nst_post_run sfc_nst_run
physics set	slow_physics

vertical_temperature_average_range_upper_bound

long_name	zsea2 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE GFS_typedefs TYPE GFS_control_type
local_name	GFS_Control%nstf_name(5)
requested	sfc_nst_post_run sfc_nst_run
physics set	slow_physics

vertical_velocity_for_updraft

long_name vertical velocity for updraft
units m s-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%w_upi
requested cs_conv_run
m_micro_run
samfdeepcnv_run
physics set slow_physics

vertically_diffused_tracer_concentration

long_name tracer concentration diffused by PBL scheme
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%vdftra
requested GFS_PBL_generic_pre_run
hedmf_run
moninshoc_run
myjpbl_wrapper_run
satmedmfvdif_run
satmedmfvdifq_run
physics set slow_physics

virtual_temperature_at_Lagrangian_surface

long_name virtual temperature at Lagrangian surface
units K
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%pt
requested fv_sat_adj_run
physics set fast_physics

volume_fraction_of_condensed_water_in_soil_at_wilting_point

long_name wilting point (volumetric)
units frac
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%smcwlt2
requested lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
physics set slow_physics

volume_fraction_of_frozen_soil_moisture_for_land_surface_model

long_name volume fraction of frozen soil moisture for lsm
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%keepsmfr
requested NOT REQUESTED
physics set

volume_fraction_of_soil_moisture

long_name total soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%smc
requested lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
physics set slow_physics

volume_fraction_of_soil_moisture_for_land_surface_model

long_name volumetric fraction of soil moisture for lsm
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%smois
requested NOT REQUESTED
physics set

volume_fraction_of_unfrozen_soil_moisture

long_name liquid soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%slc
requested lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
physics set slow_physics

volume_fraction_of_unfrozen_soil_moisture_for_land_surface_model

long_name volume fraction of unfrozen soil moisture for lsm
units frac
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%sh2o
requested NOT REQUESTED
physics set

volume_mixing_ratio_ccl4

long_name volume mixing ratio ccl4
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 9)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_cfc11

long_name volume mixing ratio cfc11
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 6)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_cfc113

long_name volume mixing ratio cfc113
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 10)
requested GFS_rrtmg_pre_run
physics set slow_physics

volume_mixing_ratio_cfc12

long_name volume mixing ratio cfc12
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 7)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_cfc22

long_name	volume mixing ratio cfc22
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

volume_mixing_ratio_ch4

long_name	volume mixing ratio ch4
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 3)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
physics set	slow_physics

volume_mixing_ratio_co

long_name volume mixing ratio co
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 5)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_co2

long_name volume mixing ratio co2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 1)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_n2o

long_name volume mixing ratio no2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 2)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

volume_mixing_ratio_o2

long_name volume mixing ratio o2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%gasvmr(:, :, 4)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

water_equivalent_accumulated_snow_depth

long_name water equiv of acc snow depth over land and sea ice
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%weasd
requested GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
physics set slow_physics

water_equivalent_accumulated_snow_depth_over_ice

long_name water equiv of acc snow depth over ice
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%weasd_ice
requested GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
 sfc_sice_run
physics set slow_physics

water_equivalent_accumulated_snow_depth_over_land

long_name water equiv of acc snow depth over land
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%weasd_land
requested GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
 lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
physics set slow_physics

water_equivalent_accumulated_snow_depth_over_ocean

long_name water equiv of acc snow depth over ocean
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%weasd_ocean
requested GFS_surface_composites_post_run
 GFS_surface_composites_pre_run
physics set slow_physics

water_friendly_aerosol_number_concentration

long_name number concentration of water-friendly aerosols
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntwa)
requested NOT REQUESTED
physics set

water_friendly_aerosol_number_concentration_updated_by_physics

long_name number concentration of water-friendly aerosols updated by physics
units kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntwa)
requested NOT REQUESTED
physics set

water_storage_in_aquifer

long_name water storage in aquifer
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%waxy
requested NOT REQUESTED
physics set

water_storage_in_aquifer_and_saturated_soil

long_name water storage in aquifer and saturated soil
units mm
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%wtxy
requested NOT REQUESTED
physics set

water_table_depth

long_name water table depth
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%zwtxy
requested NOT REQUESTED
physics set

water_table_recharge_when_deep

long_name recharge to or from the water table when deep
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%deeprechxy
requested NOT REQUESTED
physics set

water_table_recharge_when_shallow

long_name recharge to or from the water table when shallow
units m
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%rechxy
requested NOT REQUESTED
physics set

water_vapor_mixing_ratio_at_surface

long_name water vapor mixing ratio at surface
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%qvw_surf
requested NOT REQUESTED
physics set

water_vapor_specific_humidity

long_name water vapor specific humidity
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:, :, GFS_Control%ntqv)
requested GFS_stochastics_run
 GFS_suite_interstitial_2_run
 cu_gf_driver_pre_run
 cu_gf_driver_run
 cu_ntiedtke_pre_run
 drag_suite_run
 get_prs_fv3_run
 gwdc_run
 gwdps_run
 mynnedmf_wrapper_run
 mynnsfc_wrapper_run
physics set slow_physics

water_vapor_specific_humidity_at_Lagrangian_surface

long_name water vapor specific humidity updated by fast physics at Lagrangian surface
units kg kg-1
rank 3
type real
kind kind_dyn
source MODULE CCPP_typedefs TYPE CCPP_interstitial_type
local_name CCPP_interstitial%qv
requested fv_sat_adj_run
physics set fast_physics

water_vapor_specific_humidity_at_layer_for_radiation

long_name specific humidity layer
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%qlyr
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer

long_name water vapor specific humidity at lowest model layer
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_statein_type
local_name GFS_Data(cdata%blk_no)%Statein%qgrs(:,1,GFS_Control%ntqv)
requested GFS_surface_generic_post_run
 lsm_noah_run
 lsm_ruc_run
 noahmpdrv_run
 sfc_cice_run
 sfc_diff_run
 sfc_nst_run
 sfc_ocean_run
 sfc_sice_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer_for_diag

long_name layer 1 specific humidity for diag
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%q1
requested GFS_PBL_generic_post_run
GFS_surface_generic_post_run
physics set slow_physics

water_vapor_specific_humidity_at_lowest_model_layer_updated_by_physics

long_name water vapor specific humidity at lowest model layer updated by physics
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_stateout_type
local_name GFS_Data(cdata%blk_no)%Stateout%gq0(:,1,GFS_Control%ntqv)
requested sfc_diag_run
physics set slow_physics

water_vapor_specific_humidity_at_previous_time_step

long_name water vapor specific humidity at previous time step
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, 4)
requested NOT REQUESTED
physics set

water_vapor_specific_humidity_save

long_name water vapor specific humidity before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name GFS_Interstitial(cdata%thrd_no)%save_q(:, :, GFS_Control%ntqv)
requested GFS_DCNV_generic_post_run
 GFS_DCNV_generic_pre_run
 GFS_MP_generic_post_run
 GFS_SCNV_generic_post_run
 GFS_SCNV_generic_pre_run
 cs_conv_pre_run
physics set slow_physics

water_vapor_specific_humidity_two_time_steps_back

long_name water vapor specific humidity two time steps back
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_f3d(:, :, 2)
requested NOT REQUESTED
physics set

water_vapor_specific_humidity_updated_by_physics

long_name	water vapor specific humidity updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gq0(:, :, GFS_Control%ntqv)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_stochastics_run cs_conv_pre_run cs_conv_run cu_gf_driver_post_run cu_gf_driver_run cu_ntiedtke_post_run cu_ntiedtke_run get_phi_fv3_run gfdl_cloud_microphys_run h2ophys_run m_micro_run mp_thompson_pre_run mp_thompson_run samfdeepcnv_run samfshalcnv_run shoc_run zhaocarr_gscond_run zhaocarr_precpd_run
physics set	slow_physics

weight_for_momentum_at_viscous_sublayer_top

long_name weight for momentum at viscous layer top
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_a1u
requested NOT REQUESTED
physics set

weight_for_potential_temperature_at_viscous_sublayer_top

long_name weight for potential temperature at viscous layer top
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_a1t
requested NOT REQUESTED
physics set

weight_for_specific_humidity_at_viscous_sublayer_top

long_name weight for Specfic Humidity at viscous layer top
units none
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_tbd_type
local_name GFS_Data(cdata%blk_no)%Tbd%phy_myj_a1q
requested NOT REQUESTED
physics set

weights_for_stochastic_shum_perturbation

long_name	weights for stochastic shum perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%shum_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_shum_perturbation_flipped

long_name	weights for stochastic shum perturbation, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%shum_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_x_wind

long_name	weights for stochastic skeb perturbation of x wind
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%skebu_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_x_wind_flipped

long_name	weights for stochastic skeb perturbation of x wind, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%skebu_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_y_wind

long_name	weights for stochastic skeb perturbation of y wind
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%skebv_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_skeb_perturbation_of_y_wind_flipped

long_name	weights for stochastic skeb perturbation of y wind, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%skebv_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_sppt_perturbation

long_name	weights for stochastic sppt perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%sppt_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_sppt_perturbation_flipped

long_name	weights for stochastic sppt perturbation, flipped
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%sppt_wts
requested	GFS_stochastics_run
physics set	slow_physics

weights_for_stochastic_surface_physics_perturbation

long_name	weights for stochastic surface physics perturbation
units	none
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_coupling_type
local_name	GFS_Data(cdata%blk_no)%Coupling%sfc_wts
requested	GFS_surface_generic_pre_run
physics set	slow_physics

wind_speed_at_lowest_model_layer

long_name	wind speed at lowest model level
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%wind
requested	GFS_PBL_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run hedmf_run lsm_noah_run lsm_ruc_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run noahmpdrv_run satmedmfvdif_run satmedmfvdifq_run sfc_cice_run sfc_diff_run sfc_nst_run sfc_ocean_run sfc_sice_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

wood_mass

long_name wood mass including woody roots
units g m-2
rank 1
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_sfcprop_type
local_name GFS_Data(cdata%blk_no)%Sfcprop%woodxy
requested NOT REQUESTED
physics set

x_momentum_tendency_from_blocking_drag

long_name x momentum tendency from blocking drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtaux2d_bl
requested NOT REQUESTED
physics set

x_momentum_tendency_from_form_drag

long_name x momentum tendency from form drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtaux2d_fd
requested NOT REQUESTED
physics set

`x_momentum_tendency_from_large_scale_gwd`

long_name	x momentum tendency from large scale gwd
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dtaux2d_ls
requested	NOT REQUESTED
physics set	

`x_momentum_tendency_from_small_scale_gwd`

long_name	x momentum tendency from small scale gwd
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dtaux2d_ss
requested	NOT REQUESTED
physics set	

x_wind

long_name	zonal wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%ugrs
requested	GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cires_ugwp_run drag_suite_run gwdc_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run rayleigh_damp_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

x_wind_at_10m

long_name	10 meter u wind speed
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%u10m
requested	GFS_surface_generic_post_run hedmf_run maximum_hourly_diagnostics_run moninshoc_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_post_run sfc_diag_run sfc_diff_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

x_wind_at_lowest_model_layer

long_name	zonal wind at lowest model layer
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%ugrs(:,1)
requested	GFS_PBL_generic_post_run GFS_surface_generic_post_run GFS_surface_generic_pre_run noahmpdrv_run sfc_nst_run
physics set	slow_physics

x_wind_at_lowest_model_layer_for_diag

long_name	layer 1 x wind for diag
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%u1
requested	GFS_surface_generic_post_run
physics set	slow_physics

x_wind_at_lowest_model_layer_updated_by_physics

long_name	zonal wind at lowest model layer updated by physics
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gu0(:,1)
requested	sfc_diag_run
physics set	slow_physics

x_wind_save

long_name	x-wind before entering a physics scheme
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%save_u
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
physics set	slow_physics

x_wind_updated_by_physics

long_name	zonal wind updated by physics
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gu0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run gfdl_cloud_microphys_run gwdc_post_run m_micro_run samfdeepcnv_run samfshalcnv_run shoc_run
physics set	slow_physics

y_momentum_tendency_from_blocking_drag

long_name y momentum tendency from blocking drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtauy2d_bl
requested NOT REQUESTED
physics set

y_momentum_tendency_from_form_drag

long_name y momentum tendency from form drag
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtauy2d_fd
requested NOT REQUESTED
physics set

y_momentum_tendency_from_large_scale_gwd

long_name y momentum tendency from large scale gwd
units m s-2
rank 2
type real
kind kind_phys
source MODULE GFS_typedefs TYPE GFS_diag_type
local_name GFS_Data(cdata%blk_no)%Intdiag%dtauy2d_ls
requested NOT REQUESTED
physics set

y_momentum_tendency_from_small_scale_gwd

long_name	y momentum tendency from small scale gwd
units	m s-2
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%dtauy2d_ss
requested	NOT REQUESTED
physics set	

y_wind

long_name	meridional wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%vgrs
requested	GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cires_ugwp_run drag_suite_run gwdc_run gwdps_run hedmf_run moninshoc_run myjpbl_wrapper_run myjsfc_wrapper_run mynnedmf_wrapper_run mynnsfc_wrapper_run rayleigh_damp_run satmedmfvdif_run satmedmfvdifq_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

y_wind_at_10m

long_name	10 meter v wind speed
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%v10m
requested	GFS_surface_generic_post_run hedmf_run maximum_hourly_diagnostics_run moninshoc_run mynnsfc_wrapper_run satmedmfvdif_run satmedmfvdifq_run sfc_diag_post_run sfc_diag_run sfc_diff_run shinhongvdif_run ysuvdif_run
physics set	slow_physics

y_wind_at_lowest_model_layer

long_name	meridional wind at lowest model layer
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_statein_type
local_name	GFS_Data(cdata%blk_no)%Statein%vgrs(:,1)
requested	GFS_PBL_generic_post_run GFS_surface_generic_post_run GFS_surface_generic_pre_run noahmpdrv_run sfc_nst_run
physics set	slow_physics

y_wind_at_lowest_model_layer_for_diag

long_name	layer 1 y wind for diag
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_diag_type
local_name	GFS_Data(cdata%blk_no)%Intdiag%v1
requested	GFS_surface_generic_post_run
physics set	slow_physics

y_wind_at_lowest_model_layer_updated_by_physics

long_name	meridional wind at lowest model layer updated by physics
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gv0(:,1)
requested	sfc_diag_run
physics set	slow_physics

y_wind_save

long_name	y-wind before entering a physics scheme
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%save_v
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
physics set	slow_physics

y_wind_updated_by_physics

long_name	meridional wind updated by physics
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_stateout_type
local_name	GFS_Data(cdata%blk_no)%Stateout%gv0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_stochastics_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run cs_conv_run cu_gf_driver_run cu_ntiedtke_run gfdl_cloud_microphys_run gwdc_post_run m_micro_run samfdeepcnv_run samfshalcnv_run shoc_run
physics set	slow_physics

zenith_angle_temporal_adjustment_factor_for_shortwave_fluxes

long_name	zenith angle temporal adjustment factor for shortwave
units	none
rank	1
type	real
kind	kind_phys
source	MODULE GFS_typedefs TYPE GFS_interstitial_type
local_name	GFS_Interstitial(cdata%thrd_no)%xmu
requested	GFS_PBL_generic_post_run
	GFS_suite_interstitial_2_run
	dcyc2t3_run
	hedmf_run
	mynnedmf_wrapper_run
	satmedmfvdif_run
	satmedmfvdifq_run
	ysuvdif_run
physics set	slow_physics