

1 CCpp variables provided by model SCM vs requested by pool of physics

1.1 List of variables

FV3-GFS_Cldprop_type
FV3-GFS_Cldprop_type_all_blocks
FV3-GFS_Control_type
FV3-GFS_Coupling_type
FV3-GFS_Diag_type
FV3-GFS_Diag_type_all_blocks
FV3-GFS_Grid_type
FV3-GFS_Grid_type_all_blocks
FV3-GFS_Init_type
FV3-GFS_Interstitial_type
FV3-GFS_Radtend_type
FV3-GFS_Sfcprop_type
FV3-GFS_Sfcprop_type_all_blocks
FV3-GFS_Statein_type
FV3-GFS_Statein_type_all_blocks
FV3-GFS_Stateout_type
FV3-GFS_Tbd_type
FV3-GFS_Tbd_type_all_blocks
Monin-Obukhov_similarity_function_for_heat
Monin-Obukhov_similarity_function_for_heat_at_2m
Monin-Obukhov_similarity_function_for_momentum
Monin-Obukhov_similarity_function_for_momentum_at_10m
accumulated_lwe_thickness_of_convective_precipitation_amount_cnvc90
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
accumulated_lwe_thickness_of_snow_amount_in_bucket
adjusted_vertical_layer_dimension_for_radiation
adjusted_vertical_level_dimension_for_radiation
aerosol_asymmetry_parameter_for_longwave_bands_01-16
aerosol_asymmetry_parameter_for_shortwave_bands_01-16
aerosol_aware_parameter_deep_convection
aerosol_aware_parameter_shallow_convection
aerosol_optical_depth_for_longwave_bands_01-16
aerosol_optical_depth_for_shortwave_bands_01-16
aerosol_optical_properties_for_longwave_bands_01-16
aerosol_optical_properties_for_shortwave_bands_01-16
aerosol_single_scattering_albedo_for_longwave_bands_01-16
aerosol_single_scattering_albedo_for_shortwave_bands_01-16
air_pressure
air_pressure_at_interface
air_pressure_at_interface_for_radiation_in_hPa
air_pressure_at_layer_for_radiation_in_hPa
air_pressure_at_lowest_model_layer
air_pressure_difference_between_midlayers
air_temperature
air_temperature_at_interface_for_radiation
air_temperature_at_layer_for_radiation
air_temperature_at_lowest_model_layer
air_temperature_at_lowest_model_layer_for_diag
air_temperature_at_lowest_model_layer_updated_by_physics
air_temperature_at_previous_time_step
air_temperature_save

air_temperature_two_time_steps_back
air_temperature_updated_by_physics
angle_from_east_of_maximum_subgrid_orographic_variations
anisotropy_of_subgrid_orography
array_dimension_of_2d_arrays_for_microphysics
array_dimension_of_3d_arrays_for_microphysics
array_dimension_of_random_number
asymmetry_of_subgrid_orography
atmosphere_boundary_layer_thickness
atmosphere_diffusivity_coefficient_factor
atmosphere_heat_diffusivity
atmosphere_heat_diffusivity_background
atmosphere_heat_diffusivity_background_maximum
atmosphere_momentum_diffusivity_background
atmosphere_optical_thickness_due_to_ambient_aerosol_particles
block_number
bounded_vegetation_area_fraction
bulk_richardson_number_at_lowest_model_level
canopy_upward_latent_heat_flux
canopy_water_amount
ccpp_error_flag
ccpp_error_message
ccpp_loop_counter
cell_area
cell_size
change_in_ozone_concentration
characteristic_grid_length_scale
cloud_area_fraction
cloud_area_fraction_for_radiation
cloud_condensed_water_conversion_threshold
cloud_condensed_water_mixing_ratio

cloud_condensed_water_mixing_ratio_at_lowest_model_layer
cloud_condensed_water_mixing_ratio_at_surface
cloud_condensed_water_mixing_ratio_save
cloud_condensed_water_mixing_ratio_updated_by_physics
cloud_droplet_number_concentration
cloud_ice_mixing_ratio
cloud_ice_water_path
cloud_liquid_water_mixing_ratio
cloud_liquid_water_path
cloud_optical_depth_layers_678
cloud_optical_depth_weighted
cloud_rain_water_path
cloud_snow_water_path
cloud_work_function
coefficient_c_0
coefficient_c_d
coefficient_for_evaporation_of_rainfall
coefficient_from_cloud_ice_to_snow
coefficient_from_cloud_water_to_rain
coefficient_w_0
coefficient_w_d
column_precipitable_water
components_of_surface_downward_shortwave_fluxes
convective_cloud_cover
convective_cloud_cover_in_phy_f3d
convective_cloud_switch
convective_cloud_water_mixing_ratio
convective_cloud_water_mixing_ratio_in_phy_f3d
convective_transportable_tracers
convexity_of_subgrid_orography
cosine_of_latitude

cosine_of_solar_declination_angle
cosine_of_zenith_angle
countergradient_mixing_term_for_temperature
countergradient_mixing_term_for_water_vapor
critical_relative_humidity
critical_relative_humidity_at_PBL_top
critical_relative_humidity_at_surface
critical_relative_humidity_at_top_of_atmosphere
cumulative_atmosphere_detrainment_convective_mass_flux
cumulative_atmosphere_downdraft_convective_mass_flux
cumulative_atmosphere_updraft_convective_mass_flux
cumulative_canopy_upward_latent_heat_flu_multiplied_by_timestep
cumulative_change_in_ozone_mixing_ratio_due_to_PBL
cumulative_change_in_temperature_due_to_PBL
cumulative_change_in_temperature_due_to_deep_convection
cumulative_change_in_temperature_due_to_longwave_radiation
cumulative_change_in_temperature_due_to_microphysics
cumulative_change_in_temperature_due_to_shal_convection
cumulative_change_in_temperature_due_to_shortwave_radiation_and_orographic_gravity_wave_drag
cumulative_change_in_water_vapor_specific_humidity_due_to_PBL
cumulative_change_in_water_vapor_specific_humidity_due_to_deep_convection
cumulative_change_in_water_vapor_specific_humidity_due_to_microphysics
cumulative_change_in_water_vapor_specific_humidity_due_to_physics
cumulative_change_in_water_vapor_specific_humidity_due_to_shal_convection
cumulative_change_in_x_wind_due_to_PBL
cumulative_change_in_x_wind_due_to_convective_gravity_wave_drag
cumulative_change_in_x_wind_due_to_deep_convection
cumulative_change_in_x_wind_due_to_orographic_gravity_wave_drag
cumulative_change_in_y_wind_due_to_PBL
cumulative_change_in_y_wind_due_to_convective_gravity_wave_drag
cumulative_change_in_y_wind_due_to_deep_convection

cumulative_change_in_y_wind_due_to_orographic_gravity_wave_drag
cumulative_cloud_work_function
cumulative_lwe_thickness_of_convective_precipitation_amount
cumulative_lwe_thickness_of_convective_precipitation_amount_in_bucket
cumulative_snow_deposition_sublimation_upward_latent_heat_flux_multiplied_by_timestep
cumulative_snow_freezing_rain_upward_latent_heat_flux_multiplied_by_timestep
cumulative_soil_upward_latent_heat_flux_multiplied_by_timestep
cumulative_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_longwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_downwelling_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_ground_heat_flux_multiplied_by_timestep
cumulative_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_longwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_net_downward_shortwave_flux_for_coupling_multiplied_by_timestep
cumulative_surface_snow_area_fraction_multiplied_by_timestep
cumulative_surface_upward_latent_heat_flux_for_coupling_multiplied_by_timestep
cumulative_surface_upward_latent_heat_flux_for_diag_multiplied_by_timestep
cumulative_surface_upward_potential_latent_heat_flux_multiplied_by_timestep
cumulative_surface_upward_sensible_heat_flux_for_coupling_multiplied_by_timestep
cumulative_surface_upward_sensible_heat_flux_for_diag_multiplied_by_timestep
cumulative_surface_x_momentum_flux_for_coupling_multiplied_by_timestep
cumulative_surface_x_momentum_flux_for_diag_multiplied_by_timestep
cumulative_surface_y_momentum_flux_for_coupling_multiplied_by_timestep
cumulative_surface_y_momentum_flux_for_diag_multiplied_by_timestep
cumulative_transpiration_flux_multiplied_by_timestep

date_and_time_at_model_initialization
date_and_time_at_model_initialization_reordered
daytime_points
daytime_points_dimension
deep_soil_temperature
density_of_frozen_precipitation
depth_of_soil_levels_for_land_surface_model
detrainment_conversion_parameter_deep_convection
detrainment_conversion_parameter_shallow_convection
dewpoint_temperature_at_2m
diffusivity_background_sigma_level
dimensionless_exner_function_at_lowest_model_interface
dimensionless_exner_function_at_lowest_model_layer
dimensionless_exner_function_at_model_interfaces
dimensionless_exner_function_at_model_layers
diurnal_thermocline_layer_heat_content
diurnal_thermocline_layer_thickness
diurnal_thermocline_layer_x_current
diurnal_thermocline_layer_y_current
dominant_freezing_rain_type
dominant_rain_type
dominant_sleet_type
dominant_snow_type
downdraft_fraction_reaching_surface_over_land_deep_convection
downdraft_fraction_reaching_surface_over_ocean_deep_convection
dynamics_to_physics_timestep_ratio
entrainment_rate_coefficient_deep_convection
entrainment_rate_coefficient_shallow_convection
equation_of_time
extra_top_layer
flag_TKE_dissipation_heating

flag_convective_gravity_wave_drag
flag_deep_convection
flag_diagnostics
flag_diagnostics_3D
flag_for_CRICK-proof_cloud_water
flag_for_aerosol_physics
flag_for_chemistry_coupling
flag_for_cloud_condensate_normalized_by_cloud_cover
flag_for_default_aerosol_effect_in_shortwave_radiation
flag_for_flux_coupling
flag_for_frozen_soil_physics
flag_for_gfdl_microphysics_scheme
flag_for_guess_run
flag_for_hedmf
flag_for_initial_time-date_control
flag_for_iteration
flag_for_land_surface_scheme
flag_for_lw_clouds_without_sub-grid_approximation
flag_for_max-random_overlap_clouds_for_longwave_radiation
flag_for_max-random_overlap_clouds_for_shortwave_radiation
flag_for_microphysics_scheme
flag_for_mom4_coupling
flag_for_nsstm_run
flag_for_output_of_longwave_heating_rate
flag_for_output_of_shortwave_heating_rate
flag_for_precipitation_effect_on_radiation
flag_for_precipitation_type
flag_for_precipitation_type_algorithm
flag_for_reduced_drag_coefficient_over_sea
flag_for_ruc_land_surface_scheme
flag_for_solar_constant

flag_for_surface_emissivity_control
flag_for_sw_clouds_without_sub-grid_approximation
flag_for_thompson_microphysics_scheme
flag_for_using_climatology_albedo
flag_for_using_prescribed_global_mean_co2_value
flag_for_vertical_index_direction_control
flag_for_wsm6_microphysics_scheme
flag_gocart
flag_idealized_physics
flag_mg3_as_mg2
flag_print
flag_shallow_convective_cloud
flag_skip_macro
flag_to_calc_lw
flag_to_calc_sw
forecast_date_and_time
forecast_hour
forecast_time
fraction_of_convective_cloud
fraction_of_grid_box_with_subgrid_orography_higher_than_critical_height
free_convection_layer_thickness
frequency_for_longwave_radiation
frequency_for_shortwave_radiation
gas_constant_dry_air
gas_constant_water_vapor
geopotential
geopotential_at_interface
geopotential_difference_between_midlayers_divided_by_midlayer_virtual_temperature
graupel_mixing_ratio
graupel_number_concentration
gravitational_acceleration

grid_size_related_coefficient_used_in_scale-sensitive_schemes
grid_size_related_coefficient_used_in_scale-sensitive_schemes_complement
h2o_forcing
h2o_forcing_from_host
height_above_ground_at_lowest_model_layer
horizontal_block_size
horizontal_dimension
horizontal_index_of_printed_column
horizontal_loop_extent
ice_friendly_aerosol_number_concentration
ice_number_concentration
ice_water_mixing_ratio
index_for_liquid_cloud_condensate
index_for_ozone
index_of_TKE_convective_transport_tracer
index_of_dtlm_start
index_of_highest_temperature_inversion
index_of_time_step
instantaneous_atmosphere_detrainment_convective_mass_flux
instantaneous_atmosphere_detrainment_convective_mass_flux_on_dynamics_timestep
instantaneous_atmosphere_downdraft_convective_mass_flux
instantaneous_atmosphere_downdraft_convective_mass_flux_on_dynamics_timestep
instantaneous_atmosphere_heat_diffusivity
instantaneous_atmosphere_updraft_convective_mass_flux
instantaneous_atmosphere_updraft_convective_mass_flux_on_dynamics_timestep
instantaneous_cosine_of_zenith_angle
instantaneous_deep_convective_cloud_condensate_mixing_ratio_on_dynamics_time_step
instantaneous_specific_humidity_at_2m_for_coupling
instantaneous_surface_air_pressure_for_coupling
instantaneous_surface_downwelling_diffuse_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling

instantaneous_surface_downwelling_direct_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_downwelling_longwave_flux_for_coupling
instantaneous_surface_downwelling_shortwave_flux_for_coupling
instantaneous_surface_ground_heat_flux
instantaneous_surface_net_downward_diffuse_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_net_downward_diffuse_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_net_downward_direct_near_infrared_shortwave_flux_for_coupling
instantaneous_surface_net_downward_direct_ultraviolet_and_visible_shortwave_flux_for_coupling
instantaneous_surface_net_downward_longwave_flux_for_coupling
instantaneous_surface_net_downward_shortwave_flux_for_coupling
instantaneous_surface_potential_evaporation
instantaneous_surface_skin_temperature_for_coupling
instantaneous_surface_upward_latent_heat_flux
instantaneous_surface_upward_latent_heat_flux_for_coupling
instantaneous_surface_upward_latent_heat_flux_for_diag
instantaneous_surface_upward_sensible_heat_flux
instantaneous_surface_upward_sensible_heat_flux_for_coupling
instantaneous_surface_upward_sensible_heat_flux_for_diag
instantaneous_surface_x_momentum_flux
instantaneous_surface_x_momentum_flux_for_coupling
instantaneous_surface_x_momentum_flux_for_diag
instantaneous_surface_y_momentum_flux
instantaneous_surface_y_momentum_flux_for_coupling
instantaneous_surface_y_momentum_flux_for_diag
instantaneous_temperature_at_2m_for_coupling
instantaneous_upward_sensible_heat_flux
instantaneous_water_vapor_specific_humidity_tendency_due_to_convection_on_dynamics_timestep
instantaneous_x_stress_due_to_gravity_wave_drag
instantaneous_x_wind_at_10m_for_coupling
instantaneous_y_stress_due_to_gravity_wave_drag

instantaneous_y_wind_at_10m_for_coupling
inverse_scaling_factor_for_critical_relative_humidity
iounit_namelist
iteration_number
kinematic_surface_upward_latent_heat_flux
kinematic_surface_upward_sensible_heat_flux
land_area_fraction
largest_cloud_top_vertical_index_encountered_thus_far
latent_heat_of_vaporization_of_water_at_0C
latitude
latitude_index_in_debug_printouts
latitude_of_h2o_forcing_data_from_host
latitude_of_ozone_forcing_data_from_host
level_of_dividing_streamline
longitude
lw_fluxes_sfc
lw_fluxes_top_atmosphere
lwe_thickness_of_convective_precipitation_amount_for_coupling
lwe_thickness_of_convective_precipitation_amount_on_dynamics_timestep
lwe_thickness_of_deep_convective_precipitation_amount
lwe_thickness_of_graupel_amount_on_dynamics_timestep
lwe_thickness_of_graupel_amount_per_day
lwe_thickness_of_ice_amount_on_dynamics_timestep
lwe_thickness_of_ice_amount_per_day
lwe_thickness_of_moist_convective_adj_precipitation_amount
lwe_thickness_of_precipitation_amount_for_coupling
lwe_thickness_of_precipitation_amount_on_dynamics_timestep
lwe_thickness_of_shallow_convective_precipitation_amount
lwe_thickness_of_snow_amount_for_coupling
lwe_thickness_of_snow_amount_on_dynamics_timestep
lwe_thickness_of_snow_amount_per_day

lwe_thickness_of_stratiform_precipitation_amount
lwe_thickness_of_stratiform_precipitation_amount_per_day
magnitude_of_perturbation_of_vegetation_fraction
maximum_column_heating_rate
maximum_critical_relative_humidity
maximum_scaling_factor_for_critical_relative_humidity
maximum_specific_humidity_at_2m
maximum_subgrid_orography
maximum_temperature_at_2m
maximum_vegetation_area_fraction
maximum_wind_at_10m
maximum_x_wind_at_10m
maximum_y_wind_at_10m
mean_change_over_depth_in_sea_water_temperature
mean_effective_radius_for_ice_cloud
mean_effective_radius_for_liquid_cloud
mean_effective_radius_for_rain_drop
mean_effective_radius_for_snow_flake
minimum_scaling_factor_for_critical_relative_humidity
minimum_specific_humidity_at_2m
minimum_temperature_at_2m
minimum_vegetation_area_fraction
model_layer_number_at_cloud_base
model_layer_number_at_cloud_top
momentum_transport_reduction_factor_pgf_deep_convection
momentum_transport_reduction_factor_pgf_shallow_convection
mpi_rank
multiplication_factors_for_convective_gravity_wave_drag
multiplication_factors_for_mountain_blocking_and_orographic_gravity_wave_drag
natural_log_of_h2o_forcing_data_pressure_levels
natural_log_of_h2o_forcing_data_pressure_levels_from_host

natural_log_of_ozone_forcing_data_pressure_levels
natural_log_of_ozone_forcing_data_pressure_levels_from_host
nonnegative_lwe_thickness_of_precipitation_amount_on_dynamics_timestep
normalized_soil_wetness
number_of_3d_arrays_associated_with_pdf-based_clouds
number_of_coefficients_in_h2o_forcing_data
number_of_coefficients_in_h2o_forcing_data_from_host
number_of_coefficients_in_ozone_forcing_data
number_of_coefficients_in_ozone_forcing_data_from_host
number_of_convective_3d_cloud_fields
number_of_equatorial_longitude_points
number_of_hydrometeors
number_of_latitutde_points_in_h2o_forcing_data_from_host
number_of_latitutde_points_in_ozone_forcing_data_from_host
number_of_statistical_measures_of_subgrid_orography
number_of_surface_perturbations
number_of_time_levels_in_h2o_forcing_data_from_host
number_of_time_levels_in_ozone_forcing_data_from_host
number_of_total_tracers
number_of_tracers
number_of_tracers_for_CS
number_of_tracers_for_allocating_cloud_work_function
number_of_tracers_for_cloud_condensate
number_of_tracers_for_samf
number_of_vertical_diffusion_tracers
number_of_vertical_layers_for_radiation_calculations
number_of_water_tracers
ocean_mixed_layer_thickness
omega
orography
orography_unfiltered

ozone_concentration_at_layer_for_radiation
ozone_concentration_updated_by_physics
ozone_forcing
ozone_forcing_from_host
ozone_mixing_ratio
perturbation_of_heat_to_momentum_roughness_length_ratio
perturbation_of_leaf_area_index
perturbation_of_momentum_roughness_length
perturbation_of_soil_type_b_parameter
perturbation_of_vegetation_fraction
pi
pressure_at_bottom_of_convective_cloud
pressure_at_top_of_convective_cloud
pressure_cutoff_for_rayleigh_damping
rain_conversion_parameter_deep_convection
rain_conversion_parameter_shallow_convection
rain_evaporation_coefficient_deep_convection
rain_evaporation_coefficient_over_land_deep_convection
rain_number_concentration
rain_water_mixing_ratio
random_number_array
ratio_of_dry_air_to_water_vapor_gas_constants
ratio_of_dry_air_to_water_vapor_gas_constants_minus_one
ratio_of_exner_function_between_midlayer_and_interface_at_lowest_model_layer
ratio_of_snowfall_to_rainfall
ratio_of_vapor_to_dry_air_gas_constants_minus_one
ratio_of_wind_at_lowest_model_layer_and_wind_at_10m
sea_ice_concentration
sea_ice_temperature
sea_ice_thickness
sea_land_ice_mask

sea_land_ice_mask_real
sea_surface_reference_temperature
sea_water_salinity
seconds_elapsed_since_model_initialization
seed_random_numbers_lw
seed_random_numbers_sw
sensible_heat_flux_due_to_rainfall
sensitivity_of_dtl_heat_content_to_surface_temperature
sensitivity_of_dtl_thickness_to_surface_temperature
sine_of_latitude
sine_of_solar_declination_angle
slope_of_subgrid_orography
smallest_cloud_base_vertical_index_encountered_thus_far
snow_deposition_sublimation_upward_latent_heat_flux
snow_freezing_rain_upward_latent_heat_flux
snow_number_concentration
snow_temperature_bottom_first_layer
snow_water_mixing_ratio
soil_moisture_content
soil_temperature
soil_temperature_for_land_surface_model
soil_type_classification
soil_type_classification_real
soil_type_dataset_choice
soil_upward_latent_heat_flux
soil_vertical_dimension
soil_vertical_dimension_for_land_surface_model
solar_constant
specific_heat_of_dry_air_at_constant_pressure
specific_heat_of_liquid_water_at_constant_pressure
specific_heat_of_water_vapor_at_constant_pressure

specific_humidity_at_2m
specified_kinematic_surface_upward_latent_heat_flux
specified_kinematic_surface_upward_sensible_heat_flux
standard_deviation_of_subgrid_orography
start_index_of_other_tracers
statistical_measures_of_subgrid_orography
sub-layer_cooling_amount
sub-layer_cooling_thickness
subsurface_runoff_flux
surface_air_pressure
surface_air_pressure_at_previous_time_step
surface_air_pressure_two_time_steps_back
surface_air_temperature_for_radiation
surface_albedo_due_to_UV_and_VIS_diffused
surface_albedo_due_to_UV_and_VIS_direct
surface_albedo_due_to_near_IR_diffused
surface_albedo_due_to_near_IR_direct
surface_albedo_perturbation
surface_condensation_mass
surface_diffused_shortwave_albedo
surface_downwelling_diffuse_near_infrared_shortwave_flux
surface_downwelling_diffuse_near_infrared_shortwave_flux_on_radiation_time_step
surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux
surface_downwelling_diffuse_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_downwelling_direct_near_infrared_shortwave_flux
surface_downwelling_direct_near_infrared_shortwave_flux_on_radiation_time_step
surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux
surface_downwelling_direct_ultraviolet_and_visible_shortwave_flux_on_radiation_time_step
surface_downwelling_longwave_flux
surface_downwelling_longwave_flux_absorbed_by_ground
surface_downwelling_longwave_flux_on_radiation_time_step

surface_downwelling_shortwave_flux
surface_downwelling_shortwave_flux_on_radiation_time_step
surface_drag_coefficient_for_heat_and_moisture_in_air
surface_drag_coefficient_for_momentum_in_air
surface_drag_mass_flux_for_heat_and_moisture_in_air
surface_drag_wind_speed_for_momentum_in_air
surface_friction_velocity
surface_ground_temperature_for_radiation
surface_longwave_emissivity
surface_midlayer_air_temperature_in_longwave_radiation
surface_net_downwelling_shortwave_flux
surface_net_downwelling_shortwave_flux_on_radiation_time_step
surface_roughness_length
surface_runoff
surface_runoff_flux
surface_skin_temperature
surface_skin_temperature_after_iteration
surface_skin_temperature_for_nsst
surface_slope_classification
surface_slope_classification_real
surface_snow_area_fraction
surface_snow_area_fraction_for_diagnostics
surface_snow_melt
surface_snow_thickness_water_equivalent
surface_specific_humidity
surface_upward_potential_latent_heat_flux
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_shortwave_flux
surface_wind_enhancement_due_to_convection
surface_wind_stress
sw_fluxes_sfc
sw_fluxes_top_atmosphere
temperature_at_2m
temperature_at_zero_celsius
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_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_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_cloud_droplet_number_concentration_due_to_model_physics
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_number_concentration_due_to_model_physics
tendency_of_liquid_cloud_water_mixing_ratio_due_to_model_physics
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_vertically_diffused_tracer_concentration
tendency_of_water_friendly_aerosol_number_concentration_due_to_model_physics
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_model_physics
tendency_of_y_wind_due_to_convective_gravity_wave_drag
tendency_of_y_wind_due_to_model_physics
threshold_volume_fraction_of_condensed_water_in_soil
time_integral_of_x_stress_due_to_gravity_wave_drag
time_integral_of_y_stress_due_to_gravity_wave_drag
time_levels_in_h2o_forcing_data_from_host
time_levels_in_ozone_forcing_data_from_host
time_scale_for_rayleigh_damping
time_step_for_dynamics
time_step_for_physics
time_step_for_radiation
total_cloud_fraction
total_runoff
tracer_concentration
tracer_concentration_updated_by_physics
transpiration_flux
upper_bound_on_max_albedo_over_deep_snow
upward_heat_flux_in_soil
vegetation_area_fraction
vegetation_type_classification
vegetation_type_classification_real
vegetation_type_dataset_choice
vertical_dimension
vertical_dimension_of_h2o_forcing_data
vertical_dimension_of_h2o_forcing_data_from_host

vertical_dimension_of_ozone_forcing_data
vertical_dimension_of_ozone_forcing_data_from_host
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_layer_dimension_for_radiation
vertical_sigma_coordinate_for_radiation_initialization
vertical_temperature_average_range_lower_bound
vertical_temperature_average_range_upper_bound
vertically_diffused_tracer_concentration
volume_fraction_of_condensed_water_in_soil_at_wilting_point
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
vonKarman_constant
water_equivalent_accumulated_snow_depth

water_friendly_aerosol_number_concentration
water_vapor_specific_humidity
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
wind_speed_at_lowest_model_layer
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_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

FV3-GFS_Cldprop_type

long_name	derived type GFS_cldprop_type in FV3
units	DDT
rank	0
type	GFS_cldprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Cldprop(i)
requested	GFS_phys_time_vary_run
	GFS_rrtmg_pre_run
category	physics

FV3-GFS_Cldprop_type_all_blocks

long_name	derived type GFS_cldprop_type in FV3 for all blocks
units	DDT
rank	1
type	GFS_cldprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Cldprop(:)
requested	NOT REQUESTED
category	

FV3-GFS_Control_type

long_name	derived type GFS_control_type in FV3
units	DDT
rank	0
type	GFS_control_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)
requested	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_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_phys_reset_run GFS_suite_stateout_update_run GFS_time_vary_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
category	physics

FV3-GFS_Coupling_type

long_name	derived type GFS_coupling_type in FV3
units	DDT
rank	0
type	GFS_coupling_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
category	physics

FV3-GFS_Diag_type

long_name	derived type GFS_diag_type in FV3
units	DDT
rank	0
type	GFS_diag_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)
requested	GFS_phys_time_vary_run GFS_rrtmg_post_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run rrtmg_sw_post_run
category	physics

FV3-GFS_Diag_type_all_blocks

long_name	derived type GFS_diag_type in FV3 for all blocks
units	DDT
rank	1
type	GFS_diag_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(:)
requested	NOT REQUESTED
category	

FV3-GFS_Grid_type

long_name	derived type GFS_grid_type in FV3
units	DDT
rank	0
type	GFS_grid_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)
requested	GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_stateout_update_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
category	physics

FV3-GFS_Grid_type_all_blocks

long_name derived type GFS_grid_type in FV3 for all blocks
units DDT
rank 1
type GFS_grid_type
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Grid(:)
requested NOT REQUESTED
category

FV3-GFS_Init_type

long_name derived type GFS_init_type in FV3
units DDT
rank 0
type GFS_init_type
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Init_parm(i)
requested NOT REQUESTED
category

FV3-GFS_Interstitial_type

long_name derived type GFS_interstitial_type in FV3
units DDT
rank 0
type GFS_interstitial_type
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)
requested GFS_suite_interstitial_phys_reset_run
GFS_suite_interstitial_rad_reset_run
category physics

FV3-GFS_Radtend_type

long_name	derived type GFS_radtend_type in FV3
units	DDT
rank	0
type	GFS_radtend_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radtend(i)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_2_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_post_run rrtmg_sw_pre_run
category	physics

FV3-GFS_Sfcprop_type

long_name	derived type GFS_sfcprop_type in FV3
units	DDT
rank	0
type	GFS_sfcprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)
requested	GFS_phys_time_vary_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run rrtmg_lw_pre_run rrtmg_sw_pre_run
category	physics

FV3-GFS_Sfcprop_type_all_blocks

long_name	derived type GFS_sfcprop_type in FV3 for all blocks
units	DDT
rank	1
type	GFS_sfcprop_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(:)
requested	NOT REQUESTED
category	

FV3-GFS_Statein_type

long_name	derived type GFS_statein_type in FV3
units	DDT
rank	0
type	GFS_statein_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)
requested	GFS_rad_time_vary_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run
category	physics

FV3-GFS_Statein_type_all_blocks

long_name	derived type GFS_statein_type in FV3 for all blocks
units	DDT
rank	1
type	GFS_statein_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(:)
requested	NOT REQUESTED
category	

FV3-GFS_Stateout_type

long_name	derived type GFS_stateout_type in FV3
units	DDT
rank	0
type	GFS_stateout_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)
requested	GFS_suite_stateout_reset_run GFS_suite_stateout_update_run
category	physics

FV3-GFS_Tbd_type

long_name	derived type GFS_tbd_type in FV3
units	DDT
rank	0
type	GFS_tbd_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)
requested	GFS_phys_time_vary_init GFS_phys_time_vary_run GFS_rad_time_vary_run GFS_rrtmg_pre_run GFS_time_vary_pre_run
category	physics

FV3-GFS_Tbd_type_all_blocks

long_name	derived type GFS_tbd_type in FV3 for all blocks
units	DDT
rank	1
type	GFS_tbd_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(:)
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ffhh
requested	gmtb_scm_sfc_flux_spec_run hedmf_run sfc_diag_run sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%fh2
requested	sfc_diag_run sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ffmm
requested	gmtb_scm_sfc_flux_spec_run hedmf_run sfc_diag_run sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%fm10
requested	sfc_diag_run sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acv
requested	cnvc90_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totgrp
requested	GFS_calpreciptype_run
category	physics

accumulated_lwe_thickness_of_graupel_amount_in_bucket

long_name	accumulated graupel precipitation
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totgrpb
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%totice
requested GFS_calpreciptype_run
category physics

accumulated_lwe_thickness_of_ice_amount_in_bucket

long_name accumulated ice precipitation
units kg m-2
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%toticeb
requested GFS_calpreciptype_run
category physics

accumulated_lwe_thickness_of_precipitation_amount

long_name accumulated total precipitation
units m
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%totprcp
requested GFS_calpreciptype_run
category physics

accumulated_lwe_thickness_of_precipitation_amount_in_bucket

long_name	accumulated total precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totprcpb
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totsnw
requested	GFS_calpreciptype_run
category	physics

accumulated_lwe_thickness_of_snow_amount_in_bucket

long_name	accumulated snow precipitation
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%totsnwb
requested	GFS_calpreciptype_run
category	physics

adjusted_vertical_layer_dimension_for_radiation

long_name	adjusted number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lmk
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lmp
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faerlw(:, :, :, 3)
requested GFS_rrtmg_pre_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faersw(:, :, :, 3)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%asolfac_deep
requested samfdeepcnv_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%asolfac_shal
requested samfshalcnv_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faerlw(:, :, :, 1)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faersw(:, :, :, 1)
requested GFS_rrtmg_pre_run
rrtmg_sw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faerlw
requested GFS_rrtmg_setup_init
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faersw
requested GFS_rrtmg_setup_init
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%faerlw(:, :, :, 2)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%faersw(:, :, :, 2)
requested	GFS_rrtmg_pre_run rrtmg_sw_run
category	physics

air_pressure

long_name	mean layer pressure
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsl
requested	GFS_calpreciptype_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

air_pressure_at_interface

long_name	air pressure at model layer interfaces
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsi
requested	GFS_calpreciptype_run cnvc90_run get_prs_fv3_run gwdc_run gwdps_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%plvl
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%plyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsl(:,1)
requested	gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	physics

air_pressure_difference_between_midlayers

long_name	air pressure difference between midlayers
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%del
requested	GFS_zhao_carr_pwat_run get_prs_fv3_run gwdc_pre_run gwdc_run gwdps_run hedmf_run ozphys_run samfdeepcnv_run samfshalcnv_run zhaocarr_precpd_run
category	physics

air_temperature

long_name	model layer mean temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%tgrs
requested	get_prs_fv3_run gwdc_run gwdps_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tlvl
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tlyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%tgrs(:,1)
requested	GFS_surface_generic_post_run dcyc2t3_run gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%t1
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gt0(:,1)
requested	sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 3)
requested	zhaocarr_gscond_run
category	physics

air_temperature_save

long_name	air temperature before entering a physics scheme
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_t
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_calpreciptype_run gwdc_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 1)
requested	zhaocarr_gscond_run
category	physics

air_temperature_updated_by_physics

long_name	temperature updated by physics
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gt0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_calpreciptype_run get_phi_fv3_run gwdc_post_run gwdc_pre_run ozphys_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%theta
requested	gwdps_pre_run
	gwdps_run
category	physics

anisotropy_of_subgrid_orography

long_name	anisotropy of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gamma
requested	gwdps_pre_run
	gwdps_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%num_p2d
requested	GFS_rrtmg_setup_init
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%num_p3d
requested	GFS_DCNV_generic_post_run GFS_MP_generic_pre_run GFS_rrtmg_setup_init samfshalcnv_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nrcm
requested	GFS_calpreciptype_run
category	physics

asymmetry_of_subgrid_orography

long_name	asymmetry of subgrid orography
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oa4
requested	gwdps_pre_run
	gwdps_run
category	physics

atmosphere_boundary_layer_thickness

long_name	pbl height
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%hpbl
requested	hedmf_run
	samfshalcnv_run
category	physics

atmosphere_diffusivity_coefficient_factor

long_name	multiplicative constant for atmospheric diffusivities
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%moninq_fac
requested	hedmf_run
category	physics

atmosphere_heat_diffusivity

long_name diffusivity for heat
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dkt
requested hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%xkzm_h
requested hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%xkzminv
requested hedmf_run
category physics

atmosphere_momentum_diffusivity_background

long_name	background vertical diffusion for momentum
units	m2 s-1
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%xkzm_m
requested	hedmf_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%aerodp
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init
category	physics

block_number

long_name	for explicit data blocking: block number of this block
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%blkno
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sigmaf
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rb
requested	gmtb_scm_sfc_flux_spec_run hedmf_run sfc_ex_coef_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evcw
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	physics

canopy_water_amount

long_name	canopy water amount
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%canopy
requested	lsm_noah_run
category	physics

ccpp_error_flag

long_name	error flag for error handling in CCpp
units	flag
rank	0
type	integer
kind	
source	MODULE ccpp_types
local_name	cdata%errflg (local_name not used)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_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_calpreciptype_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_rrtmg_setup_finalize GFS_rrtmg_setup_init GFS_rrtmg_setup_run GFS_suite_interstitial_1_run GFS_suite_interstitial_2_run GFS_suite_interstitial_3_run GFS_suite_interstitial_phys_reset_run GFS_suite_interstitial_rad_reset_run GFS_suite_stateout_reset_run GFS_suite_stateout_update_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run GFS_time_vary_pre_finalize GFS_time_vary_pre_init GFS_time_vary_pre_run GFS_zhao_carr_pre_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
local_name cdata%errmsg (local_name not used)
requested GFS_DCNV_generic_post_run
 GFS_DCNV_generic_pre_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_calpreciptype_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_rrtmg_setup_finalize
 GFS_rrtmg_setup_init
 GFS_rrtmg_setup_run
 GFS_suite_interstitial_1_run
 GFS_suite_interstitial_2_run
 GFS_suite_interstitial_3_run
 GFS_suite_interstitial_phys_reset_run
 GFS_suite_interstitial_rad_reset_run
 GFS_suite_stateout_reset_run
 GFS_suite_stateout_update_run
 GFS_surface_generic_post_run
 GFS_surface_generic_pre_run
 GFS_surface_loop_control_part1_run
 GFS_surface_loop_control_part2_run
 GFS_time_vary_pre_finalize
 GFS_time_vary_pre_init
 GFS_time_vary_pre_run
 GFS_zhao_carr_pre_run

ccpp_loop_counter

long_name	loop counter for subcyclling loops in CCpp
units	index
rank	0
type	integer
kind	
source	MODULE ccpp_types
local_name	cdata%loop_cnt (local_name not used)
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run
category	physics

cell_area

long_name	area of the grid cell
units	m2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%area
requested	samfdeepcnv_run samfshalcnv_run
category	physics

cell_size

long_name	size of the grid cell
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%dx
requested	gwdc_pre_run
category	physics

change_in_ozone_concentration

long_name	change in ozone concentration
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dq3dt(:, :, 6:6+physics%Interstitial(i)%oz_coeff-1)
requested	ozphys_run
category	physics

characteristic_grid_length_scale

long_name	representative horizontal length scale of grid box
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dlength
requested	gwdc_pre_run gwdc_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cldf
requested	gwdc_pre_run gwdc_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clds
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%wminco
requested	zhaocarr_precpd_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, scm_state%cloud_water_index)
requested	GFS_PBL_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:,1,scm_state%cloud_water_index)
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%clw_surf
requested NOT REQUESTED
category

cloud_condensed_water_mixing_ratio_save

long_name moist cloud condensed water mixing ratio before entering a physics scheme
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%save_qcw
requested GFS_MP_generic_pre_run
category physics

cloud_condensed_water_mixing_ratio_updated_by_physics

long_name	moist cloud condensed water mixing ratio updated by physics
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0(:, :, scm_state%cloud_water_index)
requested	GFS_zhao_carr_pre_run GFS_zhao_carr_pwat_run zhaocarr_gscond_run zhaocarr_precpd_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntlnc)
requested	GFS_PBL_generic_pre_run
category	physics

cloud_ice_mixing_ratio

long_name	moist cloud ice mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw(:, :, 1)
requested	GFS_DCNV_generic_post_run GFS_MP_generic_pre_run GFS_zhao_carr_pre_run zhaocarr_gscond_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 4)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_liquid_water_mixing_ratio

long_name	moist cloud water mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw(:, :, 2)
requested	GFS_DCNV_generic_post_run GFS_MP_generic_pre_run zhaocarr_gscond_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 2)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_optical_depth_layers_678

long_name	cloud optical depth from bands 6,7,8
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 11)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_optical_depth_weighted

long_name	cloud optical depth, weighted
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 10)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_rain_water_path

long_name	cloud rain water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 6)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_snow_water_path

long_name	cloud snow water path
units	g m-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 8)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

cloud_work_function

long_name	cloud work function
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cld1d
requested	GFS_DCNV_generic_post_run
	samfdeepcnv_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%c_0
requested	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%c_d
requested	sfc_nst_run
category	physics

`coefficient_for_evaporation_of_rainfall`

<code>long_name</code>	coeff for evaporation of largescale rain
<code>units</code>	none
<code>rank</code>	0
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Model(i)%evpc
<code>requested</code>	zhaocarr_precpd_run
<code>category</code>	physics

`coefficient_from_cloud_ice_to_snow`

<code>long_name</code>	auto conversion coeff from ice to snow
<code>units</code>	none
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Model(i)%psautco
<code>requested</code>	zhaocarr_precpd_run
<code>category</code>	physics

`coefficient_from_cloud_water_to_rain`

<code>long_name</code>	auto conversion coeff from cloud to rain
<code>units</code>	none
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Model(i)%prautco
<code>requested</code>	zhaocarr_precpd_run
<code>category</code>	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%w_0
requested	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%w_d
requested	sfc_nst_run
category	physics

column_precipitable_water

long_name	precipitable water
units	kg m ⁻²
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%pwat
requested	GFS_zhao_carr_pwat_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%scmpsw
requested	GFS_rrtmg_post_run rrtmg_sw_post_run rrtmg_sw_run
category	physics

convective_cloud_cover

long_name	convective cloud cover
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cnvc
requested	GFS_DCNV_generic_post_run GFS_suite_interstitial_3_run samfdeepcnv_run samfshalcnv_post_run samfshalcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, physics%Model(i)%ncnvw+1)
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
category	physics

convective_cloud_switch

long_name	index used by cnvc90 (for convective clouds)
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%clstp
requested	cnvc90_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cnvw
requested	GFS_DCNV_generic_post_run GFS_suite_interstitial_3_run samfdeepcnv_run samfshalcnv_post_run samfshalcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, physics%Model(i)%ncnvw)
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clw
requested	GFS_SCNV_generic_post_run GFS_suite_interstitial_3_run samfdeepcnv_run samfshalcnv_run
category	physics

convexity_of_subgrid_orography

long_name	convexity of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oc
requested	gwdps_pre_run gwdps_run
category	physics

cosine_of_latitude

long_name	cosine of the grid latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%coslat
requested	dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%coszen
requested	dcyc2t3_run rrtmg_sw_run
category	physics

countergradient_mixing_term_for_temperature

long_name	countergradient mixing term for temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gamt
requested	hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gamq
requested	hedmf_run
category	physics

critical_relative_humidity

long_name	critical relative humidity
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rhc
requested	GFS_suite_interstitial_3_run zhaocarr_gscond_run zhaocarr_precpd_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rhcpbl
requested	GFS_suite_interstitial_1_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rhcbot
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rhctop
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run
category	physics

cumulative_atmosphere_detrainment_convective_mass_flux

long_name	cumulative detrainment mass flux
units	Pa
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%det_mf
requested	GFS_DCNV_generic_post_run
category	physics

`cumulative_atmosphere_downdraft_convective_mass_flux`

long_name cumulative downdraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dwn_mf
requested GFS_DCNV_generic_post_run
category physics

`cumulative_atmosphere_updraft_convective_mass_flux`

long_name cumulative updraft mass flux
units Pa
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%upd_mf
requested GFS_DCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%evcwa
requested GFS_surface_generic_post_run
category physics

`cumulative_change_in_ozone_mixing_ratio_due_to_PBL`

<code>long_name</code>	cumulative change in ozone mixing ratio due to PBL
<code>units</code>	kg kg-1
<code>rank</code>	2
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Diag(i)%dq3dt(:, :, 5)
<code>requested</code>	GFS_PBL_generic_post_run
<code>category</code>	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 gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Diag(i)%dt3dt(:, :, 3)
<code>requested</code>	GFS_PBL_generic_post_run
<code>category</code>	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 gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Diag(i)%dt3dt(:, :, 4)
<code>requested</code>	GFS_DCNV_generic_post_run
<code>category</code>	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dt3dt(:, :, 1)
requested NOT REQUESTED
category

`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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dt3dt(:, :, 6)
requested GFS_calpreciptype_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dt3dt(:, :, 5)
requested GFS_SCNV_generic_post_run
category physics

`cumulative_change_in_temperature_due_to_shortwave_radiation_and_orographic_gravity_wave_drag`

long_name cumulative change in temperature due to SW rad and oro. GWD
units K
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dt3dt(:, :, 2)
requested gwdps_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dq3dt(:, :, 1)
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dq3dt(:, :, 2)
requested GFS_DCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dq3dt(:, :, 4)
requested GFS_calpreciptype_run
category physics

`cumulative_change_in_water_vapor_specific_humidity_due_to_physics`

long_name cumulative change in water vapor specific humidity due to physics
units kg kg-1
rank 3
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dq3dt
requested NOT REQUESTED
category

`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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dq3dt(:, :, 3)
requested GFS_SCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%du3dt(:, :, 1)
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%du3dt(:, :, 4)
requested gwdc_post_run
category physics

`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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%du3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
category physics

`cumulative_change_in_x_wind_due_to_orographic_gravity_wave_drag`

long_name cumulative change in x wind due to orographic gravity wave drag
units m s-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%du3dt(:, :, 2)
requested GFS_PBL_generic_post_run
gwdps_post_run
category physics

`cumulative_change_in_y_wind_due_to_PBL`

long_name cumulative change in y wind due to PBL
units m s-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dv3dt(:, :, 1)
requested GFS_PBL_generic_post_run
category physics

`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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dv3dt(:, :, 4)
requested gwdc_post_run
category physics

`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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dv3dt(:, :, 3)
requested GFS_DCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dv3dt(:, :, 2)
requested GFS_PBL_generic_post_run
gwdps_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%cldwrk
requested GFS_DCNV_generic_post_run
category physics

`cumulative_lwe_thickness_of_convective_precipitation_amount`

long_name	cumulative convective precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%cnvprcp
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%cnvprcpb
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%sbsnoa
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%snohfa
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%evbsa
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dnirdf_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvisdf_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dnirbm_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvisbm_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dlwsfc_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dswsfc_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%gflux
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nnirdf_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nvisdf_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nnirbm_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nvisbm_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nlwsfc_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nswsfc_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%snowca
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%dqsfc_cpl
requested	GFS_PBL_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dqsfc
requested	GFS_PBL_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%ep
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dtsfc_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dtsfc
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dusfc_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dusfc
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvsfc_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dvsfc
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%transa
requested GFS_surface_generic_post_run
category physics

`date_and_time_at_model_initialization`

long_name initialization date and time
units none
rank 1
type integer
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%idat
requested GFS_rrtmg_setup_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%idate
requested	GFS_rrtmg_setup_init
category	physics

daytime_points

long_name	daytime points
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%idxday
requested	rrtmg_sw_pre_run rrtmg_sw_run
category	physics

daytime_points_dimension

long_name	daytime points dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nday
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
category	physics

deep_soil_temperature

long_name	deep soil temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tg3
requested	lsm_noah_run
category	physics

density_of_frozen_precipitation

long_name	density of frozen precipitation
units	kg m-3
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%rhofr
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%zs
requested	NOT REQUESTED
category	

detrainment_conversion_parameter_deep_convection

long_name	convective detrainment conversion parameter for deep conv.
units	m-1
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%c1_deep
requested	samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%c1_shal
requested samfshalcnv_run
category physics

dewpoint_temperature_at_2m

long_name 2 meter dewpoint temperature
units K
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dpt2m
requested GFS_surface_generic_post_run
category physics

diffusivity_background_sigma_level

long_name sigma threshold for background mom. diffusion
units none
rank 0
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%xkzm_s
requested hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsik(:,1)
requested	GFS_surface_generic_pre_run
	hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prslk(:,1)
requested	GFS_surface_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prsik
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%prslk
requested	gwdps_run
	hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xt
requested	sfc_nst_post_run
	sfc_nst_run
category	physics

diurnal_thermocline_layer_thickness

long_name	diurnal thermocline layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xz
requested	sfc_nst_post_run
	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xu
requested	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xv
requested	sfc_nst_run
category	physics

dominant_freezing_rain_type

long_name	dominant freezing rain type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tdomzr
requested	GFS_calpreciptype_run
category	physics

dominant_rain_type

long_name	dominant rain type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tdomr
requested	GFS_calpreciptype_run
category	physics

dominant_sleet_type

long_name	dominant sleet type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tdomip
requested	GFS_calpreciptype_run
category	physics

dominant_snow_type

long_name	dominant snow type
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tdoms
requested	GFS_calpreciptype_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%betal_deep
requested	samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%betas_deep
requested	samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%frain
requested	GFS_DCNV_generic_post_run GFS_SCNV_generic_post_run GFS_calpreciptype_run GFS_suite_interstitial_1_run samfshalcnv_post_run
category	physics

entrainment_rate_coefficient_deep_convection

long_name	entrainment rate coefficient for deep convection
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%clam_deep
requested	samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%clam_shal
requested	samfshalcnv_run
category	physics

equation_of_time

long_name	equation of time (radian)
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%slag
requested	GFS_rrtmg_setup_run dcyc2t3_run
category	physics

extra_top_layer

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

flag_TKE_dissipation_heating

long_name	flag for tke dissipative heating
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dspheat
requested	hedmf_run
category	physics

flag_convective_gravity_wave_drag

long_name	flag for conv gravity wave drag
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cnvgwd
requested	GFS_DCNV_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kcnv
requested	GFS_suite_interstitial_2_run gwdc_run samfdeepcnv_run samfshalcnv_run
category	physics

flag_diagnostics

long_name	logical flag for storing diagnostics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lssav
requested	GFS_DCNV_generic_post_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_calpreciptype_run GFS_surface_generic_post_run gwdc_post_run gwdps_post_run lsm_noah_post_run samfshalcnv_post_run
category	physics

flag_diagnostics_3D

long_name	flag for 3d diagnostic fields
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ldiag3d
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run GFS_PBL_generic_post_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_calpreciptype_run gwdc_post_run gwdps_post_run h2ophys_run ozphys_run
category	physics

flag_for_CRICK-proof_cloud_water

long_name	flag for CRICK-Proof cloud water
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%crick_proof
requested	GFS_rrtmg_setup_init
category	physics

flag_for_aerosol_physics

long_name	flag for aerosol physics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ltaerosol
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
category	physics

flag_for_chemistry_coupling

long_name	flag controlling cplchm collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cplchm
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ccnorm
requested	GFS_rrtmg_setup_init
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%iaer
requested	GFS_rrtmg_setup_init
category	physics

flag_for_flux_coupling

long_name	flag controlling cplflx collection (default off)
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cplflx
requested	GFS_PBL_generic_post_run GFS_calpreciptype_run GFS_surface_generic_post_run
category	physics

flag_for_frozen_soil_physics

long_name	flag for frozen soil physics (RUC)
units	flag
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%flag_frsoil
requested	NOT REQUESTED
category	

flag_for_gfdl_microphysics_scheme

long_name	choice of GFDL microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%imp_physics_gfdl
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_calpreciptype_run
category	physics

flag_for_guess_run

long_name	flag for guess run
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%flag_guess
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run lsm_noah_run sfc_nst_run
category	physics

flag_for_hedmf

long_name	flag for hybrid edmf pbl scheme (moninedmf)
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%hybedmf
requested	GFS_PBL_generic_post_run
category	physics

flag_for_initial_time-date_control

long_name	flag for initial conditions and forcing
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ictm
requested	GFS_rrtmg_setup_init
category	physics

flag_for_iteration

long_name	flag for iteration
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%flag_iter
requested	GFS_surface_loop_control_part2_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	physics

flag_for_land_surface_scheme

long_name flag for land surface model lsm=1 for noah lsm
units flag
rank 0
type integer
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%lsm
requested sfc_sice_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%isubc_lw
requested GFS_rrtmg_setup_init
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%iovr_lw
requested GFS_rrtmg_setup_init
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%iovr_sw
requested	GFS_rrtmg_setup_init
category	physics

flag_for_microphysics_scheme

long_name	choice of microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%imp_physics
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run GFS_calpreciptype_run GFS_rrtmg_setup_init
category	physics

flag_for_mom4_coupling

long_name flag controls mom4 sea ice
units flag
rank 0
type logical
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%mom4ice
requested sfc_sice_run
category physics

flag_for_nsstm_run

long_name NSSTM flag: off/uncoupled/coupled=0/1/2
units flag
rank 0
type integer
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%nstf_name(1)
requested GFS_surface_loop_control_part2_run
 sfc_nst_post_run
 sfc_nst_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%lwhtr
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%swhtr
requested NOT REQUESTED
category

flag_for_precipitation_effect_on_radiation

long_name radiation precip flag for Ferrier/Moorthi
units flag
rank 0
type logical
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%norad_precip
requested GFS_rrtmg_setup_init
category physics

flag_for_precipitation_type

long_name snow/rain flag for precipitation
units flag
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%srflag
requested GFS_calpreciptype_run
lsm_noah_run
sfc_sice_run
category physics

flag_for_precipitation_type_algorithm

long_name	flag controls precip type algorithm
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cal_pre
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%redrag
requested	sfc_ex_coef_run
category	physics

flag_for_ruc_land_surface_scheme

long_name	flag for RUC land surface model
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsm_ruc
requested	NOT REQUESTED
category	

flag_for_solar_constant

long_name	use prescribed solar constant
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%isol
requested	GFS_rrtmg_setup_init
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%iems
requested	GFS_rrtmg_setup_init
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%isubc_sw
requested	GFS_rrtmg_setup_init
category	physics

flag_for_thompson_microphysics_scheme

long_name	choice of Thompson microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%imp_physics_thompson
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ialb
requested	GFS_rrtmg_setup_init
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ico2
requested	GFS_rrtmg_setup_init
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%iflip
requested	GFS_rrtmg_setup_init
category	physics

flag_for_wsm6_microphysics_scheme

long_name	choice of WSM6 microphysics scheme
units	flag
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%imp_physics_wsm6
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
category	physics

flag_gocart

long_name	flag for 3d diagnostic fields for gocart 1
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lgocart
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run
category	physics

flag_idealized_physics

long_name	flag for idealized physics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsidea
requested	GFS_PBL_generic_post_run rayleigh_damp_run
category	physics

flag_mg3_as_mg2

long_name	flag for controlling prep for Morrison-Gettleman microphysics
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%mg3_as_mg2
requested	NOT REQUESTED
category	

flag_print

long_name	control flag for diagnostic print out
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lprnt
requested	gwdc_run gwdps_run hedmf_run rrtmg_lw_run rrtmg_sw_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

flag_shallow_convective_cloud

long_name	flag for shallow convective cloud
units	
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%shcnvcw
requested	samfshalcnv_post_run
category	physics

flag_skip_macro

long_name	flag to skip cloud macrophysics in Morrison scheme
units	flag
rank	1
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%skip_macro
requested	NOT REQUESTED
category	

flag_to_calc_lw

long_name	logical flags for lw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lslwr
requested	rrtmg_lw_run
category	physics

flag_to_calc_sw

long_name	logical flags for sw radiation calls
units	flag
rank	0
type	logical
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsswr
requested	GFS_rrtmg_setup_run
	rrtmg_sw_run
category	physics

forecast_date_and_time

long_name	current forecast date and time
units	none
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%jdat
requested	GFS_rrtmg_setup_run
category	physics

forecast_hour

long_name	hour time after 00z at the t-step
units	h
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%solhr
requested	dcyc2t3_run
	sfc_nst_run
category	physics

forecast_time

long_name	curent forecast time
units	h
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%fhour
requested	gwdc_run
category	physics

fraction_of_convective_cloud

long_name	fraction of convective cloud
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Cldprop(i)%cv
requested	cnvc90_run
category	physics

fraction_of_grid_box_with_subgrid_orography_higher_than_critical_height

long_name	frac. of grid box with by subgrid orography higher than critical height
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clx
requested	gwdps_pre_run
	gwdps_run
category	physics

free_convection_layer_thickness

long_name	thickness of free convection layer (FCL)
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%d_conv
requested	sfc_nst_run
category	physics

frequency_for_longwave_radiation

long_name	frequency for longwave radiation
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%fhlwr
requested	NOT REQUESTED
category	

frequency_for_shortwave_radiation

long_name	frequency for shortwave radiation
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%fhswr
requested	GFS_rrtmg_setup_run
category	physics

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 gmtb_scm_physical_constants
local_name	con_rd
requested	gmtb_scm_sfc_flux_spec_run gwdc_run gwdps_run samfdeepcnv_run samfshalcnv_run
category	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 gmtb_scm_physical_constants
local_name	con_rv
requested	gwdps_run samfdeepcnv_run samfshalcnv_run
category	physics

geopotential

long_name	geopotential at model layer centers
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%phil
requested	GFS_surface_generic_pre_run get_phi_fv3_run gwdps_run hedmf_run samfdeepcnv_run samfshalcnv_run
category	physics

geopotential_at_interface

long_name	geopotential at model layer interfaces
units	m2 s-2
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%phii
requested	GFS_calpreciptype_run get_phi_fv3_run get_prs_fv3_run gwdps_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%del_gz
requested	get_phi_fv3_run get_prs_fv3_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntgl)
requested	GFS_PBL_generic_pre_run
category	physics

graupel_number_concentration

long_name	number concentration of graupel
units	kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntgnc)
requested	NOT REQUESTED
category	

gravitational_acceleration

long_name	gravitational acceleration
units	m s-2
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_g
requested	GFS_DCNV_generic_post_run GFS_surface_generic_pre_run gmtb_scm_sfc_flux_spec_run gwdc_run gwdps_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work1
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run zhaocarr_precpd_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work2
requested	GFS_suite_interstitial_1_run GFS_suite_interstitial_3_run gwdc_pre_run
category	physics

h2o_forcing

long_name	water forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%h2opl
requested	h2ophys_run
category	physics

h2o_forcing_from_host

long_name	h2o forcing data from host
units	various
rank	4
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%h2o_forcing_in
requested	NOT REQUESTED
category	

height_above_ground_at_lowest_model_layer

long_name	layer 1 height
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%zlvl
requested	GFS_surface_generic_pre_run gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run
category	physics

horizontal_block_size

long_name	for explicit data blocking: block sizes of all blocks
units	count
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%blksz
requested	NOT REQUESTED
category	

horizontal_dimension

long_name	horizontal dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ix
requested	GFS_MP_generic_pre_run GFS_calpreciptype_run GFS_zhao_carr_pre_run GFS_zhao_carr_pwat_run cnvc90_run dcyc2t3_run get_phi_fv3_run get_prs_fv3_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

horizontal_index_of_printed_column

long_name	horizontal index of printed column
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ipr
requested	gwdc_run gwdps_run hedmf_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

horizontal_loop_extent

long_name	horizontal loop extent
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%im
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_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_calpreciptype_run GFS_rrtmg_post_run GFS_rrtmg_pre_run GFS_rrtmg_setup_init GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run GFS_zhao_carr_pre_run GFS_zhao_carr_pwat_run cnvc90_run dcyc2t3_post_run dcyc2t3_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_pre_run gwdps_run h2ophys_run hedmf_run lsm_noah_post_run lsm_noah_pre_run lsm_noah_run ozphys_run

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntia)
requested GFS_PBL_generic_pre_run
category physics

ice_number_concentration

long_name number concentration of ice
units kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntinc)
requested GFS_PBL_generic_pre_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntiw)
requested GFS_PBL_generic_pre_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ntcw
requested	GFS_MP_generic_pre_run GFS_rrtmg_setup_init GFS_zhao_carr_pwat_run hedmf_run
category	physics

index_for_ozone

long_name	tracer index for ozone mixing ratio
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ntoz
requested	GFS_PBL_generic_post_run GFS_rrtmg_setup_init
category	physics

index_of_TKE_convective_transport_tracer

long_name	index of TKE in the convectively transported tracer array
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ntk
requested	samfdeepcnv_run
	samfshalcnv_run
category	physics

index_of_dtlm_start

long_name	index to start dtlm run or not
units	index
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%ifd
requested	sfc_nst_run
category	physics

index_of_highest_temperature_inversion

long_name	index of highest temperature inversion
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kinver
requested	hedmf_run
category	physics

index_of_time_step

long_name	current forecast iteration
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%kdt
requested	GFS_calpreciptype_run gwdps_run sfc_nst_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dt_mf
requested	GFS_DCNV_generic_post_run samfdeepcnv_run samfshalcnv_run
category	physics

instantaneous_atmosphere_detrainment_convective_mass_flux_on_dynamics_timestep

long_name (detrainment mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%det_mfi
requested GFS_DCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dd_mf
requested GFS_DCNV_generic_post_run
samfdeepcnv_run
category physics

instantaneous_atmosphere_downdraft_convective_mass_flux_on_dynamics_timestep

long_name (downdraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dwn_mfi
requested GFS_DCNV_generic_post_run
category physics

instantaneous_atmosphere_heat_diffusivity

long_name instantaneous atmospheric heat diffusivity
units m2 s-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dkt
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%ud_mf
requested GFS_DCNV_generic_post_run
 samfdeepcnv_run
 samfshalcnv_run
category physics

instantaneous_atmosphere_updraft_convective_mass_flux_on_dynamics_timestep

long_name (updraft mass flux) * delt
units kg m-2
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%upd_mfi
requested GFS_DCNV_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%xcosz
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_run sfc_nst_run
category	physics

instantaneous_deep_convective_cloud_condensate_mixing_ratio_on_dynamics_time_step

long_name	instantaneous total convective condensate mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%cnvqci
requested	GFS_DCNV_generic_post_run
category	physics

instantaneous_specific_humidity_at_2m_for_coupling

long_name instantaneous Q2m
units kg kg-1
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%q2mi_cpl
requested GFS_surface_generic_post_run
category physics

instantaneous_surface_air_pressure_for_coupling

long_name instantaneous sfc pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%psurfi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dnirdfi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvisdfi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dnirbmi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvisbmi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dlwsfci_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dswsfci_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%gfluxi
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nnirdfi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nvisdfi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nnirbmi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nvisbmi_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nlwsfci_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nswsfci_cpl
requested GFS_surface_generic_post_run
category physics

instantaneous_surface_potential_evaporation

long_name instantaneous sfc potential evaporation
units W m-2
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%epi
requested GFS_surface_generic_post_run
category physics

instantaneous_surface_skin_temperature_for_coupling

long_name instantaneous sfc temperature
units K
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%tsfci_cpl
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqsfc1
requested GFS_PBL_generic_post_run
 hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dqsfc1
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dqsfc1
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dtsfc1
requested GFS_PBL_generic_post_run
 hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dtsfci_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dtsfci
requested GFS_PBL_generic_post_run
category physics

instantaneous_surface_x_momentum_flux

long_name x momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dusfc1
requested GFS_PBL_generic_post_run
 hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dusfci_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dusfci
requested GFS_PBL_generic_post_run
category physics

instantaneous_surface_y_momentum_flux

long_name y momentum flux
units Pa
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dvsfci
requested GFS_PBL_generic_post_run
 hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dvsfci_cpl
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dvsfci
requested GFS_PBL_generic_post_run
category physics

instantaneous_temperature_at_2m_for_coupling

long_name instantaneous T2m
units K
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%t2mi_cpl
requested GFS_surface_generic_post_run
category physics

instantaneous_upward_sensible_heat_flux

long_name instantaneous upward sensible heat flux
units W m-2
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%ushfsfci
requested NOT REQUESTED
category

instantaneous_water_vapor_specific_humidity_tendency_due_to_convection_on_dynamics_timestep

long_name instantaneous total moisture tendency
units kg kg-1 s-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%dqdti
requested GFS_DCNV_generic_post_run
 GFS_SCNV_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dusfcg
requested	gwdc_post_run gwdc_run gwdps_post_run gwdps_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%u10mi_cpl
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvsfcg
requested	gwdc_post_run gwdc_run gwdps_post_run gwdps_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%v10mi_cpl
requested	GFS_surface_generic_post_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dxinv
requested	GFS_suite_interstitial_1_run
category	physics

iounit_namelist

long_name	fortran unit number for file opens
units	none
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nlunit
requested	lsm_noah_init
category	physics

iteration_number

long_name	number of iteration
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%iter
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evap
requested	GFS_suite_interstitial_2_run gmtb_scm_sfc_flux_spec_run hedmf_run lsm_noah_run sfc_diag_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%hflx
requested	GFS_suite_interstitial_2_run gmtb_scm_sfc_flux_spec_run hedmf_run lsm_noah_run sfc_nst_run sfc_sice_run
category	physics

land_area_fraction

long_name	land area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%frland
requested	GFS_suite_interstitial_1_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acvt
requested	cnvc90_run
category	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 gmtb_scm_physical_constants
local_name	con_hvap
requested	gmtb_scm_sfc_flux_spec_run samfdeepcnv_run samfshalcnv_run
category	physics

latitude

long_name	grid latitude in radians
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%xlat
requested	NOT REQUESTED
category	

latitude_index_in_debug_printouts

long_name	latitude index in debug printouts
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%latidxprnt
requested	gwdc_run
category	physics

latitude_of_h2o_forcing_data_from_host

long_name	latitude value of the h2o forcing data coming from host
units	degree
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%h2o_lat
requested	NOT REQUESTED
category	

latitude_of_ozone_forcing_data_from_host

long_name	latitude value of the ozone forcing data coming from host
units	degree
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_lat
requested	NOT REQUESTED
category	

level_of_dividing_streamline

long_name	level of the dividing streamline
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%zmtnblck
requested	gwdps_run
category	physics

longitude

long_name	grid longitude in radians
units	radians
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%xlon
requested	dcyc2t3_run sfc_nst_post_run sfc_nst_run
category	physics

lw_fluxes_sfc

long_name lw radiation fluxes at sfc
units W m-2
rank 1
type sfcflw_type
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%RadTend(i)%sfcflw
requested rrtmg_lw_run
category physics

lw_fluxes_top_atmosphere

long_name lw radiation fluxes at top
units W m-2
rank 1
type topflw_type
kind
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%topflw
requested rrtmg_lw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%rainc_cpl
requested GFS_calpreciptype_run
category physics

lwe_thickness_of_convective_precipitation_amount_on_dynamics_timestep

long_name	convective rain at this time step
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%rainc
requested	GFS_DCNV_generic_post_run GFS_calpreciptype_run cnvc90_run samfshalcnv_post_run
category	physics

lwe_thickness_of_deep_convective_precipitation_amount

long_name	deep convective rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%raincd
requested	GFS_DCNV_generic_post_run samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%graupel
requested GFS_calpreciptype_run
category physics

lwe_thickness_of_graupel_amount_per_day

long_name graupel fall over 24h period
units mm
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%graupel0
requested GFS_calpreciptype_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%ice
requested GFS_calpreciptype_run
category physics

lwe_thickness_of_ice_amount_per_day

long_name ice fall over 24h period
units mm
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%ice0
requested GFS_calpreciptype_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%rainmcdj
requested NOT REQUESTED
category

lwe_thickness_of_precipitation_amount_for_coupling

long_name total rain precipitation
units m
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%rain_cpl
requested GFS_calpreciptype_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%rain
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%raincs
requested	samfshalcnv_post_run
	samfshalcnv_run
category	physics

lwe_thickness_of_snow_amount_for_coupling

long_name	total snow precipitation
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%snow_cpl
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%snow
requested	GFS_calpreciptype_run
category	physics

lwe_thickness_of_snow_amount_per_day

long_name	snow fall over 24h period
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snow0
requested	GFS_calpreciptype_run
category	physics

lwe_thickness_of_stratiform_precipitation_amount

long_name	stratiform rainfall amount on physics timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rainst
requested	GFS_calpreciptype_run zhaocarr_precpd_run
category	physics

lwe_thickness_of_stratiform_precipitation_amount_per_day

long_name	stratiform rain over 24h period
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%rain0
requested	GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%pertvegf
requested	lsm_noah_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cumabs
requested	gwdc_pre_run
	gwdc_run
category	physics

maximum_critical_relative_humidity

long_name maximum critical relative humidity
units frac
rank 0
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%rhcmx
requested GFS_suite_interstitial_3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%dxmx
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%spfhmx
requested GFS_surface_generic_post_run
category physics

maximum_subgrid_orography

long_name	maximum of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%elvmax
requested	gwdps_pre_run
	gwdps_run
category	physics

maximum_temperature_at_2m

long_name	max temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tmpmax
requested	GFS_surface_generic_post_run
category	physics

maximum_vegetation_area_fraction

long_name	max fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%shdmax
requested	lsm_noah_run
	sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%wind10mmax
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%u10mmax
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%v10mmax
requested GFS_surface_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dtzm
requested	sfc_nst_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 5)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 3)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 7)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 9)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dxmin
requested	GFS_suite_interstitial_1_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%spfhmin
requested	GFS_surface_generic_post_run
category	physics

minimum_temperature_at_2m

long_name	min temperature at 2m height
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%tmpmin
requested	GFS_surface_generic_post_run
category	physics

minimum_vegetation_area_fraction

long_name	min fractional coverage of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%shdmin
requested	lsm_noah_run
category	physics

model_layer_number_at_cloud_base

long_name	vertical indices for low, middle and high cloud bases
units	index
rank	2
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%mbota
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%mtopa
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%pgcon_deep
requested	samfdeepcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%pgcon_shal
requested	samfshalcnv_run
category	physics

mpi_rank

long_name	current MPI-rank
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%me
requested	GFS_rrtmg_setup_init GFS_rrtmg_setup_run gwdps_run h2ophys_run lsm_noah_init ozphys_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cgwf
requested	gwdc_pre_run
category	physics

`multiplication_factors_for_mountain_blocking_and_orographic_gravity_wave_drag`

long_name	multiplication factors for cdm_b and gwd
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%cdmbgwd
requested	gwdps_run
category	physics

`natural_log_of_h2o_forcing_data_pressure_levels`

long_name	natural log of h2o forcing data pressure levels
units	log(Pa)
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%h2o_pres
requested	h2ophys_run
category	physics

`natural_log_of_h2o_forcing_data_pressure_levels_from_host`

long_name	natural logarithm of the pressure levels of the h2o forcing data
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%h2o_pres
requested	NOT REQUESTED
category	

`natural_log_of_ozone_forcing_data_pressure_levels`

<code>long_name</code>	natural log of ozone forcing data pressure levels
<code>units</code>	log(Pa)
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%Interstitial(i)%oz_pres
<code>requested</code>	ozphys_run
<code>category</code>	physics

`natural_log_of_ozone_forcing_data_pressure_levels_from_host`

<code>long_name</code>	natural logarithm of the pressure levels of the ozone forcing data
<code>units</code>	Pa
<code>rank</code>	1
<code>type</code>	real
<code>kind</code>	kind_phys
<code>source</code>	MODULE gmtb_scm_type_defs TYPE physics_type
<code>local_name</code>	physics%ozone_pres
<code>requested</code>	NOT REQUESTED
<code>category</code>	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tprcp
requested	GFS_calprectype_run
	lsm_noah_run
	sfc_nst_run
	sfc_sice_run
category	physics

normalized_soil_wetness

long_name	normalized soil wetness
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%wet1
requested	lsm_noah_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%npdf3d
requested	GFS_DCNV_generic_post_run GFS_rrtmg_setup_init samfshalcnv_post_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%h2o_coeff
requested	h2ophys_run
category	physics

number_of_coefficients_in_h2o_forcing_data_from_host

long_name	number of coefficients in h2o forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_h2o_coefficients
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%oz_coeff
requested	ozphys_run
category	physics

number_of_coefficients_in_ozone_forcing_data_from_host

long_name	number of coefficients in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_coefficients
requested	NOT REQUESTED
category	

number_of_convective_3d_cloud_fields

long_name	number of convective 3d clouds fields
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ncnvcld3d
requested	GFS_DCNV_generic_post_run samfshalcnv_post_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lonr
requested	gwdps_run
category	physics

number_of_hydrometeors

long_name	choice of cloud scheme / number of hydrometeors
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ncld
requested	GFS_MP_generic_pre_run GFS_zhao_carr_pwat_run samfdeepcnv_run samfshalcnv_run
category	physics

number_of_latitude_points_in_h2o_forcing_data_from_host

long_name	number of latitude points in h2o forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_h2o_lats
requested	NOT REQUESTED
category	

number_of_latitude_points_in_ozone_forcing_data_from_host

long_name	number of latitude points in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_lats
requested	NOT REQUESTED
category	

number_of_statistical_measures_of_subgrid_orography

long_name	number of topographic variables in GWD
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nmtvr
requested	gwdps_pre_run gwdps_run
category	physics

number_of_surface_perturbations

long_name	number of surface perturbations
units	
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%nsfcpert
requested	NOT REQUESTED
category	

number_of_time_levels_in_h2o_forcing_data_from_host

long_name	number of time levels in h2o forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_h2o_times
requested	NOT REQUESTED
category	

number_of_time_levels_in_ozone_forcing_data_from_host

long_name	number of time levels in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_times
requested	NOT REQUESTED
category	

number_of_total_tracers

long_name	total number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_total
requested	NOT REQUESTED
category	

number_of_tracers

long_name	number of tracers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ntrac
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ncstrac
requested	NOT REQUESTED
category	

number_of_tracers_for_allocating_cloud_work_function

long_name	number of tracers for allocating cloud work function
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nn
requested	GFS_SCNV_generic_post_run
category	physics

number_of_tracers_for_cloud_condensate

long_name	number of tracers for cloud condensate
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nncl
requested	GFS_zhao_carr_pwat_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nsamftrac
requested	samfdeepcnv_run samfshalcnv_run
category	physics

number_of_vertical_diffusion_tracers

long_name	number of tracers to diffuse vertically
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%nvdiff
requested	GFS_PBL_generic_post_run GFS_PBL_generic_pre_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%levr
requested	GFS_rrtmg_setup_init rayleigh_damp_run
category	physics

number_of_water_tracers

long_name	number of water-related tracers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_water
requested	NOT REQUESTED
category	

ocean_mixed_layer_thickness

long_name	mixed layer thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%zm
requested	sfc_nst_run
category	physics

omega

long_name	layer mean vertical velocity
units	Pa s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vvl
requested	samfdeepcnv_run samfshalcnv_run
category	physics

orography

long_name	orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%oro
requested	sfc_nst_post_run sfc_nst_pre_run
category	physics

orography_unfiltered

long_name	unfiltered orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%oro_uf
requested	sfc_nst_post_run sfc_nst_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%olvr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0(:, :, scm_state%ozone_index)
requested	ozphys_run
category	physics

ozone_forcing

long_name	ozone forcing data
units	various
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%ozpl
requested	ozphys_run
category	physics

ozone_forcing_from_host

long_name	ozone forcing data from host
units	various
rank	4
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_forcing_in
requested	NOT REQUESTED
category	

ozone_mixing_ratio

long_name	ozone mixing ratio
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntoz)
requested	GFS_PBL_generic_pre_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%zt1d
requested	sfc_ex_coef_run
category	physics

perturbation_of_leaf_area_index

long_name	perturbation of leaf area index
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%xlai1d
requested	lsm_noah_run
category	physics

perturbation_of_momentum_roughness_length

long_name	perturbation of momentum roughness length
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%z01d
requested	sfc_ex_coef_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%bexp1d
requested	lsm_noah_run
category	physics

perturbation_of_vegetation_fraction

long_name	perturbation of vegetation fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%veg1d
requested	lsm_noah_run
category	physics

pi

long_name	ratio of a circle's circumference to its diameter
units	radians
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_pi
requested	gwdc_run
category	physics

pressure_at_bottom_of_convective_cloud

long_name convective cloud bottom pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Cldprop(i)%cvb
requested cnvc90_run
category physics

pressure_at_top_of_convective_cloud

long_name convective cloud top pressure
units Pa
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Cldprop(i)%cvt
requested cnvc90_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%prslrd0
requested rayleigh_damp_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%c0s_deep
requested samfdeepcnv_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%c0s_shal
requested samfshalcnv_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%evfact_deep
requested samfdeepcnv_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Model(i)%evfactl_deep
requested samfdeepcnv_run
category physics

rain_number_concentration

long_name number concentration of rain
units kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntrnc)
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntrw)
requested GFS_PBL_generic_pre_run
category physics

random_number_array

long_name	random number array (0-1)
units	none
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%rann
requested	GFS_calpreciptype_run
category	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 gmtb_scm_physical_constants
local_name	con_eps
requested	GFS_surface_generic_post_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
category	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 gmtb_scm_physical_constants
local_name	con_epsm1
requested	GFS_surface_generic_post_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%work3
requested	GFS_surface_generic_pre_run gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	physics

ratio_of_snowfall_to_rainfall

long_name snow ratio: ratio of snow to total precipitation
units frac
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%sr
requested zhaocarr_precpd_run
category 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 gmtb_scm_physical_constants
local_name con_fvirt
requested gmtb_scm_sfc_flux_spec_run
 gwdc_run
 samfdeepcnv_run
 samfshalcnv_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%f10m
requested	sfc_diag_run
category	physics

sea_ice_concentration

long_name	ice fraction over open water
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%fice
requested	sfc_sice_post_run
	sfc_sice_run
category	physics

sea_ice_temperature

long_name	sea ice surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tisfc
requested	sfc_sice_post_run
	sfc_sice_run
category	physics

sea_ice_thickness

long_name	sea ice thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%hice
requested	sfc_sice_post_run sfc_sice_run
category	physics

sea_land_ice_mask

long_name	sea/land/ice mask (=0/1/2)
units	flag
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%islmsk
requested	GFS_suite_interstitial_1_run GFS_surface_generic_post_run GFS_surface_generic_pre_run GFS_surface_loop_control_part2_run lsm_noah_run samfdeepcnv_run samfshalcnv_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run sfc_sice_post_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%slmsk
requested	sfc_nst_post_run
category	physics

sea_surface_reference_temperature

long_name	sea surface reference temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tref
requested	sfc_nst_post_run sfc_nst_run
category	physics

sea_water_salinity

long_name	salinity content in diurnal thermocline layer
units	ppt m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xs
requested	sfc_nst_run
category	physics

seconds_elapsed_since_model_initialization

long_name	seconds elapsed since model initialization
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%sec
requested	NOT REQUESTED
category	

seed_random_numbers_lw

long_name	random seeds for sub-column cloud generators lw
units	none
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%icsdlw
requested	rrtmg_lw_run
category	physics

seed_random_numbers_sw

long_name	random seeds for sub-column cloud generators sw
units	none
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%icsdsw
requested	rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%qrain
requested	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xtts
requested	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%xzts
requested	sfc_nst_run
category	physics

sine_of_latitude

long_name	sine of the grid latitude
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Grid(i)%sinlat
requested	dcyc2t3_run
	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%sdec
requested	GFS_rrtmg_setup_run dcyc2t3_run
category	physics

slope_of_subgrid_orography

long_name	slope of subgrid orography
units	none
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sigma
requested	gwdps_pre_run gwdps_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%acvb
requested	cnvc90_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sbsno
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snohf
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	physics

snow_number_concentration

long_name number concentration of snow
units kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntsnc)
requested NOT REQUESTED
category

snow_temperature_bottom_first_layer

long_name snow temperature at the bottom of the first soil layer
units K
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%tsnow
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntsw)
requested GFS_PBL_generic_pre_run
category physics

soil_moisture_content

long_name	soil moisture
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%soilm
requested	lsm_noah_run
category	physics

soil_temperature

long_name	soil temperature
units	K
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%stc
requested	lsm_noah_run
	sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tslb
requested	NOT REQUESTED
category	

soil_type_classification

long_name	soil type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%soiltype
requested	GFS_surface_generic_pre_run
	lsm_noah_run
category	physics

soil_type_classification_real

long_name	soil type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%stype
requested	GFS_surface_generic_pre_run
category	physics

soil_type_dataset_choice

long_name	soil type dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%isot
requested	GFS_surface_generic_pre_run lsm_noah_init lsm_noah_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%evbs
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	physics

soil_vertical_dimension

long_name	number of soil layers
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsoil
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%lsoil_lsm
requested	NOT REQUESTED
category	

solar_constant

long_name	solar constant (sun-earth distant adjusted)
units	W m-2
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%solcon
requested	GFS_rrtmg_setup_run rrtmg_sw_run
category	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 gmtb_scm_physical_constants
local_name	con_cp
requested	gmtb_scm_sfc_flux_spec_run gwdc_post_run gwdc_run gwdps_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run sfc_diag_run
category	physics

specific_heat_of_liquid_water_at_constant_pressure

long_name	specific heat of liquid water at constant pressure
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_cliq
requested	samfdeepcnv_run samfshalcnv_run
category	physics

specific_heat_of_water_vapor_at_constant_pressure

long_name	specific heat of water vapor at constant pressure
units	J kg ⁻¹ K ⁻¹
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_cvap
requested	samfdeepcnv_run samfshalcnv_run
category	physics

specific_humidity_at_2m

long_name	2 meter specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%q2m
requested	GFS_surface_generic_post_run gmtb_scm_sfc_flux_spec_run sfc_diag_run
category	physics

specified_kinematic_surface_upward_latent_heat_flux

long_name	specified kinematic surface upward latent heat flux
units	kg kg-1 m s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%spec_lh_flux
requested	gmtb_scm_sfc_flux_spec_run
category	physics

specified_kinematic_surface_upward_sensible_heat_flux

long_name	specified kinematic surface upward sensible heat flux
units	K m s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%spec_sh_flux
requested	gmtb_scm_sfc_flux_spec_run
category	physics

standard_deviation_of_subgrid_orography

long_name	standard deviation of subgrid orography
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%hprime1
requested	gwdps_pre_run
	gwdps_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tracers_start_index
requested	NOT REQUESTED
category	

statistical_measures_of_subgrid_orography

long_name	orographic metrics
units	various
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%hprime
requested	gwdps_pre_run
category	physics

sub-layer_cooling_amount

long_name	sub-layer cooling amount
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%dt_cool
requested	sfc_nst_post_run
	sfc_nst_run
category	physics

sub-layer_cooling_thickness

long_name	sub-layer cooling thickness
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%z_c
requested	sfc_nst_post_run
	sfc_nst_run
category	physics

subsurface_runoff_flux

long_name	subsurface runoff flux
units	g m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%drain
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run
category	physics

surface_air_pressure

long_name	surface pressure
units	Pa
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%pgr
requested	GFS_surface_generic_post_run lsm_noah_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run sfc_diag_run sfc_ex_coef_run sfc_nst_run sfc_sice_run zhaocarr_gscond_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f2d(:,2)
requested	zhaocarr_gscond_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f2d(:,1)
requested	zhaocarr_gscond_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tsfa
requested	GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_lw_pre_run rrtmg_sw_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,4)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,3)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,2)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%sfcalb(:,1)
requested	rrtmg_sw_post_run rrtmg_sw_pre_run rrtmg_sw_run
category	physics

surface_albedo_perturbation

long_name	surface albedo perturbation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%alb1d
requested	GFS_rrtmg_pre_run rrtmg_sw_pre_run
category	physics

surface_condensation_mass

long_name surface condensation mass
units kg m-2
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%cndm_surf
requested NOT REQUESTED
category

surface_diffused_shortwave_albedo

long_name mean surface diffused sw albedo
units frac
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Radrend(i)%sfalb
requested lsm_noah_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjnirdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nirdfdi
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjvisdfd
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%visdfd
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjnirbmd
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nirbmdi
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjvisbmd
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%visbmdi
requested	dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dlwsfci
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run GFS_surface_generic_pre_run dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gabsbdlw
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcdlw
requested	dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%dswsfci
requested	GFS_suite_interstitial_2_run GFS_surface_generic_post_run dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcdsw
requested	dcyc2t3_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cdq
requested	gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%cd
requested	gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%chh
requested	lsm_noah_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%cmm
requested	lsm_noah_run sfc_nst_run sfc_sice_run
category	physics

surface_friction_velocity

long_name	boundary layer parameter
units	m s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%uustar
requested	gmtb_scm_sfc_flux_spec_run sfc_ex_coef_run
category	physics

surface_ground_temperature_for_radiation

long_name	surface ground temperature for radiation
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tsfg
requested	GFS_rrtmg_pre_run rrtmg_lw_pre_run rrtmg_lw_run rrtmg_sw_pre_run
category	physics

surface_longwave_emissivity

long_name	surface lw emissivity in fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radttend(i)%semis
requested	GFS_surface_generic_pre_run dcyc2t3_run lsm_noah_run rrtmg_lw_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radttend(i)%tsflw
requested	dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%nswsfci
requested	dcyc2t3_post_run dcyc2t3_run lsm_noah_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Coupling(i)%sfcnsf
requested	dcyc2t3_run
category	physics

surface_roughness_length

long_name	surface roughness length
units	cm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%zorl
requested	gmtb_scm_sfc_flux_spec_run hedmf_run lsm_noah_run sfc_ex_coef_run
category	physics

surface_runoff

long_name	surface water runoff (from lsm)
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%srunoff
requested	lsm_noah_post_run
category	physics

surface_runoff_flux

long_name	surface runoff flux
units	g m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%runoff
requested	lsm_noah_post_run lsm_noah_pre_run lsm_noah_run
category	physics

surface_skin_temperature

long_name	surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%tsfc
requested	GFS_calpreciptype_run GFS_surface_generic_post_run GFS_surface_generic_pre_run dcyc2t3_run gmtb_scm_sfc_flux_spec_run hedmf_run lsm_noah_run sfc_diag_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_sice_post_run sfc_sice_run
category	physics

surface_skin_temperature_after_iteration

long_name	surface skin temperature after iteration
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tsurf
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run sfc_nst_post_run sfc_nst_pre_run sfc_nst_run
category	physics

surface_skin_temperature_for_nsst

long_name	ocean surface skin temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%tseal
requested	sfc_nst_pre_run sfc_nst_run
category	physics

surface_slope_classification

long_name	surface slope type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%slopetype
requested	GFS_surface_generic_pre_run
	lsm_noah_run
category	physics

surface_slope_classification_real

long_name	sfc slope type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%slope
requested	GFS_surface_generic_pre_run
category	physics

surface_snow_area_fraction

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snowc
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	physics

surface_snow_area_fraction_for_diagnostics

long_name	surface snow area fraction
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%sncovr
requested	lsm_noah_run
category	physics

surface_snow_melt

long_name	snow melt during timestep
units	m
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%snowmt
requested	sfc_sice_run
category	physics

surface_snow_thickness_water_equivalent

long_name	water equivalent snow depth over land
units	mm
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%snowd
requested	lsm_noah_run sfc_ex_coef_run sfc_sice_run
category	physics

surface_specific_humidity

long_name	surface air saturation specific humidity
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%qss
requested	gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_diag_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ep1d
requested	GFS_surface_generic_post_run lsm_noah_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%adjnirdfu
requested	GFS_surface_generic_post_run dcyc2t3_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nirdfui
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjvisdfu
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%visdfui
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjnirbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%nirbmui
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%adjvisbmu
requested GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Coupling(i)%visbmui
requested dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%ulwsfci
requested GFS_suite_interstitial_2_run
GFS_surface_generic_post_run
dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%uswsfci
requested	dcyc2t3_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f2d(:,physics%Model(i)%num_p2d)
requested	lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	physics

surface_wind_stress

long_name	surface wind stress
units	m2 s-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%stress
requested	gmtb_scm_sfc_flux_spec_run hedmf_run sfc_ex_coef_run sfc_nst_run
category	physics

sw_fluxes_sfc

long_name	sw radiation fluxes at sfc
units	W m-2
rank	1
type	sfcfsw_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radtend(i)%sfcfsw
requested	rrtmg_sw_run
category	physics

sw_fluxes_top_atmosphere

long_name	sw radiation fluxes at toa
units	W m-2
rank	1
type	topfsw_type
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%topfsw
requested	rrtmg_sw_run
category	physics

temperature_at_2m

long_name	2 meter temperature
units	K
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%t2m
requested	GFS_surface_generic_post_run gmtb_scm_sfc_flux_spec_run sfc_diag_run
category	physics

temperature_at_zero_celsius

long_name	temperature at 0 degrees Celsius
units	K
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_t0c
requested	samfdeepcnv_run samfshalcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%htlw0
requested	dcyc2t3_run rrtmg_lw_post_run rrtmg_lw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%lwhe
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%htlwc
requested	dcyc2t3_run hedmf_run rrtmg_lw_post_run rrtmg_lw_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Radrend(i)%htrlw
requested	GFS_PBL_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dtdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run dcyc2t3_run gwdps_post_run gwdps_run hedmf_run rayleigh_damp_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dtdtc
requested GFS_suite_interstitial_1_run
 dcyc2t3_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Tbd(i)%htsw0
requested dcyc2t3_run
 rrtmg_sw_post_run
 rrtmg_sw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Radtend(i)%swhc
requested NOT REQUESTED
category

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Tbd(i)%htswc
requested dcyc2t3_run
 hedmf_run
 rrtmg_sw_post_run
 rrtmg_sw_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Radtend(i)%htrsw
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntlnc)
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntgl)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntiw)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntia)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntinc)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntcw)
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntoz)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%rainp
requested zhaocarr_precpd_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntrw)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntsw)
requested GFS_PBL_generic_post_run
category physics

tendency_of_tracers_due_to_model_physics

long_name	updated tendency of the tracers
units	kg kg-1 s-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dqdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvdfttra
requested	GFS_PBL_generic_post_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, physics%Model(i)%ntwa)
requested GFS_PBL_generic_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%dqdt(:, :, 1)
requested GFS_PBL_generic_post_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gwdcu
requested gwdc_post_run
 gwdc_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dudt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run gwdps_post_run gwdps_run hedmf_run rayleigh_damp_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gwdcv
requested	gwdc_post_run gwdc_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%dvdt
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_1_run GFS_suite_stateout_update_run gwdps_post_run gwdps_run hedmf_run rayleigh_damp_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%smcref2
requested	lsm_noah_pre_run lsm_noah_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dugwd
requested gwdc_post_run
 gwdps_post_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%dvgwd
requested gwdc_post_run
 gwdps_post_run
category physics

time_levels_in_h2o_forcing_data_from_host

long_name time values of the h2o forcing data coming from host
units day
rank 1
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%h2o_time
requested NOT REQUESTED
category

time_levels_in_ozone_forcing_data_from_host

long_name	time values of the ozone forcing data coming from host
units	day
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%ozone_time
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ral_ts
requested	rayleigh_damp_run
category	physics

```

time_step_for_dynamics
  long_name    dynamics timestep
  units        s
  rank         0
  type         real
  kind         kind_phys
  source       MODULE gmtb_scm_type_defs TYPE physics_type
  local_name   physics%Model(i)%dtf
  requested    GFS_DCNV_generic_post_run
               GFS_PBL_generic_post_run
               GFS_calpreciptype_run
               GFS_rrtmg_setup_run
               GFS_surface_generic_post_run
               gwdc_post_run
               gwdps_post_run
               lsm_noah_post_run
               lsm_noah_run
               sfc_nst_run
               sfc_sice_run
               zhaocarr_gscond_run
  category     physics

```

time_step_for_physics

long_name	physics timestep
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%dtp
requested	gwdc_post_run gwdc_pre_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

time_step_for_radiation

long_name	radiation time step
units	s
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%raddt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	physics

total_cloud_fraction

long_name	layer total cloud fraction
units	frac
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%clouds(:, :, 1)
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

total_runoff

long_name	total water runoff
units	kg m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%runoff
requested	lsm_noah_post_run
category	physics

tracer_concentration

long_name	model layer mean tracer concentration
units	kg kg-1
rank	3
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs
requested	GFS_PBL_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0
requested	NOT REQUESTED
category	

transpiration_flux

long_name	total plant transpiration rate
units	kg m-2 s-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%trans
requested	GFS_surface_generic_post_run lsm_noah_pre_run lsm_noah_run
category	physics

upper_bound_on_max_albedo_over_deep_snow

long_name	maximum snow albedo
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%snoalb
requested	lsm_noah_run
category	physics

upward_heat_flux_in_soil

long_name	soil heat flux
units	W m-2
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gflx
requested	GFS_surface_generic_post_run
	lsm_noah_run
	sfc_nst_run
	sfc_sice_run
category	physics

vegetation_area_fraction

long_name	areal fractional cover of green vegetation
units	frac
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%vfrac
requested	GFS_surface_generic_pre_run
category	physics

vegetation_type_classification

long_name	vegetation type at each grid cell
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%vegtype
requested	GFS_surface_generic_pre_run lsm_noah_run sfc_ex_coef_run
category	physics

vegetation_type_classification_real

long_name	vegetation type for lsm
units	index
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%vtype
requested	GFS_surface_generic_pre_run
category	physics

vegetation_type_dataset_choice

long_name	land use dataset choice
units	index
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%ivegsrsc
requested	GFS_surface_generic_pre_run
	lsm_noah_init
	lsm_noah_run
	sfc_ex_coef_run
category	physics

vertical_dimension

long_name	number of vertical levels
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%levs
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_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_calpreciptype_run GFS_surface_generic_pre_run GFS_zhao_carr_pre_run GFS_zhao_carr_pwat_run cnvc90_run dcyc2t3_run get_phi_fv3_run get_prs_fv3_run gwdc_post_run gwdc_pre_run gwdc_run gwdps_run h2ophys_run hedmf_run ozphys_run rayleigh_damp_run samfdeepcnv_run samfshalcnv_post_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%levh2o
requested	h2ophys_run
category	physics

vertical_dimension_of_h2o_forcing_data_from_host

long_name	number of vertical layers in h2o forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_h2o_layers
requested	NOT REQUESTED
category	

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%levozp
requested	ozphys_run
category	physics

vertical_dimension_of_ozone_forcing_data_from_host

long_name	number of vertical layers in ozone forcing data coming from host
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%n_ozone_layers
requested	NOT REQUESTED
category	

vertical_index_at_cloud_base

long_name	vertical index at cloud base
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kbot
requested	GFS_suite_interstitial_3_run cnvc90_run gwdc_pre_run gwdc_run samfdeepcnv_run samfshalcnv_run
category	physics

vertical_index_at_cloud_top

long_name	vertical index at cloud top
units	index
rank	1
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%ktop
requested	GFS_suite_interstitial_3_run cnvc90_run gwdc_pre_run gwdc_run samfdeepcnv_run samfshalcnv_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kpbl
requested	gwdps_run hedmf_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kd
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kb
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%kt
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run
category	physics

vertical_interface_dimension

long_name	vertical interface dimension
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%levi
requested	GFS_calpreciptype_run
category	physics

vertical_layer_dimension_for_radiation

long_name	number of vertical layers for radiation
units	count
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%lm
requested	GFS_rrtmg_post_run GFS_rrtmg_pre_run rrtmg_lw_post_run rrtmg_sw_post_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%si
requested	GFS_rrtmg_setup_init
category	physics

vertical_temperature_average_range_lower_bound

long_name	zsea1 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nstf_name(4)
requested	sfc_nst_post_run
	sfc_nst_run
category	physics

vertical_temperature_average_range_upper_bound

long_name	zsea2 in mm
units	mm
rank	0
type	integer
kind	
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Model(i)%nstf_name(5)
requested	sfc_nst_post_run
	sfc_nst_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%vdftra
requested GFS_PBL_generic_pre_run
 hedmf_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%smcwlt2
requested lsm_noah_pre_run
 lsm_noah_run
category physics

volume_fraction_of_soil_moisture

long_name total soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%smc
requested lsm_noah_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%smois
requested NOT REQUESTED
category

volume_fraction_of_unfrozen_soil_moisture

long_name liquid soil moisture
units frac
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%slc
requested lsm_noah_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Sfcprop(i)%sh2o
requested NOT REQUESTED
category

volume_mixing_ratio_ccl4

long_name volume mixing ratio ccl4
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 9)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
category physics

volume_mixing_ratio_cfc11

long_name volume mixing ratio cfc11
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 6)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
category physics

volume_mixing_ratio_cfc113

long_name volume mixing ratio cfc113
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 10)
requested GFS_rrtmg_pre_run
category physics

volume_mixing_ratio_cfc12

long_name volume mixing ratio cfc12
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 7)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
category physics

volume_mixing_ratio_cfc22

long_name volume mixing ratio cfc22
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 8)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
category physics

volume_mixing_ratio_ch4

long_name volume mixing ratio ch4
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 3)
requested GFS_rrtmg_pre_run
rrtmg_lw_run
rrtmg_sw_run
category physics

volume_mixing_ratio_co

long_name	volume mixing ratio co
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 5)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

volume_mixing_ratio_co2

long_name	volume mixing ratio co2
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%gasvmr(:, :, 1)
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

volume_mixing_ratio_n2o

long_name volume mixing ratio no2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 2)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
category physics

volume_mixing_ratio_o2

long_name volume mixing ratio o2
units kg kg-1
rank 2
type real
kind kind_phys
source MODULE gmtb_scm_type_defs TYPE physics_type
local_name physics%Interstitial(i)%gasvmr(:, :, 4)
requested GFS_rrtmg_pre_run
 rrtmg_lw_run
 rrtmg_sw_run
category physics

vonKarman_constant

long_name	vonKarman constant
units	none
rank	0
type	real
kind	kind_phys
source	MODULE gmtb_scm_physical_constants
local_name	con_vonKarman
requested	gmtb_scm_sfc_flux_spec_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Sfcprop(i)%weasd
requested	lsm_noah_run
	sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, physics%Model(i)%ntwa)
requested	GFS_PBL_generic_pre_run
category	physics

water_vapor_specific_humidity

long_name	water vapor specific humidity
units	kg kg-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:, :, scm_state%water_vapor_index)
requested	GFS_PBL_generic_pre_run get_prs_fv3_run gwdc_run gwdps_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%qlyr
requested	GFS_rrtmg_pre_run rrtmg_lw_run rrtmg_sw_run
category	physics

water_vapor_specific_humidity_at_lowest_model_layer

long_name	specific humidity at lowest model layer
units	kg kg-1
rank	1
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%qgrs(:,1,scm_state%water_vapor_index)
requested	GFS_surface_generic_post_run gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%q1
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Stateout(i)%gq0(:,1,scm_state%water_vapor_index)
requested sfc_diag_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Tbd(i)%phy_f3d(:, :, 4)
requested zhaocarr_gscond_run
category physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_qv
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_calpreciptype_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Tbd(i)%phy_f3d(:, :, 2)
requested	zhaocarr_gscond_run
category	physics

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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gq0(:, :, scm_state%water_vapor_index)
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run GFS_MP_generic_pre_run GFS_SCNV_generic_post_run GFS_SCNV_generic_pre_run GFS_calpreciptype_run GFS_zhao_carr_pwat_run get_phi_fv3_run h2ophys_run samfdeepcnv_run samfshalcnv_run zhaocarr_gscond_run zhaocarr_precpd_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%wind
requested	GFS_surface_loop_control_part1_run GFS_surface_loop_control_part2_run gmtb_scm_sfc_flux_spec_run hedmf_run sfc_ex_coef_run
category	physics

x_wind

long_name	zonal wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%ugrs
requested	gwdc_run gwdps_run hedmf_run rayleigh_damp_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Diag(i)%u10m
requested GFS_surface_generic_post_run
gmtb_scm_sfc_flux_spec_run
hedmf_run
sfc_diag_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name physics%Statein(i)%ugrs(:,1)
requested GFS_surface_generic_post_run
gmtb_scm_sfc_flux_spec_run
lsm_noah_run
sfc_ex_coef_run
sfc_nst_run
sfc_sice_run
category 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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%u1
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gu0(:,1)
requested	sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_u
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gu0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run gwdc_post_run samfdeepcnv_run samfshalcnv_run
category	physics

y_wind

long_name	meridional wind
units	m s-1
rank	2
type	real
kind	kind_phys
source	MODULE gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vgrs
requested	gwdc_run gwdps_run hedmf_run rayleigh_damp_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%v10m
requested	GFS_surface_generic_post_run gmtb_scm_sfc_flux_spec_run hedmf_run sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Statein(i)%vgrs(:,1)
requested	GFS_surface_generic_post_run gmtb_scm_sfc_flux_spec_run lsm_noah_run sfc_ex_coef_run sfc_nst_run sfc_sice_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Diag(i)%v1
requested	GFS_surface_generic_post_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gv0(:,1)
requested	sfc_diag_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%save_v
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Stateout(i)%gv0
requested	GFS_DCNV_generic_post_run GFS_DCNV_generic_pre_run gwdc_post_run samfdeepcnv_run samfshalcnv_run
category	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 gmtb_scm_type_defs TYPE physics_type
local_name	physics%Interstitial(i)%xmu
requested	GFS_PBL_generic_post_run GFS_suite_interstitial_2_run dcyc2t3_run hedmf_run
category	physics