CMIP6 Model Documentation

Institute:	INPE
Model:	BESM-2-7
Topic:	Atmosphere
Doc. Generated:	2018-02-15
Doc. Seeded From:	N/A
Specialization Version:	0.3.0
Further Info:	https://es-doc.org/cmip6 https://specializations.es-doc.org/cmip6

Documentation Contents

1 Key Properties

Atmosphere key properties

1.1 Overview

Top level key properties

1.1.1 Model Overview

Overview of atmosphere model

Spec. ID: cmip6.atmos.key_properties.overview.model_overview

Is Required ? TRUE

Enter TEXT value:

1.1.2 Model Name

Name of atmosphere model code (CAM 4.0, ARPEGE 3.2,...)

Spec. ID: cmip6.atmos.key_properties.overview.model_name

Is Required ? TRUE

Enter TEXT value:

1.1.3 Model Family

Type of atmospheric model.

Spec. ID: cmip6.atmos.key_properties.overview.model_family

Is Required ? TRUE

Select value:

☐ AGCM - Atmospheric General Circulation Model

☐ ARCM - Atmospheric Regional Climate Model

☐ Other - please specify:

1.1.4 Basic Approximations

Basic approximations made in the atmosphere.

Spec. ID: cmip6.atmos.key_properties.overview.basic_approximations

Is Required ? TRUE

Select value(s):

☐ Primitive equations

☐ Non-hydrostatic

- ☐ Anelastic
- ☐ Boussinesq
- ☐ Hydrostatic
- ☐ Quasi-hydrostatic
- ☐ Other - please specify:

1.2 Resolution

Characteristics of the model resolution

1.2.1 Horizontal Resolution Name

This is a string usually used by the modelling group to describe the resolution of the model grid, e.g. T42, N48.

Spec. ID: cmip6.atmos.key_properties.resolution.horizontal_resolution_name

Is Required ? TRUE

Enter TEXT value:

1.2.2 Canonical Horizontal Resolution

Expression quoted for gross comparisons of resolution, e.g. 2.5 x 3.75 degrees lat-lon.

Spec. ID: cmip6.atmos.key_properties.resolution.canonical_horizontal_resolution

Is Required ? TRUE

Enter TEXT value:

1.2.3 Range Horizontal Resolution

Range of horizontal resolution with spatial details, eg. 1 deg (Equator) - 0.5 deg

Spec. ID: cmip6.atmos.key_properties.resolution.range_horizontal_resolution

Is Required ? TRUE

Enter TEXT value:

1.2.4 Number Of Vertical Levels

Number of vertical levels resolved on the computational grid.

Spec. ID: cmip6.atmos.key_properties.resolution.number_of_vertical_levels

Is Required ? TRUE

Enter INTEGER value:

1.2.5 High Top

Does the atmosphere have a high-topxxx? High-Top atmospheres have a fully resolved stratosphere with a model top above the stratopause.

Spec. ID: cmip6.atmos.key_properties.resolution.high_top

Is Required ? TRUE

Select value:

☐ True ☐ False

1.3 Timestepping

Characteristics of the atmosphere model time stepping

1.3.1 Timestep Dynamics

Timestep for the dynamics, e.g. 30 min.

Spec. ID: cmip6.atmos.key_properties.timestepping.timestep_dynamics

Is Required ? TRUE

Enter TEXT value:

1.3.2 Timestep Shortwave Radiative Transfer

Timestep for the shortwave radiative transfer, e.g. 1.5 hours.

Spec. ID: cmip6.atmos.key_properties.timestepping.timestep_shortwave_radiative_transfer

Is Required ? FALSE

Enter TEXT value:

1.3.3 Timestep Longwave Radiative Transfer

Timestep for the longwave radiative transfer, e.g. 3 hours.

Spec. ID: cmip6.atmos.key_properties.timestepping.timestep_longwave_radiative_transfer

Is Required ? FALSE

Enter TEXT value:

1.4 Orography

Characteristics of the model orography

1.4.1 Type

Time adaptation of the orography.

Spec. ID: cmip6.atmos.key_properties.orography.type

Is Required ? TRUE

Select value:

☐ Present day

☐ Modified

1.4.2 Changes

If the orography type is modified describe the time adaptation changes.

Spec. ID: cmip6.atmos.key_properties.orography.changes

Is Required ? TRUE

Select value(s):

☐ Related to ice sheets

☐ Related to tectonics

☐ Modified mean

☐ Modified variance if taken into account in model (cf gravity waves)

2 Grid

Atmosphere grid

2.1 Discretisation

Atmosphere grid discretisation

2.1.1 Overview

Overview description of grid discretisation in the atmosphere

Spec. ID: cmip6.atmos.grid.discretisation.overview

Is Required ? TRUE

Enter TEXT value:

2.2 Horizontal

Atmosphere discretisation in the horizontal

2.2.1 Scheme Type

Horizontal discretisation type

Spec. ID: cmip6.atmos.grid.discretisation.horizontal.scheme_type

Is Required ? TRUE

Select value:

☐ Spectral

☐ Fixed grid

☐ Other - please specify:

2.2.2 Scheme Method

Horizontal discretisation method

Spec. ID: cmip6.atmos.grid.discretisation.horizontal.scheme_method

Is Required ? TRUE

Select value:

☐ Finite elements

☐ Finite volumes

☐ Finite difference

☐ Centered finite difference

2.2.3 Scheme Order

Horizontal discretisation function order

Spec. ID: cmip6.atmos.grid.discretisation.horizontal.scheme_order

Is Required ? TRUE

Select value:

- ☐ Second
- ☐ Third
- ☐ Fourth
- ☐ Other - please specify:

2.2.4 Horizontal Pole

Horizontal discretisation pole singularity treatment

Spec. ID: cmip6.atmos.grid.discretisation.horizontal.horizontal_pole

Is Required ? FALSE

Select value:

- ☐ Filter
- ☐ Pole rotation
- ☐ Artificial island
- ☐ Other - please specify:

2.2.5 Grid Type

Horizontal grid type

Spec. ID: cmip6.atmos.grid.discretisation.horizontal.grid_type

Is Required ? TRUE

Select value:

- ☐ Gaussian
- ☐ Latitude-Longitude
- ☐ Cubed-Sphere
- ☐ Icosahedral
- ☐ Other - please specify:

2.3 Vertical

Atmosphere discretisation in the vertical

2.3.1 Coordinate Type

Type of vertical coordinate system

Spec. ID: cmip6.atmos.grid.discretisation.vertical.coordinate_type

Is Required ? TRUE

Select value(s):

- ☐ Isobaric - Vertical coordinate on pressure levels
- ☐ Sigma - Allows vertical coordinate to follow model terrain
- ☐ Hybrid sigma-pressure - Sigma system near terrain and isobaric above
- ☐ Hybrid pressure
- ☐ Vertically lagrangian
- ☐ Other - please specify:

3 Dynamical Core

Characteristics of the dynamical core

3.1 Dynamical Core

Characteristics of the dynamical core

3.1.1 Overview

Overview description of atmosphere dynamical core

Spec. ID: cmip6.atmos.dynamical_core.overview

Is Required ? TRUE

Enter TEXT value:

3.1.2 Name

Commonly used name for the dynamical core of the model.

Spec. ID: cmip6.atmos.dynamical_core.name

Is Required ? FALSE

Enter TEXT value:

3.1.3 Timestepping Type

Timestepping framework type

Spec. ID: cmip6.atmos.dynamical_core.timestepping_type

Is Required ? TRUE

Select value:

- ☐ Adams-Bashforth
- ☐ Explicit
- ☐ Implicit
- ☐ Semi-implicit
- ☐ Leap frog
- ☐ Multi-step
- ☐ Runge Kutta fifth order
- ☐ Runge Kutta second order
- ☐ Runge Kutta third order
- ☐ Other - please specify:

3.1.4 Prognostic Variables

List of the model prognostic variables

Spec. ID: cmip6.atmos.dynamical_core.prognostic_variables

Is Required ? TRUE

Select value(s):

- ☐ Surface pressure
- ☐ Wind components
- ☐ Divergence/curl
- ☐ Temperature
- ☐ Potential temperature
- ☐ Total water
- ☐ Water vapour
- ☐ Water liquid
- ☐ Water ice
- ☐ Total water moments
- ☐ Clouds
- ☐ Radiation
- ☐ Other - please specify:

3.2 Top Boundary

Type of boundary layer at the top of the model

3.2.1 Top Boundary Condition

Top boundary condition

Spec. ID: cmip6.atmos.dynamical_core.top_boundary.top_boundary_condition

Is Required ? TRUE

Select value:

- ☐ Sponge layer
- ☐ Radiation boundary condition
- ☐ Other - please specify:

3.2.2 Top Heat

Top boundary heat treatment

Spec. ID: cmip6.atmos.dynamical_core.top_boundary.top_heat

Is Required ? TRUE

Enter TEXT value:

3.2.3 Top Wind

Top boundary wind treatment

Spec. ID: cmip6.atmos.dynamical_core.top_boundary.top_wind

Is Required ? TRUE

Enter TEXT value:

3.3 Lateral Boundary

Type of lateral boundary condition (if the model is a regional model)

3.3.1 Condition

Type of lateral boundary condition

Spec. ID: cmip6.atmos.dynamical_core.lateral_boundary.condition

Is Required ? FALSE

Select value:

☐ Sponge layer

☐ Radiation boundary condition

☐ Other - please specify:

3.4 Diffusion Horizontal

Horizontal diffusion scheme

3.4.1 Scheme Name

Horizontal diffusion scheme name

Spec. ID: cmip6.atmos.dynamical_core.diffusion_horizontal.scheme_name

Is Required ? FALSE

Enter TEXT value:

3.4.2 Scheme Method

Horizontal diffusion scheme method

Spec. ID: cmip6.atmos.dynamical_core.diffusion_horizontal.scheme_method

Is Required ? TRUE

Select value:

☐ Iterated Laplacian

☐ Bi-harmonic

☐ Other - please specify:

3.5 Advection Tracers

Tracer advection scheme

3.5.1 Scheme Name

Tracer advection scheme name

Spec. ID: cmip6.atmos.dynamical_core.advection_tracers.scheme_name

Is Required ? FALSE

Select value:

☐ Heun

☐ Roe and VanLeer

☐ Roe and Superbee

☐ Prather

☐ UTOPIA

☐ Other - please specify:

3.5.2 Scheme Characteristics

Tracer advection scheme characteristics

Spec. ID: cmip6.atmos.dynamical_core.advection_tracers.scheme_characteristics

Is Required ? TRUE

Select value(s):

☐ Eulerian

☐ Modified Euler

☐ Lagrangian

- ☐ Semi-Lagrangian
- ☐ Cubic semi-Lagrangian
- ☐ Quintic semi-Lagrangian
- ☐ Mass-conserving
- ☐ Finite volume
- ☐ Flux-corrected
- ☐ Linear
- ☐ Quadratic
- ☐ Quartic
- ☐ Other - please specify:

3.5.3 Conserved Quantities

Tracer advection scheme conserved quantities

Spec. ID: cmip6.atmos.dynamical_core.advection_tracers.conserved_quantities

Is Required ? TRUE

Select value(s):

- ☐ Dry mass
- ☐ Tracer mass
- ☐ Other - please specify:

3.5.4 Conservation Method

Tracer advection scheme conservation method

Spec. ID: cmip6.atmos.dynamical_core.advection_tracers.conservation_method

Is Required ? TRUE

Select value:

- ☐ Conservation fixer
- ☐ Priestley algorithm
- ☐ Other - please specify:

3.6 Advection Momentum

Momentum advection scheme

3.6.1 Scheme Name

Momentum advection schemes name

Spec. ID: cmip6.atmos.dynamical_core.advection_momentum.scheme_name

Is Required ? FALSE

Select value:

- ☐ VanLeer
- ☐ Janjic
- ☐ SUPG (Streamline Upwind Petrov-Galerkin)
- ☐ Other - please specify:

3.6.2 Scheme Characteristics

Momentum advection scheme characteristics

Spec. ID: cmip6.atmos.dynamical_core.advection_momentum.scheme_characteristics

Is Required ? TRUE

Select value(s):

- ☐ 2nd order
- ☐ 4th order
- ☐ Cell-centred
- ☐ Staggered grid
- ☐ Semi-staggered grid
- ☐ Other - please specify:

3.6.3 Scheme Staggering Type

Momentum advection scheme staggering type

Spec. ID: cmip6.atmos.dynamical_core.advection_momentum.scheme_staggering_type

Is Required ? TRUE

Select value:

- ☐ Arakawa B-grid
- ☐ Arakawa C-grid
- ☐ Arakawa D-grid
- ☐ Arakawa E-grid
- ☐ Other - please specify:

3.6.4 Conserved Quantities

Momentum advection scheme conserved quantities

Spec. ID: cmip6.atmos.dynamical_core.advection_momentum.conserved_quantities

Is Required ? TRUE

Select value(s):

- ☐ Angular momentum
- ☐ Horizontal momentum
- ☐ Enstrophy
- ☐ Mass
- ☐ Total energy
- ☐ Vorticity
- ☐ Other - please specify:

3.6.5 Conservation Method

Momentum advection scheme conservation method

Spec. ID: cmip6.atmos.dynamical_core.advection_momentum.conservation_method

Is Required ? TRUE

Select value:

- ☐ Conservation fixer
- ☐ Other - please specify:

4 Radiation

Characteristics of the atmosphere radiation process

4.1 Radiation

Characteristics of the atmosphere radiation process

4.1.1 Aerosols

Aerosols whose radiative effect is taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.aerosols

Is Required ? TRUE

Select value(s):

- ☐ Sulphate
- ☐ Nitrate
- ☐ Sea salt
- ☐ Dust
- ☐ Ice
- ☐ Organic
- ☐ BC (black carbon / soot)
- ☐ SOA (secondary organic aerosols)
- ☐ POM (particulate organic matter)
- ☐ Polar stratospheric ice
- ☐ NAT (nitric acid trihydrate)
- ☐ NAD (nitric acid dihydrate)
- ☐ STS (supercooled ternary solution aerosol particle)
- ☐ Other - please specify:

4.2 Shortwave Radiation

Properties of the shortwave radiation scheme

4.2.1 Overview

Overview description of shortwave radiation in the atmosphere

Spec. ID: cmip6.atmos.radiation.shortwave_radiation.overview

Is Required ? TRUE

Enter TEXT value:

4.2.2 Name

Commonly used name for the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_radiation.name

Is Required ? FALSE

Enter TEXT value:

4.2.3 Spectral Integration

Shortwave radiation scheme spectral integration

Spec. ID: cmip6.atmos.radiation.shortwave_radiation.spectral_integration

Is Required ? TRUE

Select value:

- ☐ Wide-band model
- ☐ Correlated-k
- ☐ Exponential sum fitting
- ☐ Other - please specify:

4.2.4 Transport Calculation

Shortwave radiation transport calculation methods

Spec. ID: cmip6.atmos.radiation.shortwave_radiation.transport_calculation

Is Required ? TRUE

Select value(s):

- ☐ Two-stream
- ☐ Layer interaction
- ☐ Bulk - Highly parameterised methods that use bulk expressions
- ☐ Adaptive - Exploits spatial and temporal correlations in optical characteristics
- ☐ Multi-stream
- ☐ Other - please specify:

4.2.5 Spectral Intervals

Shortwave radiation scheme number of spectral intervals

Spec. ID: cmip6.atmos.radiation.shortwave_radiation.spectral_intervals

Is Required ? TRUE

Enter INTEGER value:

4.3 Shortwave GHG

Representation of greenhouse gases in the shortwave radiation scheme

4.3.1 Greenhouse Gas Complexity

Complexity of greenhouse gases whose shortwave radiative effects are taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.shortwave_ghg.greenhouse_gas_complexity

Is Required ? TRUE

Select value(s):

☐ CO2 - Carbon Dioxide

☐ CH4 - Methane

☐ N2O - Nitrous Oxide

☐ CFC-11 eq - Summarize the effect of non CO2, CH4, N2O and CFC-12 gases with an equivalence concentration of CFC-11

☐ CFC-12 eq - Summarize the radiative effect of the Ozone Depleating Substances, ODSs, with a CFC-12 equivalence concentration

☐ HFC-134a eq - Summarize the radiative effect of other fluorinated gases with a HFC-134a equivalence concentration

☐ Explicit ODSs - Explicit representation of Ozone Depleting Substances e.g. CFCs, HCFCs and Halons

☐ Explicit other fluorinated gases - Explicit representation of other fluorinated gases e.g. HFCs and PFCs

☐ O3

☐ H2O

☐ Other - please specify:

4.3.2 ODS

Ozone depleting substances whose shortwave radiative effects are explicitly taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.shortwave_ghg.ods

Is Required ? FALSE

Select value(s):

☐ CFC-12 - CFC

☐ CFC-11 - CFC

☐ CFC-113 - CFC

☐ CFC-114 - CFC

- ☐ CFC-115 - CFC
- ☐ HCFC-22 - HCFC
- ☐ HCFC-141b - HCFC
- ☐ HCFC-142b - HCFC
- ☐ Halon-1211 - Halon
- ☐ Halon-1301 - Halon
- ☐ Halon-2402 - Halon
- ☐ Methyl chloroform - CH3CCl3
- ☐ Carbon tetrachloride - CCl4
- ☐ Methyl chloride - CH3Cl
- ☐ Methylene chloride - CH2Cl2
- ☐ Chloroform - CHCl3
- ☐ Methyl bromide - Ch3Br
- ☐ Other - please specify:

4.3.3 Other Flourinated Gases

Other flourinated gases whose shortwave radiative effects are explicitly taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.shortwave_ghg.other_flourinated_gases

Is Required ? FALSE

Select value(s):

- ☐ HFC-134a - HFC
- ☐ HFC-23 - HFC
- ☐ HFC-32 - HFC
- ☐ HFC-125 - HFC
- ☐ HFC-143a - HFC
- ☐ HFC-152a - HFC
- ☐ HFC-227ea - HFC
- ☐ HFC-236fa - HFC
- ☐ HFC-245fa - HFC
- ☐ HFC-365mfc - HFC
- ☐ HFC-43-10mee - HFC

- ☐ CF4 - PFC
- ☐ C2F6 - PFC
- ☐ C3F8 - PFC
- ☐ C4F10 - PFC
- ☐ C5F12 - PFC
- ☐ C6F14 - PFC
- ☐ C7F16 - PFC
- ☐ C8F18 - PFC
- ☐ C-C4F8 - PFC
- ☐ NF3
- ☐ SF6
- ☐ SO2F2
- ☐ Other - please specify:

4.4 Shortwave Cloud Ice

Shortwave radiative properties of ice crystals in clouds

4.4.1 General Interactions

General shortwave radiative interactions with cloud ice crystals

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_ice.general_interactions

Is Required ? TRUE

Select value(s):

- ☐ Scattering
- ☐ Emission/absorption
- ☐ Other - please specify:

4.4.2 Physical Representation

Physical representation of cloud ice crystals in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_ice.physical_representation

Is Required ? TRUE

Select value(s):

- ☐ Bi-modal size distribution - Small mode diameters: a few tens of microns, large mode diameters: typically hundreds of microns

☐ Ensemble of ice crystals - Complex shapes represented with an ensemble of symmetric shapes

☐ Mean projected area - Randomly oriented irregular ice crystals present a greater mean projected area than spheres

☐ Ice water path - Integrated ice water path through the cloud kg m-2

☐ Crystal asymmetry

☐ Crystal aspect ratio

☐ Effective crystal radius

☐ Other - please specify:

4.4.3 Optical Methods

Optical methods applicable to cloud ice crystals in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_ice.optical_methods

Is Required ? TRUE

Select value(s):

☐ T-matrix - For non-spherical particles

☐ Geometric optics - For non-spherical particles

☐ Finite difference time domain (FDTD) - For non-spherical particles

☐ Mie theory - For spherical particles

☐ Anomalous diffraction approximation

☐ Other - please specify:

4.5 Shortwave Cloud Liquid

Shortwave radiative properties of liquid droplets in clouds

4.5.1 General Interactions

General shortwave radiative interactions with cloud liquid droplets

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_liquid.general_interactions

Is Required ? TRUE

Select value(s):

☐ Scattering

☐ Emission/absorption

☐ Other - please specify:

4.5.2 Physical Representation

Physical representation of cloud liquid droplets in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_liquid.physical_representation

Is Required ? TRUE

Select value(s):

- ☐ Cloud droplet number concentration - CDNC
- ☐ Effective cloud droplet radii
- ☐ Droplet size distribution
- ☐ Liquid water path - Integrated liquid water path through the cloud kg m-2
- ☐ Other - please specify:

4.5.3 Optical Methods

Optical methods applicable to cloud liquid droplets in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_liquid.optical_methods

Is Required ? TRUE

Select value(s):

- ☐ Geometric optics - For non-spherical particles
- ☐ Mie theory - For spherical particles
- ☐ Other - please specify:

4.6 Shortwave Cloud Inhomogeneity

Cloud inhomogeneity in the shortwave radiation scheme

4.6.1 Cloud Inhomogeneity

Method for taking into account horizontal cloud inhomogeneity

Spec. ID: cmip6.atmos.radiation.shortwave_cloud_inhomogeneity.cloud_inhomogeneity

Is Required ? TRUE

Select value:

- ☐ Monte Carlo Independent Column Approximation - McICA
- ☐ Triplecloud - Regions of clear sky, optically thin cloud and optically thick cloud, Shonk et al 2010
- ☐ Analytic
- ☐ Other - please specify:

4.7 Shortwave Aerosols

Shortwave radiative properties of aerosols

4.7.1 General Interactions

General shortwave radiative interactions with aerosols

Spec. ID: cmip6.atmos.radiation.shortwave_aerosols.general_interactions

Is Required ? TRUE

Select value(s):

- ☐ Scattering
- ☐ Emission/absorption
- ☐ Other - please specify:

4.7.2 Physical Representation

Physical representation of aerosols in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_aerosols.physical_representation

Is Required ? TRUE

Select value(s):

- ☐ Number concentration
- ☐ Effective radii
- ☐ Size distribution
- ☐ Asymmetry
- ☐ Aspect ratio
- ☐ Mixing state - For shortwave radiative interaction
- ☐ Other - please specify:

4.7.3 Optical Methods

Optical methods applicable to aerosols in the shortwave radiation scheme

Spec. ID: cmip6.atmos.radiation.shortwave_aerosols.optical_methods

Is Required ? TRUE

Select value(s):

- ☐ T-matrix - For non-spherical particles
- ☐ Geometric optics - For non-spherical particles
- ☐ Finite difference time domain (FDTD) - For non-spherical particles

- ☐ Mie theory - For spherical particles
- ☐ Anomalous diffraction approximation
- ☐ Other - please specify:

4.8 Shortwave Gases

Shortwave radiative properties of gases

4.8.1 General Interactions

General shortwave radiative interactions with gases

Spec. ID: cmip6.atmos.radiation.shortwave_gases.general_interactions

Is Required ? TRUE

Select value(s):

- ☐ Scattering
- ☐ Emission/absorption
- ☐ Other - please specify:

4.9 Longwave Radiation

Properties of the longwave radiation scheme

4.9.1 Overview

Overview description of longwave radiation in the atmosphere

Spec. ID: cmip6.atmos.radiation.longwave_radiation.overview

Is Required ? TRUE

Enter TEXT value:

4.9.2 Name

Commonly used name for the longwave radiation scheme.

Spec. ID: cmip6.atmos.radiation.longwave_radiation.name

Is Required ? FALSE

Enter TEXT value:

4.9.3 Spectral Integration

Longwave radiation scheme spectral integration

Spec. ID: cmip6.atmos.radiation.longwave_radiation.spectral_integration

Is Required ? TRUE

Select value:

- ☐ Wide-band model
- ☐ Correlated-k
- ☐ Exponential sum fitting
- ☐ Other - please specify:

4.9.4 Transport Calculation

Longwave radiation transport calculation methods

Spec. ID: cmip6.atmos.radiation.longwave_radiation.transport_calculation

Is Required ? TRUE

Select value(s):

- ☐ Two-stream
- ☐ Layer interaction
- ☐ Bulk - Highly parameterised methods that use bulk expressions
- ☐ Adaptive - Exploits spatial and temporal correlations in optical characteristics
- ☐ Multi-stream
- ☐ Other - please specify:

4.9.5 Spectral Intervals

Longwave radiation scheme number of spectral intervals

Spec. ID: cmip6.atmos.radiation.longwave_radiation.spectral_intervals

Is Required ? TRUE

Enter INTEGER value:

4.10 Longwave GHG

Representation of greenhouse gases in the longwave radiation scheme

4.10.1 Greenhouse Gas Complexity

Complexity of greenhouse gases whose longwave radiative effects are taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.longwave_ghg.greenhouse_gas_complexity

Is Required ? TRUE

Select value(s):

- ☐ CO2 - Carbon Dioxide

☐ CH4 - Methane

☐ N2O - Nitrous Oxide

☐ CFC-11 eq - Summarize the effect of non CO2, CH4, N2O and CFC-12 gases with an equivalence concentration of CFC-11

☐ CFC-12 eq - Summarize the radiative effect of the Ozone Depleating Substances, ODSs, with a CFC-12 equivalence concentration

☐ HFC-134a eq - Summarize the radiative effect of other fluorinated gases with a HFC-134a equivalence concentration

☐ Explicit ODSs - Explicit representation of Ozone Depleting Substances e.g. CFCs, HCFCs and Halons

☐ Explicit other fluorinated gases - Explicit representation of other fluorinated gases e.g. HFCs and PFCs

☐ O3

☐ H2O

☐ Other - please specify:

4.10.2 ODS

Ozone depleting substances whose longwave radiative effects are explicitly taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.longwave_ghg.ods

Is Required ? FALSE

Select value(s):

☐ CFC-12 - CFC

☐ CFC-11 - CFC

☐ CFC-113 - CFC

☐ CFC-114 - CFC

☐ CFC-115 - CFC

☐ HCFC-22 - HCFC

☐ HCFC-141b - HCFC

☐ HCFC-142b - HCFC

☐ Halon-1211 - Halon

☐ Halon-1301 - Halon

☐ Halon-2402 - Halon

☐ Methyl chloroform - CH3CCl3

☐ Carbon tetrachloride - CCl4

- ☐ Methyl chloride - CH3Cl
- ☐ Methylene chloride - CH2Cl2
- ☐ Chloroform - CHCl3
- ☐ Methyl bromide - Ch3Br
- ☐ Other - please specify:

4.10.3 Other Flourinated Gases

Other flourinated gases whose longwave radiative effects are explicitly taken into account in the atmosphere model

Spec. ID: cmip6.atmos.radiation.longwave_ghg.other_flourinated_gases

Is Required ? FALSE

Select value(s):

- ☐ HFC-134a - HFC
- ☐ HFC-23 - HFC
- ☐ HFC-32 - HFC
- ☐ HFC-125 - HFC
- ☐ HFC-143a - HFC
- ☐ HFC-152a - HFC
- ☐ HFC-227ea - HFC
- ☐ HFC-236fa - HFC
- ☐ HFC-245fa - HFC
- ☐ HFC-365mfc - HFC
- ☐ HFC-43-10mee - HFC
- ☐ CF4 - PFC
- ☐ C2F6 - PFC
- ☐ C3F8 - PFC
- ☐ C4F10 - PFC
- ☐ C5F12 - PFC
- ☐ C6F14 - PFC
- ☐ C7F16 - PFC
- ☐ C8F18 - PFC
- ☐ C-C4F8 - PFC

☐ NF3

☐ SF6

☐ SO2F2

☐ Other - please specify:

4.11 Longwave Cloud Ice

Longwave radiative properties of ice crystals in clouds

4.11.1 General Interactions

General longwave radiative interactions with cloud ice crystals

Spec. ID: cmip6.atmos.radiation.longwave_cloud_ice.general_interactions

Is Required ? TRUE

Select value(s):

☐ Scattering

☐ Emission/absorption

☐ Other - please specify:

4.11.2 Physical Reprenstation

Physical representation of cloud ice crystals in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_cloud_ice.physical_reprenstation

Is Required ? TRUE

Select value(s):

☐ Bi-modal size distribution - Small mode diameters: a few tens of microns, large mode diameters: typically hundreds of microns

☐ Ensemble of ice crystals - Complex shapes represented with an ensemble of symmetric shapes

☐ Mean projected area - Randomly oriented irregular ice crystals present a greater mean projected area than spheres

☐ Ice water path - Integrated ice water path through the cloud kg m-2

☐ Crystal asymmetry

☐ Crystal aspect ratio

☐ Effective crystal radius

☐ Other - please specify:

4.11.3 Optical Methods

Optical methods applicable to cloud ice crystals in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_cloud_ice.optical_methods

Is Required ? TRUE

Select value(s):

- ☐ T-matrix - For non-spherical particles
- ☐ Geometric optics - For non-spherical particles
- ☐ Finite difference time domain (FDTD) - For non-spherical particles
- ☐ Mie theory - For spherical particles
- ☐ Anomalous diffraction approximation
- ☐ Other - please specify:

4.12 Longwave Cloud Liquid

Longwave radiative properties of liquid droplets in clouds

4.12.1 General Interactions

General longwave radiative interactions with cloud liquid droplets

Spec. ID: cmip6.atmos.radiation.longwave_cloud_liquid.general_interactions

Is Required ? TRUE

Select value(s):

- ☐ Scattering
- ☐ Emission/absorption
- ☐ Other - please specify:

4.12.2 Physical Representation

Physical representation of cloud liquid droplets in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_cloud_liquid.physical_representation

Is Required ? TRUE

Select value(s):

- ☐ Cloud droplet number concentration - CDNC
- ☐ Effective cloud droplet radii
- ☐ Droplet size distribution

☐ Liquid water path - Integrated liquid water path through the cloud kg m-2

☐ Other - please specify:

4.12.3 Optical Methods

Optical methods applicable to cloud liquid droplets in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_cloud_liquid.optical_methods

Is Required ? TRUE

Select value(s):

☐ Geometric optics - For non-spherical particles

☐ Mie theory - For spherical particles

☐ Other - please specify:

4.13 Longwave Cloud Inhomogeneity

Cloud inhomogeneity in the longwave radiation scheme

4.13.1 Cloud Inhomogeneity

Method for taking into account horizontal cloud inhomogeneity

Spec. ID: cmip6.atmos.radiation.longwave_cloud_inhomogeneity.cloud_inhomogeneity

Is Required ? TRUE

Select value:

☐ Monte Carlo Independent Column Approximation - McICA

☐ Triplecloud - Regions of clear sky, optically thin cloud and optically thick cloud, Shonk et al 2010

☐ Analytic

☐ Other - please specify:

4.14 Longwave Aerosols

Longwave radiative properties of aerosols

4.14.1 General Interactions

General longwave radiative interactions with aerosols

Spec. ID: cmip6.atmos.radiation.longwave_aerosols.general_interactions

Is Required ? TRUE

Select value(s):

- ☐ Scattering
- ☐ Emission/absorption
- ☐ Other - please specify:

4.14.2 Physical Representation

Physical representation of aerosols in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_aerosols.physical_representation

Is Required ? TRUE

Select value(s):

- ☐ Number concentration
- ☐ Effective radii
- ☐ Size distribution
- ☐ Asymmetry
- ☐ Aspect ratio
- ☐ Mixing state - For shortwave radiative interaction
- ☐ Other - please specify:

4.14.3 Optical Methods

Optical methods applicable to aerosols in the longwave radiation scheme

Spec. ID: cmip6.atmos.radiation.longwave_aerosols.optical_methods

Is Required ? TRUE

Select value(s):

- ☐ T-matrix - For non-spherical particles
- ☐ Geometric optics - For non-spherical particles
- ☐ Finite difference time domain (FDTD) - For non-spherical particles
- ☐ Mie theory - For spherical particles
- ☐ Anomalous diffraction approximation
- ☐ Other - please specify:

4.15 Longwave Gases

Longwave radiative properties of gases

4.15.1 General Interactions

General longwave radiative interactions with gases

Spec. ID: cmip6.atmos.radiation.longwave_gases.general_interactions

Is Required ? TRUE

Select value(s):

☐ Scattering

☐ Emission/absorption

☐ Other - please specify:

5 Turbulence Convection

Atmosphere Convective Turbulence and Clouds

5.1 Turbulence Convection

Atmosphere Convective Turbulence and Clouds

5.1.1 Overview

Overview description of atmosphere convection and turbulence

Spec. ID: cmip6.atmos.turbulence_convection.overview

Is Required ? TRUE

Enter TEXT value:

5.2 Boundary Layer Turbulence

Properties of the boundary layer turbulence scheme

5.2.1 Scheme Name

Boundary layer turbulence scheme name

Spec. ID: cmip6.atmos.turbulence_convection.boundary_layer_turbulence.scheme_name

Is Required ? FALSE

Select value:

- ☐ Mellor-Yamada
- ☐ Holtslag-Boville
- ☐ EDMF - Combined Eddy Diffusivity Mass-Flux
- ☐ Other - please specify:

5.2.2 Scheme Type

Boundary layer turbulence scheme type

Spec. ID: cmip6.atmos.turbulence_convection.boundary_layer_turbulence.scheme_type

Is Required ? TRUE

Select value(s):

- ☐ TKE prognostic
- ☐ TKE diagnostic
- ☐ TKE coupled with water
- ☐ Vertical profile of Kz

- ☐ Non-local diffusion
- ☐ Monin-Obukhov similarity
- ☐ Coastal Buddy Scheme - Separate components for coastal near surface winds over ocean and land
- ☐ Coupled with convection
- ☐ Coupled with gravity waves
- ☐ Depth capped at cloud base - Boundary layer capped at cloud base when convection is diagnosed
- ☐ Other - please specify:

5.2.3 Closure Order

Boundary layer turbulence scheme closure order

Spec. ID: cmip6.atmos.turbulence_convection.boundary_layer_turbulence.closure_order

Is Required ? TRUE

Enter INTEGER value:

5.2.4 Counter Gradient

Uses boundary layer turbulence scheme counter gradient

Spec. ID: cmip6.atmos.turbulence_convection.boundary_layer_turbulence.counter_gradient

Is Required ? TRUE

Select value:

☐ True ☐ False

5.3 Deep Convection

Properties of the deep convection scheme

5.3.1 Scheme Name

Deep convection scheme name

Spec. ID: cmip6.atmos.turbulence_convection.deep_convection.scheme_name

Is Required ? FALSE

Enter TEXT value:

5.3.2 Scheme Type

Deep convection scheme type

Spec. ID: cmip6.atmos.turbulence_convection.deep_convection.scheme_type

Is Required ? TRUE

Select value(s):

☐ Mass-flux

☐ Adjustment

☐ Plume ensemble - Zhang-McFarlane

☐ Other - please specify:

5.3.3 Scheme Method

Deep convection scheme method

Spec. ID: cmip6.atmos.turbulence_convection.deep_convection.scheme_method

Is Required ? TRUE

Select value(s):

☐ CAPE - Mass flux determined by CAPE, convectively available potential energy.

☐ Bulk - A bulk mass flux scheme is used

☐ Ensemble - Summation over an ensemble of convective clouds with differing characteristics

☐ CAPE/WFN based - CAPE-Cloud Work Function: Based on the quasi-equilibrium of the free troposphere

☐ TKE/CIN based - TKE-Convective Inhibition: Based on the quasi-equilibrium of the boundary layer

☐ Other - please specify:

5.3.4 Processes

Physical processes taken into account in the parameterisation of deep convection

Spec. ID: cmip6.atmos.turbulence_convection.deep_convection.processes

Is Required ? TRUE

Select value(s):

☐ Vertical momentum transport

☐ Convective momentum transport

☐ Entrainment

☐ Detrainment

☐ Penetrative convection

☐ Updrafts

☐ Downdrafts

☐ Radiative effect of anvils

☐ Re-evaporation of convective precipitation

☐ Other - please specify:

5.3.5 Microphysics

Microphysics scheme for deep convection. Microphysical processes directly control the amount of detrainment of cloud hydrometeor and water vapor from updrafts

Spec. ID: cmip6.atmos.turbulence_convection.deep_convection.microphysics

Is Required ? FALSE

Select value(s):

☐ Tuning parameter based

☐ Single moment

☐ Two moment

☐ Other - please specify:

5.4 Shallow Convection

Properties of the shallow convection scheme

5.4.1 Scheme Name

Shallow convection scheme name

Spec. ID: cmip6.atmos.turbulence_convection.shallow_convection.scheme_name

Is Required ? FALSE

Enter TEXT value:

5.4.2 Scheme Type

Shallow convection scheme type

Spec. ID: cmip6.atmos.turbulence_convection.shallow_convection.scheme_type

Is Required ? TRUE

Select value(s):

☐ Mass-flux

☐ Cumulus-capped boundary layer

☐ Other - please specify:

5.4.3 Scheme Method

Shallow convection scheme method

Spec. ID: cmip6.atmos.turbulence_convection.shallow_convection.scheme_method

Is Required ? TRUE

Select value:

☐ Same as deep (unified)

☐ Included in boundary layer turbulence

☐ Separate diagnosis - Deep and Shallow convection schemes use different thermodynamic closure criteria

5.4.4 Processes

Physical processes taken into account in the parameterisation of shallow convection

Spec. ID: cmip6.atmos.turbulence_convection.shallow_convection.processes

Is Required ? TRUE

Select value(s):

☐ Convective momentum transport

☐ Entrainment

☐ Detrainment

☐ Penetrative convection

☐ Re-evaporation of convective precipitation

☐ Other - please specify:

5.4.5 Microphysics

Microphysics scheme for shallow convection

Spec. ID: cmip6.atmos.turbulence_convection.shallow_convection.microphysics

Is Required ? FALSE

Select value(s):

☐ Tuning parameter based

☐ Single moment

☐ Two moment

☐ Other - please specify:

6 Microphysics Precipitation

Large Scale Cloud Microphysics and Precipitation

6.1 Microphysics Precipitation

Large Scale Cloud Microphysics and Precipitation

6.1.1 Overview

Overview description of large scale cloud microphysics and precipitation

Spec. ID: cmip6.atmos.microphysics_precipitation.overview

Is Required ? TRUE

Enter TEXT value:

6.2 Large Scale Precipitation

Properties of the large scale precipitation scheme

6.2.1 Scheme Name

Commonly used name of the large scale precipitation parameterisation scheme

Spec. ID: cmip6.atmos.microphysics_precipitation.large_scale_precipitation.scheme_name

Is Required ? FALSE

Enter TEXT value:

6.2.2 Hydrometeors

Precipitating hydrometeors taken into account in the large scale precipitation scheme

Spec. ID: cmip6.atmos.microphysics_precipitation.large_scale_precipitation.hydrometeors

Is Required ? TRUE

Select value(s):

- ☐ Liquid rain
- ☐ Snow
- ☐ Hail
- ☐ Graupel
- ☐ Other - please specify:

6.3 Large Scale Cloud Microphysics

Properties of the large scale cloud microphysics scheme

6.3.1 Scheme Name

Commonly used name of the microphysics parameterisation scheme used for large scale clouds.

Spec. ID: cmip6.atmos.microphysics_precipitation.large_scale_cloud_microphysics.scheme_name

Is Required ? FALSE

Enter TEXT value:

6.3.2 Processes

Large scale cloud microphysics processes

Spec. ID: cmip6.atmos.microphysics_precipitation.large_scale_cloud_microphysics.processes

Is Required ? TRUE

Select value(s):

- ☐ Mixed phase
- ☐ Cloud droplets
- ☐ Cloud ice
- ☐ Ice nucleation
- ☐ Water vapour deposition
- ☐ Effect of raindrops
- ☐ Effect of snow
- ☐ Effect of graupel
- ☐ Other - please specify:

7 Cloud Scheme

Characteristics of the cloud scheme

7.1 Cloud Scheme

Characteristics of the cloud scheme

7.1.1 Overview

Overview description of the atmosphere cloud scheme

Spec. ID: cmip6.atmos.cloud_scheme.overview

Is Required ? TRUE

Enter TEXT value:

7.1.2 Name

Commonly used name for the cloud scheme

Spec. ID: cmip6.atmos.cloud_scheme.name

Is Required ? FALSE

Enter TEXT value:

7.1.3 Atmos Coupling

Atmosphere components that are linked to the cloud scheme

Spec. ID: cmip6.atmos.cloud_scheme.atmos_coupling

Is Required ? FALSE

Select value(s):

- ☐ Atmosphere_radiation
- ☐ Atmosphere_microphysics_precipitation
- ☐ Atmosphere_turbulence_convection
- ☐ Atmosphere_gravity_waves
- ☐ Atmosphere_solar
- ☐ Atmosphere_volcano
- ☐ Atmosphere_cloud_simulator

7.1.4 Uses Separate Treatment

Different cloud schemes for the different types of clouds (convective, stratiform and boundary layer)

Spec. ID: cmip6.atmos.cloud_scheme.uses_separate_treatment

Is Required ? TRUE

Select value:

☐ True ☐ False

7.1.5 Processes

Processes included in the cloud scheme

Spec. ID: cmip6.atmos.cloud_scheme.processes

Is Required ? TRUE

Select value(s):

☐ Entrainment

☐ Detrainment

☐ Bulk cloud

☐ Other - please specify:

7.1.6 Prognostic Scheme

Is the cloud scheme a prognostic schemexxx?

Spec. ID: cmip6.atmos.cloud_scheme.prognostic_scheme

Is Required ? TRUE

Select value:

☐ True ☐ False

7.1.7 Diagnostic Scheme

Is the cloud scheme a diagnostic schemexxx?

Spec. ID: cmip6.atmos.cloud_scheme.diagnostic_scheme

Is Required ? TRUE

Select value:

☐ True ☐ False

7.1.8 Prognostic Variables

List the prognostic variables used by the cloud scheme, if applicable.

Spec. ID: cmip6.atmos.cloud_scheme.prognostic_variables

Is Required ? FALSE

Select value(s):

- ☐ Cloud amount
- ☐ Liquid
- ☐ Ice
- ☐ Rain
- ☐ Snow
- ☐ Other - please specify:

7.2 Optical Cloud Properties

Optical cloud properties

7.2.1 Cloud Overlap Method

Method for taking into account overlapping of cloud layers

Spec. ID: cmip6.atmos.cloud_scheme.optical_cloud_properties.cloud_overlap_method

Is Required ? FALSE

Select value:

- ☐ Random
- ☐ Maximum
- ☐ Maximum-random - Combination of maximum and random overlap between clouds
- ☐ Exponential
- ☐ Other - please specify:

7.2.2 Cloud Inhomogeneity

Method for taking into account cloud inhomogeneity

Spec. ID: cmip6.atmos.cloud_scheme.optical_cloud_properties.cloud_inhomogeneity

Is Required ? FALSE

Enter TEXT value:

7.3 Sub Grid Scale Water Distribution

Sub-grid scale water distribution

7.3.1 Type

Sub-grid scale water distribution type

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_water_distribution.type

Is Required ? TRUE

Select value:

☐ Prognostic

☐ Diagnostic

7.3.2 Function Name

Sub-grid scale water distribution function name

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_water_distribution.function_name

Is Required ? TRUE

Enter TEXT value:

7.3.3 Function Order

Sub-grid scale water distribution function type

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_water_distribution.function_order

Is Required ? TRUE

Enter INTEGER value:

7.3.4 Convection Coupling

Sub-grid scale water distribution coupling with convection

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_water_distribution.convection_coupling

Is Required ? TRUE

Select value(s):

☐ Coupled with deep

☐ Coupled with shallow

☐ Not coupled with convection

7.4 Sub Grid Scale Ice Distribution

Sub-grid scale ice distribution

7.4.1 Type

Sub-grid scale ice distribution type

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_ice_distribution.type

Is Required ? TRUE

Select value:

☐ Prognostic

☐ Diagnostic

7.4.2 Function Name

Sub-grid scale ice distribution function name

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_ice_distribution.function_name

Is Required ? TRUE

Enter TEXT value:

7.4.3 Function Order

Sub-grid scale ice distribution function type

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_ice_distribution.function_order

Is Required ? TRUE

Enter INTEGER value:

7.4.4 Convection Coupling

Sub-grid scale ice distribution coupling with convection

Spec. ID: cmip6.atmos.cloud_scheme.sub_grid_scale_ice_distribution.convection_coupling

Is Required ? TRUE

Select value(s):

☐ Coupled with deep

☐ Coupled with shallow

☐ Not coupled with convection

8 Observation Simulation

Characteristics of observation simulation

8.1 Observation Simulation

Characteristics of observation simulation

8.1.1 Overview

Overview description of observation simulator characteristics

Spec. ID: cmip6.atmos.observation_simulation.overview

Is Required ? TRUE

Enter TEXT value:

8.2 Isscp Attributes

ISSCP Characteristics

8.2.1 Top Height Estimation Method

Cloud simulator ISSCP top height estimation methodUo

Spec. ID: cmip6.atmos.observation_simulation.isscp_attributes.top_height_estimation_method

Is Required ? TRUE

Select value(s):

- ☐ No adjustment
- ☐ IR brightness
- ☐ Visible optical depth
- ☐ Other - please specify:

8.2.2 Top Height Direction

Cloud simulator ISSCP top height direction

Spec. ID: cmip6.atmos.observation_simulation.isscp_attributes.top_height_direction

Is Required ? TRUE

Select value:

- ☐ Lowest altitude level
- ☐ Highest altitude level
- ☐ Other - please specify:

8.3 Cosp Attributes

CFMIP Observational Simulator Package attributes

8.3.1 Run Configuration

Cloud simulator COSP run configuration

Spec. ID: cmip6.atmos.observation_simulation.cosp_attributes.run_configuration

Is Required ? TRUE

Select value:

☐ Inline

☐ Offline

☐ Other - please specify:

8.3.2 Number Of Grid Points

Cloud simulator COSP number of grid points

Spec. ID: cmip6.atmos.observation_simulation.cosp_attributes.number_of_grid_points

Is Required ? TRUE

Enter INTEGER value:

8.3.3 Number Of Sub Columns

Cloud simulator COSP number of sub-cloumns used to simulate sub-grid variability

Spec. ID: cmip6.atmos.observation_simulation.cosp_attributes.number_of_sub_columns

Is Required ? TRUE

Enter INTEGER value:

8.3.4 Number Of Levels

Cloud simulator COSP number of levels

Spec. ID: cmip6.atmos.observation_simulation.cosp_attributes.number_of_levels

Is Required ? TRUE

Enter INTEGER value:

8.4 Radar Inputs

Characteristics of the cloud radar simulator

8.4.1 Frequency

Cloud simulator radar frequency (Hz)

Spec. ID: cmip6.atmos.observation_simulation.radar_inputs.frequency

Is Required ? TRUE

Enter FLOAT value:

8.4.2 Type

Cloud simulator radar type

Spec. ID: cmip6.atmos.observation_simulation.radar_inputs.type

Is Required ? TRUE

Select value:

☐ Surface

☐ Space borne

☐ Other - please specify:

8.4.3 Gas Absorption

Cloud simulator radar uses gas absorption

Spec. ID: cmip6.atmos.observation_simulation.radar_inputs.gas_absorption

Is Required ? TRUE

Select value:

☐ True ☐ False

8.4.4 Effective Radius

Cloud simulator radar uses effective radius

Spec. ID: cmip6.atmos.observation_simulation.radar_inputs.effective_radius

Is Required ? TRUE

Select value:

☐ True ☐ False

8.5 Lidar Inputs

Characteristics of the cloud lidar simulator

8.5.1 Ice Types

Cloud simulator lidar ice type

Spec. ID: cmip6.atmos.observation_simulation.lidar_inputs.ice_types

Is Required ? TRUE

Select value:

☐ Ice spheres

☐ Ice non-spherical

☐ Other - please specify:

8.5.2 Overlap

Cloud simulator lidar overlap

Spec. ID: cmip6.atmos.observation_simulation.lidar_inputs.overlap

Is Required ? TRUE

Select value(s):

☐ Max

☐ Random

☐ Other - please specify:

9 Gravity Waves

Characteristics of the parameterised gravity waves in the atmosphere, whether from orography or other sources.

9.1 Gravity Waves

Characteristics of the parameterised gravity waves in the atmosphere, whether from orography or other sources.

9.1.1 Overview

Overview description of gravity wave parameterisation in the atmosphere

Spec. ID: cmip6.atmos.gravity_waves.overview

Is Required ? TRUE

Enter TEXT value:

9.1.2 Sponge Layer

Sponge layer in the upper levels in order to avoid gravity wave reflection at the top.

Spec. ID: cmip6.atmos.gravity_waves.sponge_layer

Is Required ? TRUE

Select value:

☐ Rayleigh friction

☐ Diffusive sponge layer

☐ Other - please specify:

9.1.3 Background

Background wave distribution

Spec. ID: cmip6.atmos.gravity_waves.background

Is Required ? TRUE

Select value:

☐ Continuous spectrum

☐ Discrete spectrum

☐ Other - please specify:

9.1.4 Subgrid Scale Orography

Subgrid scale orography effects taken into account.

Spec. ID: cmip6.atmos.gravity_waves.subgrid_scale_orography

Is Required ? TRUE

Select value(s):

- ☐ Effect on drag
- ☐ Effect on lifting
- ☐ Enhanced topography - To enhance the generation of long waves in the atmosphere
- ☐ Other - please specify:

9.2 Orographic Gravity Waves

Gravity waves generated due to the presence of orography

9.2.1 Name

Commonly used name for the orographic gravity wave scheme

Spec. ID: cmip6.atmos.gravity_waves.orographic_gravity_waves.name

Is Required ? FALSE

Enter TEXT value:

9.2.2 Source Mechanisms

Orographic gravity wave source mechanisms

Spec. ID: cmip6.atmos.gravity_waves.orographic_gravity_waves.source_mechanisms

Is Required ? TRUE

Select value(s):

- ☐ Linear mountain waves
- ☐ Hydraulic jump
- ☐ Envelope orography
- ☐ Low level flow blocking
- ☐ Statistical sub-grid scale variance
- ☐ Other - please specify:

9.2.3 Calculation Method

Orographic gravity wave calculation method

Spec. ID: cmip6.atmos.gravity_waves.orographic_gravity_waves.calculation_method

Is Required ? TRUE

Select value(s):

☐ Non-linear calculation

☐ More than two cardinal directions

☐ Other - please specify:

9.2.4 Propagation Scheme

Orographic gravity wave propogation scheme

Spec. ID: cmip6.atmos.gravity_waves.orographic_gravity_waves.propagation_scheme

Is Required ? TRUE

Select value:

☐ Linear theory

☐ Non-linear theory

☐ Includes boundary layer ducting

☐ Other - please specify:

9.2.5 Dissipation Scheme

Orographic gravity wave dissipation scheme

Spec. ID: cmip6.atmos.gravity_waves.orographic_gravity_waves.dissipation_scheme

Is Required ? TRUE

Select value:

☐ Total wave

☐ Single wave

☐ Spectral

☐ Linear

☐ Wave saturation vs Richardson number

☐ Other - please specify:

9.3 Non Orographic Gravity Waves

Gravity waves generated by non-orographic processes.

9.3.1 Name

Commonly used name for the non-orographic gravity wave scheme

Spec. ID: cmip6.atmos.gravity_waves.non_orographic_gravity_waves.name

Is Required ? FALSE

Enter TEXT value:

9.3.2 Source Mechanisms

Non-orographic gravity wave source mechanisms

Spec. ID: cmip6.atmos.gravity_waves.non_orographic_gravity_waves.source_mechanisms

Is Required ? TRUE

Select value(s):

- ☐ Convection
- ☐ Precipitation
- ☐ Background spectrum
- ☐ Other - please specify:

9.3.3 Calculation Method

Non-orographic gravity wave calculation method

Spec. ID: cmip6.atmos.gravity_waves.non_orographic_gravity_waves.calculation_method

Is Required ? TRUE

Select value(s):

- ☐ Spatially dependent
- ☐ Temporally dependent

9.3.4 Propagation Scheme

Non-orographic gravity wave propogation scheme

Spec. ID: cmip6.atmos.gravity_waves.non_orographic_gravity_waves.propagation_scheme

Is Required ? TRUE

Select value:

- ☐ Linear theory
- ☐ Non-linear theory
- ☐ Other - please specify:

9.3.5 Dissipation Scheme

Non-orographic gravity wave dissipation scheme

Spec. ID: cmip6.atmos.gravity_waves.non_orographic_gravity_waves.dissipation_scheme

Is Required ? TRUE

Select value:

- ☐ Total wave
- ☐ Single wave
- ☐ Spectral
- ☐ Linear
- ☐ Wave saturation vs Richardson number
- ☐ Other - please specify:

10 Solar

Top of atmosphere solar insolation characteristics

10.1 Solar

Top of atmosphere solar insolation characteristics

10.1.1 Overview

Overview description of solar insolation of the atmosphere

Spec. ID: cmip6.atmos.solar.overview

Is Required ? TRUE

Enter TEXT value:

10.2 Solar Pathways

Pathways for solar forcing of the atmosphere

10.2.1 Pathways

Pathways for the solar forcing of the atmosphere model domain

Spec. ID: cmip6.atmos.solar.solar_pathways.pathways

Is Required ? TRUE

Select value(s):

☐ SW radiation - Shortwave solar spectral irradiance.

☐ Precipitating energetic particles - Precipitating energetic particles from the sun (predominantly protons) and the magnetosphere (predominantly electrons) affect the ionization levels in the polar middle and upper atmosphere, leading to significant changes of the chemical composition

☐ Cosmic rays - Cosmic rays are the main source of ionization in the troposphere and lower stratosphere.

☐ Other - please specify:

10.3 Solar Constant

Solar constant and top of atmosphere insolation characteristics

10.3.1 Type

Time adaptation of the solar constant.

Spec. ID: cmip6.atmos.solar.solar_constant.type

Is Required ? TRUE

Select value:

☐ Fixed

☐ Transient

10.3.2 Fixed Value

If the solar constant is fixed, enter the value of the solar constant (W m-2).

Spec. ID: cmip6.atmos.solar.solar_constant.fixed_value

Is Required ? FALSE

Enter FLOAT value:

10.3.3 Transient Characteristics

Solar constant transient characteristics (W m-2)

Spec. ID: cmip6.atmos.solar.solar_constant.transient_characteristics

Is Required ? TRUE

Enter TEXT value:

10.4 Orbital Parameters

Orbital parameters and top of atmosphere insolation characteristics

10.4.1 Type

Time adaptation of orbital parameters

Spec. ID: cmip6.atmos.solar.orbital_parameters.type

Is Required ? TRUE

Select value:

☐ Fixed

☐ Transient

10.4.2 Fixed Reference Date

Reference date for fixed orbital parameters (yyyy)

Spec. ID: cmip6.atmos.solar.orbital_parameters.fixed_reference_date

Is Required ? TRUE

Enter INTEGER value:

10.4.3 Transient Method

Description of transient orbital parameters

Spec. ID: cmip6.atmos.solar.orbital_parameters.transient_method

Is Required ? TRUE

Enter TEXT value:

10.4.4 Computation Method

Method used for computing orbital parameters.

Spec. ID: cmip6.atmos.solar.orbital_parameters.computation_method

Is Required ? TRUE

Select value:

☐ Berger 1978

☐ Laskar 2004

☐ Other - please specify:

10.5 Insolation Ozone

Impact of solar insolation on stratospheric ozone

10.5.1 Solar Ozone Impact

Does top of atmosphere insolation impact on stratospheric ozonexxx?

Spec. ID: cmip6.atmos.solar.insolation_ozone.solar_ozone_impact

Is Required ? TRUE

Select value:

☐ True ☐ False

11 Volcanos

Characteristics of the implementation of volcanoes

11.1 Volcanos

Characteristics of the implementation of volcanoes

11.1.1 Overview

Overview description of the implementation of volcanic effects in the atmosphere

Spec. ID: cmip6.atmos.volcanos.overview

Is Required ? TRUE

Enter TEXT value:

11.2 Volcanoes Treatment

Treatment of volcanoes in the atmosphere

11.2.1 Volcanoes Implementation

How volcanic effects are modeled in the atmosphere.

Spec. ID: cmip6.atmos.volcanos.volcanoes_treatment.volcanoes_implementation

Is Required ? TRUE

Select value:

- ☐ High frequency solar constant anomaly
- ☐ Stratospheric aerosols optical thickness
- ☐ Other - please specify: