# CMIP6 Model Documentation

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# Documentation Contents

# 1 Key Properties

*Key properties of the model*

## 1.1 Key Properties

*Key properties of the model*

### 1.1.1 Model Overview

*Top level overview of coupled model*

**Spec. ID:** cmip6.toplevel.key_properties.model_overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.1.2 Model Name

*Name of coupled model.*

**Spec. ID:** cmip6.toplevel.key_properties.model_name

**Is Required ?** TRUE

**Enter TEXT value:**

## 1.2 Flux Correction

*Flux correction properties of the model*

### 1.2.1 Details

*Describe if/how flux corrections are applied in the model*

**Spec. ID:** cmip6.toplevel.key_properties.flux_correction.details

**Is Required ?** TRUE

**Enter TEXT value:**

## 1.3 Genealogy

*Genealogy and history of the model*

### 1.3.1 Year Released

*Year the model was released*

**Spec. ID:** cmip6.toplevel.key_properties.genealogy.year_released

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.3.2 CMIP3 Parent

*CMIP3 parent if any*

    **Spec. ID:** cmip6.toplevel.key_properties.genealogy.cmip3_parent

    **Is Required ?** FALSE

    **Enter TEXT value:**

### 1.3.3 CMIP5 Parent

*CMIP5 parent if any*

    **Spec. ID:** cmip6.toplevel.key_properties.genealogy.cmip5_parent

    **Is Required ?** FALSE

    **Enter TEXT value:**

### 1.3.4 Previous Name

*Previously known as*

    **Spec. ID:** cmip6.toplevel.key_properties.genealogy.previous_name

    **Is Required ?** FALSE

    **Enter TEXT value:**

## 1.4 Software Properties

*Software properties of model*

### 1.4.1 Repository

*Location of code for this component.*

    **Spec. ID:** cmip6.toplevel.key_properties.software_properties.repository

    **Is Required ?** FALSE

    **Enter TEXT value:**

### 1.4.2 Code Version

*Code version identifier.*

    **Spec. ID:** cmip6.toplevel.key_properties.software_properties.code_version

    **Is Required ?** FALSE

    **Enter TEXT value:**

### 1.4.3 Code Languages

*Code language(s).*

    **Spec. ID:** cmip6.toplevel.key_properties.software_properties.code_languages

    **Is Required ?** FALSE

**Enter TEXT value(s):**

### 1.4.4  Components Structure

*Describe how model realms are structured into independent software components (coupled via a coupler) and internal software components.*

> **Spec. ID:** cmip6.toplevel.key_properties.software_properties.components_structure

> **Is Required ?** FALSE

> **Enter TEXT value:**

### 1.4.5  Coupler

*Overarching coupling framework for model.*

> **Spec. ID:** cmip6.toplevel.key_properties.software_properties.coupler

> **Is Required ?** FALSE

> **Select value:**

☐     OASIS - The OASIS coupler - prior to OASIS-MCT

☐     OASIS3-MCT - The MCT variant of the OASIS coupler

☐     ESMF - Vanilla Earth System Modelling Framework

☐     NUOPC - National Unified Operational Prediction Capability variant of ESMF

☐     Bespoke - Customised coupler developed for this model

☐     Unknown - It is not known what/if-a coupler is used

☐     None - No coupler is used

☐     Other - please specify:

## 1.5  Coupling

### 1.5.1  Overview

*Overview of coupling in the model*

> **Spec. ID:** cmip6.toplevel.key_properties.coupling.overview

> **Is Required ?** TRUE

> **Enter TEXT value:**

### 1.5.2  Atmosphere Double Flux

*Is the atmosphere passing a double flux to the ocean and sea ice (as opposed to a single one)xxx?*

> **Spec. ID:** cmip6.toplevel.key_properties.coupling.atmosphere_double_flux

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 1.5.3 Atmosphere Fluxes Calculation Grid

*Where are the air-sea fluxes calculated*

    **Spec. ID:** cmip6.toplevel.key_properties.coupling.atmosphere_fluxes_calculation_grid

    **Is Required ?** FALSE

**Select value:**

☐ Atmosphere grid

☐ Ocean grid

☐ Specific coupler grid

☐ Other - please specify:

### 1.5.4 Atmosphere Relative Winds

*Are relative or absolute winds used to compute the fluxxxx? I.e. do ocean surface currents enter the wind stress calculationxxx?*

    **Spec. ID:** cmip6.toplevel.key_properties.coupling.atmosphere_relative_winds

    **Is Required ?** TRUE

**Select value:**

☐ True ☐ False

## 1.6 Tuning Applied

*Tuning methodology for model*

### 1.6.1 Description

*General overview description of tuning: explain and motivate the main targets and metrics/diagnostics retained. Document the relative weight given to climate performance metrics/diagnostics versus process oriented metrics/diagnostics, and on the possible conflicts with parameterization level tuning. In particular describe any struggle with a parameter value that required pushing it to its limits to solve a particular model deficiency.*

    **Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.description

    **Is Required ?** TRUE

    **Enter TEXT value:**

### 1.6.2 Global Mean Metrics Used

*List set of metrics/diagnostics of the global mean state used in tuning model*

**Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.global_mean_metrics_used

**Is Required ?** FALSE

**Enter TEXT value(s):**

### 1.6.3 Regional Metrics Used

*List of regional metrics/diagnostics of mean state (e.g THC, AABW, regional means etc) used in tuning model/component*

**Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.regional_metrics_used

**Is Required ?** FALSE

**Enter TEXT value(s):**

### 1.6.4 Trend Metrics Used

*List observed trend metrics/diagnostics used in tuning model/component (such as 20th century)*

**Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.trend_metrics_used

**Is Required ?** FALSE

**Enter TEXT value(s):**

### 1.6.5 Energy Balance

*Describe how energy balance was obtained in the full system: in the various components independently or at the components coupling stagexxx?*

**Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.energy_balance

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.6.6 Fresh Water Balance

*Describe how fresh_water balance was obtained in the full system: in the various components independently or at the components coupling stagexxx?*

**Spec. ID:** cmip6.toplevel.key_properties.tuning_applied.fresh_water_balance

**Is Required ?** TRUE

**Enter TEXT value:**

## 1.7 Heat

*Global heat convervation properties of the model*

### 1.7.1 Global

*Describe if/how heat is conserved globally*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.global

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.7.2 Atmos Ocean Interface

*Describe if/how heat is conserved at the atmosphere/ocean coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.atmos_ocean_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.7.3 Atmos Land Interface

*Describe if/how heat is conserved at the atmosphere/land coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.atmos_land_interface

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.7.4 Atmos Sea-ice Interface

*Describe if/how heat is conserved at the atmosphere/sea-ice coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.atmos_sea-ice_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.7.5 Ocean Seaice Interface

*Describe if/how heat is conserved at the ocean/sea-ice coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.ocean_seaice_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.7.6 Land Ocean Interface

*Describe if/how heat is conserved at the land/ocean coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.heat.land_ocean_interface

**Is Required ?** FALSE

**Enter TEXT value:**

## 1.8 Fresh Water

*Global fresh water convervation properties of the model*

### 1.8.1 Global

*Describe if/how fresh_water is conserved globally*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.global

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.8.2 Atmos Ocean Interface

*Describe if/how fresh_water is conserved at the atmosphere/ocean coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.atmos_ocean_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.3 Atmos Land Interface

*Describe if/how fresh water is conserved at the atmosphere/land coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.atmos_land_interface

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.8.4 Atmos Sea-ice Interface

*Describe if/how fresh water is conserved at the atmosphere/sea-ice coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.atmos_sea-ice_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.5 Ocean Seaice Interface

*Describe if/how fresh water is conserved at the ocean/sea-ice coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.ocean_seaice_interface

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.6 Runoff

*Describe how runoff is distributed and conserved*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.runoff

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.7 Iceberg Calving

*Describe if/how iceberg calving is modeled and conserved*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.iceberg_calving

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.8 Endoreic Basins

*Describe if/how endoreic basins (no ocean access) are treated*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.endoreic_basins

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.8.9 Snow Accumulation

*Describe how snow accumulation over land and over sea-ice is treated*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.fresh_water.snow_accumulation

**Is Required ?** FALSE

**Enter TEXT value:**

## 1.9 Salt

*Global salt convervation properties of the model*

### 1.9.1 Ocean Seaice Interface

*Describe if/how salt is conserved at the ocean/sea-ice coupling interface*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.salt.ocean_seaice_interface

**Is Required ?** FALSE

**Enter TEXT value:**

## 1.10 Momentum

*Global momentum convervation properties of the model*

### 1.10.1 Details

*Describe if/how momentum is conserved in the model*

**Spec. ID:** cmip6.toplevel.key_properties.conservation.momentum.details

**Is Required ?** FALSE

**Enter TEXT value:**

# 2 Radiative Forcings

*Radiative forcings of the model for historical and scenario (aka Table 12.1 IPCC AR5)*

## 2.1 Radiative Forcings

*Radiative forcings of the model for historical and scenario (aka Table 12.1 IPCC AR5)*

### 2.1.1 Overview

*Overview of radiative forcings (GHG and aerosols) implementation in model*

**Spec. ID:** cmip6.toplevel.radiative_forcings.overview

**Is Required ?** TRUE

**Enter TEXT value:**

## 2.2 CO2

*Carbon dioxide forcing*

### 2.2.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.co2.provision

**Is Required ?** TRUE

**Select value(s):**

☐    N/A - Not applicable - forcing agent is not included

☐    M - Emissions and concentrations determined by the model state rather than externally prescribed

☐    Y - Prescribed concentrations, distributions or time series data

☐    E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐    ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐    C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐    Other - please specify:

### 2.2.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.co2.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.3 CH4

*Methane forcing*

### 2.3.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.ch4.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.3.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.ch4.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.4 N2O

*Nitrous oxide forcing*

### 2.4.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.n2o.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.4.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.n2o.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.5 Tropospheric O3

*Troposheric ozone forcing*

### 2.5.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.tropospheric_o3.provision

**Is Required ?** TRUE

**Select value(s):**

☐ N/A - Not applicable - forcing agent is not included

☐ M - Emissions and concentrations determined by the model state rather than externally prescribed

☐ Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.5.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.tropospheric_o3.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.6 Stratospheric O3

*Stratospheric ozone forcing*

### 2.6.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.stratospheric_o3.provision

**Is Required ?** TRUE

**Select value(s):**

☐    N/A - Not applicable - forcing agent is not included

☐    M - Emissions and concentrations determined by the model state rather than externally prescribed

☐    Y - Prescribed concentrations, distributions or time series data

☐    E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐    ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐    C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐    Other - please specify:

### 2.6.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.stratospheric_o3.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.7 CFC

*Ozone-depleting and non-ozone-depleting fluorinated gases forcing*

### 2.7.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.cfc.provision

**Is Required ?** TRUE

**Select value(s):**

☐    N/A - Not applicable - forcing agent is not included

☐    M - Emissions and concentrations determined by the model state rather than externally prescribed

☐    Y - Prescribed concentrations, distributions or time series data

☐      E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐      ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐      C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐      Other - please specify:

### 2.7.2    Equivalence Concentration

*Details of any equivalence concentrations used*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.cfc.equivalence_concentration

**Is Required ?** TRUE

**Select value:**

☐      N/A - Not applicabale (CFCs not included or emissions and concentrations determined by the model state)

☐      Option 1 - CFCs, including CFC-12, are provided as actual concentrations

☐      Option 2 - CFC-12 is provided as actual concentrations and any other gases are provided as an equivalence concentration of CFC-11

☐      Option 3 - Ozone depleting gases, including CFC-12, are provided as an equivalence concentration of CFC-12 and all other fluorinated gases are provided as an equivalence concentration of HFC-134a

☐      Other - please specify:

### 2.7.3    Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.greenhouse_gases.cfc.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.8    SO4

*SO4 aerosol forcing*

### 2.8.1    Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.so4.provision

**Is Required ?** TRUE

**Select value(s):**

☐      N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.8.2    Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.so4.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.9    Black Carbon

*Black carbon aerosol forcing*

### 2.9.1    Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.black_carbon.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.9.2    Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.black_carbon.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.10 Organic Carbon

*Organic carbon aerosol forcing*

### 2.10.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.organic_carbon.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.10.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.organic_carbon.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.11 Nitrate

*Nitrate forcing*

### 2.11.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.nitrate.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.11.2    Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.nitrate.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.12    Cloud Albedo Effect

*Cloud albedo effect forcing (RFaci)*

### 2.12.1    Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_albedo_effect.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐     E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐     ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐     C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐     Other - please specify:

### 2.12.2 Aerosol Effect On Ice Clouds

*Radiative effects of aerosols on ice clouds are representedxxx?*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_albedo_effect.aerosol_effect_on_ice_clouds

**Is Required ?** TRUE

**Select value:**

☐ True          ☐ False

### 2.12.3 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_albedo_effect.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.13 Cloud Lifetime Effect

*Cloud lifetime effect forcing (ERFaci)*

### 2.13.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_lifetime_effect.provision

**Is Required ?** TRUE

**Select value(s):**

☐ N/A - Not applicable - forcing agent is not included

☐ M - Emissions and concentrations determined by the model state rather than externally prescribed

☐ Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.13.2 Aerosol Effect On Ice Clouds

*Radiative effects of aerosols on ice clouds are representedxxx?*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_lifetime_effect.aerosol_effect_on_ice_clouds

**Is Required ?** TRUE

**Select value:**

☐ True          ☐ False

### 2.13.3   RFaci From Sulfate Only

*Radiative forcing from aerosol cloud interactions from sulfate aerosol onlyxxx?*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_lifetime_effect.rfaci_from_sulfate_only

**Is Required ?** TRUE

**Select value:**

☐ True          ☐ False

### 2.13.4   Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.cloud_lifetime_effect.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.14   Dust

*Dust forcing*

### 2.14.1   Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.dust.provision

**Is Required ?** TRUE

**Select value(s):**

☐ N/A - Not applicable - forcing agent is not included

☐ M - Emissions and concentrations determined by the model state rather than externally prescribed

☐ Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.14.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.dust.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.15 Tropospheric Volcanic

*Tropospheric volcanic forcing*

### 2.15.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.tropospheric_volcanic.provision

**Is Required ?** TRUE

**Select value(s):**

☐ N/A - Not applicable - forcing agent is not included

☐ M - Emissions and concentrations determined by the model state rather than externally prescribed

☐ Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.15.2 Historical Explosive Volcanic Aerosol Implementation

*How explosive volcanic aerosol is implemented in historical simulations*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.tropospheric_volcanic.historical_explosive_volcanic_-aerosol_implementation

**Is Required ?** TRUE

**Select value:**

☐ Type A - Explosive volcanic aerosol returns rapidly to zero (or near-zero) background.

☐ Type B - Explosive volcanic aerosol returns rapidly to constant (average volcano)

☐ Type C - Explosive volcanic aerosol returns slowly (over several decades) to constant (average volcano) background.

☐ Type D - Explosive volcanic aerosol set to zero

☐     Type E - Explosive volcanic aerosol set to constant (average volcano) background

☐     Other - please specify:

### 2.15.3   Future Explosive Volcanic Aerosol Implementation

*How explosive volcanic aerosol is implemented in future simulations*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.tropospheric_volcanic.future_explosive_volcanic_aerosol_-
implementation

**Is Required ?** TRUE

**Select value:**

☐     Type A - Explosive volcanic aerosol returns rapidly to zero (or near-zero) background.

☐     Type B - Explosive volcanic aerosol returns rapidly to constant (average volcano)

☐     Type C - Explosive volcanic aerosol returns slowly (over several decades) to constant (average volcano)
background.

☐     Type D - Explosive volcanic aerosol set to zero

☐     Type E - Explosive volcanic aerosol set to constant (average volcano) background

☐     Other - please specify:

### 2.15.4   Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of
non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.tropospheric_volcanic.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.16   Stratospheric Volcanic

*Stratospheric volcanic forcing*

### 2.16.1   Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.stratospheric_volcanic.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - forcing agent is not included

☐     M - Emissions and concentrations determined by the model state rather than externally prescribed

☐     Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.16.2 Historical Explosive Volcanic Aerosol Implementation

*How explosive volcanic aerosol is implemented in historical simulations*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.stratospheric_volcanic.historical_explosive_volcanic_aerosol_implementation

**Is Required ?** TRUE

**Select value:**

☐ Type A - Explosive volcanic aerosol returns rapidly to zero (or near-zero) background.

☐ Type B - Explosive volcanic aerosol returns rapidly to constant (average volcano)

☐ Type C - Explosive volcanic aerosol returns slowly (over several decades) to constant (average volcano) background.

☐ Type D - Explosive volcanic aerosol set to zero

☐ Type E - Explosive volcanic aerosol set to constant (average volcano) background

☐ Other - please specify:

### 2.16.3 Future Explosive Volcanic Aerosol Implementation

*How explosive volcanic aerosol is implemented in future simulations*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.stratospheric_volcanic.future_explosive_volcanic_aerosol_implementation

**Is Required ?** TRUE

**Select value:**

☐ Type A - Explosive volcanic aerosol returns rapidly to zero (or near-zero) background.

☐ Type B - Explosive volcanic aerosol returns rapidly to constant (average volcano)

☐ Type C - Explosive volcanic aerosol returns slowly (over several decades) to constant (average volcano) background.

☐ Type D - Explosive volcanic aerosol set to zero

☐ Type E - Explosive volcanic aerosol set to constant (average volcano) background

☐ Other - please specify:

### 2.16.4 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.stratospheric_volcanic.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.17 Sea Salt

*Sea salt forcing*

### 2.17.1 Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.sea_salt.provision

**Is Required ?** TRUE

**Select value(s):**

☐ N/A - Not applicable - forcing agent is not included

☐ M - Emissions and concentrations determined by the model state rather than externally prescribed

☐ Y - Prescribed concentrations, distributions or time series data

☐ E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐ ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐ C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐ Other - please specify:

### 2.17.2 Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.aerosols.sea_salt.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.18 Land Use

*Land use forcing*

### 2.18.1  Provision

*How this forcing agent is provided (e.g. via concentrations, emission precursors, prognostically derived, etc.)*

**Spec. ID:** cmip6.toplevel.radiative_forcings.other.land_use.provision

**Is Required ?** TRUE

**Select value(s):**

☐  N/A - Not applicable - forcing agent is not included

☐  M - Emissions and concentrations determined by the model state rather than externally prescribed

☐  Y - Prescribed concentrations, distributions or time series data

☐  E - Concentrations calculated interactively driven by prescribed emissions or precursor emissions

☐  ES - Surface emissions (and 3-D concentrations away from the surface) derived via the model from the prescribed surface concentration

☐  C - Fixed prescribed climatology of concentrations with no year-to-year variability

☐  Other - please specify:

### 2.18.2  Crop Change Only

*Land use change represented via crop change onlyxxx?*

**Spec. ID:** cmip6.toplevel.radiative_forcings.other.land_use.crop_change_only

**Is Required ?** TRUE

**Select value:**

☐  True          ☐  False

### 2.18.3  Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.other.land_use.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**

## 2.19  Solar

*Solar forcing*

### 2.19.1  Provision

*How solar forcing is provided*

**Spec. ID:** cmip6.toplevel.radiative_forcings.other.solar.provision

**Is Required ?** TRUE

**Select value(s):**

☐     N/A - Not applicable - solar forcing is not included

☐     Irradiance - Solar irradiance forcing

☐     Proton - Proton pathway to solar forcing

☐     Electron - Electron pathway to solar forcing

☐     Cosmic ray - Cosmic ray pathway to solar forcing

☐     Other - please specify:

### 2.19.2    Additional Information

*Additional information relating to the provision and implementation of this forcing agent (e.g. citations, use of non-standard datasets, explaining how multiple provisions are used, etc.).*

**Spec. ID:** cmip6.toplevel.radiative_forcings.other.solar.additional_information

**Is Required ?** FALSE

**Enter TEXT value:**