# CMIP6 Model Documentation

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# Documentation Contents

# 1 Key Properties

*Land surface key properties*

## 1.1 Key Properties

*Land surface key properties*

### 1.1.1 Model Overview

*Overview of land surface model.*

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

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.1.2 Model Name

*Name of land surface model code (e.g. MOSES2.2)*

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

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.1.3 Description

*General description of the processes modelled (e.g. dymanic vegation, prognostic albedo, etc.)*

**Spec. ID:** cmip6.land.key_properties.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.1.4 Land Atmosphere Flux Exchanges

*Fluxes exchanged with the atmopshere.*

**Spec. ID:** cmip6.land.key_properties.land_atmosphere_flux_exchanges

**Is Required ?** FALSE

**Select value(s):**

- ☐ Water
- ☐ Energy
- ☐ Carbon
- ☐ Nitrogen
- ☐ Phospherous
- ☐ Other - please specify:

### 1.1.5 Atmospheric Coupling Treatment

*Describe the treatment of land surface coupling with the Atmosphere model component, which may be different for different quantities (e.g. dust: semi-implicit, water vapour: explicit)*

**Spec. ID:** cmip6.land.key_properties.atmospheric_coupling_treatment

**Is Required ?** TRUE

**Enter TEXT value:**

### 1.1.6 Land Cover

*Types of land cover defined in the land surface model*

**Spec. ID:** cmip6.land.key_properties.land_cover

**Is Required ?** TRUE

**Select value(s):**

- ☐ Bare soil
- ☐ Urban
- ☐ Lake
- ☐ Land ice
- ☐ Lake ice
- ☐ Vegetated
- ☐ Other - please specify:

### 1.1.7 Land Cover Change

*Describe how land cover change is managed (e.g. the use of net or gross transitions)*

**Spec. ID:** cmip6.land.key_properties.land_cover_change

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.1.8 Tiling

*Describe the general tiling procedure used in the land surface (if any). Include treatment of physiography, land/sea, (dynamic) vegetation coverage and orography/roughness*

**Spec. ID:** cmip6.land.key_properties.tiling

**Is Required ?** TRUE

**Enter TEXT value:**

## 1.2 Conservation Properties

*TODO*

### 1.2.1 Energy

*Describe if/how energy is conserved globally and to what level (e.g. within X [units]/year)*

**Spec. ID:** cmip6.land.key_properties.conservation_properties.energy

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.2.2 Water

*Describe if/how water is conserved globally and to what level (e.g. within X [units]/year)*

**Spec. ID:** cmip6.land.key_properties.conservation_properties.water

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.2.3 Carbon

*Describe if/how carbon is conserved globally and to what level (e.g. within X [units]/year)*

**Spec. ID:** cmip6.land.key_properties.conservation_properties.carbon

**Is Required ?** FALSE

**Enter TEXT value:**

## 1.3 Timestepping Framework

*TODO*

### 1.3.1 Timestep Dependent On Atmosphere

*Is a time step dependent on the frequency of atmosphere couplingxxx?*

**Spec. ID:** cmip6.land.key_properties.timestepping_framework.timestep_dependent_on_atmosphere

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 1.3.2 Time Step

*Overall timestep of land surface model (i.e. time between calls)*

**Spec. ID:** cmip6.land.key_properties.timestepping_framework.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 1.3.3 Timestepping Method

*General description of time stepping method and associated time step(s)*

**Spec. ID:** cmip6.land.key_properties.timestepping_framework.timestepping_method

**Is Required ?** TRUE

**Enter TEXT value:**

## 1.4 Software Properties

*Software properties of land surface code*

### 1.4.1 Repository

*Location of code for this component.*

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

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.4.2 Code Version

*Code version identifier.*

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

**Is Required ?** FALSE

**Enter TEXT value:**

### 1.4.3 Code Languages

*Code language(s).*

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

**Is Required ?** FALSE

**Enter TEXT value(s):**

# 2 Grid

*Land surface grid*

## 2.1 Grid

*Land surface grid*

### 2.1.1 Overview

*Overview of the grid in the land surface*

**Spec. ID:** cmip6.land.grid.overview

**Is Required ?** TRUE

**Enter TEXT value:**

## 2.2 Horizontal

*The horizontal grid in the land surface*

### 2.2.1 Description

*Describe the general structure of the horizontal grid (not including any tiling)*

**Spec. ID:** cmip6.land.grid.horizontal.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 2.2.2 Matches Atmosphere Grid

*Does the horizontal grid match the atmospherexxx?*

**Spec. ID:** cmip6.land.grid.horizontal.matches_atmosphere_grid

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

## 2.3 Vertical

*The vertical grid in the soil*

### 2.3.1 Description

*Describe the general structure of the vertical grid in the soil (not including any tiling)*

**Spec. ID:** cmip6.land.grid.vertical.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 2.3.2 Total Depth

*The total depth of the soil (in metres)*

**Spec. ID:** cmip6.land.grid.vertical.total_depth

**Is Required ?** TRUE

**Enter INTEGER value:**

# 3 Soil

*Land surface soil*

## 3.1 Soil

*Land surface soil*

### 3.1.1 Overview

*Overview of soil in the land surface*

**Spec. ID:** cmip6.land.soil.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.1.2 Heat Water Coupling

*Describe the coupling between heat and water in the soil*

**Spec. ID:** cmip6.land.soil.heat_water_coupling

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.1.3 Number Of Soil layers

*The number of soil layers*

**Spec. ID:** cmip6.land.soil.number_of_soil layers

**Is Required ?** TRUE

**Enter INTEGER value:**

### 3.1.4 Prognostic Variables

*List the prognostic variables of the soil scheme*

**Spec. ID:** cmip6.land.soil.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

## 3.2 Soil Map

*Key properties of the land surface soil map*

### 3.2.1 Description

*General description of soil map*

**Spec. ID:** cmip6.land.soil.soil_map.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.2.2 Structure

*Describe the soil structure map*

**Spec. ID:** cmip6.land.soil.soil_map.structure

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.2.3 Texture

*Describe the soil texture map*

**Spec. ID:** cmip6.land.soil.soil_map.texture

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.2.4 Organic Matter

*Describe the soil organic matter map*

**Spec. ID:** cmip6.land.soil.soil_map.organic_matter

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.2.5 Albedo

*Describe the soil albedo map*

**Spec. ID:** cmip6.land.soil.soil_map.albedo

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.2.6 Water Table

*Describe the soil water table map, if any*

**Spec. ID:** cmip6.land.soil.soil_map.water_table

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.2.7 Continuously Varying Soil Depth

*Does the soil properties vary continuously with depthxxx?*

**Spec. ID:** cmip6.land.soil.soil_map.continuously_varying_soil_depth

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 3.2.8 Soil Depth

*Describe the soil depth map*

**Spec. ID:** cmip6.land.soil.soil_map.soil_depth

**Is Required ?** FALSE

**Enter TEXT value:**

## 3.3 Snow Free Albedo

*TODO*

### 3.3.1 Prognostic

*Is snow free albedo prognosticxxx?*

**Spec. ID:** cmip6.land.soil.snow_free_albedo.prognostic

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 3.3.2 Functions

*If prognostic, describe the dependancies on snow free albedo calculations*

**Spec. ID:** cmip6.land.soil.snow_free_albedo.functions

**Is Required ?** FALSE

**Select value(s):**

☐ Vegetation type

☐ Soil humidity

☐ Vegetation state

☐ Other - please specify:

### 3.3.3 Direct Diffuse

*If prognostic, describe the distinction between direct and diffuse albedo*

**Spec. ID:** cmip6.land.soil.snow_free_albedo.direct_diffuse

**Is Required ?** FALSE

**Select value:**

☐ Distinction between direct and diffuse albedo

☐ No distinction between direct and diffuse albedo

☐ Other - please specify:

### 3.3.4 Number Of Wavelength Bands

*If prognostic, enter the number of wavelength bands used*

**Spec. ID:** cmip6.land.soil.snow_free_albedo.number_of_wavelength_bands

**Is Required ?** FALSE

**Enter INTEGER value:**

## 3.4 Hydrology

*Key properties of the land surface soil hydrology*

### 3.4.1 Description

*General description of the soil hydrological model*

**Spec. ID:** cmip6.land.soil.hydrology.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.4.2 Time Step

*Time step of river soil hydrology in seconds*

**Spec. ID:** cmip6.land.soil.hydrology.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 3.4.3 Tiling

*Describe the soil hydrology tiling, if any.*

**Spec. ID:** cmip6.land.soil.hydrology.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.4.4 Vertical Discretisation

*Describe the typical vertical discretisation*

**Spec. ID:** cmip6.land.soil.hydrology.vertical_discretisation

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.4.5 Number Of Ground Water Layers

*The number of soil layers that may contain water*

**Spec. ID:** cmip6.land.soil.hydrology.number_of_ground_water_layers

**Is Required ?** TRUE

**Enter INTEGER value:**

### 3.4.6 Lateral Connectivity

*Describe the lateral connectivity between tiles*

**Spec. ID:** cmip6.land.soil.hydrology.lateral_connectivity

**Is Required ?** TRUE

**Select value(s):**

- ☐ Perfect connectivity - Common soil for multiple tiles
- ☐ Darcian flow - Darcian flow among hillslope tiles
- ☐ Other - please specify:

### 3.4.7 Method

*The hydrological dynamics scheme in the land surface model*

**Spec. ID:** cmip6.land.soil.hydrology.method

**Is Required ?** TRUE

**Select value:**

- ☐ Bucket
- ☐ Force-restore
- ☐ Choisnel
- ☐ Explicit diffusion
- ☐ Other - please specify:

## 3.5 Freezing

*TODO*

### 3.5.1 Number Of Ground Ice Layers

*How many soil layers may contain ground ice*

**Spec. ID:** cmip6.land.soil.hydrology.freezing.number_of_ground_ice_layers

**Is Required ?** TRUE

**Enter INTEGER value:**

### 3.5.2 Ice Storage Method

*Describe the method of ice storage*

**Spec. ID:** cmip6.land.soil.hydrology.freezing.ice_storage_method

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.5.3 Permafrost

*Describe the treatment of permafrost, if any, within the land surface scheme*

**Spec. ID:** cmip6.land.soil.hydrology.freezing.permafrost

**Is Required ?** TRUE

**Enter TEXT value:**

## 3.6 Drainage

*TODO*

### 3.6.1 Description

*General describe how drainage is included in the land surface scheme*

**Spec. ID:** cmip6.land.soil.hydrology.drainage.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.6.2 Types

*Different types of runoff represented by the land surface model*

**Spec. ID:** cmip6.land.soil.hydrology.drainage.types

**Is Required ?** FALSE

**Select value(s):**

- ☐ Gravity drainage
- ☐ Horton mechanism
- ☐ Topmodel-based
- ☐ Dunne mechanism
- ☐ Lateral subsurface flow
- ☐ Baseflow from groundwater
- ☐ Other - please specify:

## 3.7 Heat Treatment

*TODO*

### 3.7.1 Description

*General description of how heat treatment properties are defined*

**Spec. ID:** cmip6.land.soil.heat_treatment.description

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.7.2 Time Step

*Time step of soil heat scheme in seconds*

**Spec. ID:** cmip6.land.soil.heat_treatment.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 3.7.3 Tiling

*Describe the soil heat treatment tiling, if any.*

**Spec. ID:** cmip6.land.soil.heat_treatment.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 3.7.4 Vertical Discretisation

*Describe the typical vertical discretisation*

**Spec. ID:** cmip6.land.soil.heat_treatment.vertical_discretisation

**Is Required ?** TRUE

**Enter TEXT value:**

### 3.7.5 Heat Storage

*Specify the method of heat storage*

**Spec. ID:** cmip6.land.soil.heat_treatment.heat_storage

**Is Required ?** TRUE

**Select value:**

☐ Force-restore

☐ Explicit diffusion

☐ Other - please specify:

### 3.7.6 Processes

*Describe processes included in the treatment of soil heat*

**Spec. ID:** cmip6.land.soil.heat_treatment.processes

**Is Required ?** TRUE

**Select value(s):**

- ☐ Soil moisture freeze-thaw
- ☐ Coupling with snow temperature
- ☐ Other - please specify:

# 4 Snow

*Land surface snow*

## 4.1 Snow

*Land surface snow*

### 4.1.1 Overview

*Overview of snow in the land surface*

**Spec. ID:** cmip6.land.snow.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 4.1.2 Tiling

*Describe the snow tiling, if any.*

**Spec. ID:** cmip6.land.snow.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 4.1.3 Number Of Snow Layers

*The number of snow levels used in the land surface scheme/model*

**Spec. ID:** cmip6.land.snow.number_of_snow_layers

**Is Required ?** TRUE

**Enter INTEGER value:**

### 4.1.4 Density

*Description of the treatment of snow density*

**Spec. ID:** cmip6.land.snow.density

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Constant

☐ Other - please specify:

### 4.1.5 Water Equivalent

*Description of the treatment of the snow water equivalent*

**Spec. ID:** cmip6.land.snow.water_equivalent

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 4.1.6 Heat Content

*Description of the treatment of the heat content of snow*

**Spec. ID:** cmip6.land.snow.heat_content

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 4.1.7 Temperature

*Description of the treatment of snow temperature*

**Spec. ID:** cmip6.land.snow.temperature

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 4.1.8 Liquid Water Content

*Description of the treatment of snow liquid water*

**Spec. ID:** cmip6.land.snow.liquid_water_content

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

#### 4.1.9 Snow Cover Fractions

*Specify cover fractions used in the surface snow scheme*

**Spec. ID:** cmip6.land.snow.snow_cover_fractions

**Is Required ?** TRUE

**Select value(s):**

☐ Ground snow fraction

☐ Vegetation snow fraction

☐ Other - please specify:

#### 4.1.10 Processes

*Snow related processes in the land surface scheme*

**Spec. ID:** cmip6.land.snow.processes

**Is Required ?** TRUE

**Select value(s):**

☐ Snow interception

☐ Snow melting

☐ Snow freezing

☐ Blowing snow

☐ Other - please specify:

#### 4.1.11 Prognostic Variables

*List the prognostic variables of the snow scheme*

**Spec. ID:** cmip6.land.snow.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

### 4.2 Snow Albedo

*TODO*

### 4.2.1 Type

*Describe the treatment of snow-covered land albedo*

**Spec. ID:** cmip6.land.snow.snow_albedo.type

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Prescribed

☐ Constant

☐ Other - please specify:

### 4.2.2 Functions

*If prognostic,*

**Spec. ID:** cmip6.land.snow.snow_albedo.functions

**Is Required ?** FALSE

**Select value(s):**

☐ Vegetation type

☐ Snow age

☐ Snow density

☐ Snow grain type

☐ Aerosol deposition

☐ Other - please specify:

# 5 Vegetation

*Land surface vegetation*

## 5.1 Vegetation

*Land surface vegetation*

### 5.1.1 Overview

*Overview of vegetation in the land surface*

**Spec. ID:** cmip6.land.vegetation.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 5.1.2 Time Step

*Time step of vegetation scheme in seconds*

**Spec. ID:** cmip6.land.vegetation.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 5.1.3 Dynamic Vegetation

*Is there dynamic evolution of vegetationxxx?*

**Spec. ID:** cmip6.land.vegetation.dynamic_vegetation

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 5.1.4 Tiling

*Describe the vegetation tiling, if any.*

**Spec. ID:** cmip6.land.vegetation.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.5 Vegetation Representation

*Vegetation classification used*

**Spec. ID:** cmip6.land.vegetation.vegetation_representation

**Is Required ?** TRUE

**Select value:**

- ☐ Vegetation types
- ☐ Biome types
- ☐ Other - please specify:

### 5.1.6 Vegetation Types

*List of vegetation types in the classification, if any*

**Spec. ID:** cmip6.land.vegetation.vegetation_types

**Is Required ?** FALSE

**Select value(s):**

- ☐ Broadleaf tree
- ☐ Needleleaf tree
- ☐ C3 grass
- ☐ C4 grass
- ☐ Vegetated
- ☐ Other - please specify:

### 5.1.7 Biome Types

*List of biome types in the classification, if any*

**Spec. ID:** cmip6.land.vegetation.biome_types

**Is Required ?** FALSE

**Select value(s):**

- ☐ Evergreen needleleaf forest
- ☐ Evergreen broadleaf forest
- ☐ Deciduous needleleaf forest
- ☐ Deciduous broadleaf forest
- ☐ Mixed forest
- ☐ Woodland
- ☐ Wooded grassland
- ☐ Closed shrubland
- ☐ Opne shrubland
- ☐ Grassland

☐ Cropland

☐ Wetlands

☐ Other - please specify:

### 5.1.8 Vegetation Time Variation

*How the vegetation fractions in each tile are varying with time*

**Spec. ID:** cmip6.land.vegetation.vegetation_time_variation

**Is Required ?** TRUE

**Select value:**

☐ Fixed (not varying)

☐ Prescribed (varying from files)

☐ Dynamical (varying from simulation)

☐ Other - please specify:

### 5.1.9 Vegetation Map

*If vegetation fractions are not dynamically updated , describe the vegetation map used (common name and reference, if possible)*

**Spec. ID:** cmip6.land.vegetation.vegetation_map

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.10 Interception

*Is vegetation interception of rainwater representedxxx?*

**Spec. ID:** cmip6.land.vegetation.interception

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 5.1.11 Phenology

*Treatment of vegetation phenology*

**Spec. ID:** cmip6.land.vegetation.phenology

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic (vegetation map)

☐ Other - please specify:

### 5.1.12 Phenology Description

*General description of the treatment of vegetation phenology*

**Spec. ID:** cmip6.land.vegetation.phenology_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.13 Leaf Area Index

*Treatment of vegetation leaf area index*

**Spec. ID:** cmip6.land.vegetation.leaf_area_index

**Is Required ?** TRUE

**Select value:**

☐ Prescribed

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 5.1.14 Leaf Area Index Description

*General description of the treatment of leaf area index*

**Spec. ID:** cmip6.land.vegetation.leaf_area_index_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.15 Biomass

*Treatment of vegetation biomass*

**Spec. ID:** cmip6.land.vegetation.biomass

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 5.1.16 Biomass Description

*General description of the treatment of vegetation biomass*

**Spec. ID:** cmip6.land.vegetation.biomass_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.17 Biogeography

*Treatment of vegetation biogeography*

**Spec. ID:** cmip6.land.vegetation.biogeography

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 5.1.18 Biogeography Description

*General description of the treatment of vegetation biogeography*

**Spec. ID:** cmip6.land.vegetation.biogeography_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.19 Stomatal Resistance

*Specify what the vegetation stomatal resistance depends on*

**Spec. ID:** cmip6.land.vegetation.stomatal_resistance

**Is Required ?** TRUE

**Select value(s):**

☐ Light

☐ Temperature

☐ Water availability

☐ CO2

☐ O3

☐ Other - please specify:

### 5.1.20 Stomatal Resistance Description

*General description of the treatment of vegetation stomatal resistance*

**Spec. ID:** cmip6.land.vegetation.stomatal_resistance_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 5.1.21 Prognostic Variables

*List the prognostic variables of the vegetation scheme*

**Spec. ID:** cmip6.land.vegetation.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

# 6 Energy Balance

*Land surface energy balance*

## 6.1 Energy Balance

*Land surface energy balance*

### 6.1.1 Overview

*Overview of energy balance in land surface*

**Spec. ID:** cmip6.land.energy_balance.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 6.1.2 Tiling

*Describe the energy balance tiling, if any.*

**Spec. ID:** cmip6.land.energy_balance.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 6.1.3 Number Of Surface Temperatures

*The maximum number of distinct surface temperatures in a grid cell (for example, each subgrid tile may have its own temperature)*

**Spec. ID:** cmip6.land.energy_balance.number_of_surface_temperatures

**Is Required ?** TRUE

**Enter INTEGER value:**

### 6.1.4 Evaporation

*Specify the formulation method for land surface evaporation, from soil and vegetation*

**Spec. ID:** cmip6.land.energy_balance.evaporation

**Is Required ?** TRUE

**Select value(s):**

- ☐ Alpha
- ☐ Beta
- ☐ Combined
- ☐ Monteith potential evaporation
- ☐ Other - please specify:

### 6.1.5 Processes

*Describe which processes are included in the energy balance scheme*

**Spec. ID:** cmip6.land.energy_balance.processes

**Is Required ?** TRUE

**Select value(s):**

☐ Transpiration

☐ Other - please specify:

# 7 Carbon Cycle

*Land surface carbon cycle*

## 7.1 Carbon Cycle

*Land surface carbon cycle*

### 7.1.1 Overview

*Overview of carbon cycle in land surface*

**Spec. ID:** cmip6.land.carbon_cycle.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 7.1.2 Tiling

*Describe the carbon cycle tiling, if any.*

**Spec. ID:** cmip6.land.carbon_cycle.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.1.3 Time Step

*Time step of carbon cycle in seconds*

**Spec. ID:** cmip6.land.carbon_cycle.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 7.1.4 Anthropogenic Carbon

*Describe the treament of the anthropogenic carbon pool*

**Spec. ID:** cmip6.land.carbon_cycle.anthropogenic_carbon

**Is Required ?** FALSE

**Select value(s):**

- ☐ Grand slam protocol
- ☐ Residence time
- ☐ Decay time
- ☐ Other - please specify:

### 7.1.5 Prognostic Variables

*List the prognostic variables of the carbon scheme*

**Spec. ID:** cmip6.land.carbon_cycle.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

## 7.2 Vegetation

*TODO*

### 7.2.1 Number Of Carbon Pools

*Enter the number of carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.number_of_carbon_pools

**Is Required ?** TRUE

**Enter INTEGER value:**

### 7.2.2 Carbon Pools

*List the carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.carbon_pools

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.2.3 Forest Stand Dynamics

*Describe the treatment of forest stand dyanmics*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.forest_stand_dynamics

**Is Required ?** FALSE

**Enter TEXT value:**

## 7.3 Photosynthesis

*TODO*

### 7.3.1 Method

*Describe the general method used for photosynthesis (e.g. type of photosynthesis, distinction between C3 and C4 grasses, Nitrogen depencence, etc.)*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.photosynthesis.method

**Is Required ?** FALSE

**Enter TEXT value:**

## 7.4 Autotrophic Respiration

*TODO*

### 7.4.1 Maintainance Respiration

*Describe the general method used for maintainence respiration*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.autotrophic_respiration.maintainance_respiration

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.4.2 Growth Respiration

*Describe the general method used for growth respiration*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.autotrophic_respiration.growth_respiration

**Is Required ?** FALSE

**Enter TEXT value:**

## 7.5 Allocation

*TODO*

### 7.5.1 Method

*Describe the general principle behind the allocation scheme*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.allocation.method

**Is Required ?** TRUE

**Enter TEXT value:**

### 7.5.2 Allocation Bins

*Specify distinct carbon bins used in allocation*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.allocation.allocation_bins

**Is Required ?** TRUE

**Select value:**

- ☐ Leaves + stems + roots
- ☐ Leaves + stems + roots (leafy + woody)
- ☐ Leaves + fine roots + coarse roots + stems
- ☐ Whole plant (no distinction)
- ☐ Other - please specify:

### 7.5.3 Allocation Fractions

*Describe how the fractions of allocation are calculated*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.allocation.allocation_fractions

**Is Required ?** TRUE

**Select value:**

☐ Fixed

☐ Function of vegetation type

☐ Function of plant allometry

☐ Explicitly calculated

☐ Other - please specify:

## 7.6 Phenology

*TODO*

### 7.6.1 Method

*Describe the general principle behind the phenology scheme*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.phenology.method

**Is Required ?** TRUE

**Enter TEXT value:**

## 7.7 Mortality

*TODO*

### 7.7.1 Method

*Describe the general principle behind the mortality scheme*

**Spec. ID:** cmip6.land.carbon_cycle.vegetation.mortality.method

**Is Required ?** TRUE

**Enter TEXT value:**

## 7.8 Litter

*TODO*

### 7.8.1 Number Of Carbon Pools

*Enter the number of carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.litter.number_of_carbon_pools

**Is Required ?** TRUE

**Enter INTEGER value:**

### 7.8.2 Carbon Pools

*List the carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.litter.carbon_pools

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.8.3 Decomposition

*List the decomposition methods used*

**Spec. ID:** cmip6.land.carbon_cycle.litter.decomposition

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.8.4 Method

*List the general method used*

**Spec. ID:** cmip6.land.carbon_cycle.litter.method

**Is Required ?** FALSE

**Enter TEXT value:**

## 7.9 Soil

*TODO*

### 7.9.1 Number Of Carbon Pools

*Enter the number of carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.soil.number_of_carbon_pools

**Is Required ?** TRUE

**Enter INTEGER value:**

### 7.9.2 Carbon Pools

*List the carbon pools used*

**Spec. ID:** cmip6.land.carbon_cycle.soil.carbon_pools

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.9.3 Decomposition

*List the decomposition methods used*

**Spec. ID:** cmip6.land.carbon_cycle.soil.decomposition

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.9.4 Method

*List the general method used*

**Spec. ID:** cmip6.land.carbon_cycle.soil.method

**Is Required ?** FALSE

**Enter TEXT value:**

## 7.10 Permafrost Carbon

*TODO*

### 7.10.1 Is Permafrost Included

*Is permafrost includedxxx?*

**Spec. ID:** cmip6.land.carbon_cycle.permafrost_carbon.is_permafrost_included

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 7.10.2 Emitted Greenhouse Gases

*List the GHGs emitted*

**Spec. ID:** cmip6.land.carbon_cycle.permafrost_carbon.emitted_greenhouse_gases

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.10.3 Decomposition

*List the decomposition methods used*

**Spec. ID:** cmip6.land.carbon_cycle.permafrost_carbon.decomposition

**Is Required ?** FALSE

**Enter TEXT value:**

### 7.10.4 Impact On Soil Properties

*Describe the impact of permafrost on soil properties*

**Spec. ID:** cmip6.land.carbon_cycle.permafrost_carbon.impact_on_soil_properties

**Is Required ?** FALSE

**Enter TEXT value:**

# 8 Nitrogen Cycle

*Land surface nitrogen cycle*

## 8.1 Nitrogen Cycle

*Land surface nitrogen cycle*

### 8.1.1 Overview

*Overview of the nitrogen cycle in the land surface*

**Spec. ID:** cmip6.land.nitrogen_cycle.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 8.1.2 Tiling

*Describe the notrogen cycle tiling, if any.*

**Spec. ID:** cmip6.land.nitrogen_cycle.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 8.1.3 Time Step

*Time step of nitrogen cycle in seconds*

**Spec. ID:** cmip6.land.nitrogen_cycle.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 8.1.4 Prognostic Variables

*List the prognostic variables of the nitrogen scheme*

**Spec. ID:** cmip6.land.nitrogen_cycle.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

# 9 River Routing

*Land surface river routing*

## 9.1 River Routing

*Land surface river routing*

### 9.1.1 Overview

*Overview of river routing in the land surface*

**Spec. ID:** cmip6.land.river_routing.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 9.1.2 Tiling

*Describe the river routing, if any.*

**Spec. ID:** cmip6.land.river_routing.tiling

**Is Required ?** FALSE

**Enter TEXT value:**

### 9.1.3 Time Step

*Time step of river routing scheme in seconds*

**Spec. ID:** cmip6.land.river_routing.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 9.1.4 Grid Inherited From Land Surface

*Is the grid inherited from land surfacexxx?*

**Spec. ID:** cmip6.land.river_routing.grid_inherited_from_land_surface

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 9.1.5 Grid Description

*General description of grid, if not inherited from land surface*

**Spec. ID:** cmip6.land.river_routing.grid_description

**Is Required ?** FALSE

**Enter TEXT value:**

### 9.1.6 Number Of Reservoirs

*Enter the number of reservoirs*

**Spec. ID:** cmip6.land.river_routing.number_of_reservoirs

**Is Required ?** TRUE

**Enter INTEGER value:**

### 9.1.7 Water Re Evaporation

*TODO*

**Spec. ID:** cmip6.land.river_routing.water_re_evaporation

**Is Required ?** TRUE

**Select value(s):**

☐ Flood plains

☐ Irrigation

☐ Other - please specify:

### 9.1.8 Coupled To Atmosphere

*Is river routing coupled to the atmosphere model componentxxx?*

**Spec. ID:** cmip6.land.river_routing.coupled_to_atmosphere

**Is Required ?** FALSE

**Select value:**

☐ True ☐ False

### 9.1.9 Coupled To Land

*Describe the coupling between land and rivers*

**Spec. ID:** cmip6.land.river_routing.coupled_to_land

**Is Required ?** FALSE

**Enter TEXT value:**

### 9.1.10 Quantities Exchanged With Atmosphere

*If couple to atmosphere, which quantities are exchanged between river routing and the atmosphere model componentsxxx?*

**Spec. ID:** cmip6.land.river_routing.quantities_exchanged_with_atmosphere

**Is Required ?** FALSE

**Select value(s):**

- ☐ Heat
- ☐ Water
- ☐ Tracers
- ☐ Other - please specify:

### 9.1.11 Basin Flow Direction Map

*What type of basin flow direction map is being usedxxx?*

**Spec. ID:** cmip6.land.river_routing.basin_flow_direction_map

**Is Required ?** TRUE

**Select value:**

- ☐ Present day
- ☐ Adapted for other periods
- ☐ Other - please specify:

### 9.1.12 Flooding

*Describe the representation of flooding, if any*

**Spec. ID:** cmip6.land.river_routing.flooding

**Is Required ?** FALSE

**Enter TEXT value:**

### 9.1.13 Prognostic Variables

*List the prognostic variables of the river routing*

**Spec. ID:** cmip6.land.river_routing.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

## 9.2 Oceanic Discharge

*TODO*

### 9.2.1 Discharge Type

*Specify how rivers are discharged to the ocean*

**Spec. ID:** cmip6.land.river_routing.oceanic_discharge.discharge_type

**Is Required ?** TRUE

**Select value:**

☐ Direct (large rivers)

☐ Diffuse

☐ Other - please specify:

### 9.2.2 Quantities Transported

*Quantities that are exchanged from river-routing to the ocean model component*

**Spec. ID:** cmip6.land.river_routing.oceanic_discharge.quantities_transported

**Is Required ?** TRUE

**Select value(s):**

☐ Heat

☐ Water

☐ Tracers

☐ Other - please specify:

# 10 Lakes

*Land surface lakes*

## 10.1 Lakes

*Land surface lakes*

### 10.1.1 Overview

*Overview of lakes in the land surface*

**Spec. ID:** cmip6.land.lakes.overview

**Is Required ?** TRUE

**Enter TEXT value:**

### 10.1.2 Coupling With Rivers

*Are lakes coupled to the river routing model componentxxx?*

**Spec. ID:** cmip6.land.lakes.coupling_with_rivers

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 10.1.3 Time Step

*Time step of lake scheme in seconds*

**Spec. ID:** cmip6.land.lakes.time_step

**Is Required ?** TRUE

**Enter INTEGER value:**

### 10.1.4 Quantities Exchanged With Rivers

*If coupling with rivers, which quantities are exchanged between the lakes and rivers*

**Spec. ID:** cmip6.land.lakes.quantities_exchanged_with_rivers

**Is Required ?** FALSE

**Select value(s):**

☐ Heat

☐ Water

☐ Tracers

☐ Other - please specify:

### 10.1.5 Vertical Grid

*Describe the vertical grid of lakes*

**Spec. ID:** cmip6.land.lakes.vertical_grid

**Is Required ?** FALSE

**Enter TEXT value:**

### 10.1.6 Prognostic Variables

*List the prognostic variables of the lake scheme*

**Spec. ID:** cmip6.land.lakes.prognostic_variables

**Is Required ?** TRUE

**Enter TEXT value:**

## 10.2 Method

*TODO*

### 10.2.1 Ice Treatment

*Is lake ice includedxxx?*

**Spec. ID:** cmip6.land.lakes.method.ice_treatment

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 10.2.2 Albedo

*Describe the treatment of lake albedo*

**Spec. ID:** cmip6.land.lakes.method.albedo

**Is Required ?** TRUE

**Select value:**

☐ Prognostic

☐ Diagnostic

☐ Other - please specify:

### 10.2.3 Dynamics

*Which dynamics of lakes are treatedxxx? horizontal, vertical, etc.*

**Spec. ID:** cmip6.land.lakes.method.dynamics

**Is Required ?** TRUE

**Select value(s):**

☐ No lake dynamics

☐ Vertical

☐ Horizontal

☐ Other - please specify:

### 10.2.4 Dynamic Lake Extent

*Is a dynamic lake extent scheme includedxxx?*

**Spec. ID:** cmip6.land.lakes.method.dynamic_lake_extent

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

### 10.2.5 Endorheic Basins

*Basins not flowing to ocean includedxxx?*

**Spec. ID:** cmip6.land.lakes.method.endorheic_basins

**Is Required ?** TRUE

**Select value:**

☐ True ☐ False

## 10.3 Wetlands

*TODO*

### 10.3.1 Description

*Describe the treatment of wetlands, if any*

**Spec. ID:** cmip6.land.lakes.wetlands.description

**Is Required ?** FALSE

**Enter TEXT value:**