CMIP6 Model Documentation

Institute:	NOAA-GFDL
Model:	GFDL-ESM4
Topic:	Land Ice
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Further Info:	https://es-doc.org/cmip6 https://specializations.es-doc.org/cmip6

Documentation Contents

1 Key Properties

Land ice key properties

1.1 Key Properties

Land ice key properties

1.1.1 Overview

Overview of land surface model.

Spec. ID: cmip6.landice.key_properties.overview

Is Required ? TRUE

Enter TEXT value:

1.1.2 Model Name

Name of land surface model code

Spec. ID: cmip6.landice.key_properties.model_name

Is Required ? TRUE

Enter TEXT value:

1.1.3 Ice Albedo

Specify how ice albedo is modelled

Spec. ID: cmip6.landice.key_properties.ice_albedo

Is Required ? TRUE

Select value(s):

- ☐ Prescribed
- ☐ Function of ice age
- ☐ Function of ice density
- ☐ Other - please specify:

1.1.4 Atmospheric Coupling Variables

Which variables are passed between the atmosphere and ice (e.g. orography, ice mass)

Spec. ID: cmip6.landice.key_properties.atmospheric_coupling_variables

Is Required ? TRUE

Enter TEXT value:

1.1.5 Oceanic Coupling Variables

Which variables are passed between the ocean and ice

Spec. ID: cmip6.landice.key_properties.oceanic_coupling_variables

Is Required ? TRUE

Enter TEXT value:

1.1.6 Prognostic Variables

Which variables are prognostically calculated in the ice model

Spec. ID: cmip6.landice.key_properties.prognostic_variables

Is Required ? TRUE

Select value(s):

- ☐ Ice velocity
- ☐ Ice thickness
- ☐ Ice temperature
- ☐ Other - please specify:

1.2 Software Properties

Software properties of land ice code

1.2.1 Repository

Location of code for this component.

Spec. ID: cmip6.landice.key_properties.software_properties.repository

Is Required ? FALSE

Enter TEXT value:

1.2.2 Code Version

Code version identifier.

Spec. ID: cmip6.landice.key_properties.software_properties.code_version

Is Required ? FALSE

Enter TEXT value:

1.2.3 Code Languages

Code language(s).

Spec. ID: cmip6.landice.key_properties.software_properties.code_languages

Is Required ? FALSE

Enter TEXT value(s):

2 Grid

Land ice grid

2.1 Grid

Land ice grid

2.1.1 Overview

Overview of the grid in the land ice scheme

Spec. ID: cmip6.landice.grid.overview

Is Required ? TRUE

Enter TEXT value:

2.1.2 Adaptive Grid

Is an adative grid being usedxxx?

Spec. ID: cmip6.landice.grid.adaptive_grid

Is Required ? TRUE

Select value:

☐ True ☐ False

2.1.3 Base Resolution

The base resolution (in metres), before any adaption

Spec. ID: cmip6.landice.grid.base_resolution

Is Required ? TRUE

Enter FLOAT value:

2.1.4 Resolution Limit

If an adaptive grid is being used, what is the limit of the resolution (in metres)

Spec. ID: cmip6.landice.grid.resolution_limit

Is Required ? FALSE

Enter FLOAT value:

2.1.5 Projection

The projection of the land ice grid (e.g. albers_equal_area)

Spec. ID: cmip6.landice.grid.projection

Is Required ? TRUE

Enter TEXT value:

3 Glaciers

Land ice glaciers

3.1 Glaciers

Land ice glaciers

3.1.1 Overview

Overview of glaciers in the land ice scheme

Spec. ID: cmip6.landice.glaciers.overview

Is Required ? TRUE

Enter TEXT value:

3.1.2 Description

Describe the treatment of glaciers, if any

Spec. ID: cmip6.landice.glaciers.description

Is Required ? TRUE

Enter TEXT value:

3.1.3 Dynamic Areal Extent

Does the model include a dynamic glacial extentxxx?

Spec. ID: cmip6.landice.glaciers.dynamic_areal_extent

Is Required ? FALSE

Select value:

☐ True ☐ False

4 Ice

Ice sheet and ice shelf

4.1 Ice

Ice sheet and ice shelf

4.1.1 Overview

Overview of the ice sheet and ice shelf in the land ice scheme

Spec. ID: cmip6.landice.ice.overview

Is Required ? TRUE

Enter TEXT value:

4.1.2 Grounding Line Method

Specify the technique used for modelling the grounding line in the ice sheet-ice shelf coupling

Spec. ID: cmip6.landice.ice.grounding_line_method

Is Required ? TRUE

Select value:

☐ Grounding line prescribed

☐ Flux prescribed (Schoof)

☐ Fixed grid size

☐ Moving grid

☐ Other - please specify:

4.1.3 Ice Sheet

Are ice sheets simulatedxxx?

Spec. ID: cmip6.landice.ice.ice_sheet

Is Required ? TRUE

Select value:

☐ True ☐ False

4.1.4 Ice Shelf

Are ice shelves simulatedxxx?

Spec. ID: cmip6.landice.ice.ice_shelf

Is Required ? TRUE

Select value:

☐ True ☐ False

4.2 Mass Balance

Description of the surface mass balance treatment

4.2.1 Surface Mass Balance

Describe how and where the surface mass balance (SMB) is calulated. Include the temporal coupling frequeny from the atmosphere, whether or not a seperate SMB model is used, and if so details of this model, such as its resolution

Spec. ID: cmip6.landice.ice.mass_balance.surface_mass_balance

Is Required ? TRUE

Enter TEXT value:

4.3 Basal

Description of basal melting

4.3.1 Bedrock

Describe the implementation of basal melting over bedrock

Spec. ID: cmip6.landice.ice.mass_balance.basal.bedrock

Is Required ? FALSE

Enter TEXT value:

4.3.2 Ocean

Describe the implementation of basal melting over the ocean

Spec. ID: cmip6.landice.ice.mass_balance.basal.ocean

Is Required ? FALSE

Enter TEXT value:

4.4 Frontal

Description of claving/melting from the ice shelf front

4.4.1 Calving

Describe the implementation of calving from the front of the ice shelf

Spec. ID: cmip6.landice.ice.mass_balance.frontal.calving

Is Required ? FALSE

Enter TEXT value:

4.4.2 Melting

Describe the implementation of melting from the front of the ice shelf

Spec. ID: cmip6.landice.ice.mass_balance.frontal.melting

Is Required ? FALSE

Enter TEXT value:

4.5 Dynamics

4.5.1 Description

General description if ice sheet and ice shelf dynamics

Spec. ID: cmip6.landice.ice.dynamics.description

Is Required ? TRUE

Enter TEXT value:

4.5.2 Approximation

Approximation type used in modelling ice dynamics

Spec. ID: cmip6.landice.ice.dynamics.approximation

Is Required ? TRUE

Select value(s):

☐ SIA

☐ SAA

☐ Full stokes

☐ Other - please specify:

4.5.3 Adaptive Timestep

Is there an adaptive time scheme for the ice schemexxx?

Spec. ID: cmip6.landice.ice.dynamics.adaptive_timestep

Is Required ? TRUE

Select value:

☐ True ☐ False

4.5.4 Timestep

Timestep (in seconds) of the ice scheme. If the timestep is adaptive, then state a representative timestep.

Spec. ID: cmip6.landice.ice.dynamics.timestep

Is Required ? TRUE

Enter INTEGER value: