

# CMIP6 Model Documentation

<b>Institute:</b>	NOAA-GFDL
<b>Model:</b>	GFDL-ESM4
<b>Topic:</b>	Land Ice
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<b>Note:</b>	* indicates a required property

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# 1 Key Properties

*Land ice key properties*

## 1.1.1 Top level properties

*Land ice key properties*

### 1.1.1.1 Name \*

*Name of landice model code*

**Enter TEXT:**

### 1.1.1.2 Keywords \*

*Keywords associated with landice model code*

**Enter COMMA SEPERATED list:**

### 1.1.1.3 Overview \*

*Overview of landice model.*

**Enter TEXT:**

### 1.1.1.4 Ice Albedo \*

*Specify how ice albedo is modelled*

**Select MULTIPLE options:**

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

### 1.1.1.5 Atmospheric Coupling Variables \*

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

**Enter COMMA SEPERATED list:**

### 1.1.1.6 Oceanic Coupling Variables \*

*Which variables are passed between the ocean and ice*

**Enter COMMA SEPERATED list:**

#### 1.1.1.7 Prognostic Variables \*

*Which variables are prognostically calculated in the ice model*

Select **MULTIPLE** options:

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

### 1.2.1 Software Properties

*Software properties of land ice code*

#### 1.2.1.1 Repository

*Location of code for this component.*

Enter **TEXT**:

#### 1.2.1.2 Code Version

*Code version identifier.*

Enter **TEXT**:

#### 1.2.1.3 Code Languages

*Code language(s).*

Enter **COMMA SEPERATED** list:

### 1.3.1 Tuning Applied

*Tuning methodology for land ice component*

#### 1.3.1.1 Description \*

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

Enter **TEXT**:

## 2 Grid

*Land ice grid*

### 2.1.1 Top level properties

*Land ice grid*

#### 2.1.1.1 Name

*Name of grid in landice model.*

Enter TEXT:

#### 2.1.1.2 Overview

*Overview of grid in landice model.*

Enter TEXT:

#### 2.1.1.3 Adaptive Grid \*

*Is an adative grid being used?*

Select either TRUE or FALSE:

☐

True

☐

False

#### 2.1.1.4 Base Resolution \*

*The base resolution (in metres), before any adaption*

Enter FLOAT value:

#### 2.1.1.5 Resolution Limit

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

Enter FLOAT value:

#### 2.1.1.6 Projection \*

*The projection of the land ice grid (e.g. albers\_equal\_area)*

Enter TEXT:

## 3 Glaciers

*Land ice glaciers*

### 3.1.1 Top level properties

*Land ice glaciers*

#### 3.1.1.1 Name

*Commonly used name for the glaciers in landice model.*

**Enter TEXT:**

#### 3.1.1.2 Overview

*Overview of land ice glaciers in landice model.*

**Enter TEXT:**

#### 3.1.1.3 Description \*

*Describe the treatment of glaciers, if any*

**Enter TEXT:**

#### 3.1.1.4 Dynamic Areal Extent

*Does the model include a dynamic glacial extent?*

**Select either TRUE or FALSE:**

☐ True      ☐ False

## 4 Ice

*Ice sheet and ice shelf*

### 4.1.1 Top level properties

*Ice sheet and ice shelf*

#### 4.1.1.1 Name

*Commonly used name for the ice in landice model.*

**Enter TEXT:**

#### 4.1.1.2 Overview

*Overview of ice sheet and ice shelf in landice model.*

**Enter TEXT:**

#### 4.1.1.3 Grounding Line Method \*

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

**Select SINGLE option:**

- ☐ Grounding line prescribed
- ☐ Flux prescribed (Schoof)
- ☐ Fixed grid size
- ☐ Moving grid
- ☐ Other - please specify:

#### 4.1.1.4 Ice Sheet \*

*Are ice sheets simulated?*

**Select either TRUE or FALSE:**

- ☐ True
- ☐ False

#### 4.1.1.5 Ice Shelf \*

*Are ice shelves simulated?*

**Select either TRUE or FALSE:**

- ☐ True
- ☐ False

### 4.2.1 Mass Balance

*Description of the surface mass balance treatment*

#### 4.2.1.1 Surface Mass Balance \*

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

**Enter TEXT:**

#### 4.2.2 Basal

*Description of basal melting*

##### 4.2.2.1 Bedrock

*Describe the implementation of basal melting over bedrock*

**Enter TEXT:**

##### 4.2.2.2 Ocean

*Describe the implementation of basal melting over the ocean*

**Enter TEXT:**

#### 4.2.3 Frontal

*Description of calving/melting from the ice shelf front*

##### 4.2.3.1 Calving

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

**Enter TEXT:**

##### 4.2.3.2 Melting

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

**Enter TEXT:**

#### 4.3.1 Dynamics

##### 4.3.1.1 Description \*

*General description of ice sheet and ice shelf dynamics*

**Enter TEXT:**

##### 4.3.1.2 Approximation \*

*Approximation type used in modelling ice dynamics*

**Select MULTIPLE options:**

☐ SIA

☐ SAA



- ☐ Full stokes
- ☐ Other - please specify:

#### 4.3.1.3 Adaptive Timestep \*

*Is there an adaptive time scheme for the ice scheme?*

**Select either TRUE or FALSE:**

- ☐ True      ☐ False

#### 4.3.1.4 Timestep \*

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

**Enter INTEGER value:**