CMIP6 Model Documentation

Institute:	UA
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Topic:	landIce
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Note:	* indicates a required property

Documentation Contents

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

Manabe

1.1.1.2 Keywords *

Keywords associated with landice model code

Simple, prescribed

1.1.1.3 Overview *

Overview of landice model.

Land ice grid locations are set before model begin integration and held fixed with no changes. Basically Greenland and Antarctica are flagged as land ice locations. Snow can fall on these points. Snow depth changes results from snowfall and surface melt. If the surface temperature tried to rise above 0C, the surface temperature is reset to 0C and the heat is archived for analysis.

1.1.1.4 Ice Albedo *

Specify how ice albedo is modelled

- ☒ 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)

Snowfall, surface temperature

1.1.1.6 Oceanic Coupling Variables *

Which variables are passed between the ocean and ice

None

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.

Https://github.com/rjstouffer/Manabe-Climate-Model

1.2.1.2 Code Version

Code version identifier.

MCM_UA

1.2.1.3 Code Languages

Code language(s).

FORTRAN 77

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. andDocument the relative weight given to climate performance metrics versus process oriented metrics, andand on the possible conflicts with parameterization level tuning. In particular describe any struggle andwith 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.

Manabe

2.1.1.2 Overview

Overview of grid in landice model.

Same as atmospheric model grid

2.1.1.3 Adaptive Grid *

Is an adative grid being used?

☐ 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.

Manabe

3.1.1.2 Overview

Overview of land ice glaciers in landice model.

None

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.

Manabe

4.1.1.2 Overview

Overview of ice sheet and ice shelf in landice model.

Ice sheets are prescribed and remain unchanged in all runs. There are no ice shelves. If surface temperature rises aboe 0C over an ice sheet and there is no snow to melt, the surface temperature is set to 0C and the heat is stored for offline analysis. The ice sheet is unchanged; no water goes into the ocean.

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 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

Enter TEXT:

4.2.2 Basal

Description of basal melting

4.2.2.1 Bedrock

Describe the implementation of basal melting over bedrock

None

4.2.2.2 Ocean

Describe the implementation of basal melting over the ocean

None

4.2.3 Frontal

Description of claving/melting from the ice shelf front

4.2.3.1 Calving

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

If the water equivalent snowdepth at a grid location exceeds 20cm, excess is routed to ocean as a frozen water flux

4.2.3.2 Melting

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

None

4.3.1 Dynamics

4.3.1.1 Description *

General description of ice sheet and ice shelf dynamics

None

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: