Modeling Greenland ice sheet present-day and near-future runoff contribution.



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The last IPCC report [2] has shown an increasing contribution from Greenland melting to global sea-level over the last decade. It is therefore of importance to better assess ice sheet melting and its impact on regional ocean processes. Here, we present the results from the implementation of a routing scheme into the thermo-mechanical ice sheet mass evolution over the 20th and 21st centuries. This allows us to obtain an estimate of the total amount of freshwater reaching the ocean at each time step of the model integration, as well as a time-varying spatial distribution of the runoff along the coasts of Greenland.

Present day preliminary results



Figure 2: Map: difference of average meltwater distribution for present day (1980-2005) using ERA Interim (solid line) and CMCC-CM (dash line) as forcing fields. Boxes: time series of surface mass balance and meltwater for the seven main drainage basins (Fig. 1).

Simulations

- Ice sheet model \rightarrow GRISLI [7] (SIA+SSA);
- resolution \rightarrow 20 km;
- spin up \rightarrow 125ka 0ka, index method [4];
- GRISLI surface mass balance: PDD method;

• routing scheme \rightarrow "multiple flow direction" [6]; • forcing fields $(T,P) \rightarrow AOGCM$ CMCC-CM at 0.75° res. [8, 1, 5] and ERA Interim at 0.75° res. [3]; • future scenarios \rightarrow RCP 4.5 and RCP 8.5.

• Forcing:

- CMCC-CM is too cold over Greenland; • ERA Interim lacks of precipitation over north
- of Greenland; • use of different forcing fields required (i.e.
- CMIP5).
- 20 km resolution:
 - the coastal effects are not fully captured.

Introduction

Figure3: Map: difference of average meltwater distribution for future simulations (2006-2100) using CMCC-CM RCP4.5 (solid line) and CMCC-CM RCP8.5 (dash line) as forcing fields. Boxes: time series of surface mass balance and meltwater for the seven main drainage basins (Fig. 1).

Conclusion • Outlook:

- increase the spatial horizontal km;
- substitute PDD by a simple en model;
- improve the meltwater formation Contacts
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Future preliminary results

	References	
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