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Studying the evolution of major northern hemisphere ice sheets during marine isotopic stage 11 with a fully coupled climate-ice sheet model

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In a previous study, a 2.5-dimensional climate model of intermediate complexity (atmosphere-ocean-vegetation) coupled with a 3-dimensional thermo-mechanical ice sheet model was used to successfully simulate the evolution of Northern Hemisphere ice sheets during the last glacial-interglacial cycle and to investigate the respective climate and ice sheets responses to both insolation and atmospheric CO_2 concentration. In this work we use the same coupled model to simulate the evolution of major northern hemisphere ice sheets during marine isotopic stage 11 (MIS11). MIS11 spans from approximately 420 ka BP to 360 ka BP and is characterized by orbital configurations and atmospheric greenhouse gases concentrations comparable to present-day ones (pre-industrial conditions). It is a suitable geologic analogue of the current interglacial and its study is therefore particularly interesting in order to better assess the evolution of future climate.

In this work, we present the preliminary results obtained by performing fully coupled climate-ice sheets simulations. Two different experiments are carried out, spanning respectively from 432 ka BP to 330 ka BP (test 1) and from 547 ka BP to 330 ka BP (test 2). Both simulations are forced by insolation and atmospheric CO_2 concentration inferred from experimental data. The purpose of this work is to correctly quantify the duration of MIS11, as well as to simulate realistic glaciation and deglaciation events in the northern hemisphere and an associated sea-level evolution consistent

with reconstructions.

Key words: climate models of intermediate complexity, modeling studies, marine isotopic stage 11, northern hemisphere ice sheets, insolation, atmospheric CO_2 concentration, glaciation, deglaciation.