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Glacial inception at the end of MIS11 : sensitivity tests

M.F. Loutre

Institut d'astronomie et de géophysique G. Lemaître, Université catholique de Louvain, Belgium (marie-france.loutre@uclouvain.be)

MoBidiC, a climate model of intermediate complexity, has showed the importance of vegetation cover for the glacial inception at the end of MIS11, at least if temperature is low enough. Several sensitivity experiments were performed over the time interval 410-345 kyr BP to identify the parameters that would favour an early glacial inception at the end of MIS11. Amongst them, there are the albedo parametrisation, the strength of the thermohaline circulation, atmospheric CO2 concentration. The simulations show that the slight increase in the albedo of the snow-covered surface can induce an early (as soon as 341 kyr BP) and large glaciation, while low values don't lead to any inception. However the global annual mean temperature changes only very slightly between the extreme cases. The largest temperature difference is less than 1C. The cooler simulation exhibits also a slightly (1Sv) stronger ocean circulation. Moreover, the melting of the ice sheet during the deglaciation induces rapid changes in the intensity of the THC, due to fresh water flux and subsequent reduction of the water density. As far as vegetation is concerned, the time interval under study is divided into three sub-intervals, each of them experiencing a partial recovery of the boreal forest, in agreement with evidence from pollen records (Desprat et al., 2005). Transient climate during the study time interval can be simulated with two different strengths of the thermohaline circulation. The global temperature simulated with a strong THC (20Sv) is warmer than with a weak THC (12Sv). Simulations to test the importance of the atmospheric CO2 concentration have also been performed. Using the reference parameter for the albedo of the snow-covered continent, glacial inception can only take place for low value of the CO2 in the atmosphere. Further sensitivity test are still under work. The climate simulated with our model during MIS11 is rather stable on the point of view of the total amount of simulated continental ice, although variation in both the temperature and the vegetation are simulated.

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