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First Results of the ISMIP-HEINO Model Intercomparison Project

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The ISMIP HEINO project aims at providing a status-quo report on the ability of contemporary ice-sheet models to simulate Heinrich events. Additionally, insight about the underlying model physics and numerics is targeted at the improvement of the models. Heinrich events or Heinrich oscillations can be understood as an intrinsic feature of the Laurentide ice sheet. One Heinrich cycle consist of four phases. In the activation phase, temperate basal area migrates upstream Hudson Bay and Hudson Strait. During the subsequent surging phase ice flows fast over the sediment on Hudson Bay and Hudson Strait and discharges into the ocean. The accompanied ice loss leads to a thinning of the ice sheet over the Hudson region and downwards advection of cold ice leads to a deactivation wave, which terminates the surge (deactivation phase). During the recovering phase the ice sheet the ice sheet is rebuilt by snowfall.

Here, we present results of various ice sheet models. The majority of the models show Heinrich oscillations. Every single model seems to have a typical period and amplitude of Heinrich oscillations as well as a typical duration of Heinrich events. In some models the events are more regular than in others. The recurrence times of modelled Heinrich events among different models are in the range of about 5000 and 12,000

years. The amplitude of Heinrich oscillation in the models is spread in-between approximately 700 and 1400 meters. The duration of Heinrich events varies among the models between several hundreds and some thousands of years. Most of the models, except of one, show an overall similar behaviour, e.g., if after about 25,000 years the ice over the sediment area is sufficiently thick Heinrich events starts to develop. We will give detailed explanation of difference in the behaviour of the distinct models in terms of model physics and numerics.