Geophysical Research Abstracts, Vol. 7, 07637, 2005
SRef-ID: 1607-7962/gra/EGU05-A-07637

Experiments on the sensitivity of modelled extent of the Fennoscandian icesheet to representation of topography

F. Hebeler (1), R.S. Purves (1), M. Hagdorn (2) and N.R.J. Hulton (2)

(1) Department of Geography, University of Zurich, Switzerland (fhebeler@geo.unizh.ch), (2) School of Geosciences, University of Edinburgh, Edinburgh, UK

Widespread availability of high resolution terrain data at a near global scale, allows quantification of likely uncertainties in low resolution terrain data commonly used to represent the bed and ice sheet initiation surface in ice sheet modelling. Generation of low resolution (5km) surfaces from higher resolution (90m) data through a variety of algorithms shows a strong correlation between elevation and standard deviation in the generated surfaces. This relationship is used to generate spatially correlated error surfaces which are added to elevation models used as an initial ice-free condition for model runs. These error surfaces are used as input for Monte-Carlo simulations of icesheet behaviour during the Last Glacial Maximum in Fennoscandinavia with ice sheet runs forced using the GRIP S-10 proxy record. Preliminary results show, that as one would expect, the nucleation process is significantly modified by standard deviations in terrain of the order of 50m at a model resolution of 10km. This result is important, since it means that great care should be taken in using low resolution ice sheet models to ask questions about inception, without careful consideration of uncertainty. Furthermore, where nucleation points lie close to the Equilibrium Line Altitude, relatively small uncertainties can have significant effects on the final icesheet configuration. Spatially correlated error surfaces also produce model runs with significantly different ice extents after 50000 model years (standard deviations in extent of the order of 10%, and volume of the order of 5%). Minimum and maximum extents have qualitatively different configurations, with ice centres and nucleation points migrating several hundreds of kilometres. These results suggest that relatively small uncertainties in terrain data can have significant effects in ice sheet modelling, in particular during the inception phase. Further work is investigating the development of algorithms which more robustly capture the key features of high resolution terrain data in

generating low resolution elevation data typically used by ice sheet models.