Geophysical Research Abstracts
Vol. 14, EGU2012-5760, 2012
EGU General Assembly 2012

Initialisation of a vertically-integrated, higher-order ice sheet model using observations of surface mass balance and elevation rate.

R. Arthern, R.C.A. Hindmarsh, and C.R. Williams
British Antarctic Survey, Cambridge, United Kingdom (rart@bas.ac.uk)

One of the tasks facing ice sheet modellers is to predict how the size and shape of the large ice sheets of Greenland and Antarctica will evolve over coming centuries. An ice sheet model provides a tool to evolve the geometry of the ice sheet from its present configuration to a future one. However, errors in the specification of the present geometry and flow, or the model parameters, will inevitably lead to errors in the forecast of the future. Accurate specification of the present state and model parameters using observational data is commonly referred to as model initialisation. Here we demonstrate two different methods of initialisation. Both make use of a recently developed iterative approach to invert for the basal drag coefficient and ice viscosity. The first is more conventional and uses satellite observations of the horizontal surface velocity to invert for basal drag. The second uses only measurements of the rates of snow accumulation and elevation change, together with the assumption of continuity and conservation of mass. Both approaches are applied to a vertically-integrated, higher-order ice sheet model. For each method, maps of the velocity field, basal drag coefficient, and ice viscosity will be presented for the Antarctic ice sheet.