Geophysical Research Abstracts, Vol. 9, 02603, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-02603

Prognostic numerical studies for the ice dynamics of the temperate ice cap on King George Island, Antarctica

B. Breuer, N. Blindow, M.A. Lange
Institute for Geophysics Münster, Germany

The present study focuses on King George Island (=KGI), the largest of the South Shetland Islands, which is located north of the Antarctic Peninsula at 62° S. It is largely governed by maritime climate conditions. The overlying ice cap consists of a mainly temperate ice body with a significant amount of water affecting the ice dynamics in a non-negligible way. Additionally, the annual mean surface temperature of the ice cap reaches almost melting conditions. Thus, only a small increase in temperature will cause a large impact on the flow dynamics and consequently the stability of the ice cap.
On KGI, the surface topography of the western part of ice cap (an area of approx. $200\ \mathrm{km}^2$) was measured applying differential GPS during field campaigns in the austral summers 1997/98, 2004/05 and 2006/07. Additionally, the ice thickness distribution of the region is known by radio echo sounding measurements during the first field campaign.
We adapted a 3-D numerical dynamic-thermodynamic flow model to this part of the ice cap. First, the results of steady-state model runs were tested thoroughly against in-situ measurements of the flow velocity to make sure that the choice of the tuning parameters (water content, enhancement factor in Glen's flow law, type of basal sliding law, etc.) leads to reliable results. After this, prognostic simulations applying different possible scenarios for the future situation of the surface temperature and / or net accumulation were carried out.
We will present results of prognostic model runs for the flow dynamics of the ice cap on KGI applying different climate scenarios and will discuss the stability of this part of the ice cap.