Geophysical Research Abstracts, Vol. 9, 11709, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-11709

Seasonal acceleration of inland ice via longitudinal coupling to marginal ice

S.F. Price (1), A.J. Payne (1), T.A. Neumann (2), G.A. Catania (3)

(1) Bristol Glaciology Centre, University of Bristol, Bristol, BS8 1SS, UK, (2) Department of Geology, University of Vermont, Burlington, VT 05405, USA, (3) Institute for Geophysics, University of Texas, Austin, TX 78758, USA

We use an ice-flow model with appropriate physics to demonstrate that seasonal flow variations in the marginal region of an ice sheet can be transmitted upstream via longitudinal coupling. This finding suggests that previous observations of seasonal flow acceleration near the western flank of the Greenland ice sheet, which have been attributed to local changes in basal lubrication and sliding, require a broader interpretation. We demonstrate that these same observations can be explained by seasonal accelerations that are initiated up to ˜12 km closer to the margin where, (1) the ice is up to 40% thinner, (2) the ice is likely to be warmer, (3) the ice is heavily crevassed due to extending flow over a bedrock bump, and (4) the ablation rate and meltwater flux is higher. All four conditions imply that a traditional, ice-sheet marginal environment may be adequate for explaining previous observations of seasonal acceleration farther upstream, on the ice sheet flank.