Rib-like patterns in basal shear of ice streams

Olga Sergienko

GFDL/Princeton University

The direct observations of the basal conditions under continental-scale ice sheets are logistically difficult. A possible approach to estimate conditions at the ice - bed interface is from surface observations by means of inverse methods. The recent advances in remote and ground-based observations have allowed to acquire a wealth observations from Greenland and Antarctic ice sheets. Using high-resolution data sets of ice surface and bed elevations and surface velocities, inversions for basal conditions have been performed for several ice streams in Greenland and Antarctica. These inversions reveal the presence of rib-like spatial structures in basal shear in many locations. The analysis of the hydraulic potential distribution shows that these rib-like structures co-locate with highs of the gradient of hydraulic potential. This suggests that subglacial water plays a role in the development and evolution of the basal shear ribs.