



Basal meltwater in the onset region of Bindschadler Ice Stream, West Antarctica

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Basal meltwater is a vital component in producing a soft, deformable bed; this lubrication is necessary to produce basal sliding along an ice stream or glacier. We present evidence for extensive basal meltwater in the onset region of Bindschadler Ice Stream, West Antarctica, where the ice is in transition to streaming ice flow. These observations are revealed with the application of the amplitude variation with offset (AVO) seismic technique along a 12 km seismic reflection profile. Our results highlight a basal meltwater body near the downstream end of the profile, with strong spatial variations in the water content of the subglacial sediments in the upstream direction.

The sedimentary structures in the upper 5-10 m of the subglacial bed along the seismic profile also provide evidence for deformation due to basal sliding. Structural features are preserved in stiff till regions where basal water is minimal, while they become absent in soft till regions where water is abundant. This discontinuity of well-lubricated sediments along flow aids in restraining fast ice flow, while the presence of stored water in this region opens the possibility for transient lubrication of the bed. Taken together, these results show that extensive basal meltwater production and storage can occur at the onset of streaming ice flow, with important implications on how the subglacial bed influences ice flow behavior.