Discontinuous Sediment Cover and "Fast" Ice Flow: Observations from the Upper Reaches of Tributary C1B

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Discontinuous sediment cover upstream of the onset of the West Antarctic ice streams may be a crucial component in developing streaming ice flow, as observed from a seismic reflection experiment along the upper reaches of tributary C1B. These pockets of soft sediment beneath the slow-moving ice stream tributaries produce localized basal lubrication that helps channel the inland ice reservoir to the fast-flowing and well-developed ice streams of West Antarctica. Our seismic experiment has imaged a discontinuous package of soft sediments beneath tributary C1B, just kilometers upstream of continuous sediment cover and full development of the ice stream tributary. This pocket of sediments is coincident with a localized decrease in basal shear stress and enhanced flow of the overlying ice, but the discontinuity of these sediments does not produce the streaming ice flow observed farther downglacier. Though streaming ice flow may not be able to extend beyond the reaches of continuous subglacial sediment cover, pockets of soft sediment well upflow of the ice streams may strongly influence the flow character of the West Antarctic Ice Sheet.