



Amplitude analysis of active source seismic data from the grounding zone of Whillans Ice Stream

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Amplitude analysis of active source seismic data is often used to estimate acoustic properties and thereby infer the lithology of the substrate beneath glaciers and ice streams. The substrate beneath the ice streams of West Antarctica is of particular interest as here subglacial sediment deformation results in the rapid flow of the overriding ice. At the grounding zone, where the grounded ice sheet transitions to the floating ice shelf, this substrate is thought to stiffen due to tidal compaction resulting in a zone of higher basal shear stress which is manifest in the buckling of the internal layering in the overriding ice. Here we investigate these processes by estimating subglacial properties using active source seismic data acquired across the grounding zone of Whillans Ice Stream. Perhaps uniquely, we are able to test our methodology due to the survey crossing from an ice overlying sediment interface into a known ice overlying water interface. Our analysis indicates that lithological variations within the grounding zone are below the resolution of our methodology with the exception of a body of water trapped by a hydropotential reversal upstream of the grounding zone.