Geophysical Research Abstracts,
Vol. 11, EGU2009-2577, 2009
EGU General Assembly 2009

Ice Attenuation and Basal Conditions from Radar Observations Along the US-ITASE Traverse in East Antarctica

R.W. Jacobel (1), S.A. Arcone (2), B.C. Welch (1), B.W. Youngblood (1), J.L. Olson (1), J.R. Stamp (1), and J.M. Werner (1)

(1) St. Olaf College, Physics Department, 1520 St. Olaf Ave, Northfield, MN, 55057, USA (jacobel@stolaf.edu), (2) U.S. Army ERDC-CRREL, 72 Lyme Rd., Hanover, NH 03755, USA (Steven.A.Arcone@usace.army.mil)

We present results from ground-based radio echo reflection profiles recorded along the 2006-08 US-ITASE traverse from Taylor Dome to South Pole. Data were recorded using a 3-MHz system with a high average data density of $\tilde{4}.5$ meters per stacked trace in order to reveal details of englacial strata, as well as the bed. The 1400 km transect defines an ice flux gate for a 1.25 x106 km2 region which includes much of the megadunes, and catchment areas of Byrd Glacier. In contrast with the typically continuous radar stratigraphy of central West Antarctica, unusual cross-cutting englacial horizons typically limit continuity to about 30 km. The limitation is due to features which we interpret to be unconformities between beds of different stratigraphic dip, and usually caused by strongly metamorphosed layers - buried megadunal features.

The bed topography shows the presence of several candidate subglacial lake sites, at least one of which has not been identified previously in satellite altimetry. In addition to bed topography, we have also investigated basal reflectivity and ice attenuation by calculating the power received from some 300,000 bed echoes. Correcting received power for geometric losses and plotting versus depth, we find an average attenuation rate in the ice of 15 dB/km for the 3-MHz signal, consistent with other measured values. Removing this average attenuation from the data we find variations of up to 25dB in the basal reflectivity. We show profile segments where reflectivity is relatively high, presumably indicating areas of wet bed conditions generally thought to be unusual in East Antarctica. This would imply that in some areas ice speed measured at the surface may represent that of the entire ice column