Geophysical Research Abstracts
Vol. 12, EGU2010-7432, 2010
EGU General Assembly 2010

Radar-observed structures of interior and bottom of an ice shelf, East Dronning Maud Land, Antarctica

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We have carried out ground-based GPS and ice-penetrating radar (5 MHz) surveys to examine interior and bottom of ice shelf (∼24.5E) downstream of Sor Rondanne Mountains in Dronning Maud Land, East Antarctica. Our study areas include a rift system, topographic rumples visible in satellite images (MODIS), and an adjacent grounded ice rise. Ice cores were drilled through the ice to the ocean in the vicinity of the rift system. The radar detected ice layering, a distinct layer beneath it, and isolated scatterers. The distinct layer is continuous from the ice/bed interface of the grounded ice (∼600 m depth) so that we interpret that this layer represents the interface between the ice shelf and the ocean. In areas where ice is thin (200-300 m), we observed ice layers to just above the ice-ocean interface and the double-bounced echo of the ice-ocean interface. In areas where ice is thicker (450-600 m), the ice layers are observed to ∼230 m. Layers are down warped below the surface rumples. The down-warping amplitudes increase from 5-10 m at the surface to >25 m at 300 m depth. Isolated scatterers were found within the ice body as well as the bottom of the ice. Nature of these radar echoes is discussed using GPS, radar and ice-core data in the context of ice-ocean interaction.