# SEISMIC REFLECTIONS FROM PYCNOCLINES IN THE WATER COLUMN BENEATH AN ICE SHELF

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Pycnoclines (layers within ocean waters defined by a rapid change in density, either due to a change in temperature and/or salinity) have been found to produce reflections that appear in seismic data collected on the Amery Ice Shelf (AIS), East Antarctica. The pycnoclines, present due to an ice pump mechanism under the AIS, are clearly visible within the ocean water column beneath the ice shelf. This is evidenced in a 3 km common depth point (CDP) reflection survey undertaken on the eastern side of the AIS. The reflections are unmistakably primary in nature, producing their own multiples in the seismic record. Further processing of other AIS seismic data also reveals reflections at similar arrival times in the ocean water column. While the reflection coefficient (RC) of the ice-water and water-seafloor boundaries are approximately 600 times greater in magnitude than that of these pycnoclines, the pycnocline RCs are 40 times greater in magnitude than the surrounding ocean waters – sufficient to produce a reflection. The pycnocline reflections correlate well to changes at density interfaces observed by in-situ CTD (conductivity-temperature-depth) data collected under the AIS through a borehole in the ice. Seismic surveys carried out over different field seasons, spanning three years, and observed at different times during the summer seem to indicate that there is a variation in the depth and thickness of the pycnocline layers. One possible reason for this variation is the presence of internal waves at the interface between the density layers.

**Technical Area:** General - Other