Calving events near the terminus of Thwaites Glacier, Antarctica

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Using The Polar Earth Observing Network's (POLENET) seismic array, Repeating seismic events at the terminus of Thwaites Glacier, Antarctica, likely caused by calving, were recorded on the Polar Earth Observing Network (POLENET) seismic array. Repeating events occurred in three separate episodes, with the majority of events occurring from March 1-3 2011. The events have a monochromatic signal. A seismogenic calving mechanism is proposed that would result in these observed 2 Hz signals through resonance ("ringing") of energy within a calving ice block. Calving generates broadband noise, but the block size and seismic velocity select for only those frequencies that constructively interfere.

The events are close to the surface near 75.09S 107.82W, where radar data indicate an ice thickness of ~420 m. For a shear-wave velocity of 1840 m/s, this yields a resonance at 2.2 Hz, in good agreement with the observed ~2 Hz signals, especially if the velocity is lowered slightly to include the effects of the firn. During repeating episodes the mean interevent time is 18 +/- 6 min with a mean magnitude of M_l=1.4. Satellite imagery is not available during the time of repeating ruptures; however, during other periods icebergs of both sizes have been observed to break of the calving front of Thwaites glacier.