

# Location of ice tremors recorded at Syowa station in Antarctica

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Tectonic earthquakes and ice tremors have been observed at seismic stations in Antarctica. Ice tremors are the tremors which are generated by some ice motion (Kanao et al., 2012). The hypocenters of 18 local earthquakes recorded at Syowa Station on 1987 – 2003 are located in the coastal area around SYO station (Kanao, 2014). The purpose of this study is to reveal the hypocenter distribution of ice tremors recorded at Syowa Station in 2014.

We used the waveform data recorded by seismometer at coastal stations. The analysis period is from January to December in 2014. We define here an ice tremor as the tremor of which P and S-waves are not clear and the duration is longer than five minutes. We also estimated the hypocenters of some ice tremors by grid search using the lag times calculated by the cross-correlation function of the velocity waveform envelopes at different stations.

We find the total of 148 ice tremors in 2014. We classify the ice tremors into three types based on temporal features in their spectrum. Type A is the ice tremor which shows a long duration (~10000 seconds) and small amplitude over the waveform. Type B is that of which dominant frequency changes irregularly over the waveform. Type C is that of which dominant frequency continuously decreases and the overtones are recognized. Especially, we estimated here the location of type C events. We assumed that the seismic velocity is 1500 m/s (the typical velocity of surface wave in the sea) and the depth of hypocenter is 0 m. The type C event (recorded on December 8 in 2014) is located near the edge of the fast ice. We suggest that this type C event occurred when a large ice block collide with the fast ice.

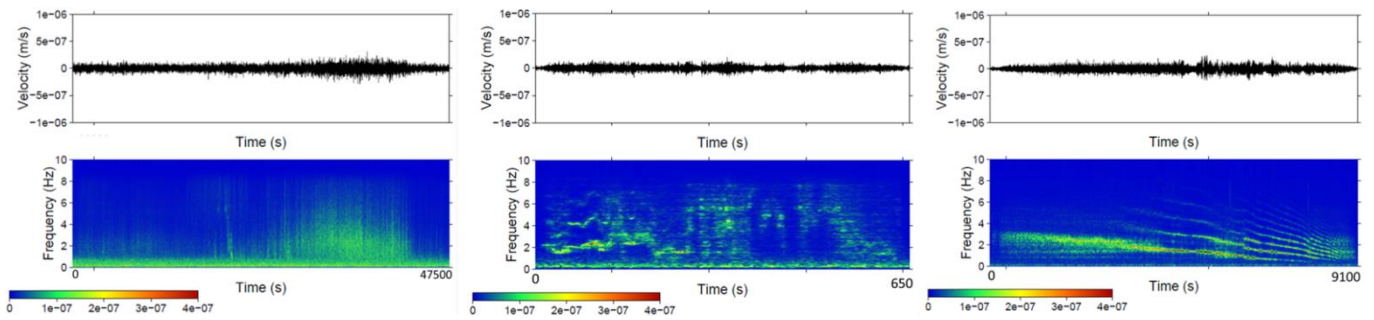


Fig.1: Examples of ice tremors of each three types.

(left)Type A: long duration (about ten thousands seconds) and small amplitude over the waveform.

(center)Type B: the dominant frequency changes irregularly over the waveform.

(right)Type C: the dominant frequency continuously decreases and the overtone is recognized.

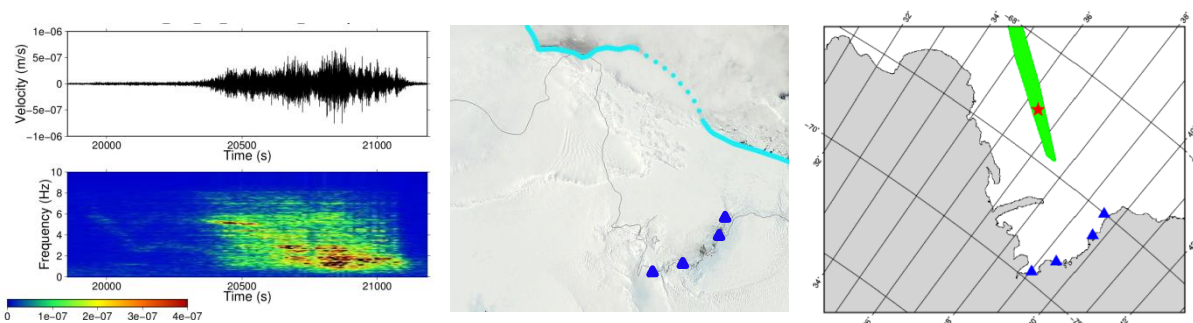


Fig 2: An example of type C ice tremors and the satellite image around the stations

Around Syowa station on December 9 in 2014. A red star (★) shows the epicenter of this event. The green area is 95% confidence region and ▲ are the seismic stations (SYO, lng, skl and rdv from N to S).