

南極・昭和基地で観測される地球自由振動帯域の縞状信号

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Streaky signal in seismic normal mode band observed at Syowa Station, Antarctica

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Background free oscillations are known as continuous and global signals on noise level in seismic normal mode band. These were found from record of superconducting gravimeter (SG) at Syowa Station, Antarctica in 1998 [Nawa et al. 1998], and then were confirmed at various sites. Other unknown slightly broad spectrum peaks were also found as streak on spectrogram in seismic normal mode band of Syowa SG data. But these signals were not found in gravimeter and seismometer records from any other sites, including IDA gravimeter record at SPA station, Antarctica.

In this study, we investigated the unknown streaky signal in seismic normal mode band using Syowa SG and broad band seismometers observed at Syowa Station and other stations. The broad spectrum peaks are clearly found at 2.5, 3.5, 7.6, 8.2, 13.2, 16.7 mHz (Figure 1) from the new third generation SG (SG58, 2010-) data at Syowa Station during January – September, 2010. These signals are confirmed from seismogram of vertical broad band seismometer (STS-1) at Syowa Station. Therefore the unknown peaks are not intrinsic noise of the first generation SG (TT70, 1993 – 2003) but are local or regional signal around Syowa Station. The atmospheric pressure, which it smears gravity signal as loading and attracting effects, doesn't have streaky feature. The sea level variation also causes high noise level at less than a few mHz band by the effect of attraction and loading [Nawa et al. 2003]. Record of a tidegauge at Syowa Station shows strong streaky signal at 2.5 mHz. But other streaky signals are not found from the tidegauge data.

We found streaky signals from seismogram at other stations (CASY, DRV, PMSA (Antarctic station), and TRIS, CRZF, PAF (Southern Ocean station)) of IRIS broadband seismometer network. These stations locate at coast. The frequencies of signal differ at each station. Streaky signals are not found at stations far from coast (over about 5 km). It is found to be different streaky signals by direction of horizontal seismogram. The source candidate is inferred to be local ocean phenomenon, e.g. local seiche arising in a few km scale. The Syowa tide gauge station with the 2.5 mHz signal locates at Nishi-no-ura Cove in East Ongul Island. The other signals might be a specific signal in otherside of East Ongul Island.

Microseisim at Syowa Station shows seasonal variation, stronger at summer, because fast ice-and sea-ice loose. Streaky signal at Syowa Station also shows seasonal variation, and its seasonality is stronger at autumn and winter and weaker at summer. The seasonal variation is consistent with that of fast-ice break-up in Lutzow-Holm Bay [Ushio, 2006]. Continuous observation of streak signal might be a good probe to monitor fast-ice variation.

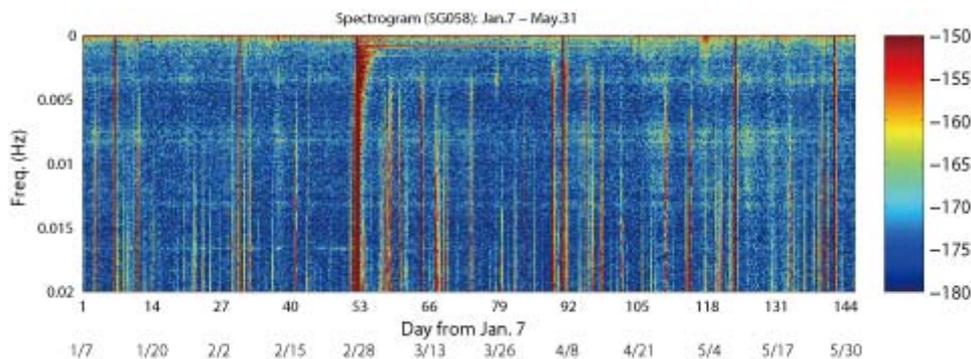


Figure 1: Spectrogram of Syowa SG data (dB)