

Observation and comparison between infrasound and audible sound compare in Antarctica

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1. Introduction

In Antarctica, geophysical events such as the collapse of glaciers and the ice quake have been observed. These event can produce infrasound as well as audible sound. Features of the infrasound are in its long distance propagation, thus the observation of infrasound can be used for remote sensing of such events. Infrasound observation has been carried out at Syowa since 2008.

2. Infrasound observation in JARE57

2.1. Trial of audible sound detection

In JARE57, we tried the multiple-site observation of infrasound and audible sound at four ground points in Lützow-Holm Bay. During days-trip to each observation site for the maintenance of instruments, we conducted audible sound observation for a few days at each site: an arrayed observation using 3 microphones and a single-site observation at Syowa.

2.2. Auto-detection of N-type infrasound waves

We newly developed automatic-detection software for N-type infrasound waves and applied it to detect such events for JARE57 infrasound observation at Syowa station.

2.3. Comparison between the spectra of infrasound and audible sound observation at Syowa

comparisons were carried out for the spectra of audible sound trial observation and arrayed observation of infrasound at Syowa.

3. Results

In JARE57, the arrayed observation of audible sound and single-site observation of infrasound at the remote 3 sites (Langhovde, Rundvågshetta, and Skallen) was operated successfully, as well as the single-site observation of audible sound and arrayed observation of infrasound at Syowa station. Datasets of the single-site infrasound observation at the remote 3 sites will be taken in the next JARE58, because of the limited operation schedule in expedition.

4. Discussion

At Skallen, the audible sound signals generated by collapses of glaciers were recorded. We successfully calculated direction of the audible sound by using the arrayed 3 microphones with an assumption of the speed of sound. Confirming some events of N-type infrasound signals were found by using the auto-detection software, confirming some event of unknown sounds and operating sound of helicopter. In the comparison of infrasound and audible sound spectra, we cannot identify the interesting spectrum trends on the infrasound spectrogram that have been observed since 2008 at Syowa on the audible data. The other interesting trend were newly found on the audible sound spectrum up to 1 kHz. It can be probably interpreted as wind-enhanced sound by unknown interaction process with the natural or artificial objects in the km-scale region near Syowa.

5. Summary

In JARE57, owing to the additional observation of audible sound, we successfully observed the possible audible sound signals generated by collapses of glaciers. By using the 3-site arrayed observation, the direction finding of sound source was in success for the first time. In the comparison between infrasound and audible sound spectra, previously reported interesting trend signals cannot be identified by the audible microphone observation.