

Infrasound observation in polar region by multiple-sites sensor arrays at around Syowa station

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Not only seismic observation but also infrasound monitoring in Antarctica is important for investigating polar region phenomena like icequakes. At Syowa station (SYO; 39E, 69S), we built a pilot infrasound site with single Chaparral Model-2 sensor in 2008 as a chance of IPY (international Polar Year) campaign. Since then, infrasonic signals have been recorded continuously at Syowa, revealing the existence of continuous low-frequency pressure waves corresponding to the Double-Frequency Microbaroms (DFM) with peaks between 4 and 10 s in whole season. Signals with same period are recorded in broadband seismograph at SYO (microseisms). The peak amplitudes of DFM reflect the influence of winter cyclonic storms in Southern Ocean, indicating relatively lower amplitudes during winters, possibly caused by sea-ice extent around the coast with decreasing oceanic loading effects. In contrast, Single-Frequency Microseism-baroms (SFM, between 12 and 30 s) are observable under storm conditions particularly in winter. Several characteristic waves detected by seismographs in Antarctica are originated from physical interaction between solid earth and atmosphere-ocean-cryosphere, involving environmental changes.

On infrasound data, stationary signals are identified with harmonic over tones at a few Hz to lower most human audible band, which appear to be local effects, such as sea-ice cracking vibration. Microseism-baroms are useful proxy for characterizing ocean wave climate, and continuous monitoring by multiple-sites seismographs and infrasound sensors contribute to FDSN and CTBT in southern high latitude. In JARE-54 program, we expanded infrasound sensors to the suburbs of SYO and multiple-sites infrasound observation was realized in February 2013. In order to detect the realistic wave source locations near SYO, array observation and multiple-sites monitoring of infrasonic and seismic waves are extremely important. The current observation project at around SYO is expected to show the existing phenomena in Antarctica with their underlying physical processes. In this paper, infrasound observation at SYO and surroundings will be discussed.

Keywords: infrasound, seismic waves, Antarctica, microbaroms, icequake, sensor array