

Current Status and Results of Infrasonic Pilot Observation at Syowa Station, Antarctica

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Infrasound is sub audible sound (pressure wave), and that frequency range is from cut-off frequency of sound (e.g., 3.21 mHz for 15 degree Celsius isothermal atmosphere) to 20 Hz (that is lowest frequency of human audible band). This frequency range is one of the new horizons of the remote sensing in the Earth's atmosphere, for example, a large earthquake in Sumatra region generated great Tsunami also produced such kinds of waves in atmosphere and shaking Earth itself by free vibration mode as well as affected even upon the upper atmosphere. Last decade, for the purpose of monitoring nuclear tests, a global infrasound network is constructed by CTBTO. The CTBT-IMS infrasound network has 60 infrasound stations and each station contains at least 4 infrasound sensors (arrayed station), they can detect a some-kiloton TNT level atmospheric explosion in range of some 1000 kilometers. This network is enough for monitoring nuclear tests, but much sparse for detecting and analyzing in detail of natural infrasound phenomena.

Observation of infrasound in Japan began in 1980's by Tahira at Aichi University of Education with using three arrayed sensors of Chaparral Physics' Model-2. They reported infrasound waves by volcanic eruptions, ocean waves, earthquakes, airplane passages, etc. Recently, it has been reported in several papers that infrasound waves possibly generated by thunders, sprites, fireballs / meteorite falls, artificial re-entry of vehicles, and auroral activities. In 2004, we began to study infrasound and discussed with Prof. Tahira, then just after his retirement of his university, these three arrayed sensors tested again at Tohoku University in 2005. In 2008, a Chaparral sensor was firstly put on the field of Syowa Station, East Antarctica as a part of the JARE-49 expedition.

In this paper, we report recent activities and status of pilot infrasound observations at Syowa Station. According to the archived datasets of Syowa, we found continuous background infrasound probably generated by ocean around East Ongul Island and the Luzow-Holm Bay region. We also find some long stand signals with harmonic over tones at a few Hz to lower most human audible band. It probably related at ice sheet vibrations with various environmental variations. The observation network developed by infrasound sensors in the Antarctic may contribute to both CTBTO and PANTOS under SCAR.

Keywords: infrasound, atmosphere, ocean, solid earth coupling, Antarctica