Two-year infrasound monitoring by using a prefectural-level sensor network in Kochi

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Infrasound, known as pressure waves in atmosphere with its frequency lower than the human audible limit of 20 Hz, can be used as one of the useful remote-sensing methods for atmospheric phenomena especially for large geophysical events such as tsunami, volcanic eruptions, typhoons, etc. In order to construct a dense sensor network in a model region for testing such capabilities and confirming noise level at each site on ground, an infrasound observation network has been installed in Kochi prefecture since 2016, taking account mainly for tsunami disasters. As for the pilot arrangement, we installed 5 sensors in Kuroshio Town in west part of Kochi pref. with a separation of about 2 and 8 km, making two-sized triangle arrays there. Then in 2017, 10 more sensors were added on wider area in whole of prefecture, constructing 25 km scale arrayed deployment in 2 cape areas of Muroto and Ashizuri. During two years since the sensor network establishment, we have been tested the capability of remote-sensing by using as much as the observed datasets with comparing with the other observations of weather, seismic, optical measurements operated by the other research institutes/agencies.

Tsunami is one of the most dangerous geophysical phenomena for human life and the Japanese originated word of TSUNAMI shows Japan is one of the most dangerous regions for tsunami disasters in the world. Kochi prefecture is located in Shikoku island along its southern coast, namely, in Kochi pref., we have many dangerous sites of tsunami invasion once a huge earthquake happens in Nankai Trough in the pacific ocean. However, in normal situation, no such signals can be detected when we can live there safely from tsunami. We do not need such disaster anymore, but without having phenomena, we cannot check the disaster-mitigation performance in reality.

Thus, we have to investigate the capability of infrasound sensing by using the other geophysical/artificial phenomena such as typhoons, volcanic eruptions, thunders, fireballs (large meteors), and rocket launches. As it is one of the densest infrasound observation networks in prefecture-level area in a nation, we need another analyzing method than that applied for usual arrayed infrasound sensors. Therefore, we tried to develop some methods for getting information from the infrasound datasets, to be useful for future alert system for disaster mitigation.

Recently, multiple typhoon passages, multiple eruption signals from a few volcanoes in Kyushu area, and a bright fireball seen over shikoku island on Jan. 3, 2019 were successfully detected by multiple sensors. In this talk, we will introduce the sensor network in Kochi as a model case and the obtained datasets in consideration of geophysical phenomena.

Keywords: Infrasound, Sensor network, Remote sensing