

Detection of coherent overpressure variation caused by 2022 Tonga eruption with Kochi University of Technology infrasound observation network

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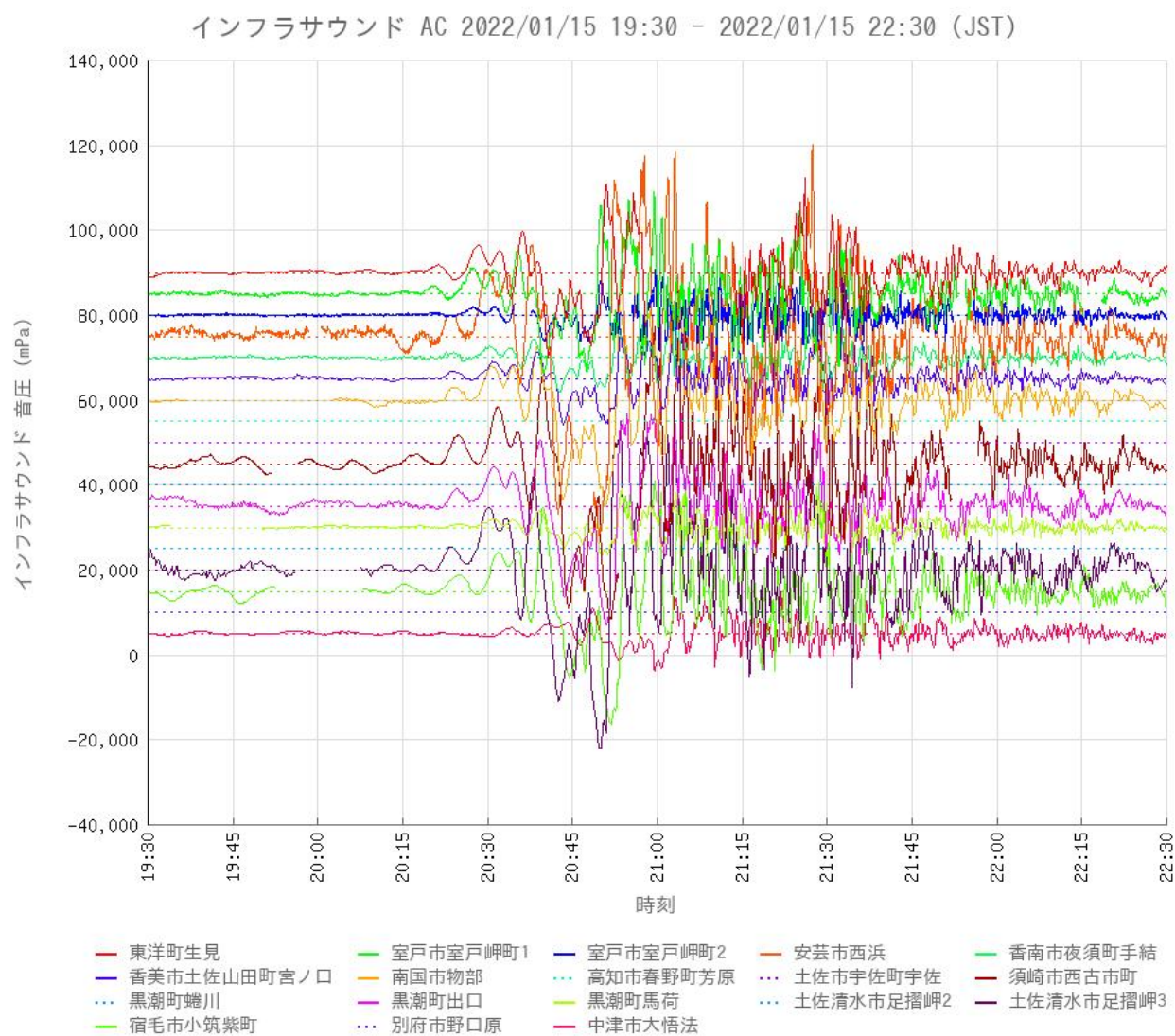
On January 15, 2022, Hunga Tonga-Hunga Ha'apai volcano in Tonga erupted destructively, generating strong impulsive shock wave from the heated atmosphere over the volcanic island. The island itself was severely destroyed and the VEI (Volcanic Explosivity Index) 6 is said to be "once in a century" level. After 7 hours from the eruption, the beginning of coherent overpressure signal was detected, lasting several hours since then.

Kochi University of Technology (KUT) have been installed more than 30 infrasound sensors of SAYA INF01 type in Japan consisting KUT Infrasound Sensor Network for investigating early tsunami warning application since 2016, as well as in 2019 the nation-wide infrasound observation network with the infrasound observation consortium was established with many collaborative institutes in Japan. The KUT Infrasound Sensor Network detected the strong and long-lasting infrasonic signals with 25 observation sites in working at the time of signal arrival.

Surprisingly, the signal shows almost similar coherent characteristics at every site from Hokkaido to Kyushu, implying the signal arrival of very huge scale disturbances we have never experienced before. Here, we will introduce the four groups of detected overpressure signals as well as detailed analysis of considerable 4 types of the propagation in atmosphere and discuss possibilities of arising some coupling events during the propagation for about 8000 km from Tonga to Japan over Pacific ocean.

The nation-wide infrasound observation network is significant for understanding such long-distant propagating waves in the atmosphere and its possibility to enhance effectiveness of the disaster mitigation.

Keywords: Infrasound, Coherent waves, Shock wave



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