Multi-sensor study of dynamics of atmospheric waves induced by volcanic eruptions: Ionospheric disturbances made by the 2015 Kuchinoerabujima volcanic eruption

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Atmospheric waves with frequencies lower than ~10 mHz excited by near-surface phenomena sometimes reach the ionosphere and have observed as ionospheric disturbances. Atmospheric waves by volcanic eruptions also can excite ionospheric perturbations.
We have examined what kinds of ionospheric disturbances can volcanic eruptions excite by comparison between GNSS-TEC observation and any other facts (the sequences of each volcanic eruptions, broadband seismometer and barometer observation results, etc). In this presentation, I would report lower frequency atmospheric wave excited by the Kuchinoerabujima eruption on 29 May 2015 and discuss the dynamics of atmospheric waves induced by volcanic eruptions. examined what kinds of ionospheric disturbances can volcanic eruptions excite
Kuchinoerabujima is a volcanic island located about 100 km off the southern tip of Kyushu, the westernmost island of the four main islands in Japan. The explosive eruption of the volcano occurred at 0:59 UT (9:59 LT) May 29, 2015, with the eruption magnitude VEI 3. We found the GEONET 1 Hz GNSS observation data showing the propagation of acoustic waves with frequencies < 0.01 Hz in the ionosphere.
GNSS-TEC perturbation by the eruption includes ~10 mHz N-shaped pulse and 5 mHz wave continuing ~15 min., and propagated spherically from the volcano. On the other hand, F-net broadband seismometer and AIST barometer arrays detected propagation of ~10 mHz infrasound. TEC N-shaped pulse corresponds to lower atmospheric infrasound propagation well. However, 5 mHz continuous TEC signal was not detected by the observation near the surface.

Keywords: GPS, GNSS, TEC, Volcanic eruption, Infrasound, Broadband seismometer

