

D-region ionospheric effects for 2016 eruptions of Mt. Aso using LF transmitter signals

*大矢 浩代¹、折戸 雄飛²、土屋 史紀³、山本 真行⁴、中田 裕之¹、吉川 顕正⁵

*Hiroyo Ohya¹, Yuhi Orito², Fuminori Tsuchiya³, Masa-yuki Yamamoto⁴, Hiroyuki Nakata¹, Akimasa Yoshikawa⁵

1. 千葉大学大学院工学研究院、2. 千葉大学工学部、3. 東北大学、4. 高知工科大学、5. 九州大学

1. Graduate School of Engineering, Chiba University, 2. Faculty of Engineering, Chiba University, 3. Tohoku University, 4. Kochi University of Technology, 5. Kyushu University

Several studies for the F-region ionosphere associated with volcano eruptions based on GPS-total electron content (TEC) data have been reported so far (e.g., Heki, 2006; Dautermann et al., 2009; Heki et al., 2010). These studies reported that acoustic waves excited by volcano eruptions reach up to the F-region ionosphere and caused F-region perturbations. After eruption of the Kelud Volcano, Indonesia, in February 2014, acoustic resonance between the Earth's surface and lower thermosphere was reported based on TEC data and the seismic wave data (Nakashima et al., 2015). However, little studies on the D-region ionosphere associated with volcano eruptions have been reported. In this study, we investigate the D-region ionospheric effects of 2016 eruptions of Mt. Aso (32.89N, 131.08E), Japan, using intensity of low frequency (LF, 30-300 kHz) transmitter signals. The LF propagation paths used in this study were JJY (JJY60) - Sasaguri (SGR, Japan, Observatory of Kyushu University), JJY (JJY40) - SGR, and BPC (68.5 kHz) - SGR. Mt. Aso erupted at 16:46 UT on 7 October, 2016. The volcanic explosivity index (VEI) was 3 out of 8, and the eruption height was 11 km. The VLF/LF intensity on all three paths varied with frequency of 2-5 mHz based on wavelet spectra during 16:53-17:20 UT after the eruptions (16:46 UT). We compared the perturbations with atmospheric pressure data obtained by the Kochi university of Technology Infrasound Sensor Network, and seismic waves in the National Research Institute for Earth Science and Disaster Resilience (NIED) Full Range Seismograph Network of Japan (F-net) data (INN, TKD, and TMC) located close to the LF path. The atmospheric pressure and vertical velocity of the seismic waves had the similar frequencies of 3-6 mHz during 16:46-17:20 UT. These similar frequencies suggest that the perturbations would be caused by acoustic resonance between the Earth's surface and lower thermosphere, or by acoustic and atmospheric gravity waves generated by the volcanic eruptions. In the presentation, we will discuss the cause of the VLF/LF perturbations in more detail.