

Simulation of ionosphere-thermosphere variations associated with the eruption of Tonga volcano

*Hiroyuki Shinagawa¹, Yasunobu Miyoshi²

1. National Institute of Information and Communications Technology, 2. Kyushu University

On 15 January 2022 significant ionospheric variations were observed worldwide, which is thought to be associated with the eruption of Hunga Tonga-Hunga Ha'apai in Tonga. Initial reports suggest that the acoustic-gravity waves generated by the eruption propagated concentrically, driving the ionosphere-thermosphere variations. To understand the mechanism of the variations in the ionosphere, we performed numerical simulations using the whole atmosphere-ionosphere coupled model GAIA and an axisymmetric 3-D nonhydrostatic atmosphere model. In the simulation, sudden heating is given initially in the volcano region. Initial results indicate that a series of concentric waves are generated and propagate outward in the ionosphere-thermosphere, and the thermospheric gravity waves originating from the eruption reach Japan in about 7 hours after the eruption, which is consistent with the observed ionospheric variations. We will report and discuss the results obtained by the simulation.

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