

Possible detection of acoustic waves by the Swarm satellites at a passage of the Lamb wave caused by the 2022 HTHH volcanic eruption

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The 2022 Hunga Tonga Hunga Ha'apai volcanic eruption caused a strong Lamb wave which orbited the Earth several times. The magnetic fields and electron density variations observed by the Swarm satellites at the passage of the Lamb wave suggest a detection of acoustic mode waves. The parallel component of magnetic field variation to the geomagnetic main field is normally very small in low and middle latitudes on the dayside. However, around the encounter of the satellite with the Lamb wave front, it shows a tendency of positive correlation with the electron density variation although the correlation coefficient is not very high. The apparent period of the variations observed by the Swarm satellites is typically around 10-20 seconds, however, the ground geomagnetic observations near the satellite orbit do not show any clear magnetic pulsations. It suggests that the observed wave-like variation could be mainly a spatial structure of compressional waves or a wavy structure in the ionospheric F-region plasmas by a vertical motion.

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