



## **Far-field Lithosphere-Atmosphere-Ionosphere Coupling Associated with the Hunga Tonga-Hunga Ha'apai Volcano Eruption**

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An instrumental array was established in Sichuan, China and was officially operated in September 2021 for monitoring vibrations and perturbations in the lithosphere-atmosphere-ionosphere (MVP-LAI) coupling. Most instruments were installed within an occupied area of  $\sim 400 \text{ m}^2$  for focusing on interactions in multiple geospheres. The Hunga Tonga-Hunga Ha'apai (HTHH) underwater volcano erupted at  $\sim 4:00$  UT on 15 January 2022. The MVP-LAI array is located  $\sim 10,275$  km away from the HTHH volcano. Four distinct mechanisms couple the perturbations in numerous geophysical parameters associated with the eruptions are separated through a long propagation distance. The perturbations in total electron contents (TECs) and the geomagnetic field are initially captured by the MVP-LAI array due to the ionospheric electrodynamics. The secondary perturbations are observed in air pressure due to arrivals of the Lamb waves propagating with a velocity of  $\sim 310$  m/s. The perturbations in air pressure change the ground vibrations, accordingly. The Lamb waves enhance the velocity of the vertical winds that probably dominated the variations in the atmospheric electric field. Meanwhile, the Lamb waves also excited upward propagations of acoustic waves driving the changes in the geomagnetic field and TECs again. All of the observation results enrich the knowledge in the LAI coupling.