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[Observational study of the heterogeneous global meteotsunami generated after the Hunga Tonga–Hunga Ha’apai Volcano eruption](#)

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Abstract: The Hunga Tonga–Hunga Ha’apai volcano eruption of January 15th 2022 generated a global atmospheric and oceanic response that was recorded by an unprecedented amount of sensors. The eruption caused an atmospheric perturbation that travelled as a Lamb wave surrounding the Earth at least 3 times, and was recorded by hundreds of barographs worldwide. The atmospheric wave showed complex patterns of amplitude and spectral energy content, although most of the energy was concentrated in the band (2–120 min). Simultaneously to each passage of the atmospheric wave and after, significant Sea Level Oscillations (SLOs) in the tsunami frequency band were recorded by tide gauges located all around the globe, in what it can be referred to as a global meteotsunami. The amplitude and dominant frequency of the recorded SLOs showed a high spatial heterogeneity. Our point is that the geometry of continental shelves and harbours acted as tuners for the surface waves generated by the atmospheric disturbance at open sea, amplifying the signal at the eigenmodes of each shelf and harbour.

Keywords: Meteotsunamis, Sea Level Oscillations, Hunga Tonga–Hunga Ha’apai volcano, tide gauges