

Rapid Conjugate Appearance of the Giant Ionospheric Lamb Wave in the Northern Hemisphere After Hunga-Tonga Volcano Eruptions

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The explosive eruption of the Hunga-Tonga volcano in the southwest Pacific at 0415UT on 15 January 2022 triggered gigantic atmospheric disturbances with surface air pressure waves propagating around the globe in Lamb mode. In space, concentric traveling ionosphere disturbances (CTIDs) are also observed as a manifestation of air pressure waves in New Zealand ~0500UT and Australia ~0630UT. As soon as the air pressure waves reached central Australia ~0800UT, conjugate CTIDs appeared almost simultaneously in the northern hemispheres through interhemispheric coupling, much earlier than the arrival of the surface air pressure waves to Japan after 1100UT. Combining observations over Australia and Japan between 0800-1000UT, both direct and conjugate CTIDs show similar horizontal phase velocities of 320-390 m/s, matching with the dispersion relation of Lamb mode. The arrival of atmospheric Lamb wave to Japan later created in situ CTIDs showing the same Lamb mode characteristics as the earlier conjugate CTIDs.

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