Longitude-Altitude Tomographic Images of Equatorial Plasma Depletions using the C/NOFS CERTO Beacon

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Using the NRL CERTO beacon on the C/NOFS satellite and an East-West chain of receivers across Peru, electron density maps of equatorial irregularities have been produced showing late time structures in equatorial bubbles. The CERTO beacon radiates coherent frequencies at 150 and 400 MHz with a common phase reference. Transmitted continuously from C/NOFS, these signals are phase enhanced after passing through the ionosphere. The VHF and UHF signals are acquired using NWRA ITS30 receivers and converted into total electron content with an unknown absolute value using the differential phase technique. Receivers located at Ancon, Huancayo, Ayacucho, Cuzco, and Puerto Maldonado recorded this relative total electron content (RTEC) between the C/NOFS satellite and the ground. Using the Multiplicative Algebraic Reconstruction Algorithm (MART), tomographic images of equatorial irregularities with 10 km spatial resolution have provided a snapshot of equatorial bubble cross section in electron density. These tomographic reconstructions also take advantage of in-situ CINDI electron density data from the C/NOFS satellite and ionosonde data from Jicamarca Radio Observatory to help constrain the reconstructions. All of the examples of 2-D bubble images occurred post midnight when they had penetrated to the top-side ionosphere.

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