

First observations of large-scale wave structure and equatorial spread F using radio beacons on board C/NOFS satellite

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Equatorial spread F (ESF) is a generic name, which refers to the presence of a wide spectrum of field-aligned irregularities in the equatorial nighttime F-region that can extend over nearly seven orders of magnitude. Recently, a large-scale wave structure (LSWS) in the F-layer electron density is identified as a reliable precursor to ESF. The LSWS can be identified as a quasi-periodic modulation in the altitude of isoelectron density contours in the bottomside F-region, superimposed on a mean slope that increases in altitude from west to east. First observations of large-scale wave structure (LSWS) and the subsequent development of equatorial spread F (ESF), using total electron content (TEC) derived from the ground based reception of radio beacon signals from the C/NOFS (Communications/Navigation Outage Forecasting System) satellite will be presented. For this study the TEC observations during January 2009 from Bac Lieu, Vietnam (9.2 N, 105.6 E geographic, 1.7N magnetic dip latitude) are analyzed along with ionosonde observations from Bac Lieu, Chumphon (10.7 N, 99.4 E, 3.3 dip lat) and 30.8 MHz VHF radar observations from Kototabang, Indonesia (0.20 S, 100.32E, 10.36S dip lat). The results indicate (1) LSWS appears to play a more important role in the development of SF than the post-sunset rise (PSSR) of the F-layer, and LSWS can appear well before E-region sunset. Other findings, that LSWS does not have significant zonal drift in the initial stages of growth, and can have zonal wavelengths of several hundred kilometers, corroborate earlier reports.