



Observation of ionospheric F region bottom-type scattering layer during pre-sunset hours

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Ionospheric F region bottom-type irregularities, which are shown as a backscattering layer with thickness typically less than 50 km in radar range-time-intensity plots, were observed generally after sunset around magnetic equator. Using simultaneous multi-beam radar measurements over two low-latitude stations, Sanya (18.3°N, 109.6°E; dip latitude 13°N) and Fuke (19.3°N, 109.1°E; dip latitude 14°N) in China, we report a thin bottom-type scattering layer (BSL) initially occurred at pre-sunset (~1720 LT), much earlier than the occurrence of BSL generated from the equatorial plasma shear vortex driven instability. The pre-sunset BSL was situated around 225 km altitude, and continued to exist until the appearance of ESF plumes after sunset (~1930 LT). Interestingly, the Doppler velocities of the pre-sunset BSL echoes measured by the radar, and the F layer virtual heights obtained from the collocated Digisonde measurements over Sanya both show oscillations with a period of about 1 hour, suggesting a close link between the occurrences of the BSL and of F region plasma density large-scale wave structure before sunset. Although the post-sunset BSL is usually thought to be generated through the equatorial plasma shear vortex driven instability, the present BSL observed during the pre-sunset hours at low latitudes far away from the magnetic equator, however, is hard to be explained by the equatorial mechanism. Possible factors responsible for the occurrence of the pre-sunset BSL are discussed.