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Ionospheric response to high-speed streams at solar minimum
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To demonstrate high-speed stream effects during the recent deep solar minimum year 2008, we have analyzed manually scaled foF2 and hmF2 at Jicamarca and total electron content (TEC) in the equatorial ionization anomaly (EIA) region over the America longitudinal sector. Our results reveal that a prominent 9-day oscillation appears in the hmF2 and foF2 at the dip equator. The 9-day oscillation amplitudes of foF2 are not always positively correlated with TEC in the equatorial ionosphere and they show non-linear dependence on the intensity of geomagnetic disturbances. With the outputs of Fejer and Scherliess [1997] empirical model, we found that this periodicity is also present in equatorial vertical drifts caused by disturbance dynamo electric field (DDEF) but absent in the drifts due to prompt penetration electric field (PPEF). DDEF effects on the equatorial periodic variations alone are not sufficient to explain the observed phenomena; other mechanisms, such as thermal expansion/contraction and neutral composition changes, are also the plausible causes of the periodic oscillation in the equatorial ionosphere. Further, the complicated patterns appear in the 9-day band-pass-filtered TEC perturbations in the EIA region, and they are quite different from the patterns of global coherent thermospheric oscillations triggered by high-speed streams. We also found that the latitudinal variations of band-passed-filtered TEC present different behaviors involving tilt latitudinal configuration, anti-phased correlation between the crests and trough, and south-north asymmetry, which vary as a function of season, local time, or even from event to event.