

The longitudinal differences of lunar tidal characteristics between East Asian and American sectors during stratospheric sudden warming events: 2009-2018.

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With data of total electron content (TEC), equatorial electrojet (EEJ), stratospheric temperature and wind field, variations of the low-latitude ionosphere in East Asian and American sectors were investigated during stratospheric sudden warming events from 2009-2018. The lunar tidal amplitudes (M2) were derived with the least-square method. Then their features were compared separately during outstanding major events, moderate major events, minor events, and a non-SSW winter. Brief results are listed as follows: (1) In the American sector, the M2 tides appeared to be dominant over solar tides in all major events since distinct time-shifted semi-diurnal patterns could always be detected during those periods. (2) In the East Asian sector, the M2 characteristics were less clear, and sometimes even hard to identify, which means the relative strengths of lunar and solar tides are more complex in this sector. (3) The M2 amplitudes in TEC tend to be larger in the American sector than in East Asian sector during the same event. (4) The longitudinal differences tend to be lessened in minor SSWs compared to major SSWs. (5) During the non-SSW winter, lunitidal features could still be detected in both sectors. Similar results can be found in previous works for different kinds of parameters. Such longitudinal differences were attributed to combined effects of the geomagnetic field configuration, the latitudinal dependence of lunar and solar tides, the changes of atmospheric circulation, and the coupling process from the lower-atmosphere to the F region ionosphere.

Keywords: Stratospheric Sudden Warming, Low-latitude Ionosphere, Longitudinal Differences, Lunitidal Characteristics