

Meridional movement of northern and southern EIA in the East-Asia sector during 2002-2003 SSW

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This presentation investigates the asymmetrical variability of the location of the north and the south equatorial ionization anomaly (EIA) crests in the East-Asian sector, along with their association with simultaneous observations of equatorial electrojet (EEJ) strength, geomagnetic activity index, and solar flux index during the 2002–2003 sudden stratospheric warming (SSW) event. Analysis of these observations indicates the existence of a large-scale quasi 16-day periodic meridional movement in both EIA crests, and also reveals a strong correlation between the quasi 16-day oscillation in geomagnetic latitudes of the EIA crest and EEJ strength. The latitude of the northern/southern EIA crest and the EEJ strength indicate that obvious synchronous periodic oscillations were in-phase in the northern and southern hemisphere when the SSW occurred. In addition, it is also found that both the EIA crest location and amplitude of the periodic movement of the EIA locations exhibit hemispheric asymmetry. The amplitude of the periodic movement of the EIA location in the southern hemisphere is larger than that of the northern hemisphere, and the southern EIA crest is further off from the equator than the north one. Understanding these asymmetries requires a combination of mechanisms that involve at least trans-equator meridional winds and the position of a sub-solar point; however, potential disturbances in neutral winds associated with the SSW may additionally complicate the equatorial ionospheric dynamics.

Keywords: equatorial ionization anomaly, sudden stratospheric warming, ionosphere