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The equatorial ionospheric anomaly in electron content from solar minimum to solar maximum for South East Asia

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Abstract. Median hourly, electron content-latitude profiles obtained in South East Asia under solar minimum and maximum conditions have been used to establish seasonal and solar differences in the diurnal variations of the ionospheric equatorial anomaly (EIA). The seasonal changes have been mainly accounted for from a consideration of the daytime meridional wind, affecting the EIA diffusion of ionization from the magnetic equator down the magnetic field lines towards the crests. Depending upon the seasonal location of the subsolar point in relation to the magnetic equator diffusion rates were increased or decreased. This led to crest asymmetries at the solstices with (1) the winter crest enhanced in the morning (increased diffusion rate) and (2) the same crest decaying most rapidly in the late afternoon (faster recombination rate at lower ionospheric levels). Such asymmetries were also observed, to a lesser extent, at the equinoxes since the magnetic equator (located at about 9°N lat) does not coincide with the geographic equator. Another factor affecting the magnitude of a particular electron content crest was the proximity of the subsolar point, since this increased the local ionization production rate. Enhancements of the EIA took place around sunset, mainly during the equinoxes and more frequently at solar maximum, and also there was evidence of apparent EIA crest resurgences around 0300 LST for all seasons at solar maximum. The latter are thought to be associated with the commonly observed, post-midnight, ionization enhancements at midlatitudes, ionization being transported to low latitudes by an equatorward wind. The ratio increases in crest peak electron contents from solar minimum to maximum of 2.7 at the equinoxes, 2.0 at the northern summer solstice and 1.7 at northern winter solstice can be explained, only partly, by increases in the magnitude of the eastward electric field **E** overhead the magnetic equator affecting the [**E**×**B**] vertical drifts. The most important factor is the corresponding increase in ionization production rate due to the increase in solar radiation flux. The EIA crest asymmetries observed at solar maximum were less significant, and this is probably due to the corresponding increase in ionization densities leading to an increase of the retarding effect of ion-drag on the daytime meridional winds.

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