Daytime Climatology of Ionospheric NmF2 and hmF2 from COSMIC data

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Constellation Observing System for Meteorology, Ionosphere and Climate (COSMIC) data were analyzed to study the climatological variations of the $F_2$ region ionosphere. A 30 day running median was applied to the daily medians of each geomagnetic latitude bin ($10^\circ$) to remove the short term variability of the data. This permitted a better description of the long term daytime climatology across the most recent solar minimum to be obtained. Several significant features appeared in this climatology: 1) low-latitude $N_mF_2$ was dominated by the semi-annual anomaly, the equatorial anomaly and the annual asymmetry (anomaly); 2) Semi-annual and annual anomalies extended into the middle latitudes; 3) this extension into the middle latitudes appears to be dependent on variations of solar radiation over the solar cycle, as the variations did not reach as far poleward in 2008 as they did in 2010; 4) The second equinoctial maximum is not centered on the September equinox, but occurred in October; 5) there is an annual variation at high latitudes in which maximum values of $N_mF_2$ occur in summer – there is no indication of a winter anomaly and, in fact, when hemispheres are compared, maximum $N_mF_2$ at mid latitudes always occurs in the summer hemisphere rather than the winter one; 6) the highest values of $h_mF_2$ at low latitudes occur on the summer side of the magnetic equator throughout the four year period, probably resulting from winds blowing from the summer to the winter.