

Annual and semiannual variation of the global ionospheric TEC

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In the present work we analysis the Annual and semiannual variation of the global ionosphere from TEC data of both the TOPEX/POSEIDON and GPS network. The TEC data are used to estimate the relative annual and semiannual amplitude, A_1 and A_2 , as well as the symmetrical and asymmetrical parts, A' and A'' , of the relative annual amplitude. Thus we investigated in detail the TEC climatology from maps of these indices, with emphasis on the quantitative presentation and local time and latitudinal changes of the annual and semiannual variations of the ionospheric TEC. It was found that the yearly TEC variations, through their indices A_1 , A_2 , A' and A'' , manifested most properties of the ionospheric climatology which were previously found and investigated chiefly from the peak electron density parameter NmF2. (1) The symmetrical annual index A' is positive (20-25%) at tropic and mid-latitude all the local time excluding the sunrise period, implying that TEC is stronger in December solstice than in June solstice, as the behavior of NmF2 annual anomaly. (2) The semiannual index A_2 is positive (10% to 15%) in daytime at all the latitudes, and goes up to 20% in evening and midnight at tropic latitudes, indicating that the TEC value may larger at equinoxes than at solstices, just as the semiannual anomaly of NmF2. (3) The asymmetrical annual index A'' maintain opposite signs in different hemispheres and tending to reverse around noon time at higher mid-latitudes, just as the seasonal anomaly of NmF2 that the noon time ionization at higher mid-latitudes is strong in winter than in summer.