

Neutral thermosphere modelling using sectorial geomagnetic indices

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Since the 1970's, semi-empirical models of neutral thermospheric density are stuck at a 10–20% precision limit with respect to observations. One of the reasons for this is the use of planetary geomagnetic indices (i.e. one value for the whole Earth at a given UT). However, it is well known that the atmospheric variability related to geomagnetic activity at thermospheric heights is a function, while not well known, of geographical location (cf. different physical regimes governing the polar ionosphere). In our tests we made use of the so-called $a\lambda$ longitude sector geomagnetic index that depends on both the geodetic latitude and longitude, the DTM-2000 model of the neutral thermospheric density, and the observed densities derived from the accelerometer measurements aboard the CHAMP satellite. Using the sectorial index of geomagnetic activity instead of the planetary one improves the agreement of the modelled and observed densities especially during the geomagnetic storms. The DTM-2000 algorithm was modified to accommodate these indices, which in fact represents the first step of its upcoming complete revision, in order to benefit most from the assimilation of the CHAMP and GRACE density data.