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Ionospheric signatures of non-migrating tides and stratospheric warming

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Observational data bases from recent years provided more and more evidence that climate and weather phenomena influence the dynamics of the high atmosphere. In the first part of this presentation we will address the dynamical interaction caused by non-migrating tides. Several of these tidal modes are generated in the lower atmosphere and are believed to propagate all the way up to the exosphere. Quantities that reflect the characteristics of the tides very well, are thermospheric temperature and wind. The dynamics of the neutrals is partly transferred to charged particles in the ionospheric E-layer. For that reason tidal signals are also present in the ionospheric E and F region. We show, as examples, the effect on the equatorial electrojet (EEJ), vertical plasma drift and F region electron density. Since the coupling conditions and strength between neutral and charged particles vary over the course of a day (a year, a solar cycle), the recovery of the complete ionospheric tidal signals is complex. We will present the amplitude and annual variation for the most prominent tidal components.
A very recent topic of vertical coupling is the influence of sudden stratospheric warming (SSW) on the ionospheric electrodynamics. SSW has been shown to modify among others the diurnal variation of the vertical plasma drift and the electric field at equatorial latitudes. We will present global observations of the EEJ and its response to SSW events in 2002/2003. A typical feature is an enhancement of the EEJ intensity in the pre-noon hours and a reduction in the afternoon. Possible mechanisms causing these modifications will be discussed.