Climatological variations in the ionosphere deduced from long-term database of EISCAT UHF radar

Tetsuo Motoba[1]; Yasunobu Ogawa[2]; Satonori Nozawa[3]; Ryoichi Fujii[3]
[1] Nagoya Univ.; [2] SNational Institute of Polar Research; [3] STEL, Nagoya Univ

Long-term database of European incoherent scatter (EISCAT) UHF radar at Tromsoe (69.6N, 19.2E) has been utilized to study ionospheric climatology for electron density, ion and electron temperatures, and ion drifts. The EISCAT UHF radar is able to characterize diurnal, seasonal, and solar cycle variations of height dependent ionospheric structures in the auroral-subauroral zone. The huge database covers about 2 solar cycles (1984-2004). Based on the database, our systematical analyses will result in a comprehensive overview of various features of the ionosphere.

Solar EUV radiation is one of the primary energy inputs to the upper atmosphere and its ionizing radiation produces the ionosphere. For many models and algorithms the F10.7 index has widely been used as a reasonable proxy for solar EUV flux, but the F10.7 index temporal variation does not exactly reflect the solar EUV-range radiation, especially short-term variations. In comparison with the F10.7 index, it was shown that the composite Mg II index, derived from space-based measurements, is more suitable indicator of the solar EUV flux temporal variation as well as the UV flux [Viereck et al., 2000]. In fact, we confirm that long-time series of the Mg II index has a slightly higher correlation with the ionospheric F2-peak height (hmF2) data than the F10.7 index. In this study, we filter out the dominating effects of solar activity on the hmF2 variation by replacing the F10.7 index with the Mg II index and reexamine the EISCAT database to obtain more accurate long-term trend of hmF2. The same method is applied also to the long-term trend analysis of other ionospheric parameters.