



Diagnostics of the ionospheric sub-auroral region on the example of the main ionospheric trough and AKR-like emissions

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The sub-auroral ionosphere is a region which changes drastically with a change of geomagnetic activity. It represents a boundary between auroral oval and mid-latitude ionosphere, and, during geomagnetic disturbances, is influenced by Auroral Electrojet, Field Aligned Currents and features related to the plasmapause dynamics. One of the typical structures for the mid-latitude ionosphere is the main ionospheric trough.

The mid-latitude electron density trough is mostly observed in the topside ionosphere and its existence is dependent on magnetospherically induced motions. Its behavior, thus, can provide useful information on the magnetospheric dynamics. The convective electric field and auroral particle precipitation play an important role in the creation of trough features towards the equatorward edge of the auroral oval.

The geomagnetic storms result from a very efficient exchange of energy from the solar wind into the space environment surrounding the Earth and have a major impact on the behavior of the Earth's magnetosphere and, thus, on the main ionospheric trough as well. The analysis of the mid-latitude trough features during geomagnetic disturbances can give us also information about physical processes and changes that occur in the ionosphere.

During geomagnetic disturbances, it is also very likely to observe so called AKR-like emissions that can be seen at satellite altitudes as well as from the ground. We present here emissions that have been observed at the top side ionosphere region.

Using the DEMETER in situ satellite measurements and the data retrieved from FORMOSAT-3/COSMIC radio occultation measurements the mid-latitude trough characteristics with regard to the geographic and magnetic longitude at a fixed local time have been presented.