

Title: Ionospheric drift measurements

Author: Daniel Kouba

Department: Department of Surface and Plasma Science

Supervisor: RNDr. Petra Koucká Knížová, Ph.D. Institute of Atmospheric Physics,
Academy of Sciences of the Czech Republic

Abstract:

This thesis deals with ionospheric drift measurements using Digisonde DPS-4. The results are divided into theoretical and practical part. It is shown that for drift data processing it is necessary to choose correct reflection points corresponding to drift movements first. The selection is made in three steps: restriction of Doppler frequency shift, height range selection, choice of the maximum zenith angle. Afterwards it is possible to credibly estimate the vector of drift velocity.

The experimental results of drift measurements are based on data from the Pruhonice station. To study the common behavior of ionospheric drifts during quiet conditions, the statistical characteristics of drift velocity components are investigated in layers E and F during geomagnetic quiet year 2006.

The maximal daily amplitude of horizontal velocity demonstrates the influence of geomagnetic activity. It is proved to be considerable in the F layer meanwhile it was not observed in the E layer. The effect of strong geomagnetic disturbances is shown at two examples of extreme storms.

The implementation of the reflection points selection method significantly increased the quality of drift measurements. The analysis of drift movements was made in such a detail way for the middle latitudes for the first time and it describes the behavior of drifts during quiet conditions as well as during geomagnetic disturbances.

Keywords: ionosphere dynamics, Digisonde, drift movements, geomagnetic storm