



Can a poor quality of drift measurements indicate a well stratified ionosphere?

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Ionosonde measurements are based on the total reflection of HF waves at locations in the ionosphere where the frequency of the transmitted wave is equal to the plasma frequency.

During Digisonde drift measurement, transmitted signal illuminates a large ionospheric area of several hundred kilometres diameter above the sounder. Spectral analysis is applied to the received signals to identify reflection points in the ionosphere and their Doppler shifts.

For velocity estimation we need measurement with minimally 3 non-colinear registered reflection points.

However, in case of perfectly horizontally stratified ionosphere, only one vertical direction echo exists. The oblique echoes in measurements occur due to ionospheric irregularities disturbing the density contours.

It means that good quality drift results with a large number of SKYmap points come from measurements of the disturbed ionosphere.

In Pruhonice observatory, we provide both F-region and E-region drift measurements every 15 minutes. Quality of measurement (number and distribution of identified reflection points) is variable, during the best measurements we register several thousands of reflection points on the SKYmap. On the other hand, during some measurements we only register a few points.

In our paper we show diurnal and seasonal variation of drift measurement quality. We can not estimate drift velocity for poor-quality SKYmaps accurately, but we can obtain different information about state of ionosphere. The SKYmaps with a few reflection points cumulated near vertical direction tell us that the ionosphere is well vertically stratified.