Ionosonde measurements of dynamic characteristics and inhomogeneities of the ionosphere

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Models for the ionosphere, including the IRI model, use various characteristics of the ionosphere to base a reconstruction or modelling of the electron density distribution on, such as f_oF_2, h_mF_2 and vertical TEC. These variables are either used to build (climatological) models or are ingested in real-time for nowcasting applications. However, only static, local characteristics are currently being used. In order to improve the models for the electron distribution and to provide accurate forecasts, knowledge of dynamic parameters like plasma drift velocities as well as asymmetries and gradients in the ionosphere are needed. This is particularly important for the modelling of the ionosphere in disturbed conditions, as strong gradients and large plasma movements can be expected to occur during storms. We use the capabilities of the Digisonde installed at the geophysical observatory in Dourbes, Belgium to investigate ionospheric tilts and gradients as well as the full, three-dimensional plasma drift vector. We discuss diurnal and seasonal quiet-time patterns and look at some recent geomagnetic storms.