



## **Comparison of Travelling Ionospheric Disturbances characteristics extracted from Digisonde-to-Digisonde operations and GNSS-TEC de-trending and gradient techniques**

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Digisonde-to-Digisonde (D2D) “skymap” observations in Europe offer the potential for near real-time identification of Travelling Ionospheric Disturbances (TID) characteristics and specification of the TID wave parameters. The method is based on permanent measurements, from a pan-European network of Digisondes, of the angle-of-arrival, Doppler frequency, and time-of-flight of ionospherically reflected high-frequency (HF) radio pulses. An operational system has been developed that provides the estimated TID characteristics online (<http://tid.space.noa.gr>) since 2017 and the data is archived in a dedicated database. In this contribution, the extracted TID characteristics are compared with the results obtained with GNSS TEC analysis methodologies, and specifically with the TEC de-trending and the TEC gradients processing techniques. The analysis can serve for a cross-validation of HF and GNSS-based TID identification methodologies, especially regarding the amplitude of imposed perturbation in the electron density and the propagation direction. The comparison is mainly focused on periods of enhanced auroral activity. However, this methodology will provide the framework for additional experiments that are under development addressing the needs of the TechTIDE EC H2020 project. These experiments will cover TID activity periods with both auroral and lower atmosphere triggering sources.