New approaches in Medium Scale Travelling Ionospheric Disturbances modelling

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The Medium Scale Travelling Ionospheric Disturbances (MSTIDs) are the most frequent wave signatures in the ionosphere, with amplitudes up to several TECUs, periods from several hundreds to one-two thousands of seconds, and propagation velocities from 50 to +300 m/s, mainly equator-eastward in winter/fall seasons, and westward in summer/spring seasons (M. Hernandez-Pajares et al., Radio Science, doi:10.1029/2011RS004951, 2012). Although their amplitude in not very important in relative terms, compared with the typical background electron content, MSTID's undulatory nature makes them likely the main non-linear error affecting precise GNSS processing, for instance in Wide Area RTK or either RTK techniques.

In this paper we will summarize the new proposed approaches for MSTID modelling, developed in the context of the PIOM-FIPP project (funded under the PECS programme with Czech Republic for New ESA Member States). In particular we will focus on: (1) the MSTID Ambiguity Resolution in GNSS Ionospheric Interferometry (ARGII), mainly intended for the potential use of sparse regional or wide GNSS networks (as an affordable alternative to the classical usage of local networks), and (2), the direct GNSS Ionospheric Interferometry (dGII) like a simple and undemanding technique from the point of view of the GNSS user. Both techniques will be presented and mainly assessed in range domain. We will present as well the impact of ARGII and dGII on precise GNSS processing.