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Expanding the Groundbased Global Ionosonde Network

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Today's global ionosonde network GIRO [1] provides in real time the ionospheric characteristics of the bottomside ionospheric electron density profiles at the ionosonde locations. These characteristics are assimilated on-the-fly in the IRI-based Real-time Assimilative Model (IRTAM) [2], which in turn drives a suite of computational algorithms of the Realistic Ionosphere (RION) service [3]. Advanced ionosondes capable of reliably processing and analyzing the measured ionograms are expensive, and consequently the global grid of GIRO ionosondes is sparse. To enhance the GIRO grid density, we propose to add low cost receive-only ionosondes to the network that can receive and process the oblique transmissions from GIRO ionosondes. The new "receive-only" ionosonde, DPS-R, can receive ionogram and fixed-frequency transmissions from DPS4D ionosondes at distances up to about 1,500 km. The processing and analysis capabilities of the DPS-R include all the signal processing features contained in the DPS4D digisonde. A pilot project in Europe has successfully tested the concept of digisonde-to-digisonde synchronized sounding [4]. Oblique fixed-frequency transmissions are used to detect and analyze in real time travelling ionospheric disturbances (TIDs) in the bottomside ionosphere, both medium and large scale TIDs [5]. The oblique ionograms can be automatically scaled to estimate the electron density profiles at the mid-points of the links, and the midpoint profile characteristics can be added to those obtained from the vertical ionograms and assimilated in IRTAM. A small number of DPSRs can easily enhance the sensor grid density by a factor of 3 or more. Lowell GIRO Data Center (LGDC) is a data management infrastructure that operates several online databases for public academic access to RION data.

References

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