



Simultaneous global radio observations of the ionosphere for assessment of forces from below and above

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To accurately assess the global impact on the ionosphere of forces from below and above the ionosphere requires simultaneous measurements around the globe. The network of Digisonde ionospheric sounders operating at 80+ locations in the world represents a Global Ionospheric Radio Observatory (GIRO) with simultaneous measurements every 15 minutes or at some stations 7.5 minutes. Today GIRO provides public access to 30+ million records of ionospheric measurements collected at 64 locations, of which 42 provide real-time feeds, publishing their measurement data within several minutes from their completion. GIRO databases holding ionogram and Doppler skymap records of HF ionospheric soundings have registered connections from 123 organizations in 33 countries. Easy access to the global state of the ionospheric plasma distribution given in accurate and fine detail by the ionosonde measurements has inspired a number of studies of the ionospheric response to space weather events [Zong et al., 2009; Paznukhov et al., 2009]

GIRO is comprised of three components: (1) the network of Digisonde stations providing online and offline data recorded at the same time [Reinisch et al.]; (2) two master GIRO databases, the Digital Ionogram Data Base (DIDBase) and the DriftBase for skymap/drift measurements; and (3) associated software capable of automatic and interactive data analysis and the derivation of higher order data products for end user applications. [Galkin et al., 2008; Khmyrov et al., 2008]. The greatest operational impact of GIRO has come through the single-point availability of the global network's real-time and retrospective data to both scientists and computer algorithms, free from handling tapes, cartridges, CDs, etc.

Availability of GIRO data with minimal latency allows for the assimilation of the ionogram-derived data in real-time models such as the real-time extension planned for the International Reference Ionosphere (IRI), and the GAIM model.

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