INCOHERENT SCATTER RADAR BASED EMPIRICAL MODELS

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This paper presents an overview of empirical ionospheric models developed from long-term incoherent scatter radar observations at 7 sites. These include local models for Sondrestrom, Millstone Hill, and Arecibo radars, respectively, in America longitudes, local models for EISCAT Svalbard and mainland radars and for St. Santin radars in Europe, and local models for the Middle and Upper atmosphere radar at Shigaraki in Asia. These models cover a height range largerly between 100-600 km, with exceptions for Millstone Hill for up to 1000 km, and for Shigaraki for starting from 200 km. Developed also are a regional model over Millstone Hill area based on the radar's steerable antenna measurements spaning 32-55^o geographic latitudes and a regional model for the America sector incorporating local models for the three NSF UAFs and Millstone Hill regional model. These models produce variations in electron density, ion and electron temperatures, as well as ion parallel drifts for some radars, as a function of height, local time and season with dependence on solar and magnetic activities.

In addition to models for the scalar parameters, a new high-latitude convection model is produced based on line-of-sight velocity measurements provided by the Millstone Hill extra-wide coverage experiments and by Sondrestrom compscan experiments. The convection model has a dependence on Interplanetary Magnetic Fields (IMF) components Bz and By and its variations with season are also identified. The convection can be also driven by an alternative set of parameters, Kp index and the IMF By direction. Future plans for new ISR-based models will be briefly discussed.

Abstract Submission Form

2006 National Radio Science Meeting

Abstract: zhang27453

Date Received: September 16, 2005

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2. G - Ionospheric Radio and Propagation
3. (a)
4. C - Contributed Paper
5. No special instructions