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Abstract

International Reference Ionosphere and Polar Ionosphere

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The International Reference Ionosphere (IRI) is a joint project of the two international scientific unions in charge of ionospheric physics: the International Union of Radio Science (URSI) and the Committee on Space Research (COSPAR). An URSI/COSPAR Working Group of 50+ experts is in charge of developing and improving the model. By charter this is an empirical model combining all available and reliable ground and space data. The team members come from all parts of the globe and represent all ground and space techniques for acquiring ionospheric data. IRI is a climatological model representing monthly averages of electron density, ion densities (O^+ , H^+ , He^+ , N^+ , NO^+ , O_2^+ , $Cluster^+$), electron temperature, ion temperature, ion drift and also the probability of F1-layer and spread-F occurrence. The model is widely used for many Space Weather related applications in science as well as engineering and education and is currently being considered by the International Standardization Organization (ISO) as standard for the ionospheric environment. This talk will in its first part briefly review the current status of the IRI modeling effort and discuss some of the applications.

The second part will discuss the polar ionosphere and its representation in IRI. Being an empirical model IRI depends on the availability of data sets with good temporal and spatial coverage. This is the case for middle and low latitudes but to a much lesser extent for the high-latitudes. At high latitudes in addition to solar ionization the ionospheric plasma is determined by energetic particle precipitating down from the Magnetosphere and by the direct solar wind access in the so-called Cusp (or Cleft) region. Close coupling with the Magnetosphere and Atmosphere leads to significant variations with latitude, local time, season, solar activity and magnetic activity. So modeling requires a high density of ground stations and satellite overflights. We will discuss the current status of IRI modeling in the polar ionosphere and in particular a recent effort to use TIMED/GUVI and DMSP/SSUSI data to include auroral oval characteristics in IRI. Barrow's location, of course, is optimal for providing significant contributions to the IRI modeling effort with appropriate observing equipment (ionosonde, GPS receiver).