



Development of Central Europe Regional Ionospheric Model (CERIM IION) for Space Weather Forecasting

Mykhaylo Lyashenko, Leonid Chernogor, and Igor Domnin

Institute for ionosphere, Kharkov, Ukraine (mlyashenko@ya.ru / +38 057 706 22 87)

Central Europe Regional Ionospheric Model (CERIM IION) based on the Kharkov incoherent scatter radar (ISR) database consists of two parts. Empirical part of the CERIM IION based on experimental data obtained with the Kharkov ISR during period 1997 – 2006 that is corresponding to the 23-rd solar activity cycle. This part of the model allows calculating the main geospace parameters – electron density, electron and ion temperatures, and vertical component of plasma drift velocity. Theoretical part of the CERIM IION includes well-know theoretical relations and served for calculation of medium and dynamic process parameters. Parameters of neutral atmosphere calculated using the NRLMSISE-00 model. Results of theoretical modelling are values of heat and particle flux densities, input energy to electron gas as well as values of thermospheric winds, ion-electron and ion-neutral collision frequencies, heat conductivity and ambipolar diffusion tensors, plasma scale height. Modelling results of the ionospheric plasma parameters are presented in the tabular form. Each of the tables includes the diurnal ionospheric parameters variations for vernal and autumnal equinoxes, winter and summer solstices in the range height of 200 – 750 km. Dependence of ionospheric parameters on solar activity (SA) is determined by phase of SA cycle – minimum, maximum, descending and rising. CERIM IION is used for accurate definition of global models of ionosphere and for more accurate calculation of radio wave propagation conditions over the Central Europe region that allows decreasing transmission system power, improving noise immunity of radio communication, radiolocation and radio navigation facilities. Reduction of power inputs allows improving electromagnetic and ecological situation over the Central Europe.