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A Mars M1 ionosphere layer empirical model based on MARSIS data.

Beatriz Sánchez - Cano (1), Sandro M. Radicella (2), Miguel Herraiz (1), Gracia Rodríguez - Caderot (3), and Olivier Witasse (4)

(1) Departamento de Física de la Tierra, Astronomía y Astrofísica I, Facultad de Ciencias Físicas, University Complutense of Madrid (UCM), Madrid, Spain. Meiga-Metnet Proyect. (beasanch@fis.ucm.es), (2) Aeronomy and Radiopropagation Laboratory of Abdus Salam International Centre for Theoretical Physics (ICTP), Trieste, Italy (rsandro@ictp.it), (3) Sección departamental de Astronomía y Geodesia, Facultad de Ciencias Matemáticas, University Complutense of Madrid (UCM), Madrid, Spain. Meiga-Metnet Proyect. (grc@mat.ucm.es) , (4) ESA/ESTEC, Noordwijk,The Netherlands (owitasse@rssd.esa.int)

More than 200 topside ionograms obtained from the low frequency radar MARSIS on board the ESA mission Mars Express (MEX) have been used to model the height dependent electron density in the so called M1 layer. The data have been downloaded from the ESA planetary science archive. The basic data used correspond to both hemispheres but only in regions of Mars without surface magnetic anomalies and in the period of time July-October 2005. It was assumed that the M1 can be considered a Chapman layer as recognized in some previous investigations.

The model is essentially dependent on the solar zenith angle. To take into account the dependence with solar activity, M1 peak electron density and height data from radio occultation observations of the NASA mission Mars Global Surveyor (MGS) have been used for the period 1998-2005. The model results have been compared with electron density profiles from radio occultation data of MGS and topside electron density derived from ionospheric soundings MARSIS data not included in the data base used to obtain the empirically model described in this study.

The comparisons show that the empirical model appears to be realistic. Possible improvements of the model are discussed.