Reconstruction of the ionospheric 3D electron density distribution based on operational TEC estimations

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New methods to generate global maps of the F2 layer peak electron density of the ionosphere (NmF2) and to reconstruct the ionospheric and plasmaspheric 3D electron density distribution will be presented. Furthermore, NmF2 maps will be compared with measurements from the ionosonde station Juliusruh.

Electron density distribution represented by global maps at different ionospheric heights as well as NmF2 map are calculated every 5 minutes and distributed via the operational data service SWACI (http://swaciweb.dlr.de) at DLR Neustrelitz.

Using the global Neustrelitz TEC Model (NTCM-GL) and a recently in DLR developed global NmF2 model, the corresponding slab thickness will be calculated. Combining this modelled slab thickness data and routinely generated TEC maps in SWACI, actual NmF2 maps are computed. Global TEC maps are produced by assimilating actual ground based GNSS measurements into an operational version of NTCM-GL. Finally, the derived NmF2 and TEC maps in tandem with a new approach of a DLR internal empirical 3D electron density model will be used to reconstruct the actual spatial electron density distribution of the ionosphere and plasmasphere.