



## Real time reconstruction of 3-D electron density distribution over Europe with TaD profiler

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TaD (TSM-assisted Digisonde) profiler, developed on the base of Topside Sounder Model (TSM), provides vertical electron density profile (EDP) from the bottom of ionosphere up to the GNSS orbit heights over Digisonde sounding stations. TaD EDP uses the bottomside profile provided by Digisonde software and extends it above the F layer peak by representing O<sup>+</sup> distribution by  $\alpha$ -Chapman formula and H<sup>+</sup> distribution by a single exponent. The profile above F layer peak takes the topside scale height HT and transition height hT from TSM and plasmasphere scale height Hp defined as a function of HT. All these profile parameters are adjusted to the current conditions by comparing the profile integral with measured GNSS TEC. The latter is taken from GNSS TEC maps produced by Royal Observatory of Belgium in the area (35°, 60°)N and (-15°, 25°)E. Maps of foF2 and hmF2 are produced in the same area on the base of DIAS (European Digital Upper Atmosphere Server) network of Digisonde stations and TaD profiles are calculated at all grid nodes (1°x1°) on latitude and longitude. Electron density at any point of the 3-D space is then obtained by simple interpolation between nodes. Possible use of reconstruction technique to GNSS applications is demonstrated by calculating the distribution of electron density along various ray paths of GNSS signals.