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Combination of different satellite observation data for ionosphere modelling

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Electromagnetic measurements from various satellite missions are influenced on their way through the ionosphere by free electrons and thus could be used to improve our knowledge on the distribution of electron density in this region of the earth atmosphere and to provide a tool for correcting other measurements. At DGFI a procedure for multi-dimensional ionospheric modelling has been developed. It consists of a given reference part (e.g. IRI2007) and an unknown corrections part expanded in terms of multi-dimensional base functions (e.g. B-splines). The corresponding series coefficients are calculated from satellite measurements by parameter estimation. To take advantage of the different characteristics of the various measurement techniques we do a joint adjustment of COSMIC/FORMOSAT-3 GNSS measurements together with ground based GNSS and measurements from dual-frequency radar altimetry. The weights of the different techniques are estimated by a variance component estimation (VCE).
In this contribution we will introduce our model approach and present first results of the combination of different observation techniques. We will focus on vertical integrated electron density (vertical electron content, VTEC) models which will be compared to other VTEC maps available from a variety of institutions.