



Three-dimensional Reconstruction of Ionosphere/Plasmasphere using GNSS measurements

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The dispersion of the ionosphere pertaining to the microwave signals allows gaining information about this medium. Among different systems observing the ionosphere, space geodetic techniques have turned into a promising tool for monitoring and modeling the ionospheric parameters in terms of Total Electron Content (TEC) or electron density along the ray path. The relevant input data for modeling ionospheric parameters is the ionospheric observable (L4) and is formed from the phase-smoothed code pseudorange obtained from dual-frequency Global Navigation Satellite Systems measurements. The L4 is related to the ionospheric electron density using adequate profile function. Within this study, we apply a combination of the multi-layer Chapman profile function for the bottom-side and topside ionosphere, and a separate profile function for the plasmasphere. As a first step of this study, we assume the plasmaspheric contribution to be known, and concentrate only on the ionospheric part. To model the ionospheric electron density in globe, the parameters of electron density, i.e. the maximum electron density, and its corresponding height are modeled using two sets of spherical harmonics expansion. The coefficients of two sets of spherical harmonics expansions are obtained through recursive parameter estimation technique applying appropriate constraints.