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Towards a regional modeling of the electron density of the ionosphere using GPS observations

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Since the total electron content of the ionosphere is defined as the integral of the electron density along the signal path, GPS measurements can be interpreted and used as observations for estimating the electron density of the ionosphere. Basically the electron density is a four-dimensional function depending on spatial position and time. In this contribution we study different approaches to model a regional spatial part of the electron density, e.g. by a multi-resolution representation based on spherical wavelets or polynomial spline functions. The coefficients of the corresponding series expansions are computable from the GPS observations using parameter estimation methods.