



Regional ionosphere model for China from precise point positioning interpolated by least-squares collocation

Wojciech Jarmolowski (1), Xiaodong Ren (2), Anna Krypiak-Gregorczyk (1), and Paweł Wielgosz (1)

(1) University of Warmia and Mazury in Olsztyn, Institute of Geodesy, Faculty of Geodesy, Geospatial and Civil Engineering, Olsztyn, Poland (pawel.wielgosz@uwm.edu.pl), (2) School of Geodesy and Geomatics, Wuhan University, Wuhan, China (xdren@whu.edu.cn)

Precise point positioning (PPP) has been considered a valuable tool in many applications, such as the ocean-tide measuring, the atmospheric water vapor sensing and the crustal-deformation monitoring. Especially, with the advent and development of PPP ambiguity resolution (PPP-AR) technique, PPP has become an important method to extract the slant total electron content (STEC) with high accuracy based on carrier-phase observations. In this paper, we use PPP-AR technique to estimate undifferenced integer carrier-phase ambiguity parameters on both frequencies, which can be used to remove the integer ambiguities error of the geometry-free observations (L4), and then STEC observations based on carrier phase can be derived.

The presented regional TEC model for China is spatially interpolated by least-squares collocation (LSC) using signal and noise covariances estimated by leave-one-out (LOO) validation. This internal validation provides internal accuracy measures that reach few tenths of TECU, due to significantly dense network of inland points. Another means of validation are TEC map self-consistency analyses based on comparisons with raw carrier phase data and UQRG and IGSG models. In addition, the coastal points together with a number of IGS stations extend the model over the sea and give an opportunity for comparisons with Jason-2 altimetry. These external comparisons are summarized together with local validations of UQRG and IGSG models by Jason-2 altimetry. As the validation results of the regional model are comparable with UQRG and the investigated region includes highest TEC anomalies, the study is a valuable step towards increasing the accuracy and resolution of the ionosphere models.