Ionosphere Modeling and Estimation using Regional GPS Data

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After the Selective Availability (SA) was turned off, the ionosphere pseudorange group delay and carrier phase advance became the largest error source in obtaining the accurate positioning and navigation solution from GPS data. The purpose of this research is to model the precise ionosphere delay with regional GPS network data. We generate regional ionosphere maps on a daily basis at Korea Astronomy Observatory (KAO) using data from nine permanent GPS sites of Korea in a solar geomagnetic reference frame. This ionosphere model is based on 2-dimensional grid method depending on the weighting function which explains the relation between each grid point and ionospheric pierce point (IPP). The 2-D Total Electron Content (TEC) estimate uses the phase leveled dual frequency GPS data with a minimum elevation cutoff of 10 degrees in a least-squares fit, which includes the instrumental biases estimation. The regional ionosphere modeling algorithm is applicable to the global ionosphere modeling as well.