

Real-time ionospheric estimation over Japan

Tetsuya Iwabuchi[1]; Christian Rocken[1]; Zdenek Lukes[1]; Leos Mervart[1]; James Johnson[1]; Masayuki Kanzaki[2]

[1] GPS Solutions Inc.; [2] NGS

<http://www.gps-solutions.com/~iwabuchi>

Japan's dense GEONET with real-time streaming data offers unique opportunities for continuous ionospheric monitoring with high horizontal resolution. We have developed software that estimates absolute ionospheric delay at the several TECU level and differential TECU (between GEONET sites) at the 0.05 TECU level in real-time.

Absolute ionospheric slant delay estimation in the direction of all GPS satellites in view over Japan is based on the combined use of pseudo-range and phase data from GEONET. This requires that differential code biases (DCBs) for all GEONET stations are determined. We estimate these receiver DCBs daily using the GPS satellite DCBs and global ionospheric model (GIM) from the Center for Orbit Determination in Europe (CODE).

We estimate the ionospheric delay with several mm precision at the double difference level. This estimation uses only phase data and it requires network solutions with dual frequency L1, L2 carrier phase ambiguity resolution. These ionospheric delay corrections can be used as corrections for the processing of single frequency GPS observations in differential mode for surveying. We demonstrate that these ionospheric corrections can be used for carrier phase ambiguity resolution over 200 - km baselines. Thus these real-time ionospheric estimations open the possibility to use lower cost single frequency receivers in Japan for deformation monitoring on a large scale.