# Comparisons of GPS TEC and IGS TEC over four SEALION sites

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Global Positioning System (GPS) finds its applications in the navigational system as well as for the ionospheric observation. For the navigation purpose such as the Ground Based Augmentation System (GBAS), the ionospheric correction is simply incorporated in the pseudo-range correction. For the ionospheric observation, GPS-derived Total Electron Content (TEC) can describe the ionosphere ionization which varies over place and time. The satellite signals passing through the earth ionosphere to the ground-based GPS stations can suffer from the amplitude and phase fluctuation. The dispersion of two frequency GPS signals leads to the computation of the TEC by integrating the electron density along the propagation path. TEC measured by the dual-frequency JAVAD-GPS receivers installed at four GPS receiver stations in Thailand namely; Chiang Mai (18.76 deg N 98.93 deg E) located at the geomagnetic latitude 12.7 deg N, Bangkok (13.73 deg N 100.78 deg E) located at the geomagnetic latitude 6.7 deg N Chumphon (10.72 deg N 99.37 deg E) located at the geomagnetic latitude 3.0 deg N, and Phuket (7.90 deg N 98.39 deg E) located at the geomagnetic latitude 0.4 deg S are employed in this work. These four stations are part of the South East Asia Low-latitude Ionospheric Network (SEALION). SEALION has been conducted by National Institute of Information and Communications Technology (NICT) since 2003 for the purpose of monitoring and forecasting equatorial ionospheric disturbances, especially plasma bubbles. Several GPS receiver networks have been established and developed, one of which by the International GNSS Service (IGS), in recent years,

The IGS collects, archives, and distributes GPS observation data sets. It provides the GPS-based TEC map data via the ftp site: ftp://igscb.jpl.nasa.gov/. In order to verify the GPS TEC, it would be interesting to compare the GPS TEC with the IGS TEC on equinox and solstice days. In addition, we have ever compared the GPS TEC with the IGS TEC on equinox and solstice days in 2007 at Chumphon station in our previous work. The result reveals that the trends of the GPS TEC and IGS TEC are similarly. However, the IGS TEC values are higher than those from the GPS TEC about 2 TECU for year 2007. The noon-bite out phenomenon appears on March equinox day for IGS TEC only, but not for the rest.

To extend our research work into this study, we compare the GPS-TEC with the IGS TEC over four stations in Thailand. We use the IGS TEC map data at 20 deg N and 100 deg E, the nearest monitoring location to Chiang Mai station, at 15 deg N and 100 deg E, the nearest monitoring location to Bangkok station, and at 10 deg N and 100 deg E, the nearest monitoring location to Chumphon and Phuket stations. From this research, we find that the GPS TEC agree with the IGS TEC during the study period. The noon-bite out is not clearly seen on both of the IGS TEC and GPS TEC. This may be due to the height of the GPS satellite, about 22000 kilometers, which includes both of the ionosphere and the plasmasphere, the major parts which contribute to the TEC variation.