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Validation of the technique for absolute total electron content and differential code biases estimation

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We have developed a technique for vertical total electron content (TEC) and differential code biases (DCBs) estimation using data from a single GPS/GLONASS station. The algorithm is based on TEC expansion into Taylor series in space and time (TayAbsTEC).
We perform the validation of the technique using Global Ionospheric Maps (GIM) computed by Center for Orbit Determination in Europe (CODE) and Jet Propulsion Laboratory (JPL). We compared differences between absolute vertical TEC (VTEC) from GIM and VTEC evaluated by TayAbsTEC for 2009 year (solar activity minimum - sunspot number about 0), and for 2014 year (solar activity maximum - sunspot number 110).
Since there is difference between VTEC from CODE and VTEC from JPL, we compare TayAbsTEC VTEC with both of them. We found that TayAbsTEC VTEC is closer to CODE VTEC than to JPL VTEC. The difference between TayAbsTEC VTEC and GIM VTEC is more noticeable for solar activity maximum (2014) than for solar activity minimum (2009) for both CODE and JPL.
The distribution of VTEC differences is close to Gaussian distribution, so we conclude that results of TayAbsTEC are in the agreement with GIM VTEC.
We also compared DCBs evaluated by TayAbsTEC and DCBs from GIM, computed by CODE. The TayAbsTEC DCBs are in good agreement with CODE DCBs for GPS satellites, but differ noticeable for GLONASS. We used DCBs to correct slant TEC to find out which DCBs give better results. Slant TEC correction with CODE DCBs produces negative and nonphysical TEC values. Slant TEC correction with TayAbsTEC DCBs doesn't produce such artifacts.
The technique we developed is used for VTEC and DCBs calculation given only local GPS/GLONASS networks data. The evaluated VTEC data are in GIM framework which is handy when various data analyses are made.