

# Calibration errors on the slant TEC determined with GPS

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Global Positioning Satellite Systems (GPS) is an essential element for a series of technological applications in different fields of human activity. In addition they have greatly contributed to scientific research in the field of geodesy as well as in remote sensing the Earth's ionosphere. Nowadays ionospheric information that can be derived from GPS observations represents the richest source of data for the study of ionospheric processes that define the climate and weather of the ionosphere under the effects of the varying solar radiation. The reliability of such data is of fundamental importance to guarantee the validity of their use. It is also evident that every improvement on the knowledge of the ionosphere's behavior can be used to advance the quality of GPS operation and GPS assisted services. After processing the GPS observations the Total Electron Content (TEC), which is the integral of the electron density over the ray path that links the satellite with the ground receiver can be calculated.

GPS TEC determinations are the result of a calibration process that includes models and assumptions that are widely accepted and used within the scientific community. Based on the GPS TECs obtained from pairs of co-located GPS receivers, this contribution shows GPS TEC single differences of more than 10 TECu, exceeding several times the expected value derived from the calibration models. The analysis focalizes on two major issues: the errors translated from the code-delay to the carrier-phase ionospheric observable by the so-called levelling process and the stability of the receiver's Inter-Frequency Bias (IFB also named DCB for Differential Hardware Delay). Finally a new calibration method is presented with some results that show the precision gain obtained with the new technique.