Estimating Total Electron Content Using 1,000+ GPS Receivers

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A computer program uses data from more than 1,000 Global Positioning System (GPS) receivers in an Internet-accessible global network to generate daily estimates of the global distribution of vertical total electron content (VTEC) of the ionosphere. This program supersedes an older program capable of processing readings from only about 200 GPS receivers. This program downloads the data via the Internet, then processes the data in three stages. In the first stage, raw data from a global subnetwork of about 200 receivers are preprocessed, station by station, in a Kalman-filter-based least-squares estimation scheme that estimates satellite and receiver differential biases for these receivers and for satellites. In the second stage, an observation equation that incorporates the results from the first stage and the raw data from the remaining 800 receivers is solved to obtain the differential biases for these receivers. The only remaining error sources for which an account cannot be given are multipath and receiver noise contributions. The third stage is a postprocessing stage in which all the processed data are combined and used to generate new data products, including receiver differential biases and global and regional VTEC maps and animations.

This program was written by Attila Komjathy and Anthony Mannucci of Caltech for **NASA's Jet Propulsion Laboratory**. *Further information is contained in a TSP (see page 1).*

This software is available for commercial licensing. Please contact Karina Edmonds of the California Institute of Technology at (818) 393-2827. Refer to NPO-41612.