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Monitoring of GPS slant total delays at GFZ Potsdam

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We developed a fast and accurate point-to-point ray-tracing algorithm to compute the signal travel time delay, also known as Slant Total Delay (STD), between a GPS satellite and a ground-based receiver. Our approach is validated using data available from a comparison campaign that was carried out under the umbrella of the International Association of Geodesy Working Group 4.3.3. The speed of our algorithm increased; on an ordinary PC (Core2Quad Intel processor, 2.5 GHz, 2 GB RAM) we compute $\sim$ 2000 STDs per second using a single core. Therefore, monitoring of STDs processed for a dense network of ground-based receivers in Germany against STDs derived from a numerical weather model became feasible. Such a monitoring system is a precondition for the potential use of STDs in GPS meteorology. Currently, we use data from the Global Forecast System (GFS) in lieu of data from the Integrated Forecast System (IFS) because short range (6h) forecasts are easily accessible. We also provide some insight into a new product of our software; the Potsdam Mapping Function (PMF), which is nothing but speedy direct mapping utilizing short range GFS forecasts. In fact, it appears that the speed of our algorithm is rendering the application of mapping functions in GPS processing obsolete.