

Determination of Tropospheric Slant Wet Delay Using GPS

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The GPS(Global Positioning System) satellite signals get delayed due to the water vapor in the atmosphere before reaching the GPS receiver on the ground, thus causing positioning errors. Thus, one can compute the amount of the water vapor by processing the GPS data and translate it into Precipitable Water Vapor (PWV), which can be assimilated into Numerical Weather Prediction. Especially, 3-dimensional distribution of the water vapor is an important factor to determine for accurate weather prediction and climate studies. Slant Wet Delay (SWD), the amount of the GPS signal delay along the line of sight between a GPS receiver and the satellite, should be precisely calculated to create 3-D distribution map of the water vapor. In this study, we used a Canadian permanent GPS site to estimate the SWDs and compared the estimates with co-located Water Vapor Radiometer (WVR) measurements. To improve the accuracy in GPS data processing, three major error sources were considered: azimuthal variations in the wet mapping function, ocean loading displacements, and GPS antenna phase center variations.