GPS Water Vapor Observations at Mauna Loa Observatory in 2005

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Results from a year of ongoing GPS water vapor observations at Mauna Loa Observatory are presented for the first time. The ESRL Global Systems Division, with the assistance of GMD in Boulder and the Staff of Mauna Loa Observatory, installed a GPS receiver at MLO in November 2004. The purpose of this joint effort is to evaluate the utility of ground-based GPS water vapor observations for long-term climate monitoring. Figure 1 compares integrated precipitable water vapor measurements retrieved from tropospherically-induced signal delays in the GPS radio signals (1-A) with observations from the Naval Research Laboratory Water Vapor Millimeter-wave Spectrometer (1-B), and PW derived from the Hilo Radiosonde (1-C) at and above the altitude of MLO. The least squares fit to each data set (Figure 2) agree within 0.8 mm (~ 20%), with GPS wet, RAOBS dry, and WVMS somewhere in between.

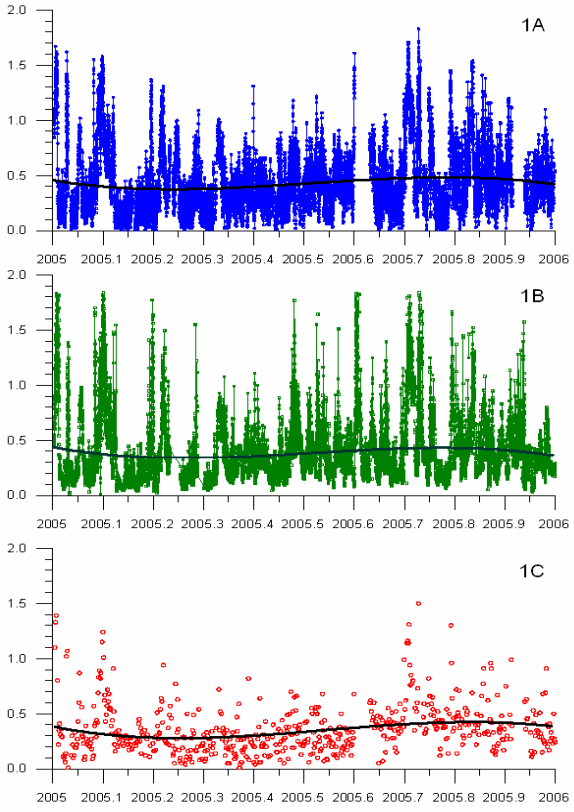

Figure 1. Integrated (total atmospheric column) precipitable water vapor time series at Mauna Loa Observatory in 2005. 1A is ESRL/GSD GPS, 1B is NRL Water Vapor Millimeter-wave Spectrometer, and 1C is from Hilo Radiosonde. The solid black line is least squares fit to all observations.

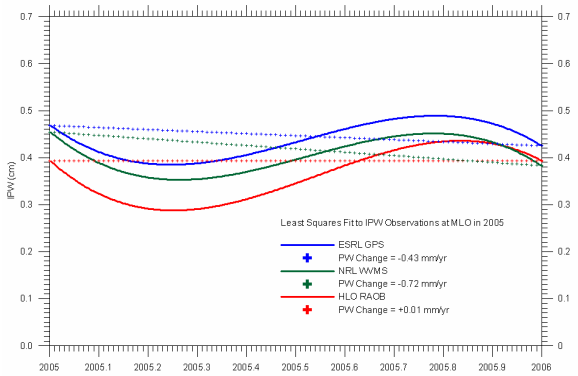

Figure 2. Least squares fit to observations shown in Figure 1. Blue is GPS, green is WVMS, and red is RAOBS. The lines connecting the end points of the curves have slopes of -0.43 mm/yr for GPS, -0.72 mm/year for WVMS, and +0.01 mm/year for RAOBS.

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