

Design of a Ground-based GPS System to Provide Near Real Time Estimates of Precipitable Water Vapor

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The size and scope of permanent arrays of continuously operating GPS receivers will soon rival the current worldwide network of ~600 radiosonde launch sites. The accuracy of ground-based GPS estimates of precipitable water vapor (PWV) has already been demonstrated through a number of direct comparisons with simultaneous radiosonde and water vapor radiometer (WVR) measurements of this quantity. A GPS-based system for determination of PWV offers the added benefits of more frequent estimates of this quantity and the potential for near real time availability. Including additional PWV estimates into numerical weather models could significantly improve the accuracy of weather forecasts.

We describe a complete end-to-end system that is designed to provide accurate, near real time estimates of PWV from GPS and surface meteorology observations. The essential elements of this system include: the use of accurate predicted GPS orbits, near real time data collection from both GPS receivers and high quality surface meteorological instruments, and automated data processing and PWV estimation. We present a detailed description of each of these elements as well as the necessary hardware and software interfaces. An overall data flow diagram is shown to illustrate how near real time estimation of PWV is achieved with such a system.

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10. Schedule after Runge paper and immediately before Bar-Sever paper to be given in the same special session.

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