Near Real-Time Tropospheric Water Vapour Profiling Using A Ground-Based GPS Receiver

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ABSTRACT

This article presents a remote-sensing tool employing an artificial neural networks algorithm for near real-time determination of the relative humidity (RH) profile above a site using global positioning system (GPS) data recorded by a ground-based GPS receiver. GPS data were processed to obtain Integrated Water Vapour. The integrated water vapour in conjunction with ground level information for temperature, pressure, and RH was fed as inputs to the developed neural network which in turn generated the instantaneous RH profile, at six standard pressure levels of 100, 150, 200, 300, 500, and 700 hPa, as output. GPS and radiosonde data for the years 2009 and 2010 were used to train the system while the same data for 2011 were used to validate the system. The relative humidity profile results for 2011 generated using GPS data and the neural network, upon comparison with recorded *in situ* radiosonde RH profile measurements for the same days and times in the year 2011, had root mean square error of less than 4%, which falls within the margin of error of the Vaisala RS92 Radiosonde's humidity measurement regime.