



## **Spatiotemporal variations of water vapor content over Ethiopia: A study using GPS observations and ECMWF model**

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In this study we characterize the spatial and temporal variability of integrated water vapour (IWV) in Ethiopia from a network of GPS stations. Water vapour plays a major role in atmospheric processes but remains difficult to quantify due to its high variability in time and space and the sparse set of available measurements. Global Positioning Systems (GPS) has demonstrated its ability to monitor IWV with an accuracy comparable to other means of measurements (radiosondes, microwave radiometers, ...) and a good time resolution and under all meteorological conditions. IWV values for a set of Ethiopian GPS stations have been estimated from 2007 to 2011. They have also been extracted from European Centre for Medium-Range Weather Forecasts (ECMWF) model, using nearest point from the original reduced Gaussian grid. First we compare the IWV estimated from GPS and from the model. The bias varies from site to site but in general a bias of less than 1 kg/m<sup>2</sup> was analysed in the ECMWF data set with respect to GPS observations. The correlations between the two data sets exceed 0.85 at different time scales at a 99.9% significant level. Second we observe the spatial variation of the IWV. High values are obtained in those stations that are located in north-eastern (Afar depression sites) and south-western part of the country. This distribution is related to the spatial variability of the climate in Ethiopia. Finally, we study the diurnal, seasonal cycle and inter-annual variability of IWV for all stations over Ethiopia. The main result is the strong inter-annual variability observed for the dry seasons.