GNSS as a tool for tropospheric water vapor monitoring. Alqueva lake Case-Study.

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In recent years Global Navigation Satellite System (GNSS), in particular GPS observations, has proved its capacity to monitor atmospheric water vapor with an accuracy that is comparable to the measurements of meteorological sensors (Karabatic et al., 2011). This gas plays a major role in many processes concerning physics, thermodynamics and dynamics of the atmosphere. The provision of Zenith Total Delays (ZTD) and Integrated Water Vapor (IWV) was established as a standard sounding technique. However, the derivation of 3D (or 4D considering the temporal dimension) water vapor distribution is currently under development. The quality of the GNSS tomography is affected by a number of factors such as the spatio-temporal distribution of the observations, the reconstruction method, the initial field, terrain morphology. Independent observations can help to constrain the a-priori GNSS tomographic field and radiosonde data are often used for that purpose.

The present work focuses on the study of the diurnal cycle of water evaporation over the Alqueva lake (Portugal), one of the largest dams and artificial lakes in Western Europe. For that, a 15-station GNSS network was installed during two weeks campaign. The GNSS network consists of a main cluster of 14-station with an inner station distance between 2-6 km and an outside station, about 30 km distance, for comparison analysis. Three meteorological stations were also installed and several radiosondes were launched within the framework of the ALquevahydro-meteorological Experiment (http://www.alex2014.cge.uevora.pt/).

We will present the current status of the analysis that is being carrying out, namely: the pattern behaviour of daily ZTD´s and IWV and also the first tomographic results.
Due to small altimetry difference between the stations (110 m maximum), the tomographic results in the bottom layer with low number of rays intersections and very limited angular variability of the rays due to rather flat terrain in the study region tend to accumulate the total water vapor from the whole model. In this research we will show several techniques to overcome these problems and evaluate their effectiveness.