



Characterisation of Mediterranean heavy rainfall events from GPS water vapour monitoring

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High precipitating events occur regularly during autumn season in South of France along the Mediterranean coast. These extreme precipitation and flooding events produce societal damages. The main limitation to improve the forecast of such events relies on the knowledge of the initial water vapour field (Ducrocq et al. 2002). Usual water vapour observation instrument (radio-sounding, radiometers...) fail to characterize mesoscale distribution of moisture. For a decade, GPS receivers have shown their ability to provide humidity estimation. Thus, GPS dense networks are unique to provide vertically integrated tropospheric water vapour observations.

In this work, we use a four years GPS data set from a GPS network to better characterize humidity field in Southern France (mainly Languedoc-Roussillon and Provence) before and during heavy rainfall events. After looking through about 40 study cases a selection of 14 events has been applied. GPS data analysis, rain gauge measurements and satellite wind data are used in accordance with rain location and GPS water vapour mass monitoring.

Our systematic GPS data analyses during several HPE events revealed that multiple HPE schemes arise from combining humidity monitored by GPS with wind surface information, in particular, thanks to the unique spatial and temporal resolution of the GPS data. For most events, a high correlation is found between the topography of the coast, the direction and location of the moisture fluxes and the location of the rainfall.

For all the cases, the study of ZTD temporal variations revealed some difficulties to be explained using simple physical processes. Some characteristics HPEs events will be presented.