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The contribution of permanent GPS station PW data on heavy local rainfall events in the Greek area.

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For the last two decades GPS has demonstrated its ability to estimate and monitor the magnitude of atmospheric water vapor with good time resolution and under all meteorological conditions. In this study, the precipitable water (pw) values estimated over specific permanent GPS stations of various Greek networks are analyzed by using different processing options dealing with the selection of different mapping functions for the computation of troposheric delay. Another, basic topic of this study is the combination of pw values with ground meteorological data and more specifically with precipitation values, recorded few days before and after the heavy rainfall events. These events occurred within the year 2013 at various locations of the Greek territory like, Epirus, Central Macedonia, the city of Athens and Rhodes island, and included various rainfall kinds like the flash flood type. For example, the amount of precipitation in the case of Rhodes over passed the 100 mm within few hours. In order to account for the tropospheric delay gradients and for the estimation of precipitable water GPS data were processed with high precision software such as GAMIT of MIT. Pw values were estimated for all GPS permanent stations around and inside of each test area. The estimated values which derived are discussed through the comparison and statistical analysis between various parameters, like the pw precipitation, rate of time changing and tropospheric delay gradients time series. The main analysis applied indicates the complexity of the phenomena close to rainfall zone at time of precipitation in order to provide a clear precursor of the torrential rainfall events. For this type of successful scenarios more kind of atmospheric data may be needed. However, some peculiar conclusions through the monitoring process can be highlighted.