Precipitable water vapour contents at "local" scale: a comparative study on GNSS-derived data versus modelled ones from ECMWF operational models

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We present a comparative study between GNSS-derived precipitable water (PW) contents and modelled data from ECMWF operational models. Nearly 4 years of PW contents derived from meteorological and GNSS data are analyzed. We use GNSS data from a geodetic monitoring network of the Neapolitan active volcanoes managed by INGV as well as from some GPS stations installed on purpose. We compare PW time series retrieved from GNSS observations with those coming from models. The total water vapour content of the atmosphere can be derived by modelling from the vertical profile of the specific humidity. We use ECMWF operational models available at a horizontal resolution of about 15 km, 3-hourly samples. The number of vertical model levels is 91 up to mid 2013 and 137 afterwards. We recomputed the surface pressure on the real Earth surface, which differs from the orography, i.e. the smooth surface of the atmospheric model, by propagating the pressure from the orography to the surface. A very good agreement is achieved between PW retrieved from GNSS observations and computed from models using the highest time and space resolution (0.15 degree, 3-hourly 91-137 layers) operational models. We even focus our analysis on the occasion of some extreme raining events hitting Campania region (Italy).