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Evaluating multimodel variability of humidity over Europe using long term GPS network and ground base datasets

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Thanks to efforts made to reanalyse observed data to produce long-term homogenized datasets of new parameters or multi-parameters in recent years, we can better characterize, evaluate and analyse the water cycle in models at different scales. In this paper, a few MED-CORDEX simulations covering the ERA-interim period are evaluated against reprocessed IWV from GPS datasets over the European domain, from 1995 to 2008.
The humidity is an important component of the water cycle, and models often have difficulties representing it. The high quality, consistent, long-term IWV dataset recently produced from GPS at more than 100 stations over Europe, with about half of the stations having nearly 15 years of data over the period from 1995 to 2010 is therefore used to evaluate the simulated IWV at seasonal, interannual and possibly diurnal time scales. Regional features are then identified, corresponding to different climate regimes. Other datasets, such as reanalysis of multi-parameters observed at one site (SIRTA, Palaiseau, France) over more than 10 years, or more regional networks are used to explain the dispersion of IWV among the different models and their biases against observations.
The relationship between IWV and surface temperature is also evaluated locally to assess how much the sources of humidity from advection or surface fluxes are enough to reach the total capacity of the atmosphere in humidity when temperature increases. Over arid areas, this relation can depart from the Clausius-Clapeyron relation when temperature becomes too high. The ability of models to reproduce this relation during present climate is of high importance to estimate future climate.