EMS Annual Meeting Abstracts
Vol. 14, EMS2017-496, 2017

The homogenization of GPS Integrated Water Vapour time series: methodology and benchmarking the algorithms on synthetic datasets

Roeland Van Malderen (1), Eric Pottiaux (2), Anna Klos (3), Olivier Bock (4), Janusz Bogusz (3), Barbara Chimani (5), Michal Elias (6), Marta Gruszczyńska (3), José Guijarro (7), Selma Zengin Kazancı (8), and Tong Ning (9)

(1) Royal Meteorological Institute of Belgium, Observations, Brussels, Belgium (roeland.vanmalderen@meteo.be), (2) Royal Observatory of Belgium (ROB), Brussels, Belgium, (3) Military University of Technology, Warsaw, Poland, (4) IGN LAREG, University Paris Diderot, Sorbonne Paris, France, (5) Central Institute for Meteorology and Geodynamics, Austria, (6) Research Institute of Geodesy, Topography and Cartography, Czech Republic, (7) AEMET (Spanish Meteorological Agency), Spain, (8) Karadeniz Technical University, Turkey, (9) Lantmäteriet, Sweden

Within the COST Action ES1206 “Advanced Global Navigation Satellite Systems tropospheric products for monitoring severe weather events and climate” (GNSS4SWEC), there was a clear interest and need to homogenize a worldwide Integrated Water Vapour (IWV) dataset retrieved with Global Positioning System (GPS), by correcting (artificial) break points due to e.g. instrumental changes. The first activity concentrated on a worldwide GPS dataset covering 100+ stations, with a homogeneous data processing from 1995 to March 2011. As at most of these stations, the ERA-interim reanalysis IWV field output correlates well with the IWV retrieved by GPS, the ERA-interim IWV time series are used as reference and the IWV differences between both sets are considered. The characterization of these IWV differences provided us with typical trend values, seasonal oscillations and noise models, to build a synthetic benchmark IWV dataset of differences. As a matter of fact, three different synthetic datasets have been generated, with different levels of complexity (w/o autoregressive noise, w/o gaps and trends), to assess the impact of these different factors on the performance of homogenization algorithms.

In this presentation, we will show the results of different homogenization algorithms on those 3 different sets of synthetic time series. We present their detection scores and compare the estimated trends (and uncertainties) from their homogenized time series with the true input trends. We analyze the sensitivity of each detection method w.r.t. the complexity of the synthetic datasets. Finally, an outlook of the future activities will be given.