EMS Annual Meeting Abstracts
Vol. 14, EMS2017-369, 2017

Comparing precipitable water from remote sensing and space geodetic techniques with numerical weather models

Daniel Landskron, Angelika Xaver, Johannes Böhm, and Wouter Dorigo
Vienna University of Technology, Wien, Austria (daniel.landskron@geo.tuwien.ac.at)

The amount of precipitable water (PW) in the troposphere and its spatial and temporal variations are important parameters of the hydrological cycle. PW corresponds to the height of a water column containing the entire water vapor in zenith direction above a certain location, and its variability and long-term changes may be indicative for changes in the hydrological cycle. In meteorology there are several methods of obtaining PW, in general through measurements from satellites as well as from terrestrial stations. Space geodetic applications such as Global Navigation Satellite Systems (GNSS) and Very Long Baseline Interferometry (VLBI) open new possibilities in obtaining tropospheric water vapor; GNSS meteorology has proven to be ideally suited for deriving meteorological parameters such as PW and has become an integral part of weather services in recent years. Less well known is the ability to determine PW through observations of radio waves from quasars billions of light years away using the space geodetic technique VLBI. The presence of water vapor and water particles in the troposphere decelerates these signals similarly to those from GNSS satellites, which enables accurate estimations of their amount. Another dataset of PW stems from microwave radiometry by remote sensing satellites as, e.g., combined and provided by the GlobVapour Product by the European Space Agency (ESA). We analyze the correlation between all these datasets and compare them with data from the European Centre for Medium-Range Weather Forecasts (ECWMF). Eventually we draw conclusions about possible synergies and the ability and performance of the datasets in describing the amount and variation of water vapor in the troposphere