



A high-quality, homogenized, global, long-term (1993-2008) DORIS precipitable water dataset for climate monitoring and model verification

Olivier BOCK (1), Pascal WILLIS (2,3), Junhong WANG (4,5), and Carl MEARS (6)

(1) IGN LAREG, Univ Paris Diderot, Sorbonne Paris Cité, Paris, France (olivier.bock@ign.fr), (2) IGN DRE, Saint-Mandé, France, (3) IPGP UMR 7154 CNRS, Univ Paris Diderot, Sorbonne Paris Cité, Paris, France, (4) Department of Atmospheric and Environmental Sciences, State University of New York, Albany, New York, USA, (5) NCAR EOL, Boulder, CO, USA, (6) Remote Sensing Systems, Santa Rosa, CA, USA

A high-quality, consistent, global, long-term dataset of zenith tropospheric delay (ZTD) and precipitable water (PW) was produced from Doppler Orbitography Radiopositioning Integrated by Satellite (DORIS) measurements. DORIS measurements from 81 sites are reprocessed homogeneously from January 1993 to August 2008. The dataset was screened and homogenized. A two-level screening method was developed. The first level uses post-processing information and applies range checks and outlier checks to ZTD and formal error estimates. It rejects less than 3% of the data. The second level detects outliers by comparing DORIS ZTD data with ECMWF reanalysis (ERA-Interim) data and rejects about 1% of the data. There is consistency between the screened DORIS ZTD data, ERA-Interim and Global Positioning System (GPS) data. A linear drift in mean differences is evidenced, which potentially results from biases introduced by the progressive replacement of Alcatel antennas with Starec antennas at the DORIS sites. The DORIS PW was homogenized by applying a bias correction based on the median difference between DORIS and ERA-Interim PW data each time the station equipment is changed. The homogenized DORIS PW data were compared with ERA-Interim, GPS, radiosonde, and microwave radiometer satellite data (SSM/I and AMSRE). There is excellent agreement with GPS data with a correlation of 0.98 and a standard deviation of differences of 1.5 kg m⁻², and with ERA-Interim and satellite PW data, with a correlation > 0.95 and a standard deviation of differences < 2.7 kg m⁻². Radiosonde data show less good agreement with the DORIS PW data. Preliminary results of water vapor trends and variability are shown for 31 sites with more than 10 years of data and 23 sites with more than 15 years of data. Good consistency is found between DORIS PW trends and ERA-Interim trends, which demonstrates the high potential of the DORIS PW dataset for climate monitoring and model verification.