IRS2012-462
International Radiation Symposium 2012
Dahlem Cube, Berlin, Germany, 06 – 10 August 2012

Remote Sensing of atmospheric total column water vapor. Intercomparison of POLDER, AMSR-E and MODIS retrievals.

J. Riedi, L. Mcharek, P. Dubuisson, F. Parol, and F. Thieuleux

Université des Sciences et Technologies de Lille, Laboratoire d'Optique Atmosphérique, Villeneuve d'Ascq, France (jerome.riedi@univ-lille1.fr)

Since December 2004, the CNES PARASOL (Polarization and Anisotropy of Reflectances for Atmospheric Science coupled with Observations from a Lidar) mission is flying in the A-train with AQUA (NASA) providing more than 5 years of temporally and spatially coincident observations from POLDER, MODIS and AMSR-E which enable total column water vapour amount retrievals.
We are providing here a temporal and statistical analysis of water vapour near-infrared retrievals from POLDER against MODIS and AMSR-E products derived from near-infrared, thermal infrared and microwave observations over ocean. A temporal analysis of POLDER official product is conducted in view of AMSR-E and MODIS coincident retrievals over ocean. Even though some of the evaluated products seem to be of higher general quality, this analysis illustrates the significant variability and remaining large uncertainties in water vapour observations from space.
The parametrization operationaly used for retrieval of total column water vapour amount from near-infrared POLDER measurements is then revisited. This parametrization establish a non linear relation between the air mass weighted total column water vapour amount and the ratio of top of atmosphere reflectances in two close near infrared bands (one absorbing and one window channel).
We investigate the sensitivity of retrievals to coefficients of the existing parametrization and show in particular the strong uncertainties related to representation of the high absorption regime (large air masses or water vapour amount).
Finally, an alternative approach based on the use of simple multilayer neural network is developed to improve the mathematical parametrization. It is shown that this approach can improve the retrieval especially in case where multiangle observations sampling different air masses are used. Also, it is shown how this neural-network based parametrization can allow for a better representation of surface condition when retrievals are performed over land where spectral variation between the two near infrared channels can be significant.