



20 years of Total Column of Water Vapor over Sea from ATSR measurements: climatology and extension of the AIRWAVE approach over land

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20-years day-night TCWV datasets over water in clear sky conditions have been produced applying the Advanced Infra-Red Water Vapour Estimator (AIRWAVE) algorithm [Casadio et al., 2016] to the measurements of the Along Track Scanning Radiometer (ATSR) missions.

The quality of the obtained datasets has been evaluated against independent products derived from space borne sensors (SSM/I) and in situ measurements (ARSA database).

The quality of the first version of the database (AIRWAVE-v1) is very good for the whole ATSR missions with the exception of the polar and coastal regions where AIRWAVE tends to underestimate the TCWV amount.

Version 2 of AIRWAVE, which accounts for both the atmospheric variability at different latitudes and the associated seasonality, improves the quality of the database in these regions.

AIRWAVE has been developed for observations over water surfaces. However, the capability of the AIRWAVE retrieval algorithm could in principle be extended to land surfaces. The main difficulty in exploiting land measurements is linked to the knowledge of the surface emissivity in ATSR IR channels. Indeed, while sea emissivity is generally close to one and is almost constant all over the globe, land emissivity has strong variations depending on e.g. surface type and vegetation cover. Furthermore, the angular emissivity variations can also be relevant. We have tested the use of different emissivity datasets to perform land clear sky TCWV retrievals.

In this paper we show both water vapour climatologies over water surfaces obtained using the new AIRWAVE-v2 dataset and the results of the application of AIRWAVE to measurements over land. In particular, here we show the comparison of the results obtained using two different approaches: one makes use of the emissivity database IREMIS (<http://cimss.ssec.wisc.edu/iremis/>) and the other one exploits the emissivity retrieved from SEVIRI infrared channels. The performance of the two approaches will be assessed with the aid of the TCWV dataset from the ESA DUE GlobVapour project (<http://www.globvapour.info/>), composed by SSM/I TCWV over sea and MERIS TCWV over land.

Casadio, S., Castelli, E., Papandrea, E., Dinelli, B. M., Pisacane, G., and Bojkov, B.: Total column water vapour from along track scanning radiometer series using thermal infrared dual view ocean cloud free measurements: The Advanced Infra-Red Water Vapour Estimator (AIRWAVE) algorithm. *Remote Sensing of Environment* 172,1-14, 2016.