AIRWAVE-SLSTR: The AIRWAVE algorithm extension to Sentinel 3 SLSTR measurement and the quality of the Water Vapor Columns retrieved over water surfaces

Bianca M. Dinelli¹, Elisa Castelli¹, Enzo Papandrea¹, Paolo Pettinari^{1,3}, Stefano Casadio², Massimo Valeri², and Bojan Bojkov⁴

¹ Istituto di Scienze dell'Atmosfera e del Clima (ISAC-CNR), Via Piero Gobetti, 101, 40129, Bologna,

² SERCO s.p.a., Via Sciadonna 24, 00044 Frascati (RM)

³DIFA, Universita' di Bologna, Bologna

⁴Eumetsat







MA MATER STUDIORUM Niversità di Bologna



The AIRWAVE-SLSTR algorithm

- AIRWAVE was developed to obtain the TCWV over water surfaces from the TIR channels of the (A)ATSR instrument series.
- The algorithm makes use of tabulated parameters (computed using a RTM in climatological conditions)
- In the frame of an EUMETSAT contract the algorithm has been modified to account for the differences between ATSR and SLSTR (operating on board the Sentinel 3 satellite)
 - Different span of time -> New CO₂ and CFCs climatology used to compute the parameters, accounting for their trends over the years.
 - New viewing geometry and swath.
 - New Spectral Response Functions (SRF).

The algorithm has been tested using 4 months of measurements of SLSTR-A in 2018 and 1 month of SLSTR-B (July 2018)

The results have been validated with collocated measurements of SSMI/S and IGRA stations



AIRWAVE-SLSTR

Direction of flight



- General good agreement between AIRWAVE and both SSMI/S and IGRA
- Few artefacts due to not perfect cloud filtering
- Average dry Bias of about 2 kg/m² partly due to the different penetration of MW wrt TIR – investigations on other causes is ongoing.
- The dry bias is larger in the Summer hemisphere, but can be cured with parameters computed using climatology estimated only over water surfaces
- Application of AIRWAVE-SLSTR on the full SLSTR-A and B is ongoing



