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An improved wet tropospheric correction for CryoSat-2 over open and coastal ocean

M. Joana Fernandes (1,2), Clara Lázaro (1,2), Alexandra L. Nunes (3,2), Nelson Pires (1,2), Salvatore Dinardo (4), and Jérôme Benveniste (5)

(1) Faculdade de Ciências, Universidade do Porto, Departamento de Geociências Ambiente e Ordenamento do Território, Porto, Portugal (mjfernan@fc.up.pt, clazaro@fc.up.pt, nelson.pires@fc.up.pt)), (2) Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR/CIMAR), Universidade do Porto, Porto, Portugal (anunes@ciimar.up.pt), (3) Instituto Politécnico do Porto, Instituto Superior de Engenharia, Porto, Portugal, (4) SERCO/ESA-ESRIN, Frascati, Italy, (5) ESA, Frascati, Italy

In the scope of the CryoSat Plus for Oceans (CP4O) project, encouraged by the European Space Agency, a data combination (DComb) algorithm has been developed for the computation of the wet tropospheric correction (WTC) for CryoSat-2, which does not possess an onboard microwave radiometer (MWR), thus relying on a model-based WTC provided by the European Centre for Medium-Range Weather Forecasts (ECMWF). This WTC is based on the objective analysis of all available wet path delay data sources (e.g. from scanning imaging MWR (SI MWR) on board remote sensing satellites, those derived from Global Navigation Satellite Systems (GNSS) measurements at coastal stations and from an atmospheric model such as the ECMWF ReAnalysis (ERA) Interim.

This presentation gives a brief description of the DComb algorithm and its application to CryoSat-2.

The algorithm was first applied to Jason-2 and compared with the correction from the Jason-2 advanced microwave radiometer (AMR) present on the version D of the Geophysical Data Records (GDR-D), known to be a well calibrated and accurate correction, with improved performance in coastal regions. These results show that for epochs and locations for which SI-MWR measurements are available, the DComb WTC is very similar to that of AMR, evidencing that the SI-MWR water vapour products, previously calibrated with respect to AMR, are an extremely valuable data set for the estimation of the WTC for any altimeter mission, including those which possess an onboard MWR.

For both Jason-2 and CryoSat-2 the new correction was validated through analysis of sea level anomaly variance at crossovers, function of distance from the coast and latitude. The influence of the GNSS-derived wet path delays in the coastal regions, of major importance for the full exploitation of CryoSat-2 data, in particular those acquired in the Synthetic Aperture Radar (SAR) mode, is also shown.