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Poster
The assessment of long-term errors of altimeter sea level measurements is of crucial importance for studies concerning the Mean Sea Level (MSL) evolution. One of the main contributors to the long-term sea level uncertainties is the correction of the altimeter range from the wet troposphere path delay, which is provided by onboard microwave radiometers for the main altimeter missions.
The first part of the study is dedicated to the wet tropospheric correction (WTC) estimated from microwave radiometers. Nowadays, water vapor products from microwave radiometers are rather consistent but important discrepancies remain. Understanding these differences can help us to improve the retrieval of water vapor and reduce at the same time the error on the mean sea level. Three radiometers are compared: Advanced Microwave Scanning Radiometer for EOS (AMSR-E), JASON-1 Microwave Radiometer (JMR) and ENVISAT Micro-Wave Radiometer (MWR). Water vapor products are analyzed both in terms of spatial and temporal distribution over the period 2004-2010, using AMSR-E as a reference. Overall, the study confirms the general good agreement between the radiometers: similar patterns are observed for the spatial distribution of water vapor and the correlation of the times series is better than 0.90. However, regional discrepancies are observed and a quantitative agreement on the trend is not obtained. Regional discrepancies are driven by the annual cycle. The JMR product shows discrepancies highly dependent on water vapor, which might be related to calibration issues. Furthermore, triple collocation analysis suggests a possible drift of JMR. MWR discrepancies are located in coastal regions and follow a seasonal dynamic with stronger differences in summer. It may result from processing of the brightness temperatures.
These discrepancies explain why the operational ECMWF atmospheric model is usually used as a common reference for mean sea level studies. However, due to several major improvements on the processing, this model is not homogenous over the altimetry period (from 1993 onwards) preventing the detection of errors on radiometer wet tropospheric correction especially on first altimetry decade. The second part of this study aims at determining the quality of WTC provided by ERA interim atmospheric model reanalyzes (ECMWF) in comparison with ECMWF operational fields and also with reanalyzes derived from National Centers for Environmental Predictions / National Center for Atmospheric Research (NCEP/NCAR). Separating our analyses on several temporal and spatial scales, we demonstrate that ERA interim is the best model WTC for the altimeter sea level at climate scales.
Overall, this work demonstrates the relevance of the feed-backs that the “altimetry” and “atmosphere” communities can bring to each other.
OSTS session
Quantifying Errors and Uncertainties in Altimetry Data