Geophysical Research Abstracts
Vol. 20, EGU2018-15033, 2018
EGU General Assembly 2018

Validation of Sentinel-3A wet path delay over the open and coastal ocean

M. Joana Fernandes (1,2), Clara Lázaro (1,2), Marco Restano (3), Américo Ambrózio (3), and Jérôme Benveniste (3)

(1) Faculdade de Ciências, Universidade do Porto, Departamento de Geociências Ambiente e Ordenamento do Território, Porto, Portugal, (2) Centro Interdisciplinar de Investigação Marinha e Ambiental (CIIMAR/CIMAR), Universidade do Porto, 4050-123 Porto, Portugal, (3) European Space Agency, Via Galileo Galilei, CP 64, 00044 Frascati, Italy

Launched on 16 February 2016, Sentinel-3A (S3A) carries a two-band microwave radiometer (MWR) similar to those of ERS and Envisat, aimed at the precise retrieval of the wet path delay (WPD) through collocated measurements with the SRAL instrument.
Due to their instrumental characteristics and retrieval algorithms, the two-band MWR deployed on the European Space Agency (ESA) altimeter missions are known for their good performance in the open-ocean. However, when they approach the coast, the retrieval algorithm, which was designed for surfaces with ocean emissivity, generates very noisy values as the footprint encounters non-ocean surfaces. The same happens at high latitudes in regions covered with ice.
This study aims at presenting an independent validation of the S3A WPD derived from the on-board MWR, present on S3A Level-2 Non-Time Critical (NTC) products from the so called “Spring 2017” Reprocessing Campaign.
The validation is performed by means of comparisons with independent data sets, namely: the GPM Microwave Imager (GMI); Global Navigation Satellite Systems (GNSS) derived path delays determined at coastal stations; wet path delays from the MWR on board Jason-2 (J2), Jason-3 (J3) and SARAL/AltiKa.
The overall along-track performance is also compared against estimates obtained from the GNSS-derived Path Delay Plus (GPD+) algorithm and from atmospheric models. For this purpose, GPD+ WPD have been derived by combining, through space-time objective analysis, all available observations but not including those from S3A MWR, i.e. using only third-party observations.
Moreover, the correction is also evaluated against the WPD derived from an atmospheric model, GPD+ and the Composite WPD, by means of sea level anomaly variance, both along-track and at crossovers and function of distance from coast.
Considering the relative short period of the analysis, the overall performance of S3A MWR seems good and stable. Small scale factors and offsets relative to GMI, J2 and J3 and SARAL have been found. RMS differences (cm) of S3A with respect to the various radiometers of 1.0 (GMI), 1.1 (J2), 1.3 (J3) and 1.5 (SARAL) indicate good agreement between these sensors.
In spite of the small analysed period, a stable temporal evolution of the S3A WTC has been observed. Periodic patterns of the differences with respect to GMI are explained by the different orbits and corresponding samplings of these sensors.
In line with the similar two-band instruments aboard previous ESA altimetric missions, strong ice and land contamination can be observed, the latter one being mainly up to 20 km from the coast. GPD+ corrections tuned to S3A and taking full advantage of the valid S3A MWR are under development, aiming at generating continuous corrections, also valid in the coastal zone and at high latitudes.