EGU2020-19345
https://doi.org/10.5194/egusphere-egu2020-19345
EGU General Assembly 2020

Coastal Sea Level Change from in the North Eastern Atlantic

Luciana Fenoglio-Marc[1], Bernd Uebbing[1], Jürgen Kusche[1], and Salvatore Dinardo[2]
[1]University of Bonn, Institute of Geodesy, APMG, Germany (fenoglio@geod.uni-bonn.de)
[2]HE SPACE/EUMETSAT, Darmstadt, Germany

A significant part of the World population lives in the coastal zone, which is affected by coastal sea level rise and extreme events. Our hypothesis is that the most accurate sea level height measurements are derived from the Synthetic Aperture Altimetry (SAR) mode. This study analyses the output of dedicated processing and assesses their impacts on the sea level change of the North-Eastern Atlantic.

It will be shown that SAR altimetry reduces the minimum usable distance from five to three kilometres when the dedicated coastal retrackers SAMOSA+ and SAMOSA++ are applied to data processed in SAR mode. A similar performance is achieved with altimeter data processed in pseudo low resolution mode (PLRM) when the Spatio-Temporal Altimeter sub-waveform Retracker (STAR) is used. Instead the Adaptive Leading Edge Sub-waveform retracker (TALES) applied to PLRM is less performant. SAR processed altimetry can recover the sea level heights with 4 cm accuracy up to 3-4 km distance to coast. Thanks to the low noise of SAR mode data, the instantaneous SAR and in-situ data have the highest agreement, with the smallest standard deviation of differences and the highest correlation. A co-location of the altimeter data near the tide gauge is the best choice for merging in-situ and altimeter data. The r.m.s. (root mean squared) differences between altimetry and in-situ heights remain large in estuaries and in coastal zone with high tidal regimes, which are still challenging regions. The geophysical parameters derived from CryoSat-2 and Sentinel-3A measurements have similar accuracy, but the different repeat cycle of the two missions locally affects the constructed time-series.

The impact of these new SAR observations in climate change studies is assessed by evaluating regional and local time series of sea level. At distances to coast smaller than 10 Kilometers the sea level change derived from SAR and LRM data is in good agreement. The long-term sea level variability derived from monthly time-series of LRM altimetry and of land motion-corrected tide gauges agrees within 1 mm/yr for half of in-situ German stations. The long-term sea level variability derived from SAR data show a similar behaviour with increasing length of the time series.