Geophysical Research Abstracts
Vol. 14, EGU2012-11013, 2012
EGU General Assembly 2012

Towards an improved altimeter time series for Envisat climate applications

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The quality of Envisat altimeter for sea-level mesoscale studies or in multi-mission merging context was already demonstrated many times. Yet, concerning climate applications, significant errors have been detected related with its long-term stability. To date, the off line along track data delivered to users (GDR: Geophysical Data Records) were not reliable for mean sea level trend applications. However, post processing and data updates enabled to build up a working basis which enabled to anticipate the whole mission GDR reprocessing and to evidence errors in the data-set.

A first objective of the work presented here is to describe the sources of long-term errors in relationship with the heterogeneity of the historical data time series and also with some major events strongly impacting the data quality. For instance, the impact on the global trend, day/night consistency and regional analysis is thoroughly detailed. For this purpose, cross-calibration with other missions and comparison to in-situ data sets are performed. These methods, as well as results, will be presented, and shown to play a crucial role in the improvement of Envisat altimetric data set. For instance, they are shown to have enabled the detection of an error in an instrumental correction. They could also evidence the major impact of the choice of the gravity field model into orbit standards on the regional long term studies. As a consequence, a new orbit standard was computed to improve the reliability of data at regional scales.

In 2011, the first official whole mission reprocessing (V2.1 standards) was completed. A second objective of this paper is to show their quality and to demonstrate that they can still be improved for climate long term studies. Provided the two major updates identified with the methods presented above, Envisat altimeter data become more and more relevant for mean sea level trend studies. In this presentation, the role of cross calibration in a multi-mission context is also stressed. In fact, the improvements noticed on Envisat are shown to enhance as well the reliability of other missions, towards an ever improving altimetric system.