

TASK 4.1 Impact for the validation of satellite observations: Altimetry

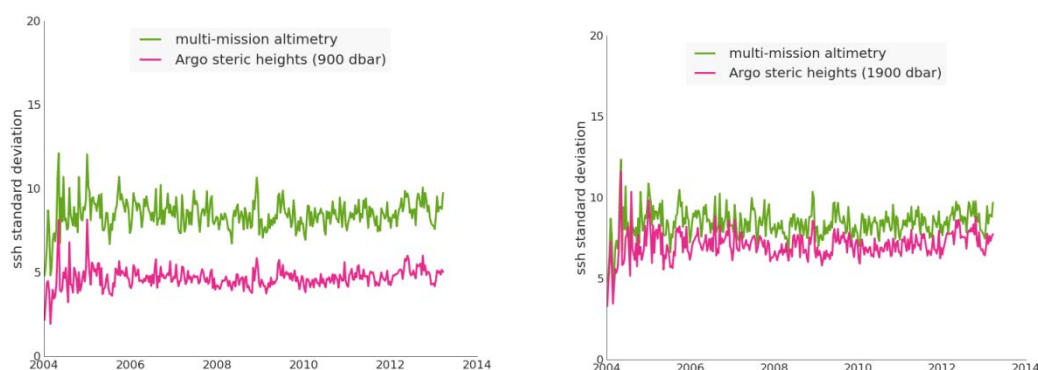
Authors: J.-F. Legeais⁽¹⁾, A. Pascual⁽²⁾, S. Guinehut⁽¹⁾, (1) CLS, Toulouse, France, (2) IMEDEA (CSIC-UIB), Mallorca, Spain

Description of impact study carried out (overview, objectives, role of Argo): Satellite altimetry and Argo are strongly complementary to describe the ocean state, for ocean and climate research and for sea level rise studies. As the signals of interest are of very low amplitude and are highly sensitive to biases or errors present in the dataset, very high qualified data are required. We focus here on the calibration and validation of the altimeter Sea Level Anomalies (SLA) by comparison with Dynamic Heights Anomalies (DHA) computed from the Argo in-situ temperature and salinity (T/S) profiles. The E-AIMS activities have allowed us to determine to which extent the altimetry quality assessment is sensitive to the sampling and processing of the Argo data.

Results: The comparison of altimetry with Argo data allows the detection of drift, jumps or anomalies in the altimeter measurements and the assessment of the impact of new altimeter standards in the Sea Level computation. Further details are available in Valladeau et al., 2012 (Valladeau G., JF Legeais, M. Ablain, S. Guinehut and N. Picot, "Comparing Altimetry with tide gauges and Argo Profiling Floats for data quality assessment and Mean Sea Level studies", Marine Geodesy Vol. 35 Suppl. 1, 2012.). However, the uncertainty associated with some results remains relatively high and within the E-AIMS project, we have better characterized to which extent the altimetry validation is sensitive to the Argo data and their processing. The studies have focused on several points:

- Sensitivity to the spatial sampling of the Argo floats: The altimeter drift detection and the global statistics between both types of data are not affected by a reduction of the number of Argo floats and a reduced spatial coverage of the in-situ network.
- Sensitivity to the temporal sampling of the Argo profiles: A reduced temporal sampling of the floats (>10 days) can prevent us from detecting the impact of new altimeter standards in some specific situations. However, this impact is not systematically detected according to the case of study. The temporal sampling of the Argo floats should thus be maintained with at least the existing temporal coverage.
- Sensitivity to the reference depth for the integration of the Argo dynamic heights: The detection of the altimeter drift and the quality assessment of new altimeter standards or products are highly sensitive to the choice of this reference level. This affects the ocean coverage by the network, the physical content of the sampled water column (see figures below) and the analysis of the altimeter sea level closure budget. This has been studied globally but also in some regions such as the Mediterranean Sea. There is a balance to be found between the vertical sampling of the ocean and the spatial coverage (horizontal sampling) and this choice of reference level may vary according to the case of study (global or regional analyses, long-term trends or variances differences...). For most situations of altimeter quality assessment, the vertical extension of the Argo profiles should be extended to deeper levels.

Figures:



Standard deviation of the altimeter SLA (green) and the in-situ dynamic heights from Argo profiles with a 900 dbar reference (left) and 1900 dbar reference (right) in the Antarctic Circumpolar Current.