Using Argo to validate remote sensing missions

With its more than 3500 automatic profilers, the Argo array is one of the most important component of the Global in-situ Ocean Observing System. The array provides measurements of temperature and salinity profiles down to 2000 m. These data are rapidly expanding the historical database of the ocean sub-surface (specially in the case of ocean salinity) and are providing novel information about the ocean's vertical structure and its variability. Moreover, these data allow real-time monitoring, model-constraining and contribute to calibration and verification efforts.

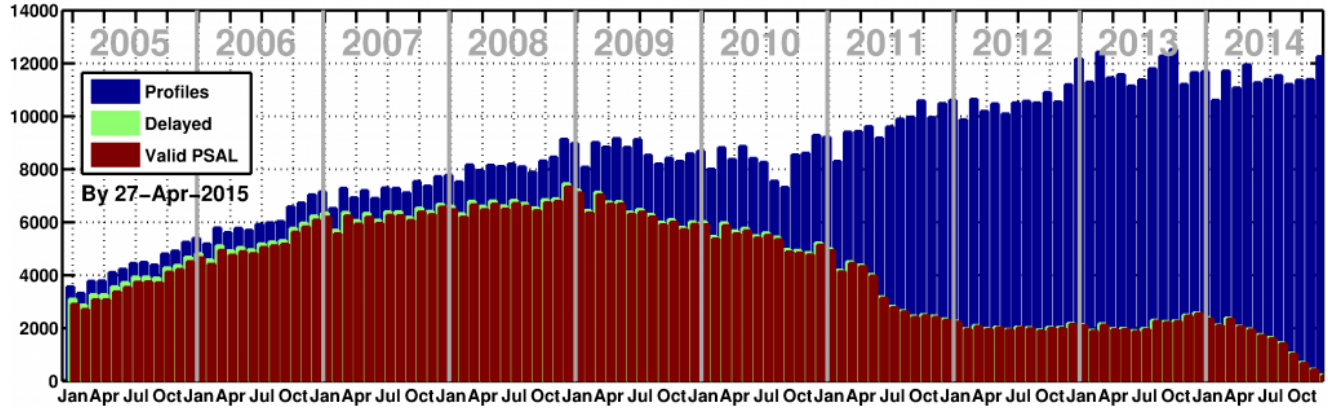

Figure 1: Number of Argo profiles from January 2005 to December 2014: Shown are the total number of profiles, the delayed mode profiles as for April 27, and the number of delayed mode profiles with salinity.

The Euro-Argo (www.euro-argo.eu) research infrastructure, designed to coordinate the European contribution to Argo, is part of the European Strategy Forum on Research Infrastructures (ESFRI). Euro-Argo is expected to provide additional 50 floats per year and support about the 25% of the Argo array.

Members of the Euro-Argo Improvements for the GMEX/Copernicus Marine Service (E-AIMS) project have been working since January 2013 to help design the new phase of Argo by

implementing and validating new float technologies. Moreover, the activities developed in E-AIMS have allowed to better understand the ability of the observations recovered by this array of automatic profilers to constrain numerical models and to validate remote sensing missions.

A recent contribution entitled "*Assessment of the Impact of Argo in ocean models and satellite validation from E-AIMS project*" provides a summary of the main results provided by E-AIMS so far. It illustrates how Observing System Evaluations and Observing System Simulation Experiments have been conducted to quantify the contribution of Argo to constrain global and regional monitoring and forecasting centers and validate satellite observations. Recommendations for the new phase of Argo are also elaborated.

In the particular context of SMOS, the the Argo array continues to be the only observing system able to provide global measurements of salinity, allowing validation of the retrieval algorithms in different geophysical scenarios (sea surface temperature, surface wind speed and distance to the coast).

Comparison of Argo near surface salinity data with satellite SSS products generated by the SMOS Barcelona Expert Centre (http://cp34-bec.cmima.csic.es) have demonstrated this high potential of Argo. It has been noticed that the number of available Delayed Mode profiles has been decreasing during the validation period (2011-2013). If in January 2011 more than 6000 Argo salinity profiles are available, by December 2013, less than 1000 Argo salinity profiles are available (Figure 1). This is due to the time required for the Argo data delayed mode quality control but it would be very important to reduce this time delay and/or to produce intermediate data sets where surface observations are validated. The results indicate that robust estimates of the difference between SMOS and Delayed Argo have been found. The standard deviation of the differences are of the order of 0.29 and 0.23 (in the

practical salinity scale) depending if the comparison is done in the latitudinal band of 60S-60N or 30S-30N respectively.

Le Traon, P.Y., E. Remy, and J. Ballabrera-Poy, 2015: Assessment of the impact of Argo in ocean models and satellite validation from E-AIMS project. Mercator Ocean – Coriolis Quarterly Newsletter, 52, 11-15. The whole manuscript can be found here.