

Validation of Sentinel-3A altimetry data by using in-situ multi-platform observations near Mallorca Island (western Mediterranean)

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In the frame of the Copernicus Marine Environment Monitoring Service (CMEMS) Sea Level Thematic Assembly Center (SL-TAC), a glider mission was undertaken between May and June 2016 along the same track as the overpass of the Sentinel 3A satellite in the Southern Mallorca region. Moreover, a one-day ship mission on May 30, synchronous with the overpass of the satellite, captured two transects of moving vessel ADCP close to the coastal area. The aim was to compare the along track altimeter products and multi-platform in-situ observations in the southern coastal zone of the Mallorca Island and the Algerian Basin. In addition, we explored the potential of the Synthetic Aperture Radar Mode (SARM) instrumentation of Sentinel-3 mission, which enables the satellite to measure nearest the coasts with both higher spatial resolution and higher precision than previous missions. With the ultimate goal of contributing to a more complete understanding of both ocean and coastal physical processes and the biogeochemical impacts.

The analyses presented here are conducted through the comparison of Absolute Dynamic Topography (ADT) obtained from the Sentinel-3A altimetry measurements along ground-track #713 and Dynamic Height (DH) derived from temperature and salinity profiles measured by the glider along the trajectory followed by the satellite. Moreover, currents derived from altimetry and in-situ glider data along the track followed by the satellite; and from ADCP data collected in the coastal region are analysed. Results show a good agreement between ADT from altimetry and DH from glider data with maximum differences of around 2 cm that promote a root mean square error (RMSE) of 1 cm, the correlation coefficient between both datasets is 0.89. The satellite data closely resemble the geostrophic velocity pattern observed by the glider measurements along the Algerian Current, and also the ADCP data in the coastal zone, exhibiting a RMSE lower than 10 cm/s and a correlation coefficient larger than 0.75.

This mission is part of a study focused on mesoscale variability and comparison of the along-track and gridded interpolated maps altimetry products in the western Mediterranean Sea using in-situ data including Argo, ADCP, gliders, drifters, HF radar and tide gauges data. We take advantage of the high spatial resolution and a multi-platform approach to investigate the variability of physical processes in the coastal area of this region. This experiment contributes to the preparatory cal/val activities of the forthcoming wide-swath satellite altimeter (SWOT) that will provide daily high resolution sea surface height measurements during the fast phase after launch around the Balearic Islands.