Regional assessment of altimetry products in the NW Med: Comparisons to in-situ data and model outputs.

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In this preliminary study, we investigate the characteristics of a standard regional NRT product & an experimental L3 coastal sea-level product from PISTACH data, and assess their combined use with in-situ data (drifters) and a regional model.

The results suggest that:
- L2 NRT data shows some consistent behaviour with drifter data, despite biases.
- RED3 retracking : better coastal coverage (+5%)
- NORMED model has an excess of energy at the mesoscales, possibly arising from the lack of energy dissipation towards the finer scales.

Velocity differences between altimetry data and drifter trajectories have been computed (see fig. 2):
- As expected, differences tend to be lower spatial separations smaller than 20 km.
- Differences vary with filtering scale, with smallest differences for 54 km filtering.
- Such behaviour not reproduced by Cryosat-2 and Envisat data.
- Important bias (6-7 cm.s^{-1}) computed from 54 km filtering.
- Such behaviour not reproduced by Cryosat-2 and Envisat (new orbit) data.
- Important bias (6-7 cm.s^{-1}) computed from 54 km filtering.

Comparison of RED3 & MLE4 retrackings on L3 coastal SLA product from PISTACH data.

An experimental Delayed-Time L3 coastal sea-level product has been computed in the NW Mediterranean Sea from AVISO Jason-2 PISTACH data (http://www.aviso.oceanobs.com):

- Better coverage near coast (+5-10%)
- Less noise on RED3 at fine scale (~10km).
- MLE4 better at larger scales (~50km).

Geostrophic Current Anomalies from model and altimetry data

From fig. 6 & 7 : 3 main zones of variability are visible along J2 track #9 on both altimetry data & model SLA:
- Coastal & slope areas (3)
- Lower energy offshore zone (2)
- Balearic front zone (1)

Comparison of L3 coastal SLA product from PISTACH data to the NORMED regional model

MARS3D : 3D numerical ocean model for Application at Regional Scale (Lazure and Dumas, 2009).
- Test free surface model, Boussinesq and hydrostatic assumptions, Arakawa-C grid.
- The NORMED configuration:
  - NW Mediterranean Sea (cf. figure 5)
  - 1.2 km resolution, 30 x 40 depth levels, central row.
- Atmospheric forcing : MM5 model (3 to 9km).

Analysis of data & model spectral contents

(1) Notable differences appear between SLA spectra computed from altimetry data and model:
- Increased energy at mesoscale on model in winter and fall.
- Slope change (k^4) of the model at 60-100 km (~2mRMS) – close to the QG theory.
- Models with k^4 slope.
- Inverse energy cascade in NORMED?

(2) Seasonal variability of the spectrum is visible on altimetry SLA spectrum:
- Higher energy at mesoscales in spring and summer.
- Flatter slope (k^4) of altimetry spectrum, peaking in spring (k^4).
- Dissipation of turbulent energy from the direct cascade (eg. Capet et al., 2008)?