Envisat (see below), but not yet for Cryosat-2 as (WGS84 ellipsoid), without removing any biases by hand, and WE aim at performing an computed and compared. Often altimeter/tide gauge are a good reference having been conservatively screened and quality-controlled: data against the SGDR and the coastal 1-Hz data produced by CTOH in Toulouse which (1) National Oceanography Centre, United Kingdom, (2) University of Southampton, United Kingdom. (3) Consiglio Nazionale delle Ricerche, Pisa, Italy. (**) Corresponding author: cip@nocs.ac.uk, +44-(0)23-80594404

Rationale and Study area
Following on the coastal altimetry work for Envisat started in the COASTALT project (2008-2012), the NOC coastal altimetry processor is being extended to process data from multiple altimetric missions within the ESA DUE eSurge and eSurge-Venice projects for the provision of Earth Observation data in support of storm surge monitoring, modelling and forecasting. An important calibration and validation site is the area in the Northern Adriatic Sea, where storm surges (locally called ‘acqua alta’) are particularly frequent – this is the site of the eSurge-Venice project. For this validation activity we have processed Envisat and Cryosat data in the area, and compared them with data from the CNR tide gauge (TG) at the “Acqua Alta” platform ~14 km from the coast of Venice Lido. We also looked at Jason-1 and -2 over an adjacent area in the Northern Adriatic – see talk and OSTST poster by Passaro et al.

Correlation between Envisat and TG
We compared, in terms of correlation of the TWLE series, ALES-reprocessed Envisat data against the SGDR and the coastal 1-Hz data produced by CTOH in Toulouse which are a good reference having been conservatively screened and quality-controlled:

- ALES improves correlation everywhere compared to SGDR
- ALES maintains correlation above 0.8 over most of the 18-Hz locations, except for a few locations.
- The correlation for the CTOH 1-Hz series is only marginally higher. This is expected being ALES a high-rate non-filtered product.

Absolute vs Relative Calibration
Often altimeter/tide gauge intercomparison is RELATIVE, that is the common bias is removed and anomalies are computed and compared. WE aim at performing an ABSOLUTE calibration, i.e. closing the altimetric height budget using absolute references (WGS84 ellipsoid), without removing any biases by hand, and working with absolute levels. This is possible for Envisat (see below), but not yet for Cryosat-2 as there are large remaining processing biases.

What we have learnt so far from these results
The comparison of our retracted data against the standard data in the Envisat (and Jason, see other poster) SGDRs shows that:
1. with dedicated sub-waveform retrackers (and in particular with the ALES retracker) we can retrieve more and better data closer to the coast. Correlations with the tide gauge data improve especially in the coastal strip (~10-20 km from the coast) but also, slightly, in the open ocean region, as many waveforms in this area suffer from the presence of bright-target-like artefact and therefore do not conform well with the Brown model.
2. 20-Hz noise levels for the ALES-retracted Envisat are flat until about 3 Km from the coastline, as opposed to ~5 Km for the SGDR data.
3. RMS values between ALES and tide gauge are at ~10 cm order of magnitude on the absolute water level (i.e. NOT using anomalies) which is a good result indicating a substantial closure of the SSH equation.
4. Cryosat-2 data show an even better performance very close to the coast, with noise levels compared to the offshore ones up to less than 1 km from the coast, even if unresolved bias problems prevent an absolute RMS calculation so far.
5. For Cryosat-2, the RMS difference with the tide gauge, computed with anomalies, is of the order of 8 cm.

To view these results and others, please visit our project website at www.storm-surge.info

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