Sea level variation is one of the major threats for coastal zones. Improving its observation is essential to better understand and predict the behavior of the coastal ocean. Altimetry provides unique long-term observational datasets to characterize how sea level variability evolves from the open ocean to the coastal ocean. The X-TRACK processing chain has been developed in order to recover as much as possible altimetry data in the coastal ocean. Now, X-TRACK is a multi-mission product covering all the coastal ocean, produced by the CTOH and freely distributed by the AVISO+ service. It has been decided to inject the L2 ALES product in the X-TRACK post-processing algorithm, using the best possible set of altimetry corrections, in order to combine the different efforts that have been done to advance the capabilities of satellite altimetry near coastlines, in a high resolution product (20Hz ~ 300m) which will be available for the research community.

New along-track tidal constants Products

The last improvement of the coastal altimetry SLA data has led the CTOH to produce new regional along-track tidal constant product based on the X-TRACK software, available in 2019 on the operational AVISO+ web portal.

As example, figure 2 shows the results of the harmonic analysis performed on X-TRACK SLA data for the M2 empirical tidal constituent in two coastal areas. The RMS of the along-track amplitude differences derived from altimetry and from the FES2014 global tidal model.

Results: • Good agreements between the model and X-TRACK tidal constants over the open ocean. • Larger differences are observed in coastal regions (may be due to erroneous altimetry data or to model errors). • The new tidal constant product has better results expeditely in the coastal zone. • For the Kerguelen zone we got a large improvement in the south part (sea ice coverage).

A new version of X-TRACK SLA multi-mission product at 20Hz, based on ALES retracker

We aim to take advantage of the large progress that have been made in coastal altimetry during the last decades. X-TRACK is now a mature L3 1-Hz multi-mission product and its editing and post-processing strategy allows to obtain more accurate data closer to the coast. The ALES retracker is able to retrieve more coastal altimeter waveforms than the standard processing, and then significantly more reliable 20-Hz SLA data [2].

In the context of the bridging phase of the ESA’s climate change initiative sea-level project (SL_cci) and acknowledging user needs we have strated to compute an X-TRACK L3 multi-mission product combining the better spatial resolution provided by high-rate data, the post-processing strategy of X-TRACK (adapted to 20Hz data), the advantage of the ALES retracker, refined geophysical corrections and dedicated studies on the impact of correction and processing on resulting sea level trends [3].

Despite they have a much higher noise level than the classical 1-Hz data, once filtered, the high resolution allow to recover more information on coastal sea level variations. X-TRACK high rate technique extend the number of valid SLA several kilometers shoreward along the track. The combined high rate X-TRACK/ALES product increases the number of useful near shore sea level data available; as an example, for Jason-2 we obtain 80% of valid sea level data at a distance of 3.4 km in average for the Western African Coast, instead of 4.5 km for the X-TRACK 20Hz alone and 7.6 km for the X-TRACK’s 1Hz version.

The presence of a bias between CMEMS product and X-TRACK products is due to differences in the selected treatment and will be resolve soon. The trend computed from the gridded SLA product CMEMS miss the coastal signal because his resolution is too low to capture it.

The different along-track products have comparable trend (computed for the Jason 2 period), except close to the coast where different products give different estimations of the local sea level trend with sometimes opposite sign. The combined high rate X-TRACK/ALES remains robust and coherent in space close to the coast.