

## **Abstract for AGU Fall Meeting 2015**

### **Global coastal altimetry data enable an improved look at coastal dynamics and sea level**

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The field of research aiming at recovering meaningful measurements of sea level and significant wave height from satellite altimetry in the coastal strip, known as coastal altimetry, has reached maturity thanks to the concerted effort of a lively community of scientists ([www.coastalt.eu/community](http://www.coastalt.eu/community)). We illustrate the improvements in radar waveform retracking, as well as those in the corrections of atmospheric and surface effects, that together enable coastal altimetry to achieve a precision comparable to the 2-cm level at 1-Hz seen over the open ocean. We present design and implementation of a multi-mission coastal altimetry processor based on the ALES retracking algorithm that has been used to generate products from the Jason-1, Jason-2 and Envisat altimeters in the 50-km coastal band globally; these products are freely available.

We show examples of the validation of satellite altimetry data against tide gauges and wave buoys in dynamically different regions of the world's coasts (Northern Adriatic, UK coast, South Africa, South-East Australia). We demonstrate the intrinsically superior performance of SAR mode (delay-Doppler) altimetry from ESA Cryosat-2 mission, showing measurement noise of around 5 cm or lower for the 20-Hz data almost all the way to the coast when the orientation of the satellite track is favourable. This is extremely promising for the Sentinel-3 altimeter, due for launch in late 2015, which will be in SAR mode everywhere.

We finally illustrate with examples two very different applications of the reprocessed data, both having significant societal impact: a) the observation of the offshore-to-coast sea level profile during extreme events (storm surges), which is of great value to surge modellers and forecasters; and b) the use of long (>20 years) time series of coastal altimetry to derive the rates of global and regional sea level rise in the coastal strip, therefore enabling a link between the open-ocean estimates and those from tide gauges.