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Developing radar altimetry in the oceanic coastal zone: the COASTALT project

Paolo Cipollini (1), Jesus Gomez-Enri (2), **Christine Gommenginger** (1), Cristina Martin-Puig (3), Stefano Vignudelli (4), Phil Woodworth (5), Jérôme Benveniste (6)

(1) National Oceanography Centre, Southampton, U.K, (2) Universidad de Cádiz, Spain, (3) Starlab Barcelona S.L., Barcelona, Spain, (4) Istituto di Biofisica, Consiglio Nazionale delle Ricerche, Pisa, Italy, (5) Proudman Oceanographic Laboratory, Liverpool, U.K, (6) European Space Agency, ESRIN, Frascati, Italy

Fifteen years of global altimetry data over the coastal ocean lie, largely unexploited, in the data archives, simply because intrinsic difficulties in the corrections (especially the wet tropospheric component, the high-frequency atmospheric signal and the tides) and issues of land contamination in the footprint have so far resulted in systematic flagging and rejection of these data [1]. These data would be invaluable for studies of coastal circulation, sea level change and impact on the coastline. In addition, they provide an essential link between the land-based geodetic measurements and oceanic mean sea surface information. Recently, a number of studies have dealt with the problem of analyzing these nearshore data, and some initiatives have been launched for an extensive reprocessing of the coastal altimetric records in order to recover all the available information. Amongst those initiatives, a prominent role is taken by the COASTALT Project, funded by the European Space Agency (ESA) and starting in early 2008.

The main objective of the COASTALT Project is to make the status of pulse-limited coastal altimetry operational, by defining and testing the new coastal radar altimeter product so that ESA can routinely generate and distribute the Envisat coastal altimetry product. On the way to this overall objective the COASTALT partners also aim to:

(1) carry out an extensive study of the possible improvements in geophysical corrections, and identifying the best strategies

(2) revisit the whole approach to waveform retracking, by assessing the capabilities of physically-based retrackers in the coastal ocean, testing novel retracking schemes and strategies, identifying the best candidate strategy for immediate operational application and producing a fully usable prototype of that retracker, while at the same time seeding the research into the next generation or retrackers for Sentinel-3

(3) assess the performance of the new retracked products over two regions with different characteristics, where a host of in situ measurements are available for validation

(4) provide full documentation on the new product in a way that is consistent with - and can be integrated with - the Envisat User Handbook

In this paper we will first illustrate the first project phase, based on the assessment of user requirements, and summarize those requirements, Then we will describe the COASTALT methodology and objectives in some detail: in particular we will discuss the different possible approaches to deal with the problem of geophysical corrections in the coastal zone, including the assessment of models of the wet tropospheric correction, the use of GPS-meteo observations and Global Ionosphere maps from GPS tomography, and the use of regional models (such as in [2]) for the inverted barometer correction and for high frequency and tidal dealiasing. Then we will illustrate and discuss the various options for coastal waveform retracking, and present a plan for the validation of the retracked data.

It must be stressed that COASTALT also contains a significant element of capacity building, outreach and dissemination, including the presence of a dedicated work-package on outreach. We will conclude by illustrating the first steps of a newly created Coastal Altimetry Science Working Team, which will hopefully act as a scientific and operational forum as well as an incubator of new ideas in this novel field of altimetry.

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