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Progress in Coastal Altimetry: the experience of the COASTALT Project

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Satellite altimetry over the open ocean is a mature discipline, and data are routinely assimilated for operational applications. In contrast, global altimetry data collected over the coastal ocean remain 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. In the last couple of years, significant research has been carried out into overcoming these problems and extending the capabilities of current and future altimeters to the coastal zone, with the aim to integrate the altimeter-derived measurements of sea level, wind speed and significant wave height into coastal ocean observing systems. At the same time the major Space Agencies have recognized the importance of the topic and are sustaining coastal altimetry research through projects such as COASTALT (ESA), PISTACH (CNES) and some OSTST (NASA/CNES) initiatives. A number of crucial improvements to the processing of the altimetric waveforms in the coastal zone and to the correction of the measurements for path delay and geophysical effects (tides and atmospheric) are being implemented and tested. The first custom-processed coastal altimetry data are now available, and many more data from Jason-1, Jason-2 and Envisat will become available during 2009. This new "coastal altimetry" community, inherently interdisciplinary, has already had two well-attended international workshops (see http://www.coastalt.eu/pisaworkshop08/).

In this paper we will report on the progress of the COASTALT Project, funded by the European Space Agency, which aims at defining, developing and testing a prototype software processor to generate new Envisat radar altimeter products in the coastal zone. Ultimately, the plans are for ESA to routinely generate and distribute these new Envisat coastal altimetry products, also in preparation for exploitation of data from the future altimetry missions, CryoSat and Sentinel-3. These missions will have inherently improved coastal zone capabilities by virtue of the adoption of a Delay-Doppler instrument.

We will first summarize the final recommendations on the geophysical corrections, then illustrate the research and development that has gone into the design of the coastal altimetry processor (including both an in-depth analysis of Envisat waveforms in two coastal regions that are guiding the definition of the retracking algorithms, and the strategies for validation of the reprocessed data), and lastly present the outlook for the final phase of the project, including plans for a follow-on activity to extend the reprocessing to other areas and other ESA missions.