Third Cryosat User Workshop
12-14 March 2013 Dresden University

Title – Coastal SAR altimetry data from the eSurge processor

Authors: Paolo Cipollini (NOC), Luke J West (NOC), Christine Gommenginger (NOC), Helen Snaith (NOC), Jerome Benveniste (ESA/ESRIN), Salvatore Dinardo (ESSA/ESRIN), Craig Donlon (ESA/ESTEC).

Abstract:

The SAR altimeter on board Cryosat-2 allows an intrinsically higher along-track resolution than conventional pulse-limited instruments. This has advantages for some open ocean applications, like in areas of strong submesoscale activities (filaments, very intense fronts across storms) and in areas affected by major oil slicks. The advantages are even more evident in the coastal zone, where the typical scale of dynamical phenomena is shortened.

When the track approaches the coast almost orthogonally, the waveforms conform well to the delay-Doppler Altimetry model (and give sensible results when retracked), up to 500 m from the coast or even closer, as already demonstrated by Dinardo et al. using Cryosat-2 data at the 5th Coastal Altimetry Workshop (2011).

Assimilation in, and validation of, storm surge models appear as a very promising application of the coastal altimetry data, that can bring tangible societal benefits. Altimeters observe directly the Total Water Level Envelope (TWLE), which is a key quantity for modelers and forecasters of storm surges. This particular application is being tested within the ESA Data User Element eSurge Project, where a multi-mission coastal altimetry processor (derived from the one developed for the COASTALT Project) generates reprocessed data for a number of past storm surge events. Long altimetric time series are 'blended' with tide gauge observations to allow TWLE prediction in real time based on the gauges; a demonstration of the direct near-real-time capabilities of coastal altimetry is also an objective of eSurge.

The eSurge coastal altimetry processor is able to process Cryosat-2 data on the basis of the SAMOSA3 SAR altimetry waveform model. We will present examples of the reprocessed coastal Cryosat-2 data over a few significant events in the North Sea, U.S. East Coast and North Indian Ocean, highlighting the improved information content with respect to conventional LRM data, and we will discuss how these data are integrated with other observations and model output within the eSurge system.