Preliminary Analysis between CPP Retracker and SAMOSA Retracker over open ocean in SAR mode

Salvatore Dinardo[1], Francois Boy[2], Nicolas Picot[2], David Cotton[3], Jerome Benveniste[4]

(1) Serco/Esrin,(2) CNES,(3) Satoc,(4) ESA

Nowadays, two different methodologies to derive Sea Surface Heights (SSH) and Significant Wave Heights (SWHs) over open ocean from CryoSat L1b SAR waveforms have been devised and developed: the first one is the one currently implemented in the CNES/CLS CPP (CryoSat Prototype Processor) and is based on a pure numerical solution and second one is the one developed by the SAMOSA team and is based on a pure analytic solution.

One of the goal of the R&D Project Cryosat+ for Ocean (CP4O), supported under the ESA STSE (Support To Science Element) programme and by CNES, is to assess any eventual differences stemming from the two methodologies through an exhaustive round robin exercise.

The scope of the present work is to feature the very first preliminary results of an inter-comparison analysis operated between SSHs and SWHs derived by SAR CPP Re-tracker and by SAMOSA Re-tracker, run over L1b CPP waveforms , L1b SAR Kiruna PDGS waveforms (Baseline B) and ESRIN EOP-SER SAR L1b waveforms (SAR waveforms generated independently at the ESRIN by EOP-SER Team).

The activity has been performed by the ESRIN EOP-SER Team as side task in the CryoSat for Ocean Project (CP4O) and the analysis had been operated on just one CryoSat SAR Pass (2012 05 30 Time 21:19:55) acquired in the Pacific Ocean.

The SAMOSA Retracker and the CPP Retracker, once applied on the same input waveforms (CPP) and with the same scenario conditions, seem to provide equivalent results with very minor differences in term of range/SWH noise and trends/biases.

The inter-comparison against the Kiruna PDGS waveforms points out the detrimental effect for open ocean studies, in term of noise and bias, caused by the application of the weighting function (Hamming function) and by the truncation of the waveform trailing edge (CryoSat PDSG Baseline B).

This reality had led to the recommendation by the CP40 team to use CPP Products in the framework of the Project CP40.

The inter-comparison against the ESRIN EOP-SER waveforms highlights that trends/biases in range can source from different approaches adopted in the application of stacking algorithms or in the Doppler Correction.
It is strongly recommended to investigate the origin of such discrepancies and, in the end, to standardize the procedures of the stacking algorithms.

Even if the first results seem to be promising, it needs to bear in mind that they are not fully conclusive because derived from just one CryoSat Pass but anyway they highlight the outstanding importance for

an extensive inter-comparison exercise between the two existing re-tracking methodologies based on at least two sub-cycle dataset in different sea state conditions (for example moderate and low sea state). This activity will be one of the major outcome of the CP4O WP 5000.