TUDaBo: A SAR-RDSAR Processing Service on G-POD

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1 Abstract

The service TUDaBo SAR-RDSAR has been primarily developed as an offline processor prototype under the working title "PLRM FBR processor for CryoSat-2 at TU Darmstadt". The PLRM products were intended to serve as a reference to validate the SARvatore G-POD service in SAR mode and to support teaching at TU Darmstadt. Recently this processor prototype has been enhanced to produce RDSAR data in coastal zone and SAR L1B and L2 data co-located to RDSAR. Various processing options have been implemented.

To allow open access to the processor and its results it is available at ESA's G-POD service. Currently only the RDSAR processor for open ocean CryoSat-2 data is enabled to registered users. SAR processing will be available after final testing. Further options for the extension of the processing to coastal zone and to Sentinel-3 data are foreseen.

This contribution gives a brief introduction to both the applied SAR-RDSAR algorithms and of their particular features. Further on examples and results are given to show their quality and performance.

2 How to get Access

1. Registration at https://earth.esa.int/web/guest/general-registration.
2. An e-mail shall be sent to the G-POD team (write to eo-gpod@esa.int) requesting the activation of the service for the created EO-SSO user account.
3. Afterwards, user can freely access the service at http://gpod.eo.esa.int/services/FBR/
4. This service is listed under the Marine theme and can be found through the search bar.

3 Introduction

The purpose of this poster is to describe the processing schemes that are applied to generate the L1a and L2 data sets. The CryoSat-2 TUDaBO-RDSAR product is comparable to the CryoSat-2 RADS RDSAR products which have been regionally cross-validated in open ocean against the SAR GPOD data in the North Sea (Fenoglio-Marc et al., 2015). The processing is based on Scharroo (2016) with a different ordering of some processing steps and updated input data for calibration and filtering.

The main processing stages of the RDSAR processing are:

1. Gather 4 bursts of 64 echoes.
2. Correct echo amplitude and phase
3. Apply the low-pass filter correction
4. Adjust the FAI (Fine Range Word) for each burst
5. Align the echoes horizontally (in range time)
6. Zero-pad the echoes
7. Perform a 1-dimensional FFT, horizontally.
8. Incoherently average the individual waveforms
9. Rescale the waveform

The usage of the service can be divided into three steps

- Selection of the region of interest and the epoch
- Selection of the desired processing parameters and the data output
- Post processing on the users computer

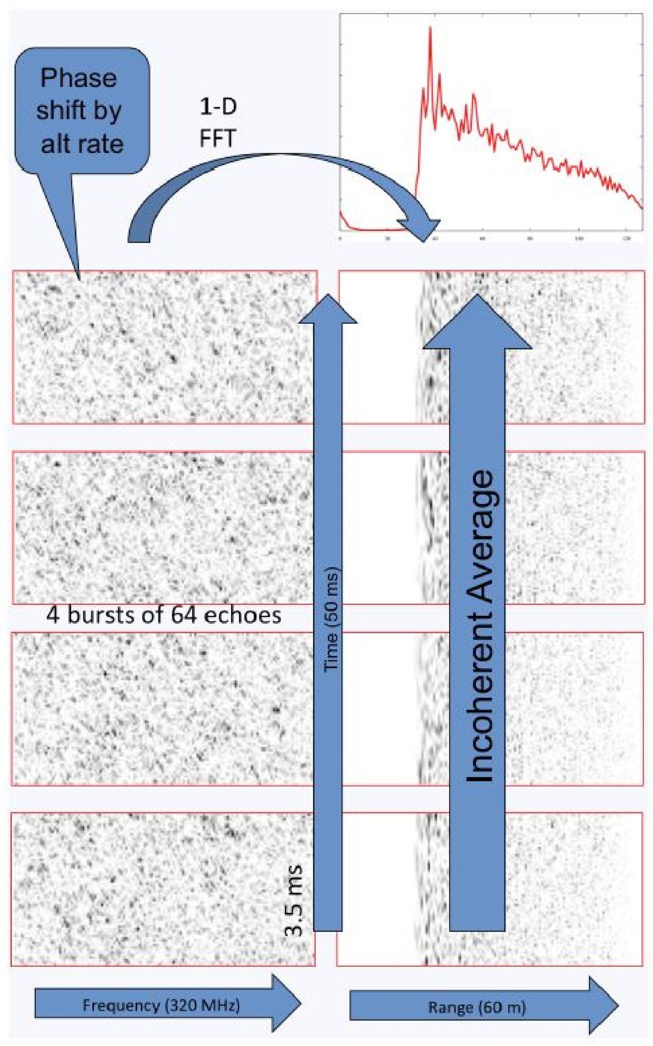

Figure 1: Principle of RDSAR processing, Credits: Remko Scharroo

4 Data Selection

The data selection process is based on the following display showing the world map.

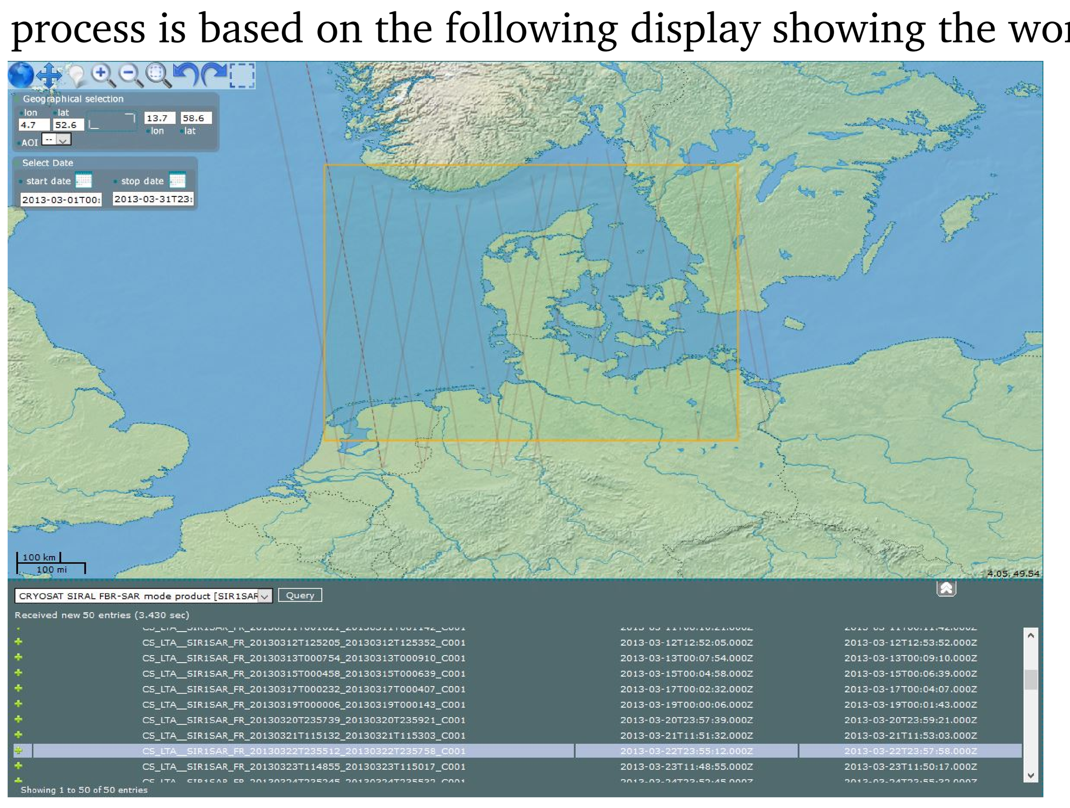

Figure 2: Data selection screen on G-POD

Available FBR data can be queried for a selected area and epoch. It is possible to choose only a subset for processing of the L1A data found. E.g. in Figure 2 only one track in the German Bight is selected and highlighted in Figure 2 with a darker dashed line.

5 Processing Parameters

The parameters determining how the FBR data is going to be processed to waveforms and how these are going to be retracked is chosen in the GUI, shown in Figure 3.

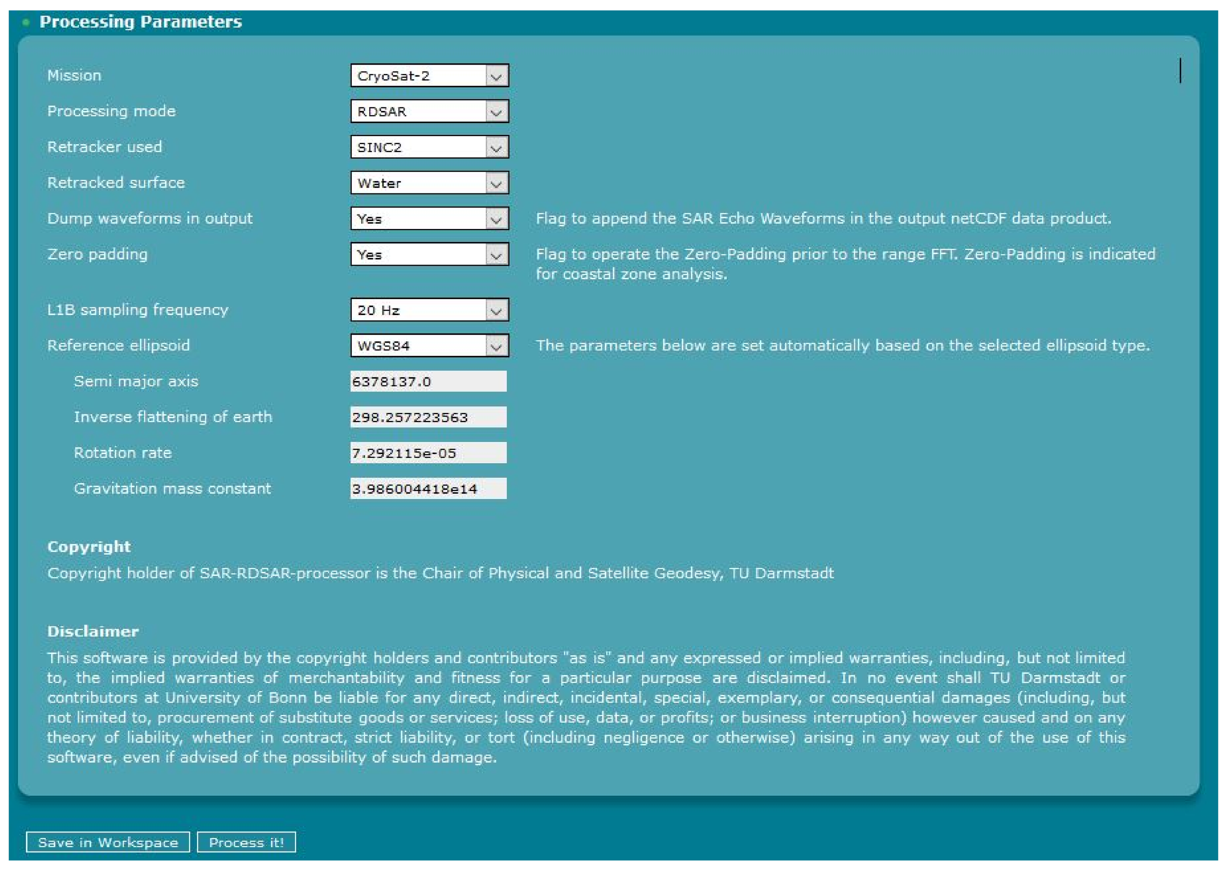

Figure 3: GUI to choose processing parameters for TUDaBo on G-POD

Table 1 gives an overview about possible options.

Mission		CryoSat-2 Sentinel-3
Retracker used	RDSAR	BMLE3 SINC2*
	SAR	SINCS*
Retracked surface		Water Ocean All None
Zero Padding		Yes

Processing Mode	RDSAR SAR
Dump waveforms in output	Yes No
Reference Ellipsoid	WGS84 TOPEX GRS80
L1B sampling frequency	20 Hz 40 Hz 80 Hz

Table 1: Currently available, in preparation and foreseen processing parameters.
*SINC2 and SINCS are retrackers using fast convolutions (see Buchhaupt, et al.(2017)).

6 Example Along One Track

As an example the results from retracking the track highlighted in Figure 2 are shown.

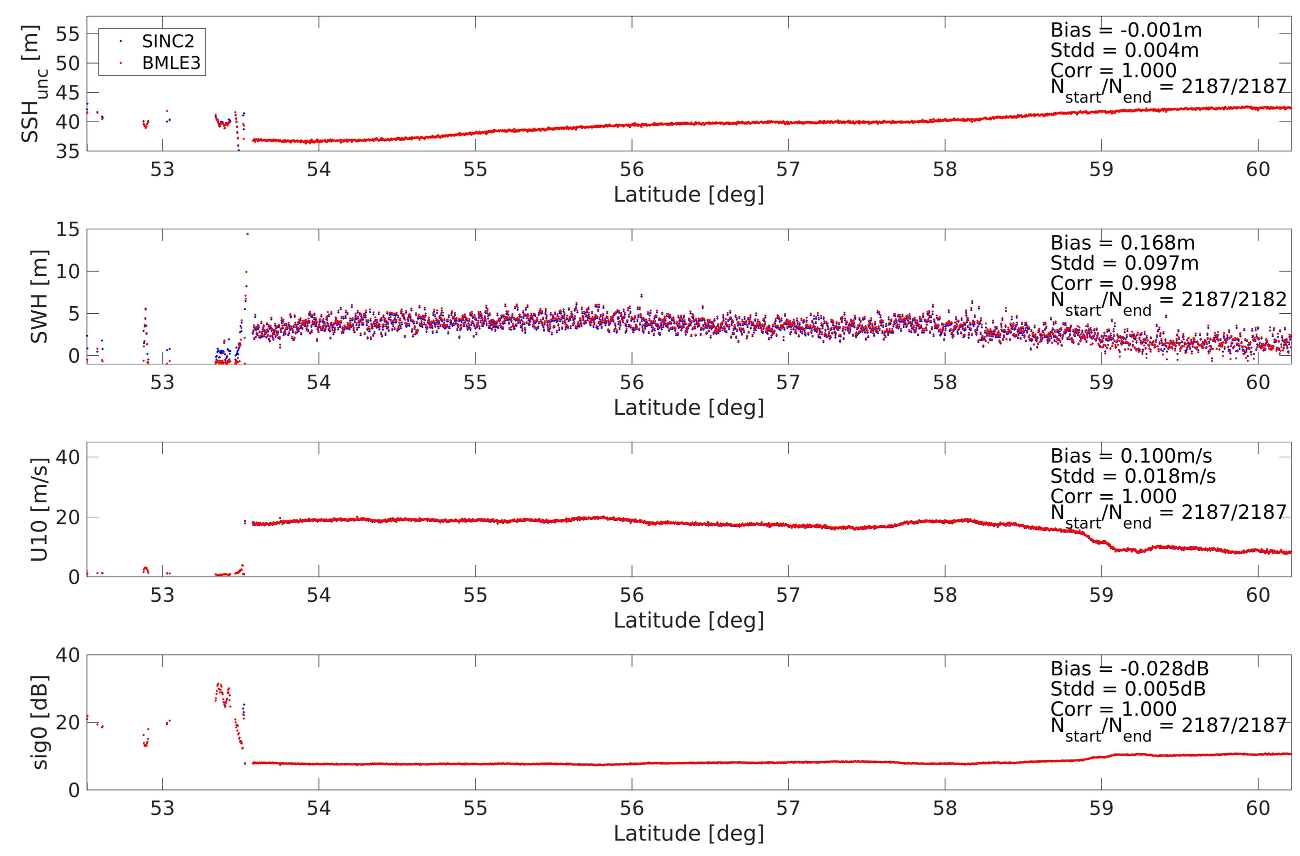

Figure 4: 20 Hz parameters retrieved for the track shown in Figure 2.

Except for the SWH the results from both retracker have a good agreement. The differences for SWH are caused by the fact that Brown MLE3 does not use a look up table, whereas SINC2 is a numerical retracker which does not need one.

7 Acknowledgements

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References

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