

## → 10th COASTAL ALTIMETRY WORKSHOP

### SAR Altimetry Training Course

# SARvatore Demo and Hands-On

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# SARvatore

## SAR Versatile Altimetric Toolkit for Ocean Research & Exploitation

- ESA G-POD System Introduction
- CryoSat-2 SAR/SARin Processing Service Introduction
- Service Walk-Through
- SARvatore for Sentinel-3
- Conclusions



# G-POD Distributed Environment

- The **ESA Grid Processing on Demand (G-POD)** system is a generic GRID-based operational computing environment providing users with a fast computational facility without the need to handle bulky data.
- The G-POD system hosts high-speed connectivity, distributed processing resources and large volumes of data to provide scientific and industrial partners with a shared data processing platform fostering the development, validation and operations of new Earth Observation applications.
- In particular, the G-POD environment consists of:

Over **600 CPUs** in about **90 Working Nodes**

Over **330 TB** of local on-line Storage plus **180 TB** of EO data accessed directly from the PACs.

Access to Cloud processing and data resources on demand

Internal dedicated 1 Gbit LAN at ESRIN and at UK-PAC archives

1 Gbps external connection

Software Resources on-line: IDL, MATLAB, BEAT, BEAM, BEST, CQFD, NEST, BRAT, Gamma

System: GRID Globus on Linux



As of today, G-POD includes more than **300TB** of **EO data stored locally.**

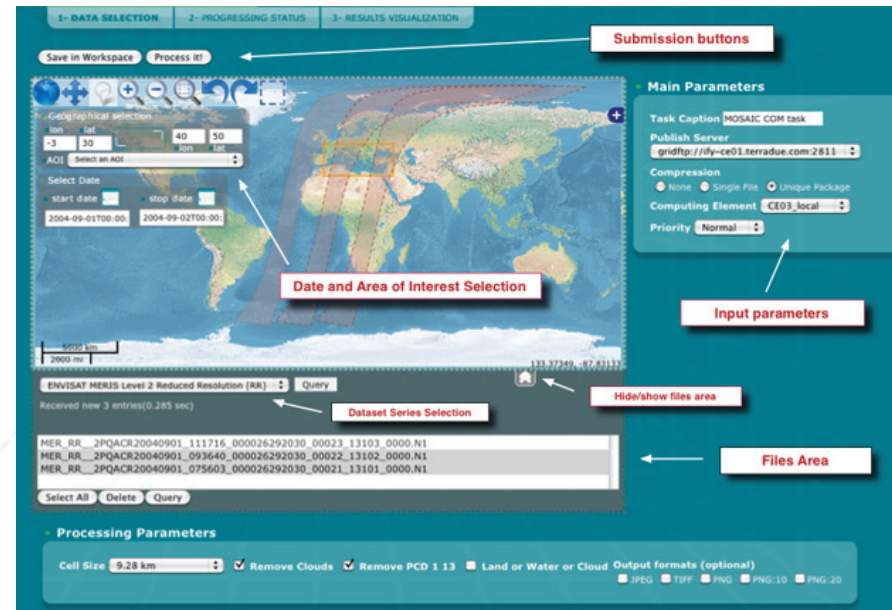
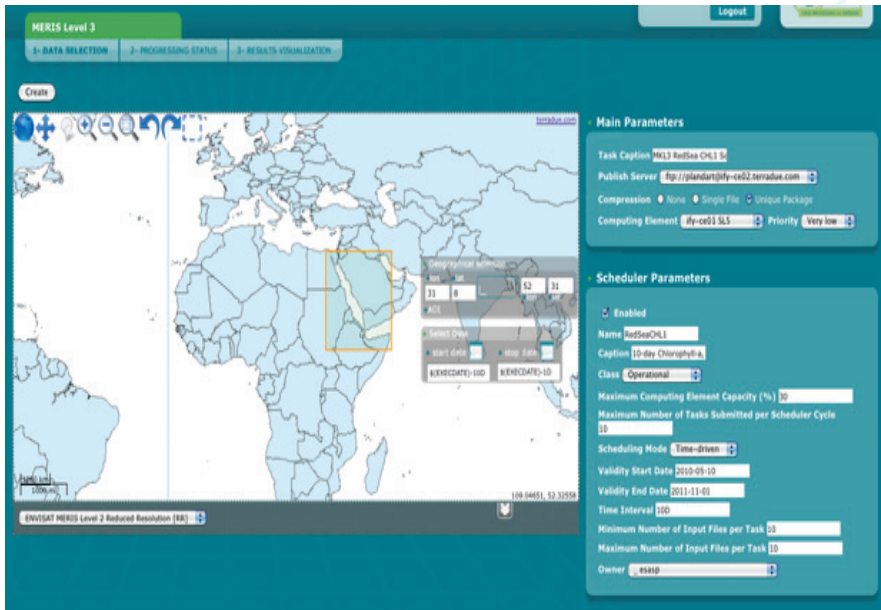
EO Data available to G-POD services come from both ESA and non-ESA missions.

# G-POD Web Portal

The **G-POD web portal** is a flexible, secure, generic and distributed web platform.

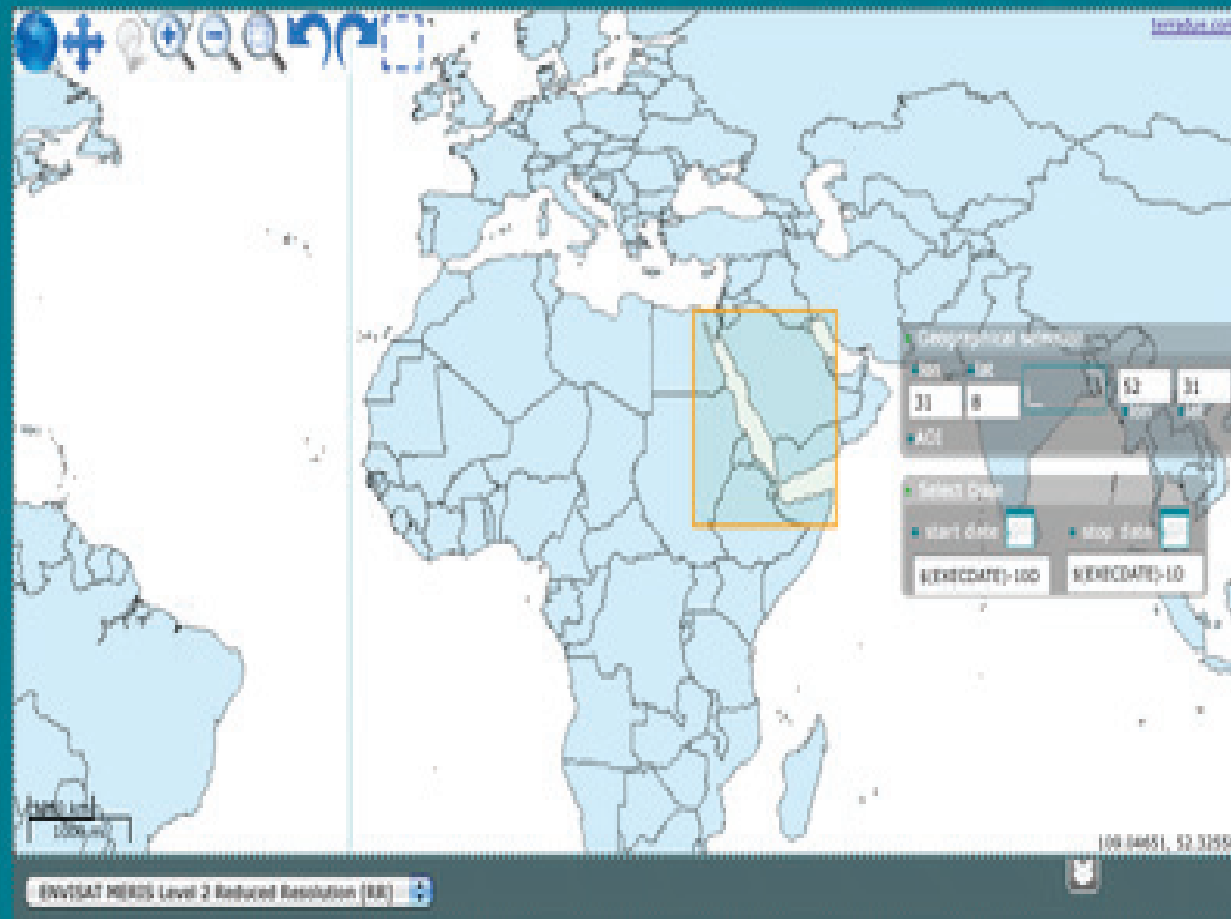
From the creation of a new task to the output/publication, passing through the data selection and the job monitoring, the user goes through a **friendly** and **intuitive** user interface accessible from everywhere.

More info on the G-POD Web Portal are available here: <http://wiki.services.eoportal.org/tiki-index.php?page=GPOD+User+Manual#Annex>





Create



## Main Parameters

Task Caption **MERIS RedSea-CHL1 0**Publish Server **http://plandart@ity-cc02.cnr.edu.com**Compression  None  Single File  Unique PackageComputing Element **ity-cc01-SLS** Priority **Very low**

## Scheduler Parameters

 EnabledName **RedSeaCHL1**Caption **10-day Chlorophyll-a**Class **Operational**Maximum Computing Element Capacity (%) **30**Maximum Number of Tasks Submitted per Scheduler Cycle **10**Scheduling Mode **Time-driven**Validity Start Date **2010-08-10**Validity End Date **2011-11-01**Time Interval **100**Minimum Number of Input Files per Task **10**Maximum Number of Input Files per Task **10**Owner **esato**

Submission buttons

Save in Workspace

Process It!

Geographical selection

lon lat 40 50  
-3 30 lon lat

AOI Select an AOI

Select Date

start date stop date  
2004-09-01T00:00: 2004-09-02T00:00:

ENVIAT MERIS Level 2- Reduced Resolution (RR) Query

Received new 3 entries(0.285 sec)

Dataset Series Selection

MER\_RR\_2PQACR200-40901\_111716\_000026292030\_00023\_13103\_0000.N1  
MER\_RR\_2PQACR200-40901\_093640\_000026292030\_00022\_13102\_0000.N1  
MER\_RR\_2PQACR200-40901\_075603\_000026292030\_00021\_13101\_0000.N1

Select All Delete Query

Main Parameters

Task Caption MOSAIC COM task

Publish Server  
gridftp://ify-ce01.terradue.com:2811

Compression  
 None  Single File  Unique Package

Computing Element CE03\_local

Priority Normal

Processing Parameters

Cell Size 9.28 km  Remove Clouds  Remove PCD 1 13  Land or Water or Cloud

Output formats (optional)  
 JPEG  TIFF  PNG  PNG:10  PNG:20

Date and Area of Interest Selection

Main Parameters

Input parameters

Hide/show files area

Files Area

Processing Parameters

Cell Size 9.28 km  Remove Clouds  Remove PCD 1 13  Land or Water or Cloud

Output formats (optional)  
 JPEG  TIFF  PNG  PNG:10  PNG:20



# G-POD Services Portfolio

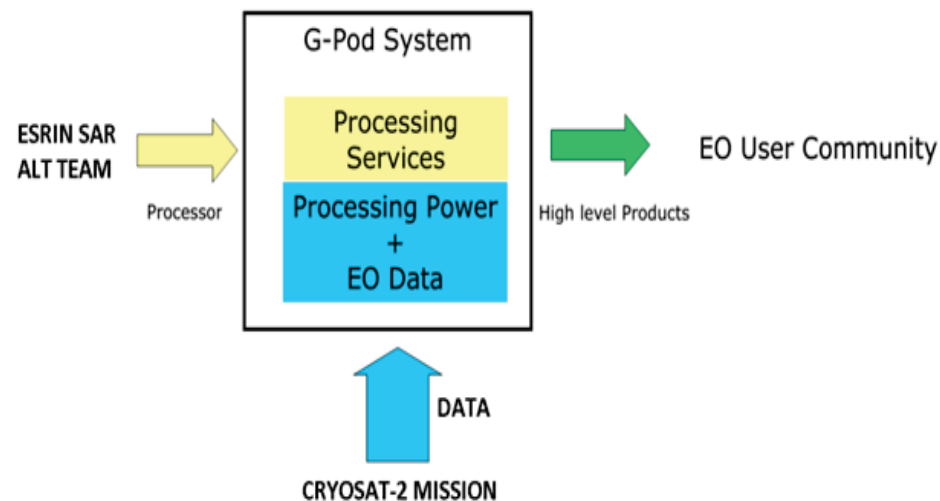
AARDVARC
aeromeris
algal1
AMORGOS
Antarctica
ASARP
BEAMARITHM
BeamReproject
BIOMASAR-II
<b>BRAT</b>
download
ESCATSM
FAIRE2
GEOFIT

GlobTemperature
GMESCQC
<b>GUT</b>
Imager
INSAR
JLOEP
JURASSIC
KLIMA
LandsatIPF
MCFS
MGVIJRC2
MGVIRegional
MIOPS
MKL3
MOSAICOM

MSGBaroncini
MSGTimeseries
NEST
PHAVEOS
<b>RAIES</b>
<b>RIVERLAKE2</b>
SAROTECnFLO
<b>SARvatore for CryoSat</b>
<b>SARINvatore for CryoSat</b>
SMOSL1
SMOSL2OS
SMOSL2SM
SOIL MAPPER
SSEGridFAPAR
VASD
vomit
WACMOS

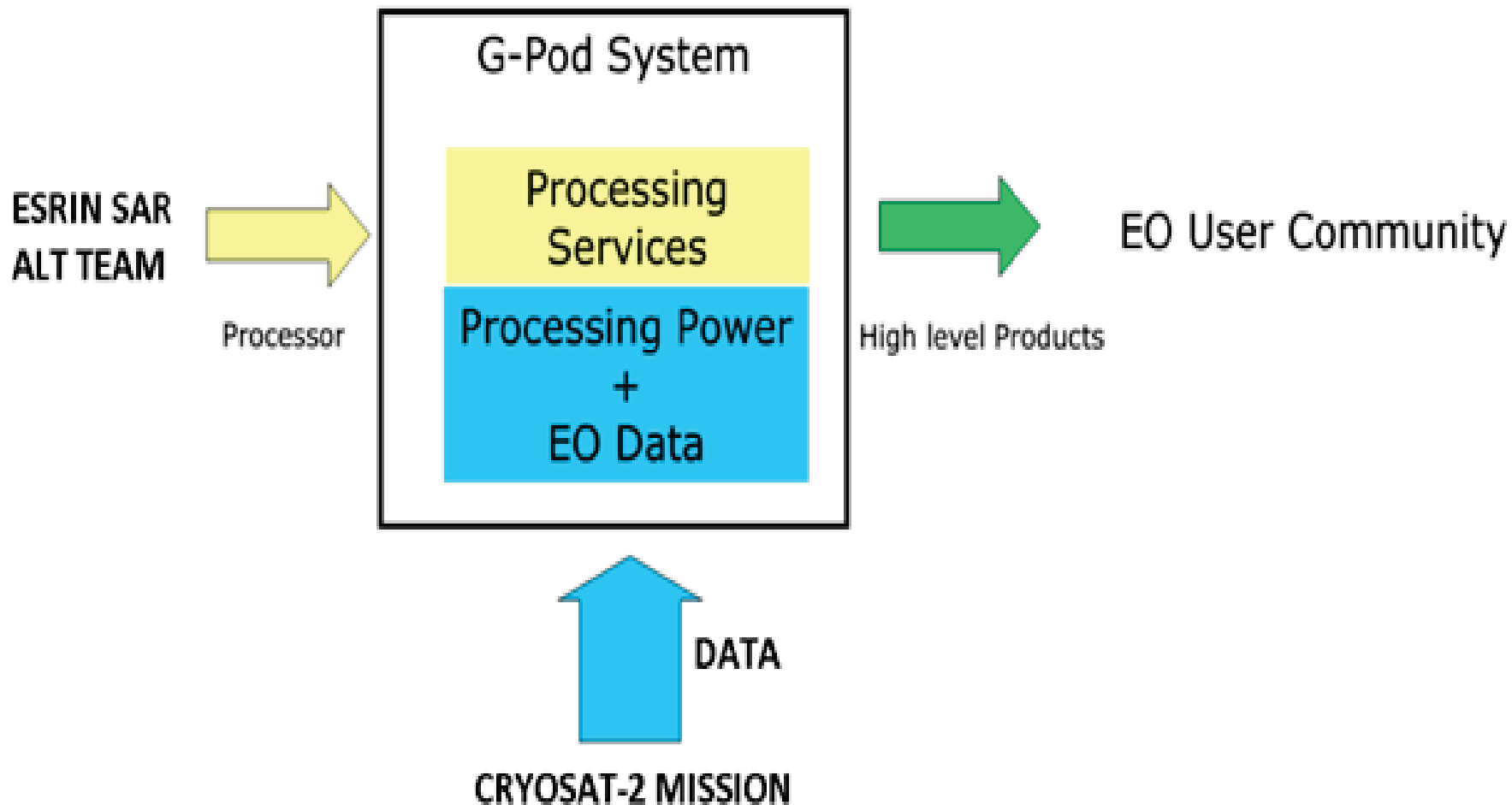
# GPOD CryoSat SAR Processing Service

- The ESA G-POD Service, SARvatore (**SAR** Versatile **Alt**imetric **T**oolkit for **O**cean **R**esearch & **E**xploitation) for CryoSat-2 is an Earth-Observation application that provides the capability to process remotely and on demand CryoSat-2 SAR/SARin data, from L1a (FBR) data products until SAR Level-2 geophysical data products.
- The service to process Sentinel-3 data has been developed and used during commissioning phase. It will be opened to scientists with the release of Level 1A products.





# GPOD CryoSat SAR Processing Service



# CryoSat-2 Processor Prototype

- The service is based on the SAR Processor Prototype that was developed by the ESRIN R&D Altimetry Team for CryoSat-2 validation purposes and preparation for Sentinel-3 mission.
- **System features:**
  - SAR/SARin L1b Processor Prototype (Standard Delay-Doppler Processing).
  - SAR/SARin L2 Retracker Prototype (with SAMOSA Analytical Model and LEVMAR Least Square Estimator).
  - Input: CRYOSAT SAR/SARIN FBR Data – Sentinel-3 SAR Data
  - Output L1b → Radar Echogram.
  - Output L2 → SSH, SLA (W/O SSB), SWH, sigma0, wind speed.



# CryoSat-2 Processor Prototype

- ESRIN R&D ALT team compiled the processor's MATLAB source code into a 64-bit Linux binary and delivered to ESA G-POD team the executables, the input archive (FBR data) and satellite footprints (ASCII tracks). The toolkit has been fully integrated in the GPOD System for grid on-demand computing.

The objectives of the service integration in GPOD are:

- to experiment in-house research themes that will be further exploited in the ESA-funded R&D projects.
- to validate CryoSat-2 for ocean applications and support the exploitation of Sentinel-3 data.
- to provide scientists with the access to SAR/SARin processing to get acquainted with the novelties and specificities of SAR/SARin Altimetry and to build their own customized products.

# Service Registration and Access

- ❑ The service is **open, free of charge and accessible online from everywhere.**
- ❑ In order to be granted the **access to the service**, you need to have an **EO-SSO (Earth Observation Single Sign-On) credentials** (for EO-SSO registration, go at <https://earth.esa.int/web/guest/general-registration>) and **afterwards, you need to submit an e-mail** to theG-POD team (write to [eo-gpod@esa.int](mailto:eo-gpod@esa.int)), requesting the activation of the SARvatore service for your EO-SSO user account.
- ❑ After a registration to EO SSO, user can freely access at the on line services at:
  - [https://gpod.eo.esa.int/services/CRYOSAT\\_SAR/](https://gpod.eo.esa.int/services/CRYOSAT_SAR/)
  - [https://gpod.eo.esa.int/services/CRYOSAT\\_SARIN/](https://gpod.eo.esa.int/services/CRYOSAT_SARIN/)
- ❑ These services are listed under the Marine Theme and can be found through the search bar.



# Service Registration and Access

**esa** Welcome to the ESA Earth Observation Users' Single Sign On  
European Space Agency

ESA SPs

## ESA Earth Observation Users' Single Sign On Login

**Credentials**

EO-SSO ID: Salvatore.Dinardo ?

Password: \*\*\*\*\* ?

Max idle time: half a day ?

Max session time: Until browser close ?

[Login](#) [Reset](#)

[Forgot your password?](#)



# Service Registration and Access

esa grid processing on demand European Space Agency

esa Home Services Workspace Catalogue Products Schedulers My profile Admin Documentation Help

SARvatore  
Search  
Showing the 10 results found. [more...](#)

Name: Salvatore Dinardo  
Credits: 3  
Logout

g-pod  
grid processing on demand

Services list

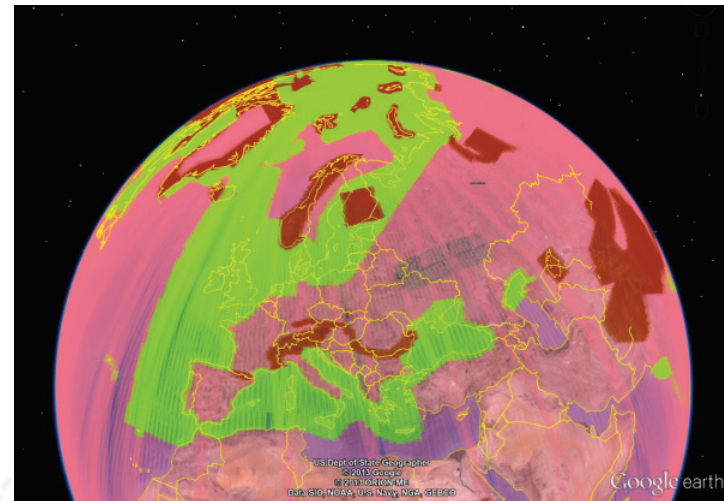
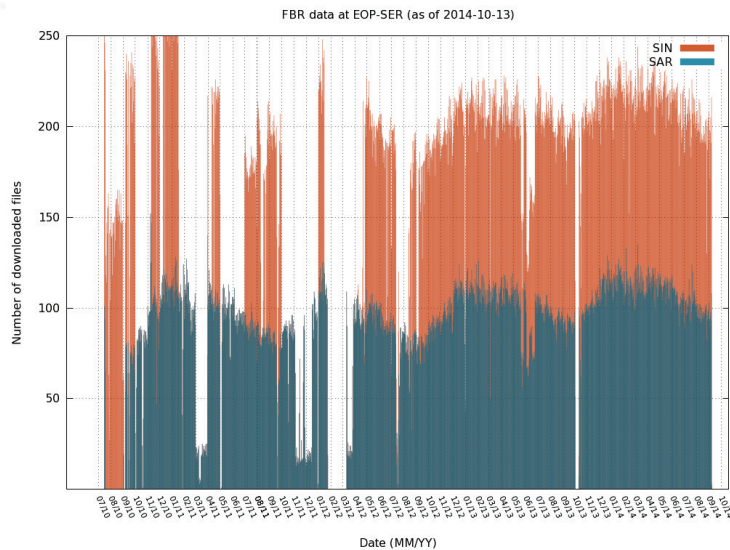
- Land
- Marine
- Atmosphere
- Security
- Emergency Response

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powered by Gridify - © 2006 - 2010 Terradue srl



# CryoSat-2 DATA Catalogue in G-POD

- The current GPOD service offers **SAR (SARvatore)** and **SARin (SARinvatore)** processing schemes.
- **376,376 SAR** passes and **293,936 SARin** passes have been stored in the service catalogue.
- An amount of **160 TB** of CryoSat-2 FBR data have been archived into the G-POD storage\*.
- Data obtained from the ESRIN R&D ALT Team (historical) and CS-2 ftp servers (current).



\*Partial historical archive (<2012/05) were provided by NOAA/RADS and ESA/ESTEC.

# SARvatore Usage Statistics

In last 2.5 years, 65 SARvatore and 62 SARINvatore users have been supported with:

- 143748 CPU hours (that's 5990 days or 200 months or **16.7 years**)
- Number of processing tasks submitted for SARvatore: 7856
- Number of processing tasks submitted for SARINvatore: 229
- Input processed by SARvatore tasks: 70.7 TB
  - Output produced: 2.8 TB
- Input processed by SARINvatore tasks: 7.9 TB
  - Output produced: 29 GB

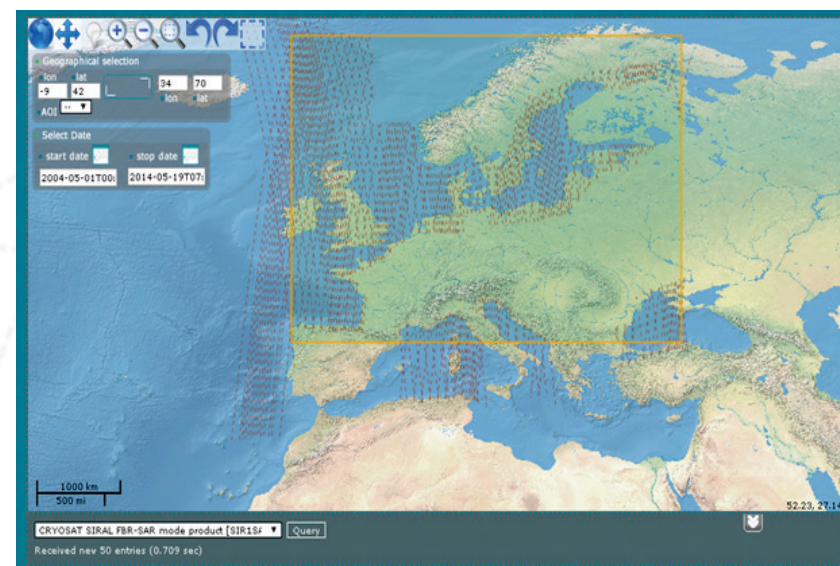
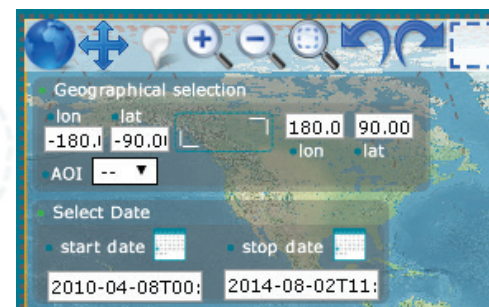
# SARvatore for Cryosat-2

The screenshot shows the ESA grid processing on demand website interface. At the top, the ESA logo and the text "grid processing on demand" are visible. A navigation menu includes "esa", "Home", "Services", "Workspace", "Catalogue", "Products", "Schedulers", "My profile", and "Documentation". A search bar is present with a "Search" button and a message "Showing the 8 results found. [more...](#)". A user profile section shows "Name: Marco Restano" and "Credits: 3", with a "Logout" button. A "g-pod" logo is also visible. The main content area features a "Services list" with four service cards: "EO Products Download", "SARInvatore for CryoSat-2", "SARvatore for CryoSat-2", and "SARvatore for SENTINEL3". The "SARvatore for CryoSat-2" card is highlighted. To the right, a detailed view of the "SARvatore for CryoSat-2" service is shown, including its name, classification (B), a 4-star rating, and a service description: "SARvatore (SAR Versatile Altimetric Toolkit for Ocean Research and Exploitation) for CryoSat-2 is a Software Processor Prototype developed in ESA/ESRIN to experiment with SAR processing from L1a (FBR) to L2 using the SAMOSA model. It can be used over open ocean or coastal zone, as well as more difficult targets such as rivers and lakes."



# The Service Graphical User Interface

- Once get to the service page, the first action is to select **the zone of interest** (by either drawing a rectangle or typing coordinates) and **the time of interest** for the run (start –stop date).
- By default, the start date is the time of CryoSat-2 launch.
- The GUI embeds all the standard buttons for image browsing as panning, zoom-in zoom-out, centering, undo, redo, reset, etc.







Geographical selection

lon lat 94 70

-9 42 lon lat

AOI

Select Date

start date stop date

2004-05-01T00: 2014-05-19T07:



1000 km  
500 mi

92.23, 27.14

CRYOSAT SIRAL FBR-SAR mode product [SIR1S#] Query

Received new 50 entries (0.709 sec)

# Data Selection

- After the temporal/spatial selection, by clicking on the “**QUERY**” button, the service lists all CryoSat-2 passes matching the temporal/spatial requirements.
- **CryoSat-2 SAR/SARin** tracks, crossing the area of interest, are then overlaid on the world map.
- The graphical interface lists up to 250 FBR products per page and informs users on the total number of passes found.
- The user can select products by: clicking on specific passes. A ‘Select all’ option is available.

The screenshot shows the SARvatore for CryoSat-2 interface. It includes a map of the world with a geographical selection box over the North Atlantic. The selection parameters are: lon: -180.0, lat: -90.00, lon: 180.0, lat: 90.00. The start date is 2010-04-08T00: and the stop date is 2014-08-02T11:.

Below the map, there is a 'Query' button circled in red. Below that is a table of results:

File Name	Start	End
CS_OFFL_SIR1SAR_FR_20111229T005752_20111229T010512_A001	2011-12-29T00:57:52.000Z	2011-12-29T01:05:12.000Z
CS_OFFL_SIR1SAR_FR_20111229T010706_20111229T010859_A001	2011-12-29T01:07:06.000Z	2011-12-29T01:08:59.000Z
CS_OFFL_SIR1SAR_FR_20111229T014149_20111229T014206_A001	2011-12-29T01:41:49.000Z	2011-12-29T01:42:06.000Z
CS_OFFL_SIR1SAR_FR_20111229T015311_20111229T015920_A001	2011-12-29T01:53:11.000Z	2011-12-29T01:59:20.000Z
CS_OFFL_SIR1SAR_FR_20111229T022819_20111229T022933_A001	2011-12-29T02:28:19.000Z	2011-12-29T02:29:33.000Z
CS_OFFL_SIR1SAR_FR_20111229T023104_20111229T023213_A001	2011-12-29T02:31:04.000Z	2011-12-29T02:32:13.000Z
CS_OFFL_SIR1SAR_FR_20111229T023226_20111229T023449_A001	2011-12-29T02:32:26.000Z	2011-12-29T02:34:49.000Z
CS_OFFL_SIR1SAR_FR_20111229T023706_20111229T024410_A001	2011-12-29T02:37:06.000Z	2011-12-29T02:44:10.000Z
CS_OFFL_SIR1SAR_FR_20111229T025215_20111229T025408_A001	2011-12-29T02:52:15.000Z	2011-12-29T02:54:08.000Z

At the bottom of the interface, there is a 'Query' button circled in red, and a red arrow pointing to it. Below the table, it says 'Showing 1 to 100 of 100 entries' and 'Results from 1 to 100 out of 80006 (4.285 sec) | next page'.





CRYOSAT SIRAL FBR-SAR mode product [SIR1S/

Received new 100 entries (4.285 sec)

	File Name	Start	End
+	CS_OFFL_SIR1SAR_FR_20111229T005752_20111229T010512_A001	2011-12-29T00:57:52.000Z	2011-12-29T01:05:12.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T010706_20111229T010859_A001	2011-12-29T01:07:06.000Z	2011-12-29T01:08:59.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T014149_20111229T014206_A001	2011-12-29T01:41:49.000Z	2011-12-29T01:42:06.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T015311_20111229T015920_A001	2011-12-29T01:53:11.000Z	2011-12-29T01:59:20.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T022819_20111229T022933_A001	2011-12-29T02:28:19.000Z	2011-12-29T02:29:33.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T023104_20111229T023213_A001	2011-12-29T02:31:04.000Z	2011-12-29T02:32:13.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T023226_20111229T023449_A001	2011-12-29T02:32:26.000Z	2011-12-29T02:34:49.000Z
+	CS_OFFL_SIR1SAR_FR_20111229T023706_20111229T024410_A001	2011-12-29T02:37:06.000Z	2011-12-29T02:44:10.000Z
+	CS OFFL SIR1SAR FR 20111229T025215 20111229T025408 A001	2011-12-29T02:52:15.000Z	2011-12-29T02:54:08.000Z

Showing 1 to 100 of 100 entries

Results from 1 to 100 out of 80006 (4.285 sec)

| [next page](#)

# Session Main Parameters Panel

On the top right, a **main parameters** panel allows users to set the:

- Name of the current task.
- Ftp Server to publish results (portal or personal).
- Data compression format (tgz, none).
- Grid Computing Resources.
- Task Priority.

The screenshot shows the SARvatore for CryoSat-2 interface. The 'Main Parameters' panel is highlighted in red and contains the following settings:

- Task Caption: CryoSat-2 SARvatore
- Publish Server: Portal
- Compression: Portal
- CRSATSAT:  None  Single File  Unique Package
- Computing Element: Operational CE 02
- Priority: Normal

The interface also shows a map of the world with a yellow box over the North Atlantic, a table of file names and dates, and various navigation and control buttons.



- Main Parameters

Task Caption

Publish Server

Compression

None  Single File  Unique Package

Computing Element

Priority

# List of Processing Options

The last step, before task submission, is to set the list of processing options.

- The processor prototype is **versatile** in the sense that the users can customize and adapt the processing, according their specific requirements, by setting the list of configurable options.
- In the G-POD interface, users can easily set processing options via a series of drop-down menus.
- The configurable options are divided according to the processing level they refer to (L1b and L2).

**Processing Parameters**

Here you find a list of processing options that you can select according to the processing level  
For a wiki user manual of the service, go here: [wiki](#)

**L1b Processor**

- **Filter out Duplicated CryoSat-2 Products during the processing time**  
Enable to filter out duplicated products during the processing: duplicated products will not be processed  Enable
- **Data Posting Rate 20 Hz/80 Hz**  
Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)
- **Hamming Weighting Window**  
Flag to set the application of the Hamming Weighting Window on the burst data (section 4.4 in REF1)
- **Exact Beam-Forming**  
Flag to set the application of exact or approximated Doppler Beam Steering (section 4.4 in REF1)
- **FFT Zero-Padding**  
Flag to operate the Zero-Padding prior to the range FFT (section 4.8 in REF1). Zero-Padding is indicated for coastal zone analysis
- **Radar Receiving Window Size**  
Flag to select the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis
- **Antenna Pattern Compensation**  
Flag to activate the antenna pattern compensation on the Stack Data
- **Dump SAR Stack Data in output**  
Be aware that SAR Stack Data are bulky data products (around 1 GB for single pass); do not process them massively but limit yourself at around 10/20 passes at the time  
Flag to dump the SAR Stack Data in the output package

**L2 Processor**

- **Restrict the re-tracking on specific surfaces**  
Flag to limit the processing on open sea or on water (open sea, coastal zone and inland water) or to process the full pass
- **PTR width alphap parameter**  
Use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter
- **SAMOS4 Model Generation**  
Flag to select the generation of the SAMOSA model to use in the re-tracking. SAMOSA3 is a truncated version (only zero order term) of SAMOSA2 (REF2), SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain
- **Single-Look or Multi-Look Model**  
Flag to set the application of the Model Multilooking (Single-Look or Multi-Look). Single-Look option is indicated for quick look operations while Multi-Look is the most accurate
- **Dump RIP in output**  
Flag to append Range Integrated Power (RIP) in the output netCDF data product
- **Dump SAR Echo Waveforms in output**  
Flag to append the SAR Echo Waveforms in the output netCDF data product

## Processing Parameters

Here you find a list of processing options that you can select according to the processing level

For a wiki user manual of the service, go [here](#): [wiki](#)

### L1b Processor

#### - Filter out Duplicated CryoSat-2 Products during the processing time

Enable to filter out duplicated products during the processing: duplicated products will not be processed

#### - Data Posting Rate 20 Hz/80 Hz

Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)

#### - Hamming Weighting Window

Flag to set the application of the Hamming Weighting Window on the burst data (section 4.4 in REF1)

#### - Exact Beam-Forming

Flag to set the application of exact or approximated Doppler Beam Steering (section 4.4 in REF1)

#### - FFT Zero-Padding

Flag to operate the Zero-Padding prior to the range FFT (section 4.8 in REF1). Zero-Padding is indicated for coastal zone analysis

#### - Radar Receiving Window Size

Flag to select the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis

#### - Antenna Pattern Compensation

Flag to activate the antenna pattern compensation on the Stack Data

#### - Dump SAR Stack Data in output

Be aware that SAR Stack Data are bulky data products (around 1 GB for single pass); do not process them massively but limit yourself at around 10/20 passes at the time

Flag to dump the SAR Stack Data in the output package

# List of Processing Options

## L2 Processor

### - Restrict the re-tracking on specific surfaces

Flag to limit the processing on open sea or on water (open sea, coastal zone and inland water) or to process the full pass

### - PTR width alphap parameter

Use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter

### - SAMOSA Model Generation

Flag to select the generation of the SAMOSA model to use in the re-tracking. SAMOSA3 is a truncated version (only zero order term) of SAMOSA2 (REF2), SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain

### - Single-Look or Multi-Look Model

Flag to set the application of the Model Multilooking (Single-Look or Multi-Look). Single-Look option is indicated for quick look operations while Multi-Look is the most accurate

### - Dump RIP in output

Flag to append Range Integrated Power (RIP) in the output netCDF data product

### - Dump SAR Echo Waveforms in output

Flag to append the SAR Echo Waveforms in the output netCDF data product



# Task Submission

Once user has operated the selection of the processing options, in order to submit the task to G-POD Computing Elements, the user has to click on the “PROCESS IT” button.

The screenshot shows the ESA G-POD web interface for task submission. The main heading is "esa grid processing on demand". The user is logged in as "Salvatore.Dinardo" with 3 credits. The task is titled "SARvatore for CryoSat-2". The interface is divided into three steps: 1- DATA SELECTION, 2- PROGRESSING STATUS, and 3- RESULTS VISUALIZATION. In the "1- DATA SELECTION" step, there are buttons for "Save in Workspace", "Process it!" (highlighted with a red box), "Schedule (Time-driven scheduler)", and "Schedule (Data-driven scheduler)". Below these buttons is a world map with a geographical selection tool. The tool includes input fields for longitude (lon) and latitude (lat), a dropdown for AOI, and date selection fields for start and stop dates. The "Main Parameters" panel on the right shows the task caption "CryoSat-2 SARvatore", the publish server set to "Portal", compression options (None, Single File, Unique Package), the computing element set to "Operational CE 02", and the priority set to "Normal". At the bottom, there is a table of received new 100 entries (5.333 sec).

CS_RPRO_SIR1SAR_FR_20111009T230602_20111009T230639_B001	2011-10-09T23:06:02.000Z	2011-10-09T23:06:39.000Z
CS_RPRO_SIR1SAR_FR_20111011T230337_20111011T230413_B001	2011-10-11T23:03:37.000Z	2011-10-11T23:04:13.000Z
CS_RPRO_SIR1SAR_FR_20111013T230058_20111013T230145_B001	2011-10-13T23:00:58.000Z	2011-10-13T23:01:45.000Z
CS_RPRO_SIR1SAR_FR_20111015T225828_20111015T225916_B001	2011-10-15T22:58:28.000Z	2011-10-15T22:59:16.000Z
CS_RPRO_SIR1SAR_FR_20111016T105758_20111016T105809_B001	2011-10-16T10:57:58.000Z	2011-10-16T10:58:09.000Z
CS_RPRO_SIR1SAR_FR_20111018T105527_20111018T105540_B001	2011-10-18T10:55:27.000Z	2011-10-18T10:55:40.000Z

Name: Salvatore.DinarDO  
Credits: 3

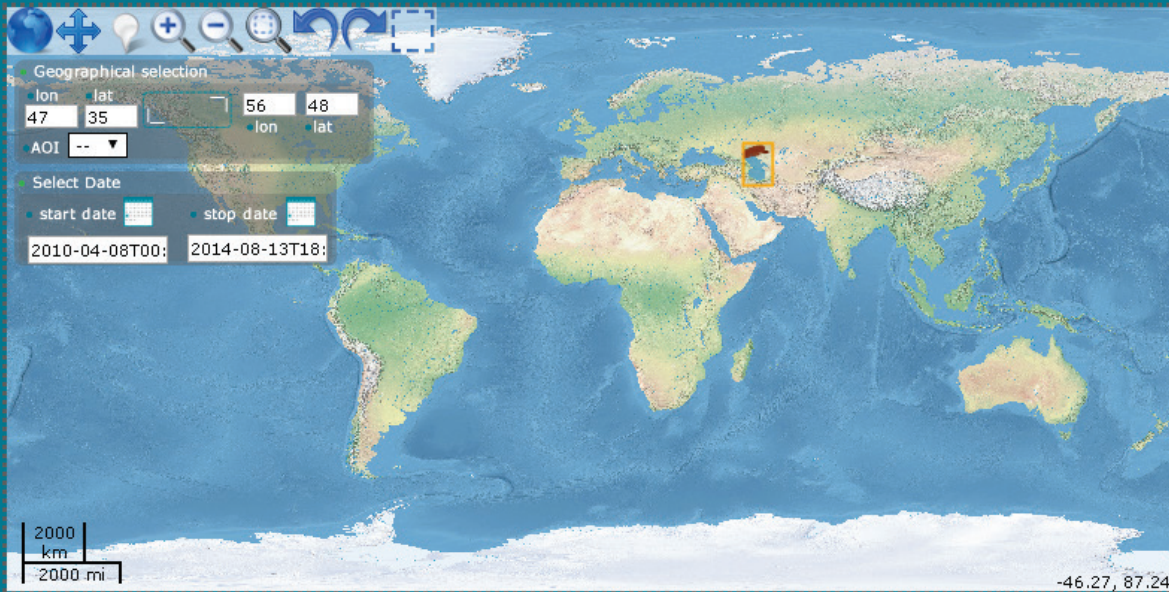
Logout



### SARvatore for CryoSat-2

- 1- DATA SELECTION
- 2- PROGRESSING STATUS
- 3- RESULTS VISUALIZATION

- Save in Workspace
- Process it!
- Schedule (Time-driven scheduler)
- Schedule (Data-driven scheduler)



#### Main Parameters

Task Caption: CryoSat-2 SARvatore

Publish Server: Portal

Compression:  None  Single File  Unique Package

Computing Element: Operational CE 02

Priority: Normal

CRYOSAT SIRAL FBR-SAR mode product [SIR1Sv] Query

Received new 100 entries (5.333 sec)

CS_RPRO_SIR1SAR_FR_20111009T230602_20111009T230639_B001	2011-10-09T23:06:02.000Z	2011-10-09T23:06:39.000Z
CS_RPRO_SIR1SAR_FR_20111011T230337_20111011T230413_B001	2011-10-11T23:03:37.000Z	2011-10-11T23:04:13.000Z
CS_RPRO_SIR1SAR_FR_20111013T230058_20111013T230145_B001	2011-10-13T23:00:58.000Z	2011-10-13T23:01:45.000Z
CS_RPRO_SIR1SAR_FR_20111015T225828_20111015T225916_B001	2011-10-15T22:58:28.000Z	2011-10-15T22:59:16.000Z
CS_RPRO_SIR1SAR_FR_20111016T105758_20111016T105809_B001	2011-10-16T10:57:58.000Z	2011-10-16T10:58:09.000Z
CS_RPRO_SIR1SAR_FR_20111018T105527_20111018T105540_B001	2011-10-18T10:55:27.000Z	2011-10-18T10:55:40.000Z



# Task Viewer / Workspace

- After submission of the job, users will be directed to the workspace page where they can **check in real time the status of the run** and can be notified on the run status. The color code is:

**Orange** → run under processing

**Green** → run completed

**Red** → run failed

- Further, clicking on the task, the user can have more info on the processing task as:

- Task Id
- Processing Id
- Grid Working Node Id
- Task Progress (data retrieving, data processing, data publishing)
- Task Creation Time

The screenshot shows a web interface with a navigation bar at the top containing links for 'esa', 'Home', 'Services', 'Workspace', 'Catalogue', 'Products', 'Schedulers', 'My profile', and 'Documentation'. Below the navigation bar is a search box and a 'Logout' button. The main content area is titled 'Workspace' and contains a table with the following columns: 'All', 'Prepared', 'Created', 'Pending', 'Active', 'Paused', 'Failed', 'Completed', 'Incomplete', and 'Deleted'. The table has one row with the following data:

Caption	Service	Computing Resource	Status	Creation time	Submission time	Completion time
CryoSat-2 SARvatore	SARvatore for CryoSat-2	Operational CE 02	Completed	2014-05-20 18:43:00	2014-05-20 18:43:00	2014-05-20 18:52:47

Below the table, there are buttons for 'Delete', 'Abort', '(Re-)submit', and 'Rebuild and Resubmit'. The 'Status' cell in the table is highlighted in green and circled in red.



# Task Viewer / Workspace

After submission of the job, users will be directed to the workspace page where they can **check in real time the status of the run** and can be notified on the run status. The color code is:

**Orange** → run under processing

**Green** → run completed

**Red** → run failed

Navigation: Home Services **Workspace** Catalogue Products Schedulers My profile Documentation Help

Search:  20 Showing the 1 results found. [more...](#)

Name: Salvatore Dinardo Credits: 3 [Logout](#)

**Workspace**

g-pod grid processing on demand

All	Prepared	Created	Pending	Active	Paused	Failed	Completed	Incomplete	Deleted
Caption	Service	Computing Resource	Status	Creation time	Submission time	Completion time			
<input type="checkbox"/> <a href="#">CryoSat-2 SARvatore</a>	SARvatore for CryoSat-2	Operational CE 02	Completed	2014-05-20 18:43:00	2014-05-20 18:43:00	2014-05-20 18:52:47			

Pages: 1

Buttons: Delete Abort (Re-)submit Rebuild and Resubmit

# Task Viewer / Workspace

After run completion, clicking on the button “**Jobs Information**”, the user can inspect:

- The **GPOD log file** (.stdout or .stderr) where **eventual errors on data retrieving or data storing** are reported.
- The **prototype configuration file** (L1b\_CONFIG\_FILE.log where all the **processing options** are reported).
- The prototype log files (L1b\_start.log and L2\_start.log) where **eventual prototype processing errors** are reported.
- User can also decide to change one or more processing options and then re-submit the task.

The screenshot displays the SARvatore for CryoSat-2 interface. At the top, it shows the task ID: d1cd9d71-44b3-462b-8176-33d8111e09b7 and the service: SARvatore\_for\_CryoSat2. The status is 'Completed' with 100% progress. A map of the Arctic region is shown on the right. Below the map is a table with columns for Result Identifier, Start Time, and End Time. The 'Jobs Information' section is highlighted with a red box, showing details for the SARvatore task, including the last notification time and the list of log files: 20624\_stdout, 20624\_stderr, L1b\_CONFIG\_FILE.log, L1b\_start.log, and L2\_CONFIG\_FILE.log. The 'publish' section shows the last notification time and the URL for publishing results.

# Task Viewer / Workspace

## Task Operations

### Caption

CryoSat-2 SARvatore

Copy Schedule (Data-driven scheduler) Schedule (Time-driven scheduler) Clone Recreate Resubmit Requery Input Data Delete

## Jobs Information

### SARvatore

Details Input Parameters **Processing Nodes**



[20624]  
[0/1]  
WN142

Last notification: [2014-10-07T15:48:00]  
20624.stdout  
20624.stderr  
L1b\_CONFIG\_FILE.log  
L1b\_start.log  
L2\_CONFIG\_FILE.log

### publish

Details Parameters **Processing Nodes**



[30842]  
[2/1]  
WN132

Last notification: [2014-10-07T15:52:33] Publishing results to  
gsiftp://gpodeportal@giserver2.esrin.esa.int:2811//data/operational/ftproot/d1cd9d71-44b3-462b-8176-33d8111e09b7/  
30842.stdout  
30842.stderr



# Example of Config and Log Files (L1b)

##### SARvatore L1b PROCESSOR PROTOTYPE CONFIGURATION FILE #####

##### SYSTEM PATHS #####

DATA\_FOLDER=/gpts/gpts01/RDIR/S\_141268966612828892147082565778/SARvatore/20624/L1b\_WDIR/

AUX\_FOLDER=/gpts/gpts01/RDIR/AUX\_DATA/

#####

##### CONFIGURATION FLAGS #####

Weight\_Flag=D  
Beam\_Forming\_EXACT=N  
Mean\_Profile=N  
Save\_Stack=N  
Gridding\_Flag=LR  
Extended\_Window=Y  
Zero\_Padding\_Flag=Y

#####

##### GEOGRAPHICAL SUBSETTING #####

NORTH\_LAT=-3  
SOUTH\_LAT=-13  
EAST\_LON=-32  
WEST\_LON=-38

#####

↑  
Configuration  
File Examples  
(L1B)

#####

SARvatore Processor Prototype  
SAR Versatile Altimetry Toolkit for OLIW (Ocean-Land-Inland Water) Research and Exploitation

Current Run: CryoSat-2 SAR Mode L1b Processor  
Current Version: 1.52

#####

Found 3 Passes to Process

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

Pass with 537 Records to Process

BLOCK START: 1 -> 200  
Scenario Recovery: 1 -> 200  
Gain and Calibration Correction: 1 -> 200  
Beam Pointing: 1 -> 200  
Beam Forming (Approximated): 1 -> 200  
Beam Stacking: 1 -> 200  
Scenario Recovery: 1 -> 200  
Alignment and Range Compression: 1 -> 200  
Elapsed time is 35.847286 seconds.  
BLOCK END: 1 -> 200

BLOCK START: 201 -> 400  
Scenario Recovery: 201 -> 400  
Gain and Calibration Correction: 201 -> 400  
Beam Pointing: 201 -> 400  
Beam Forming (Approximated): 201 -> 400  
Beam Stacking: 201 -> 400  
Scenario Recovery: 201 -> 400  
Alignment and Range Compression: 201 -> 400  
Elapsed time is 27.736071 seconds.  
BLOCK END: 201 -> 400

BLOCK START: 401 -> 537  
Scenario Recovery: 401 -> 537  
Gain and Calibration Correction: 401 -> 537  
Beam Pointing: 401 -> 537  
Beam Forming (Approximated): 401 -> 537  
Beam Stacking: 401 -> 537  
Scenario Recovery: 401 -> 537  
Alignment and Range Compression: 401 -> 537  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Elapsed time is 14.332029 seconds.  
BLOCK END: 401 -> 537

Generating Output in kml, png and mat format

Output Generated -> Moving to Next Pass ...

Completed L1b Processing for the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR

No CryoSat-2 L1b File for: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR -> File Skipped

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.TGZ

← Execution Log

# Example of Config and Log Files (L1b)

##### SARvatore L1b PROCESSOR PROTOTYPE CONFIGURATION FILE #####

##### SYSTEM PATHS #####

DATA\_FOLDER=/gpts/gpts01/RDIR/S\_141268966612828892147082565778/SARvatore/20624/L1b\_WDIR/

AUX\_FOLDER=/gpts/gpts01/RDIR/AUX\_DATA/

#####

##### CONFIGURATION FLAGS #####

Weight\_Flag=D  
Beam\_Forming\_EXACT=N  
Mean\_Profile=N  
Save\_Stack=N  
Gridding\_Flag=LR  
Extended\_Window=Y  
Zero\_Padding\_Flag=Y

#####

##### GEOGRAPHICAL SUBSETTING #####

NORTH\_LAT=-3  
SOUTH\_LAT=-13  
EAST\_LON=-32  
WEST\_LON=-38

#####

Configuration File Examples (L1B)

#####

SARvatore Processor Prototype  
SAR Versatile Altimetry Toolkit for OLIW (Ocean-Land-Inland Water) Research and Exploitation

Current Run: CryoSat-2 SAR Mode L1b Processor  
Current Version: 1.52

#####

Found 3 Passes to Process

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

Pass with 537 Records to Process

BLOCK START: 1 -> 200  
Scenario Recovery: 1 -> 200  
Gain and Calibration Correction: 1 -> 200  
Beam Pointing: 1 -> 200  
Beam Forming (Approximated): 1 -> 200  
Beam Stacking: 1 -> 200  
Scenario Recovery: 1 -> 200  
Alignment and Range Compression: 1 -> 200  
Elapsed time is 35.847286 seconds.  
BLOCK END: 1 -> 200

BLOCK START: 201 -> 400  
Scenario Recovery: 201 -> 400  
Gain and Calibration Correction: 201 -> 400  
Beam Pointing: 201 -> 400  
Beam Forming (Approximated): 201 -> 400  
Beam Stacking: 201 -> 400  
Scenario Recovery: 201 -> 400  
Alignment and Range Compression: 201 -> 400  
Elapsed time is 27.736071 seconds.  
BLOCK END: 201 -> 400

BLOCK START: 401 -> 537  
Scenario Recovery: 401 -> 537  
Gain and Calibration Correction: 401 -> 537  
Beam Pointing: 401 -> 537  
Beam Forming (Approximated): 401 -> 537  
Beam Stacking: 401 -> 537  
Scenario Recovery: 401 -> 537  
Alignment and Range Compression: 401 -> 537  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Elapsed time is 14.332029 seconds.  
BLOCK END: 401 -> 537

Generating Output in kml, png and mat format

Output Generated -> Moving to Next Pass ...

Completed L1b Processing for the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR

No CryoSat-2 L1b File for: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR -> File Skipped

-----

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.TGZ

Execution Log

# Example of Config and Log Files (L1b)

##### SARvatore L1b PROCESSOR PROTOTYPE CONFIGURATION FILE #####

##### SYSTEM PATHS #####

DATA\_FOLDER=/gpps/gpps01/RDIR/S\_141268966612828892147082565778/SARvatore/20624/L1b\_WDIR/

AUX\_FOLDER=/gpps/gpps01/RDIR/AUX\_DATA/

##### CONFIGURATION FLAGS #####

Weight\_Flag=D  
Beam\_Forming\_EXACT=N  
Mean\_Profile=N  
Save\_Stack=N  
Gridding\_Flag=LR  
Extended\_Window=Y  
Zero\_Padding\_Flag=Y

##### GEOGRAPHICAL SUBSETTING #####

NORTH\_LAT=-3  
SOUTH\_LAT=-13  
EAST\_LON=-32  
WEST\_LON=-38

#####

**You don't need to care about them (if everything goes ok)**

#####

SARvatore Processor Prototype  
SAR Versatile Altimetry Toolkit for OLIW (Ocean-Land-Inland Water) Research and Exploitation

Current Run: CryoSat-2 SAR Mode L1b Processor  
Current Version: 1.52

#####

Found 3 Passes to Process

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

Beam Stacking: 401 -> 537  
Scenario Recovery: 401 -> 537  
Alignment and Range Compression: 401 -> 537  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Extrapolation going on with more than 4 samples  
Elapsed time is 14.332029 seconds.  
BLOCK END: 401 -> 537

Generating Output in kml, png and mat format

Output Generated -> Moving to Next Pass ...

Completed L1b Processing for the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.DBL

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR

No CryoSat-2 L1b File for: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.HDR -> File Skipped

Processing the Pass: CS\_OFFL\_SIR1SAR\_FR\_20140619T042952\_20140619T043016\_B001.TGZ

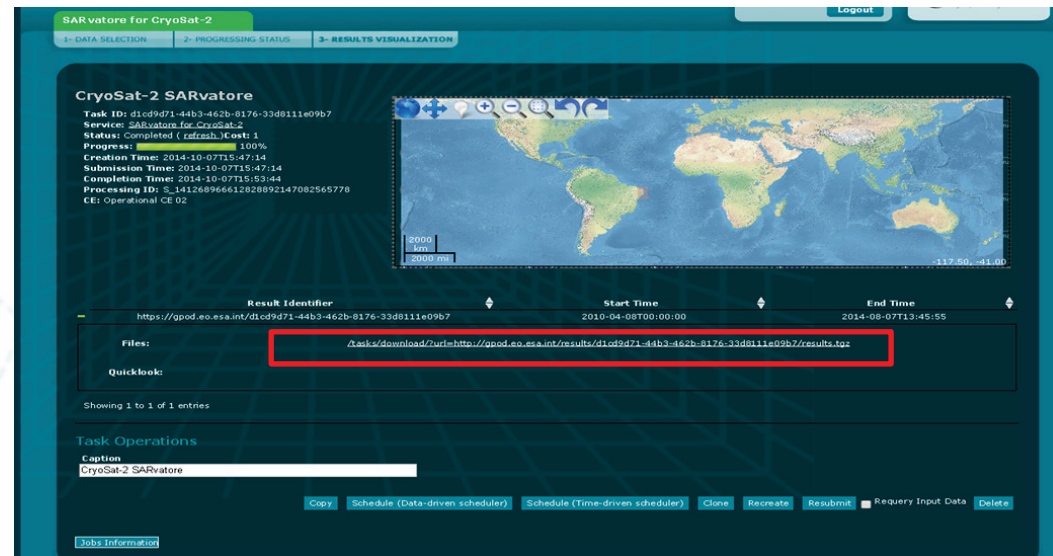
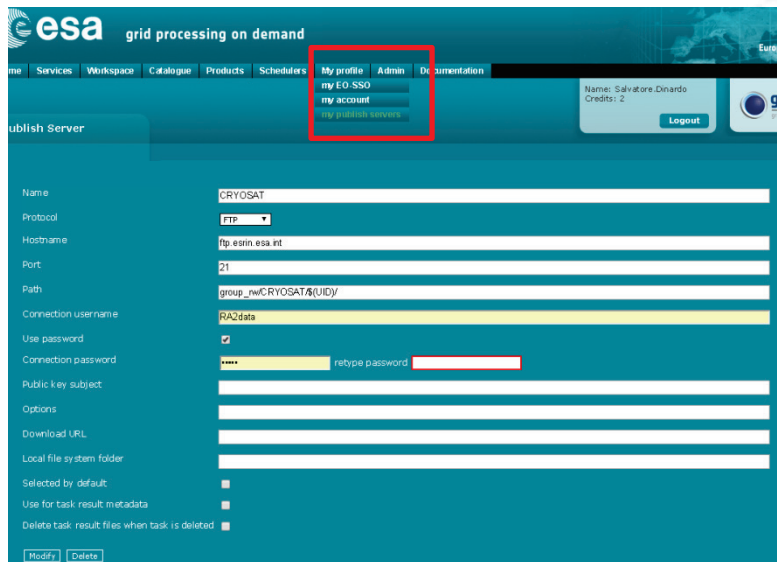
Execution Log

Configuration File Examples (L1B)



# Output Package Publishing

- In case of successful run completion (**green** status), the portal will provide the user with a http link from where to download the output package on own local drive.
- The user can order to post the package directly on his **own personal ftp server** once the ftp server credentials have been inserted (through my “publish servers” sub-menu).
- This is the recommended option when processing large amount of data.



# Output Package Publishing

SARvatore for CryoSat-2 Logout

1- DATA SELECTION 2- PROGRESSING STATUS 3- RESULTS VISUALIZATION

### CryoSat-2 SARvatore

Task ID: d1cd9d71-44b3-462b-8176-33d8111e09b7  
Service: SARvatore\_for\_CryoSat-2  
Status: Completed (refresh) Cost: 1  
Progress:  100%  
Creation Time: 2014-10-07T15:47:14  
Submission Time: 2014-10-07T15:47:14  
Completion Time: 2014-10-07T15:53:44  
Processing ID: S\_141268966612828892147082565778  
CE: Operational CE 02

2000 km  
2000 mi

Result Identifier	Start Time	End Time
<a href="https://gpod.eo.esa.int/d1cd9d71-44b3-462b-8176-33d8111e09b7">https://gpod.eo.esa.int/d1cd9d71-44b3-462b-8176-33d8111e09b7</a>	2010-04-08T00:00:00	2014-08-07T13:45:55

Files: </tasks/download?url=http://gpod.eo.esa.int/results/d1cd9d71-44b3-462b-8176-33d8111e09b7/results.tgz>

Quicklook:

Showing 1 to 1 of 1 entries

### Task Operations

Caption  
CryoSat-2 SARvatore

[Copy](#) [Schedule \(Data-driven scheduler\)](#) [Schedule \(Time-driven scheduler\)](#) [Clone](#) [Recreate](#) [Resubmit](#)  Requery Input Data [Delete](#)

[Jobs Information](#)

# Output Package Publishing

The screenshot shows the 'Publish Server' configuration page in the ESA Grid Processing on Demand interface. The page has a teal header with the ESA logo and navigation tabs: Home, Services, Workspace, Catalogue, Products, Schedulers, My profile, Admin, and Documentation. The 'My profile' tab is active, showing options for 'my EO-SSO', 'my account', and 'my publish servers'. A user profile box on the right shows 'Name: Salvatore.Dinardo' and 'Credits: 2', with a 'Logout' button. The main form contains the following fields:

- Name: CRYOSAT
- Protocol: FTP (dropdown)
- Hostname: ftp.esrin.esa.int
- Port: 21
- Path: group\_rw/CRYOSAT/\${UID}/
- Connection username: RA2data
- Use password:
- Connection password: \*\*\*\*\* retype password:
- Public key subject:
- Options:
- Download URL:
- Local file system folder:
- Selected by default:
- Use for task result metadata:
- Delete task result files when task is deleted:

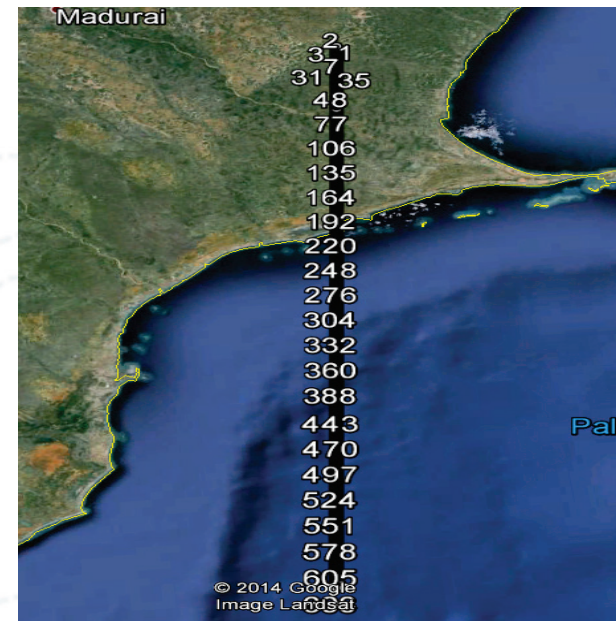
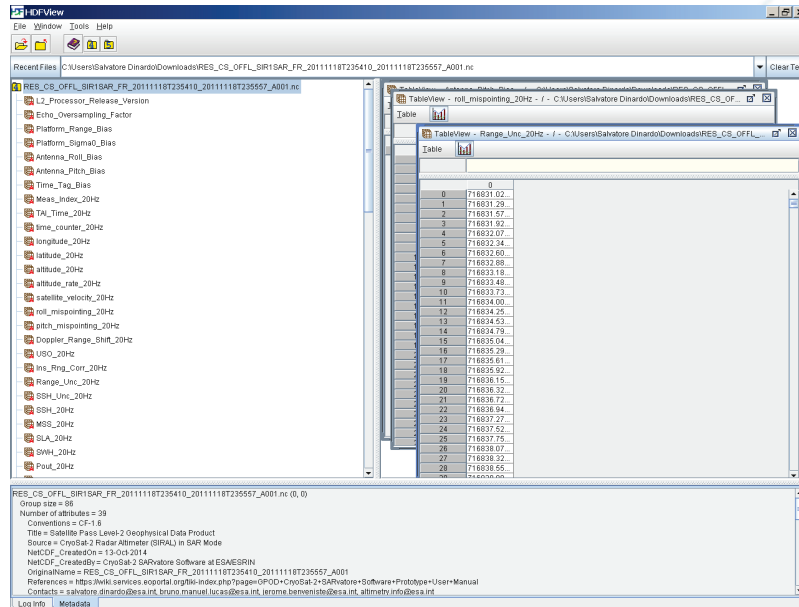
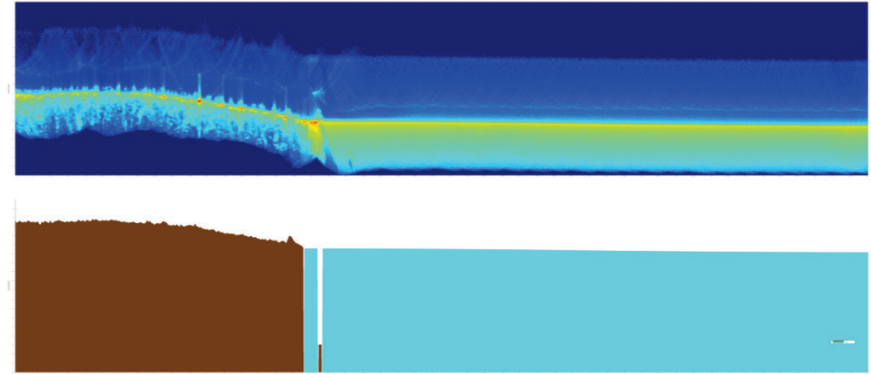
At the bottom of the form are 'Modify' and 'Delete' buttons.



# Output Package Content

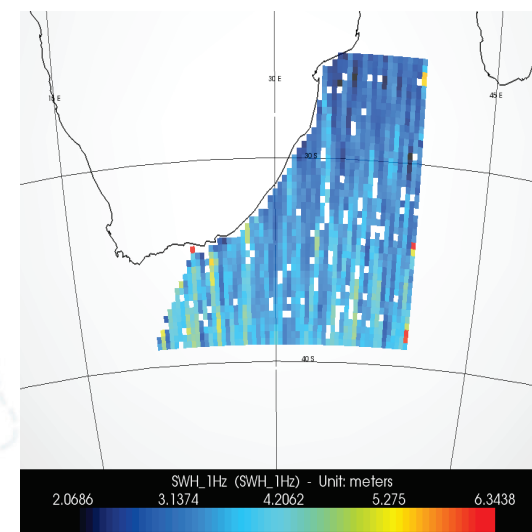
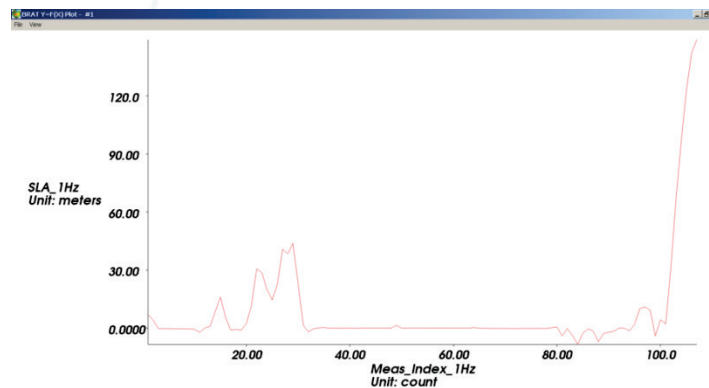
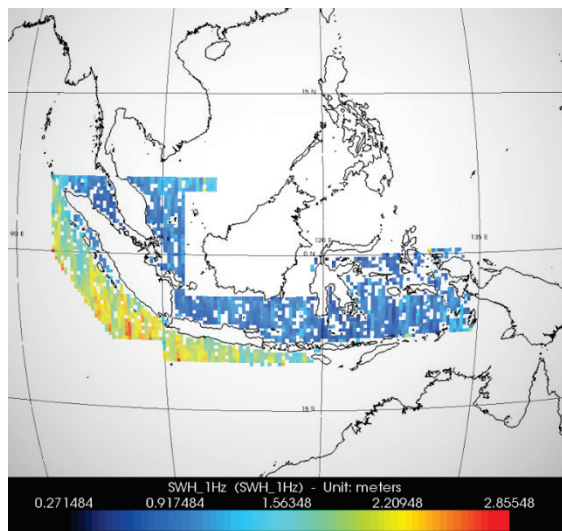
The output package consists of:

- Pass Ground-Track in KML format
- Radar Echogram Picture in PNG format
- L2 data product in NETcdf format with all the scientific results. The netCDF format is self-explanatory with all the data field significance described in the attributes



# NetCDF Product in BRAT

- The NetCDF product follows the CF (Climate&Forecast) 1.6 Convention and can be opened with any standard NetCDF tools (ncdump, HDFview, etc)
- Anyhow, the recommended option is to ingest the NetCDF product in BRAT Toolbox in order to exploit all the BRAT functionalities to browse and visualize the output content



# R&D Projects using CryoSat-2 GPOD Data

- GOCP40 (Paolo Cipollini and Marcello Passaro, NOC & TUM)
- CE++ (Ole Andersen, DTU)
- SCOOP (Luciana Fenoglio, TU Bonn)
- SeaNice (Sara Fleury, LEGOS)
- SHAPE ( Pierre Fabry & Nicolas Bercher, Along Track)
- Iceberg Detection (Jean Tournadre, IFREMER)
- Swell Detection (Saleh Abdallah, ECMWF)
- CRUCIAL (Philip Moore, NU)
- SAR SSB Study (Christine Gommenginger, NOC)
- ....



# OFF LINE GPOD Processing

- For massive processing (years of data in large area of interest), it is recommended to request an off line processing: GPOD team is available to process the data for you in an off line configuration and post the output L2 in a personal ftp repository.
- In order to request an order of processing, please write your order description (ime of interest, region of interest, processing baseline) at:

[eo-gpod@esa.int](mailto:eo-gpod@esa.int)

[altimetry.info@esa.int](mailto:altimetry.info@esa.int)

# GPOD SAR Service for Sentinel-3

- The GPOD Service for Sentinel-3 SAR mode is currently under test phase; It is planned to make the service open when S3 L1A products will be released by ESA/EUMETSAT Agencies. The processing options will be the same as the CryoSat SAR service.

**SARvatore for SENTINEL3**

1- DATA SELECTION 2- PROGRESSING STATUS 3- RESULTS VISUALIZATION

Save in Workspace Process IT! Schedule (Time-driven scheduler) Schedule (Data-driven scheduler)

**Geographical selection**

lon lat 180.00 90.00  
lon lat 180.00 90.00

AOI

Select Date

start date stop date  
2016-11-03T00:00 2017-02-16T14:02

**Main Parameters**

Task Caption SARvatore for S3

Publish Server Portal

Compression  
None Single File Unique Package

Computing Element  
ESRIN CE 01 SL6 64bits Optimized for S3

Priority Normal

File Name	Start	End
S3A_SR_0_SRA_20161103T063428_20161103T083547_20161103T102857_0079_010_278_SVI_0_HR_002	2016-11-03T08:34:28.000Z	2016-11-03T08:35:47.000Z
S3A_SR_0_SRA_20161103T083547_20161103T084547_20161103T102904_0599_010_278_SVI_0_HR_002	2016-11-03T08:35:47.000Z	2016-11-03T08:45:47.000Z
S3A_SR_0_SRA_20161103T083547_20161103T084547_20161103T102904_0599_010_278_SVI_0_HR_002	2016-11-03T08:35:47.000Z	2016-11-03T08:45:47.000Z

**L1B Processor:**

- Data Posting Rate**  
Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)
- Hamming Weighting Window**  
Flag to set the application of the Hamming Weighting Window on the burst data (section 4.4 in REF1)
- Exact Beam-Forming**  
Flag to set the application of exact or approximated Doppler Beam Steering (section 4.4 in REF1)
- FFT Zero-Padding**  
Flag to operate the Zero-Padding prior to the range FFT (section 4.8 in REF1). Zero-Padding is indicated for coastal zone analysis
- Radar Receiving Window Size**  
Flag to select the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis
- Antenna Pattern Compensation**  
Flag to activate the antenna pattern compensation on the Stack Data
- Dump SAR Stack Data in output**  
Flag to dump the SAR Stack Data in the output package. Be aware that SAR Stack Data are bulky data products (around 3 GB for single pass), do not process them massively but limit yourself at around 10/20 passes at the time

**L2 Processor:**

- Restrict the re-tracking on specific surfaces**  
Flag to limit the processing on open sea or on water (open sea, coastal zone and inland water) or to process the full pass
- PTR width alphap parameter**  
Use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter
- SAMOSAs Model Generation**  
Flag to select the generation of the SAMOSA model to use in the re-tracking. SAMOSA3 is a truncated version (only zero order term) of SAMOSA2 (REF2). SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain
- Dump RIP in output**  
Flag to append Range Integrated Power (RIP) in the output netCDF data product
- Dump SAR Echo Waveforms in output**  
Flag to append the SAR Echo Waveforms in the output netCDF data product
- Single-look or Multi-look Model**

# Options in SARvatore for Cryosat-2

The screenshot shows the ESA grid processing on demand website interface. At the top, the ESA logo and the text "grid processing on demand" are visible. Below this is a navigation menu with links for Home, Services, Workspace, Catalogue, Products, Schedulers, My profile, and Documentation. A search bar is present with a "Search" button and a message indicating "Showing the 8 results found." with a "more..." link. On the right, a user profile for "Marco Restano" with 3 credits and a "Logout" button is shown. The main content area displays a "Services list" with four service cards: "EO Products Download", "SARInvatore for CryoSat-2", "SARvatore for CryoSat-2", and "SARvatore for SENTINEL3". The "SARvatore for CryoSat-2" card is highlighted. To the right of the cards, a detailed view for "SARvatore for CryoSat-2" is shown, including its classification (B), a 4-star rating, and a service description: "SARvatore (SAR Versatile Altimetric Toolkit for Ocean Research and Exploitation) for CryoSat-2 is a Software Processor Prototype developed in ESA/ESRIN to experiment with SAR processing from L1a (FBR) to L2 using the SAMOSA model. It can be used over open ocean or coastal zone, as well as more difficult targets such as rivers and lakes."



# List of Processing Options

The last step, before task submission, is to set the list of processing options.

- The processor prototype is **versatile** in the sense that the users can customize and adapt the processing, according their specific requirements, by setting the list of configurable options.
- In the G-POD interface, users can easily set processing options via a series of drop-down menus.
- The configurable options are divided according to the processing level they refer to (L1b and L2).

**Processing Parameters**

Here you find a list of processing options that you can select according to the processing level  
For a wiki user manual of the service, go here: [wiki](#)

**L1b Processor**

- **Filter out Duplicated CryoSat-2 Products during the processing time**  
Enable to filter out duplicated products during the processing: duplicated products will not be processed  Enable
- **Data Posting Rate 20 Hz/80 Hz**  
Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)
- **Hamming Weighting Window**  
Flag to set the application of the Hamming Weighting Window on the burst data (section 4.4 in REF1)
- **Exact Beam-Forming**  
Flag to set the application of exact or approximated Doppler Beam Steering (section 4.4 in REF1)
- **FFT Zero-Padding**  
Flag to operate the Zero-Padding prior to the range FFT (section 4.8 in REF1). Zero-Padding is indicated for coastal zone analysis
- **Radar Receiving Window Size**  
Flag to select the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis
- **Antenna Pattern Compensation**  
Flag to activate the antenna pattern compensation on the Stack Data
- **Dump SAR Stack Data in output**  
Be aware that SAR Stack Data are bulky data products (around 1 GB for single pass); do not process them massively but limit yourself at around 10/20 passes at the time  
Flag to dump the SAR Stack Data in the output package

**L2 Processor**

- **Restrict the re-tracking on specific surfaces**  
Flag to limit the processing on open sea or on water (open sea, coastal zone and inland water) or to process the full pass
- **PTR width alphap parameter**  
Use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter
- **SAMOS4 Model Generation**  
Flag to select the generation of the SAMOSA model to use in the re-tracking. SAMOSA3 is a truncated version (only zero order term) of SAMOSA2 (REF2), SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain
- **Single-Look or Multi-Look Model**  
Flag to set the application of the Model Multilooking (Single-Look or Multi-Look). Single-Look option is indicated for quick look operations while Multi-Look is the most accurate
- **Dump RIP in output**  
Flag to append Range Integrated Power (RIP) in the output netCDF data product
- **Dump SAR Echo Waveforms in output**  
Flag to append the SAR Echo Waveforms in the output netCDF data product

# L1b Processing Options

Option Name	Option Value	Option Description
Filter out Duplicated CryoSat-2 Products during the processing time	<ul style="list-style-type: none"> <li>- Enable</li> <li>- Disable</li> </ul>	Enable to filter out duplicated products during the processing: duplicated products will not be processed
Data Posting Rate 20 Hz/80 Hz	<ul style="list-style-type: none"> <li>- 20Hz</li> <li>- 80 Hz</li> </ul>	Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)
Hamming weighting Window	<ul style="list-style-type: none"> <li>- Apply only in coastal zone</li> <li>- Yes, apply it</li> <li>- No. do not apply it</li> </ul>	User can decide here whether to apply a Hamming weighting window on the SAR burst data, do not apply it, or to apply it only for surface location in coastal area (more info at REF1)
Exact Beam-Forming	<ul style="list-style-type: none"> <li>- Approximated</li> <li>- Exact</li> </ul>	User can decide here whether to operate an exact Beam-Forming or an approximated Beam-Forming (more info at REF1)
FFT Zero-Padding	<ul style="list-style-type: none"> <li>- Yes, apply Zero-Padding</li> <li>- No, don't apply Zero-Padding</li> </ul>	User can decide here whether to operate the Zero-Padding prior to the range FFT (section 4.8 in REF1). Zero-Padding is indicated for coastal zone and sea-ice analysis
Radar Receiving Window Size	<ul style="list-style-type: none"> <li>- 128 Range Bins</li> <li>- 256 Range Bins</li> </ul>	User can select here the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis

## L1b Processing Options(2)

Option Name	Option Value	Option Description
Antenna Pattern Compensation	- Yes - No	Flag to activate the antenna pattern compensation on the Stack Data
Dump SAR Stack Data in output	- Yes - No	Be aware that SAR Stack Data are bulky data products (around 1 GB for single pass); do not process them massively but limit yourself at around 10/20 passes at the time  Flag to dump the SAR Stack Data in the output package



# L1B Option – Hamming Window

Option Name	Option Value	Option Description
Hamming weighting Window	<ul style="list-style-type: none"> <li>- Apply only in coastal zone</li> <li>- Yes, apply it</li> <li>- No. do not apply it</li> </ul>	User can decide here whether to apply a Hamming weighting window on the SAR burst data, do not apply it, or to apply it only for surface location in coastal area (more info at REF1)

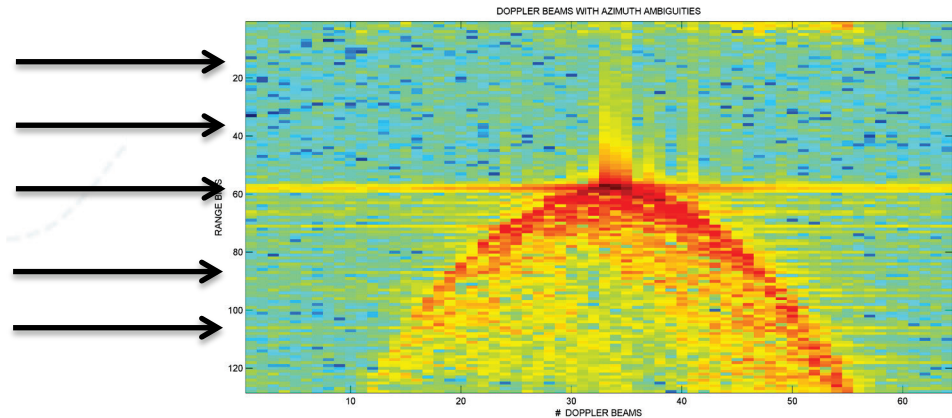
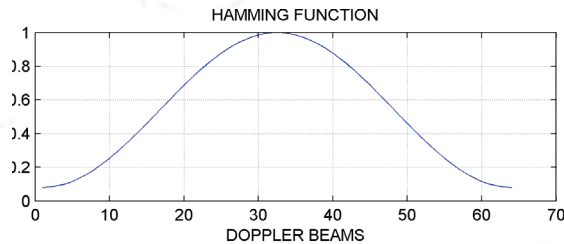
**Default option:** Apply only in coastal zone

**Coastal Zone recommended:** Apply only in coastal zone

**Open Ocean recommended:** No. do not apply it

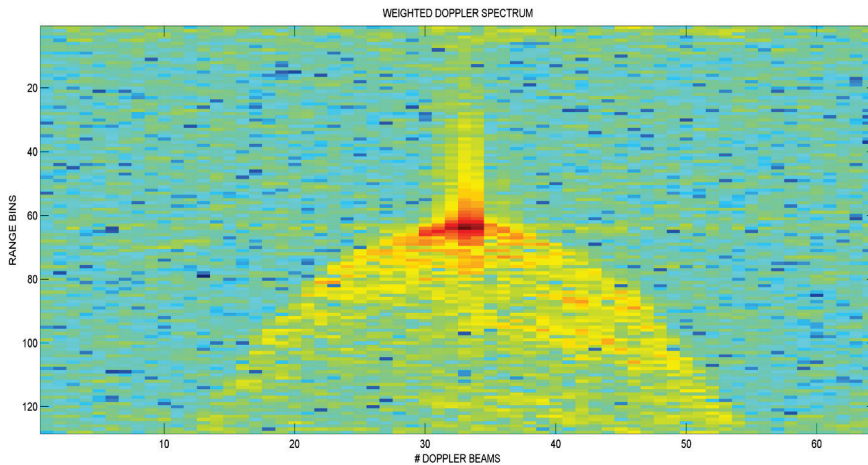
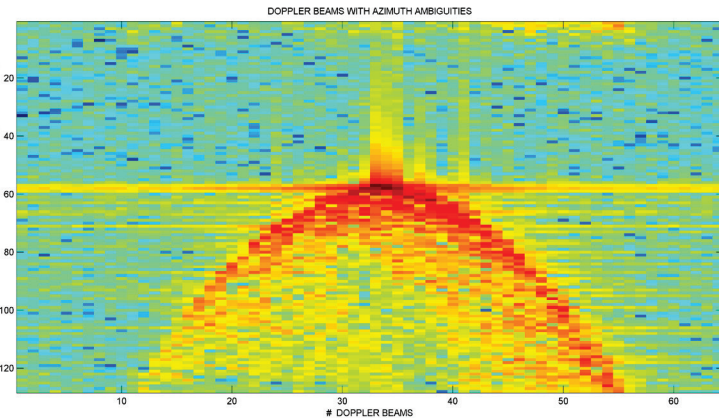
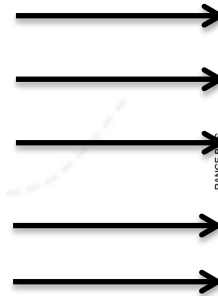
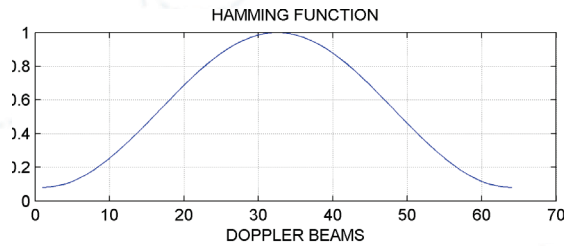
# Weighting Function in the coastal zone (1)

To suppress parabolic artifacts on the radargram to the quasi-specular coastal waters, => application of a weighting Function in Doppler Domain to Delay-Doppler Spectrum before the Beam Forming. Users can optionally apply the **Hamming** function.



# Weighting Function in the coastal zone (1)

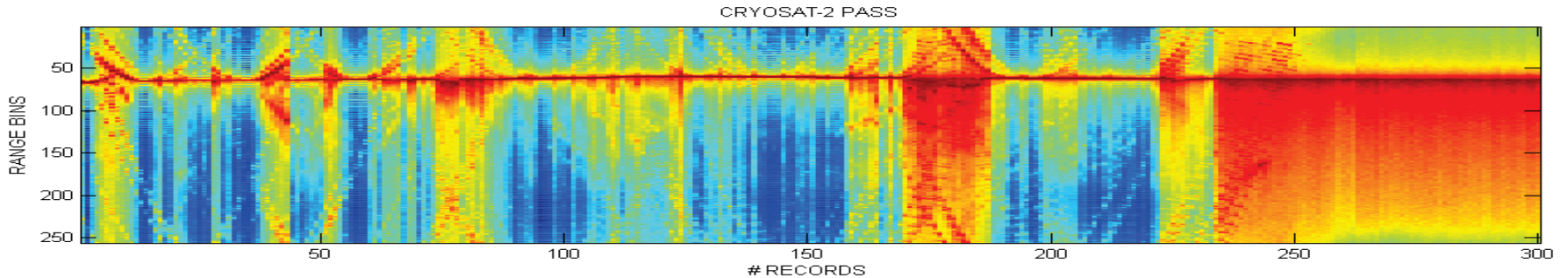
To suppress parabolic artifacts on the radargram to the quasi-specular coastal waters, => application of a weighting Function in Doppler Domain to Delay-Doppler Spectrum before the Beam Forming. Users can optionally apply the **Hamming** function.





# Weighting Function in the coastal zone (2)

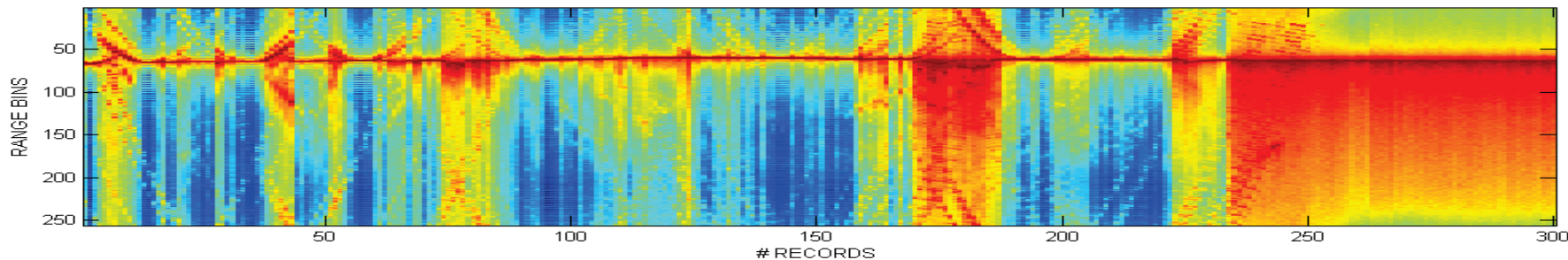
Effect of the application of the Hamming Function to eliminate parabolic artifacts on the radargram (echo stack)



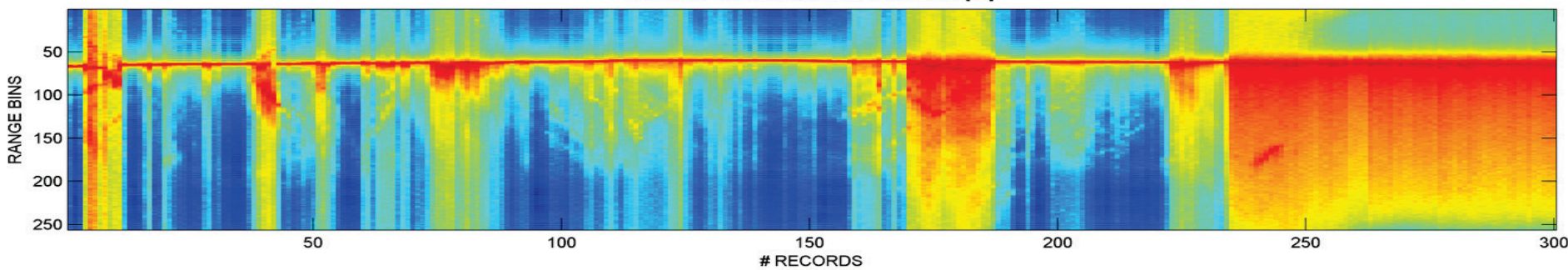
# Weighting Function in the coastal zone (2)

Effect of the application of the Hamming Function to eliminate parabolic artifacts on the radargram (echo stack)

CRYOSAT-2 PASS



CRYOSAT -2 PASS OVER CASPIAN SEA [db]



# L1B Option – Exact Beam-Forming

Option Name	Option Value	Option Description
Exact Beam-Forming	<ul style="list-style-type: none"> <li>- Approximated</li> <li>- Exact</li> </ul>	User can decide here whether to operate an exact Beam-Forming or an approximated Beam-Forming (more info at REF1, section 4.4)

- In the **approximate beam** steering, all the Doppler Beams will be steered by the same angle. This approximation can be considered acceptable on **gentle undulating surfaces**.
- For effect of the application of the Beam Formation, the Doppler Beams are angularly Equispaced. The **exact beam forming** needs to be applied in case of **highly variable topographic surfaces (land)**.

**Default option:** Approximated

**Coastal Zone recommended:** Approximated

**Open Ocean recommended:** Approximated



# FFT Zero-Padding

Option Name	Option Value	Option Description
FFT Zero-Padding	<ul style="list-style-type: none"> <li>- Yes, apply Zero-Padding</li> <li>- No, don't apply Zero-Padding</li> </ul>	User can decide here whether to operate the Zero-Padding prior to the range FFT ( <b>section 4.8 in REF1</b> ). Zero-Padding is indicated for coastal zone and sea-ice analysis

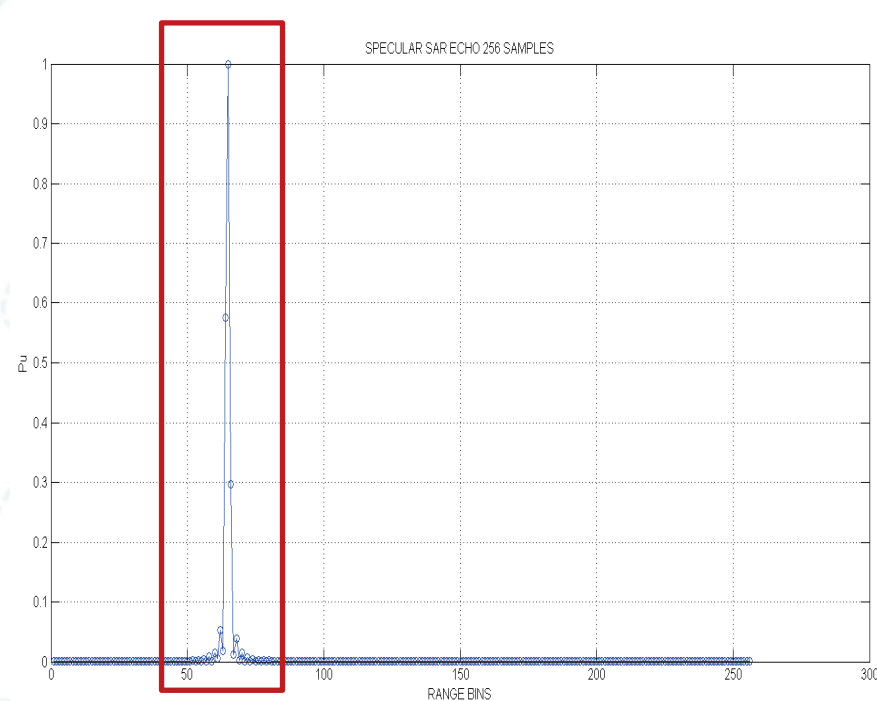
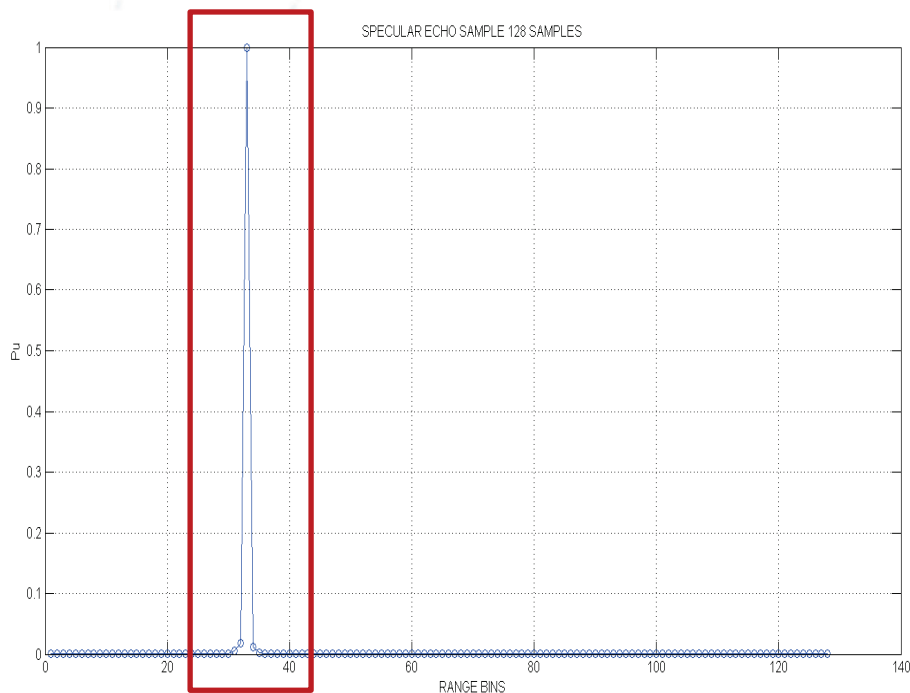
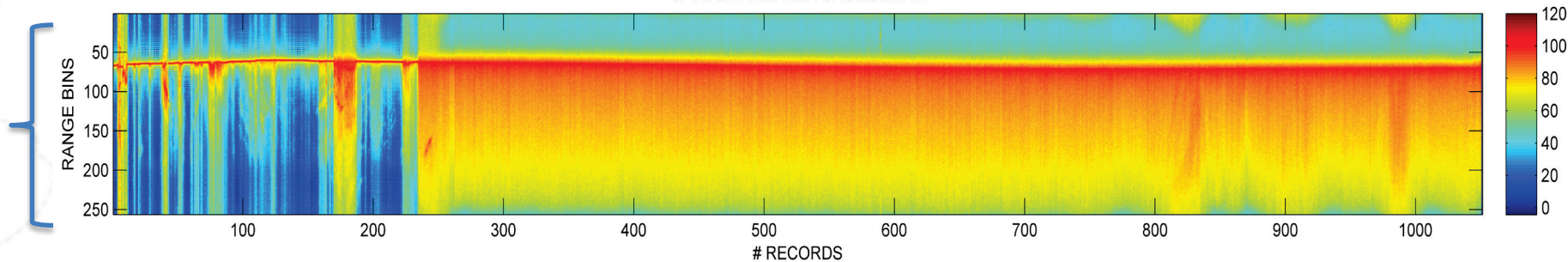
**Default option:** Yes, apply Zero-Padding

**Coastal Zone recommended:** Yes, apply Zero-Padding

**Open Ocean recommended:** User pref

# ZERO-PADDING => DOUBLE SAMPLING

CRYOSAT-2 RADAR CRONOGRAM



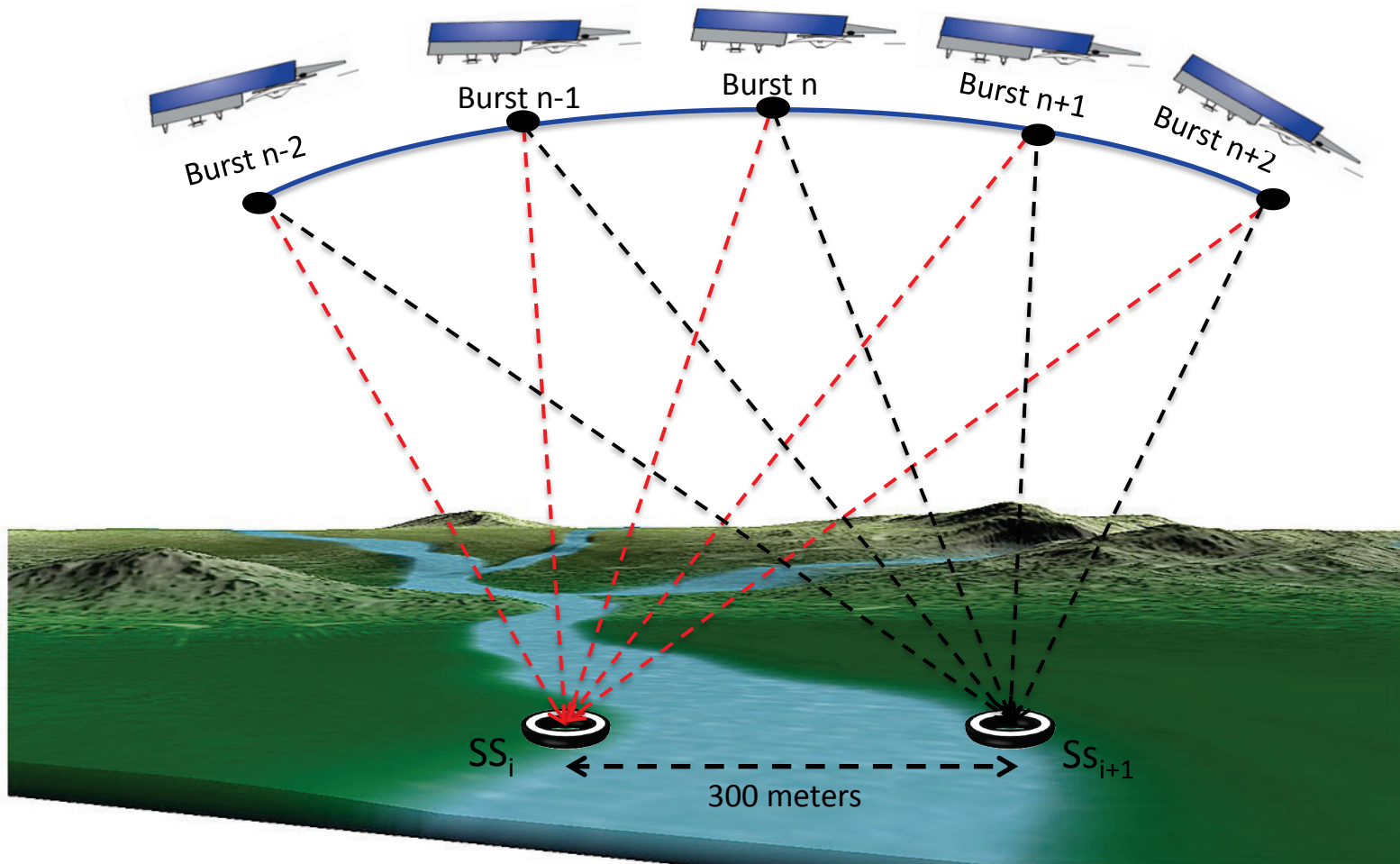
# L1B Option – Posting Rate 20 Hz/80 Hz

Option Name	Option Value	Option Description
Posting Rate	- 20 Hz - 80 Hz	Flag to set the data posting rate: 20 Hz (canonic posting rate) or 80 Hz (finer posting rate)

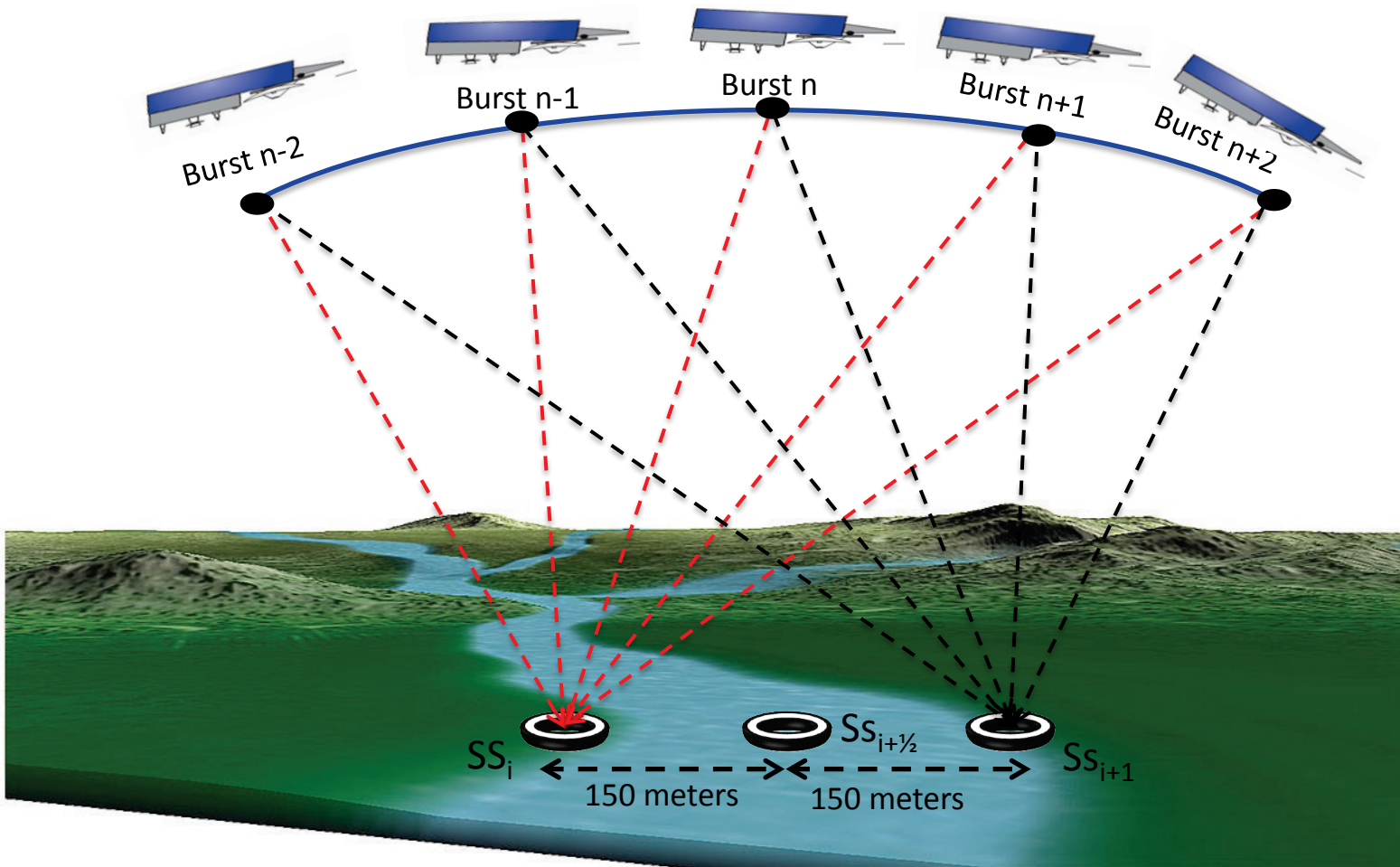
**Default option: 20 Hz**



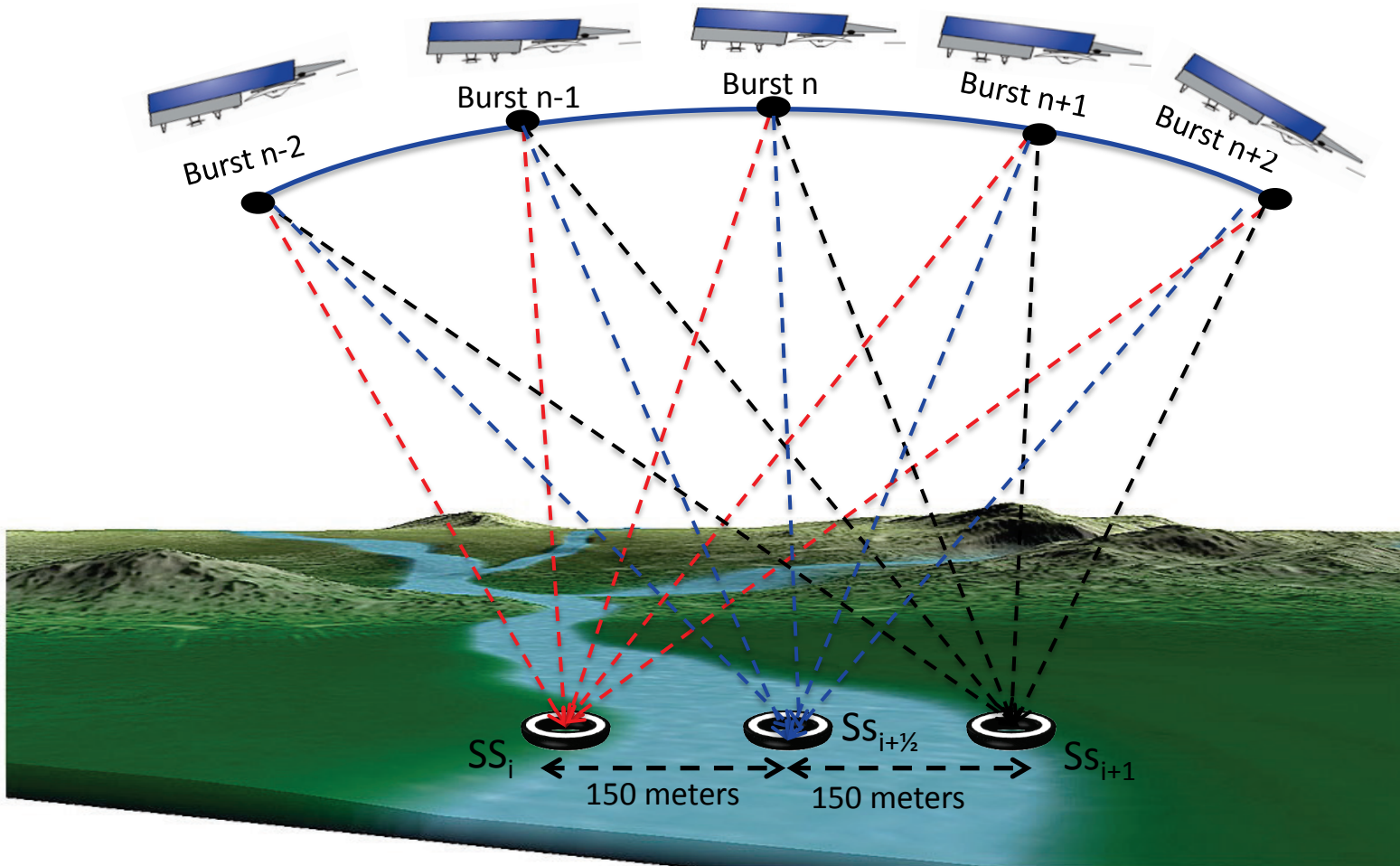
# Posting Rate 20 Hz/80 Hz



# Posting Rate 20 Hz/80 Hz

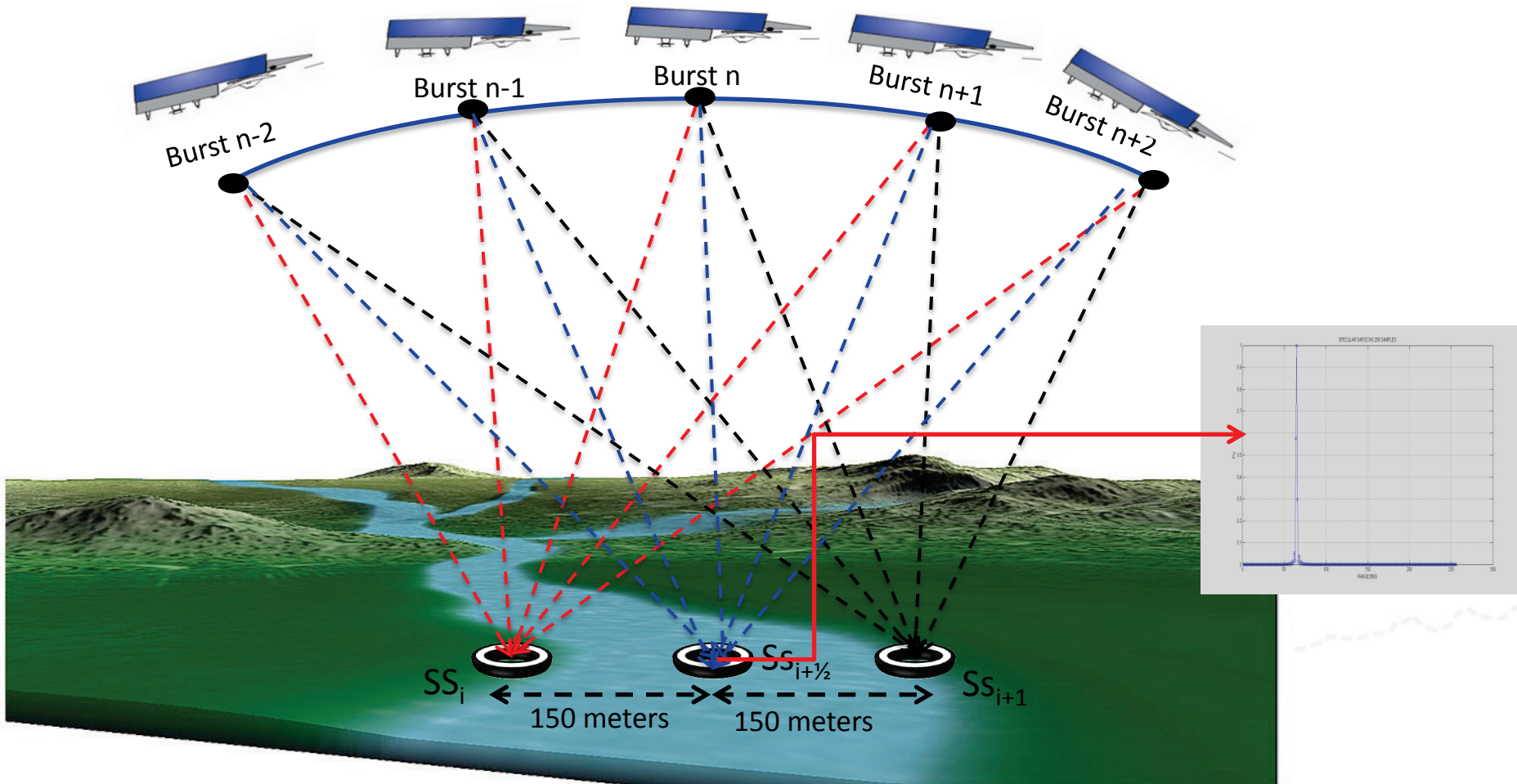


# Posting Rate 20 Hz/80 Hz

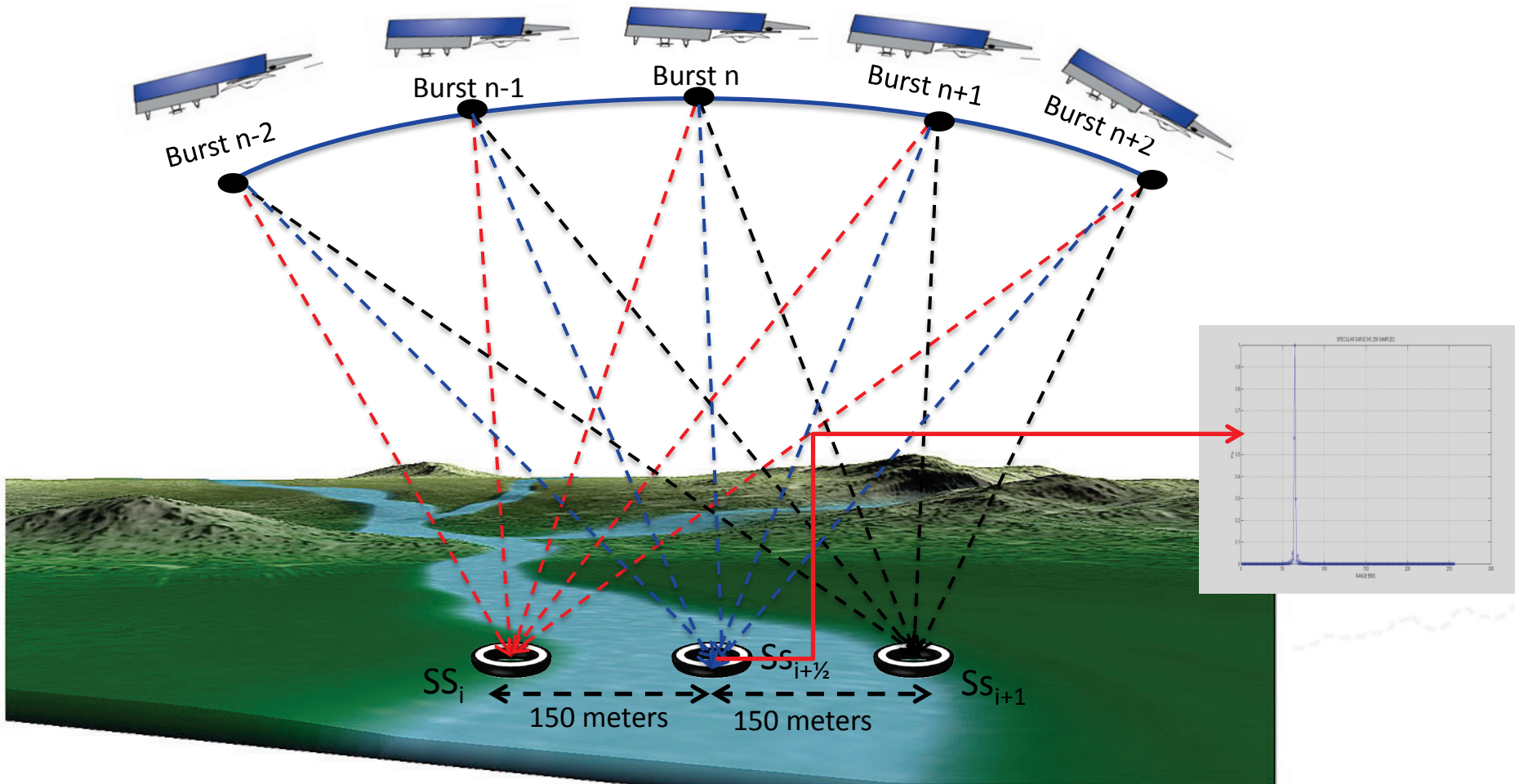




# Posting Rate 20 Hz/80 Hz



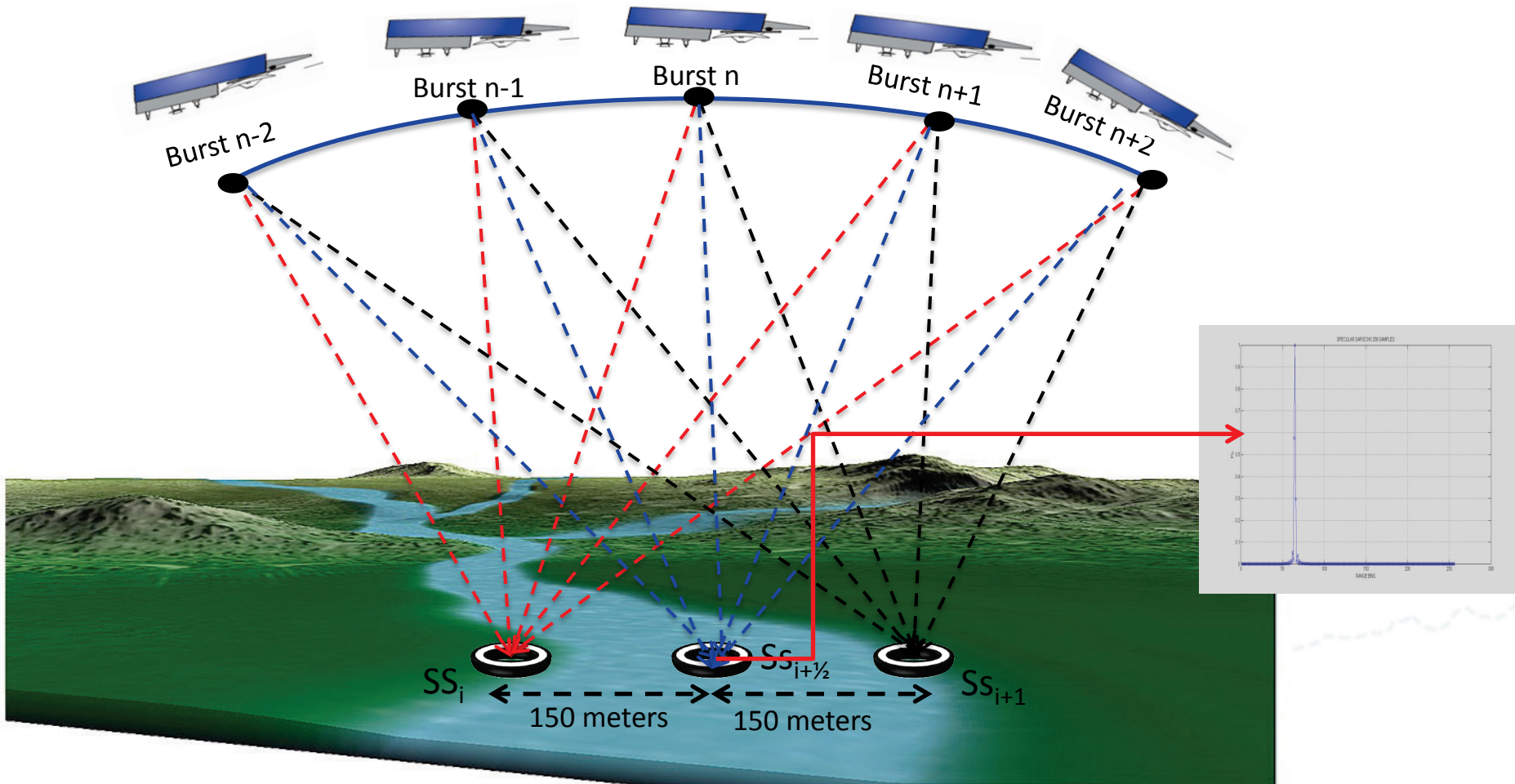
# Posting Rate 20 Hz/80 Hz



**WE CAN HAVE A SAR ALTIMETRIC MEASUREMENT IN ANY GROUND POINT ALONG THE TRACK**

**!**

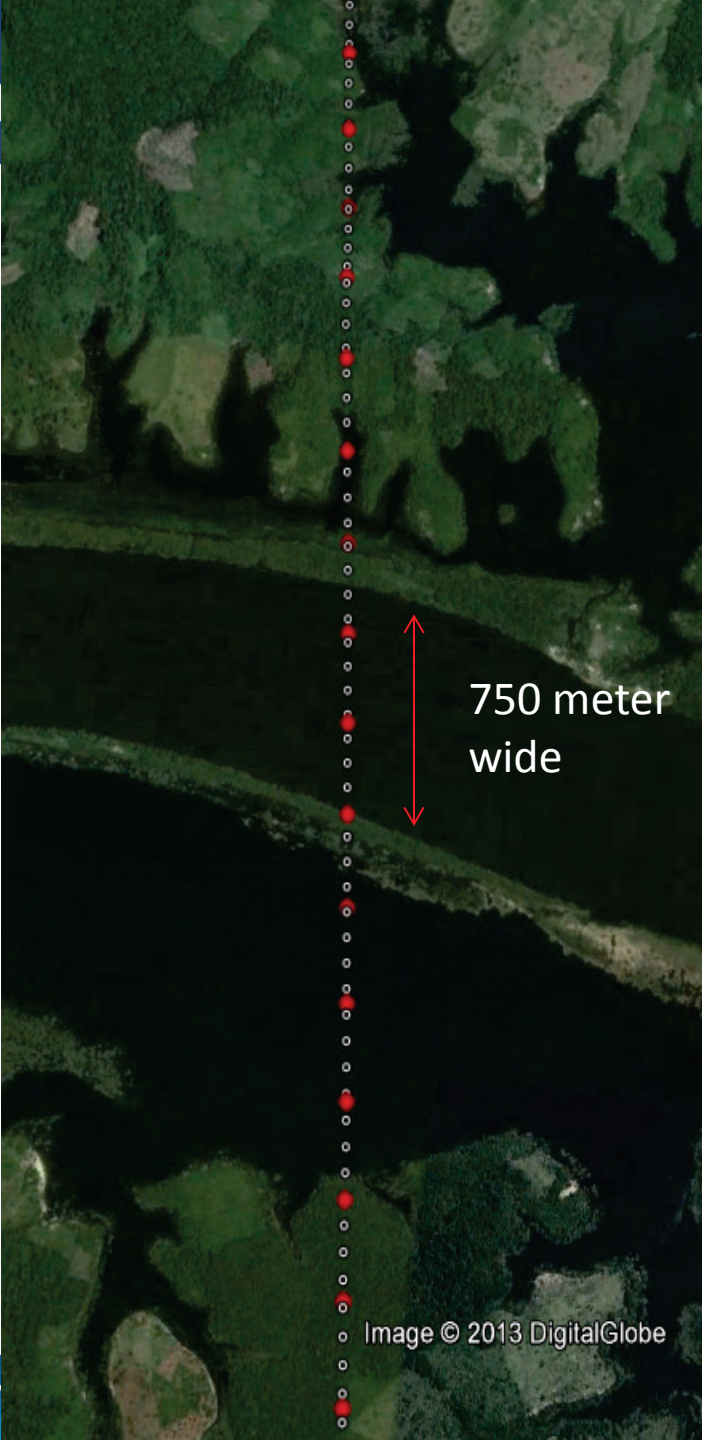
# Posting Rate 20 Hz/80 Hz



**WE CAN HAVE A SAR ALTIMETRIC MEASUREMENT IN ANY GROUND POINT ALONG THE TRACK**

!



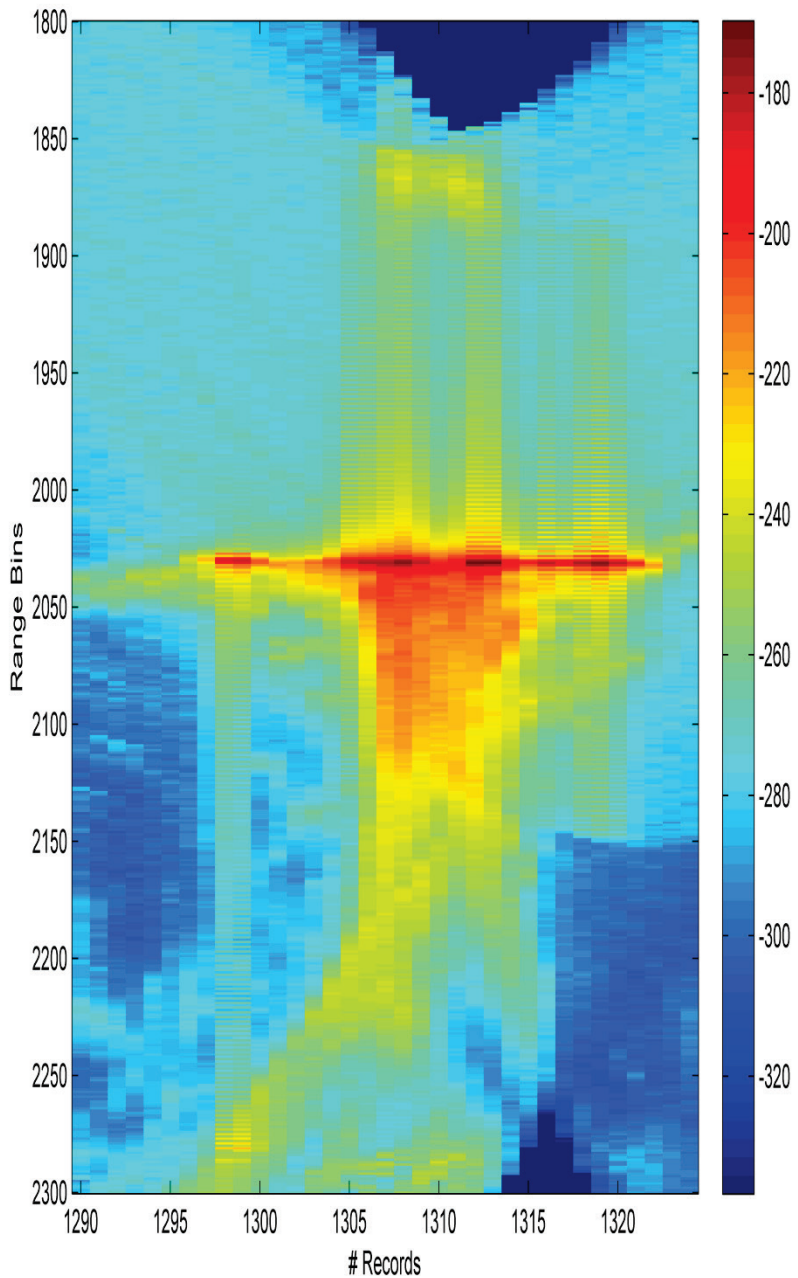


750 meter  
wide

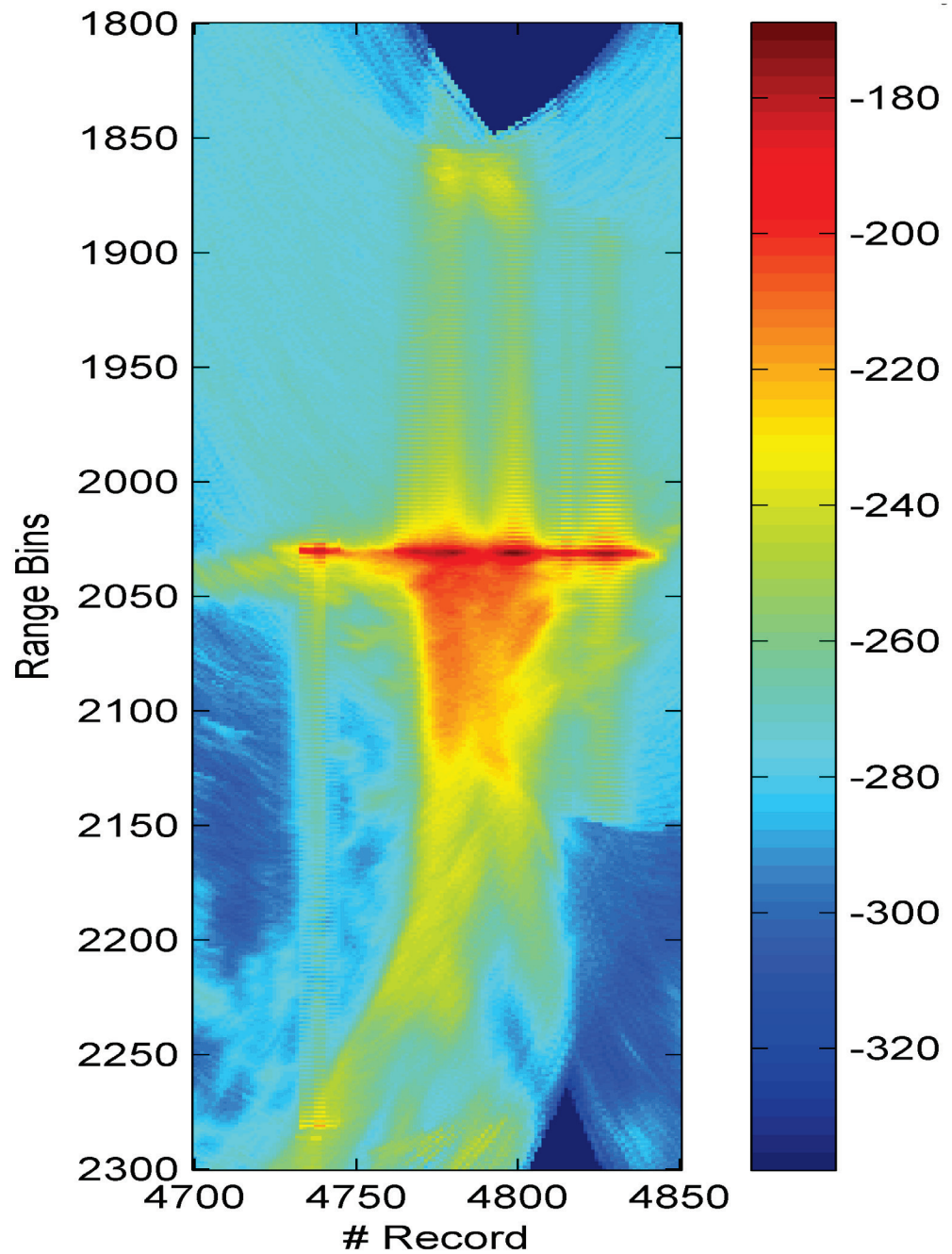
Image © 2013 DigitalGlobe



# SAR ALTIMETRY 20 Hz



# SAR ALTIMETRY 80 Hz



# L1B Options – Window Size

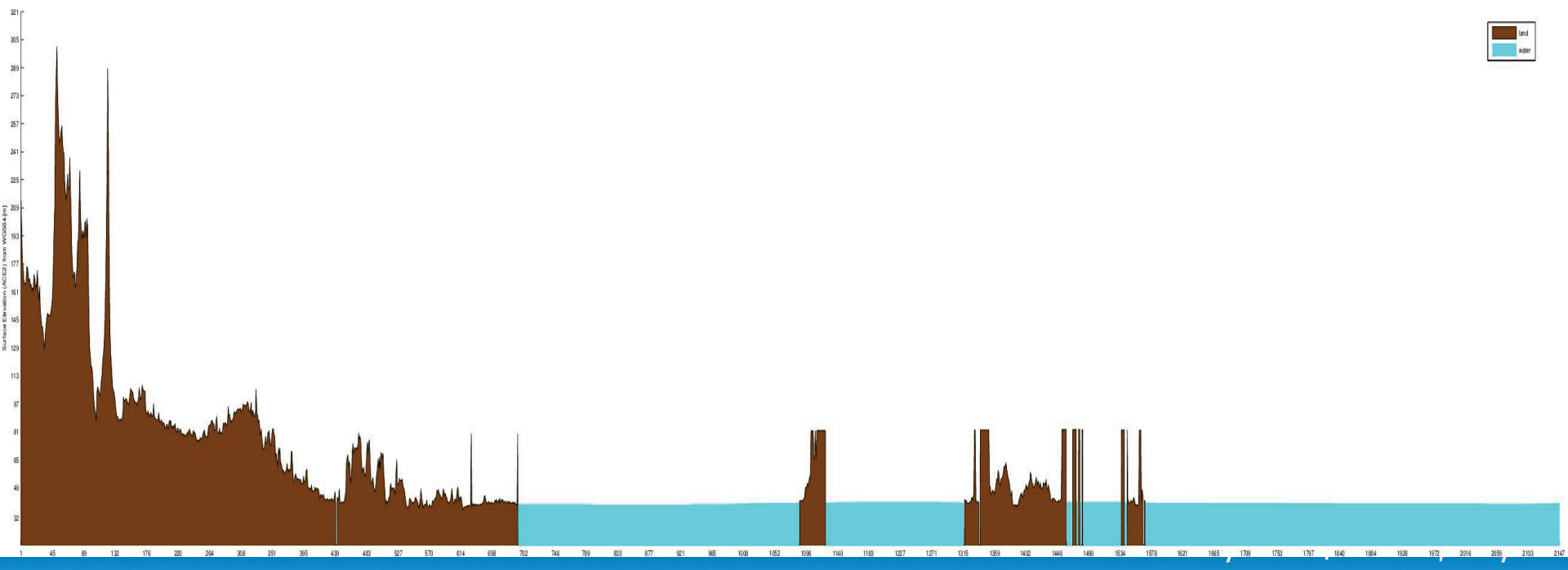
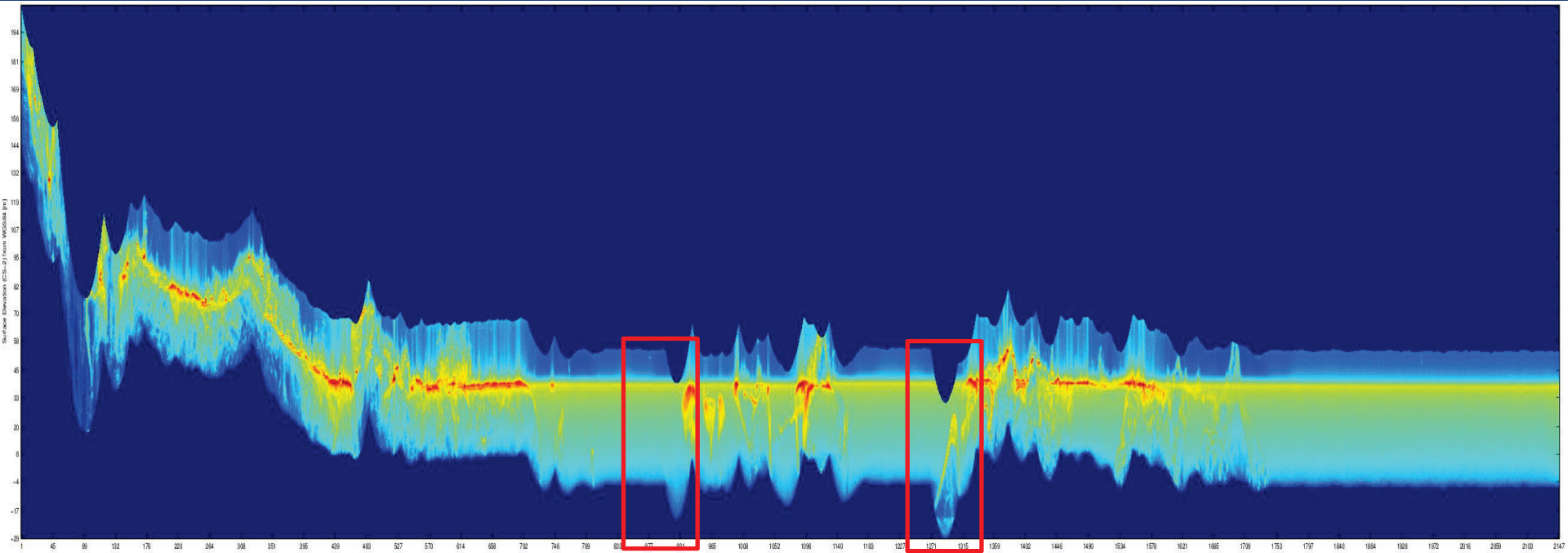
Option Name	Option Value	Option Description
Radar Receiving Window Size	<ul style="list-style-type: none"> <li>- 128 Range Bins</li> <li>- 256 Range Bins</li> </ul>	User can select here the size of the radar receiving window: 128 range bins (standard) or 256 range bins (extended). Extended window is indicated for coastal zone analysis

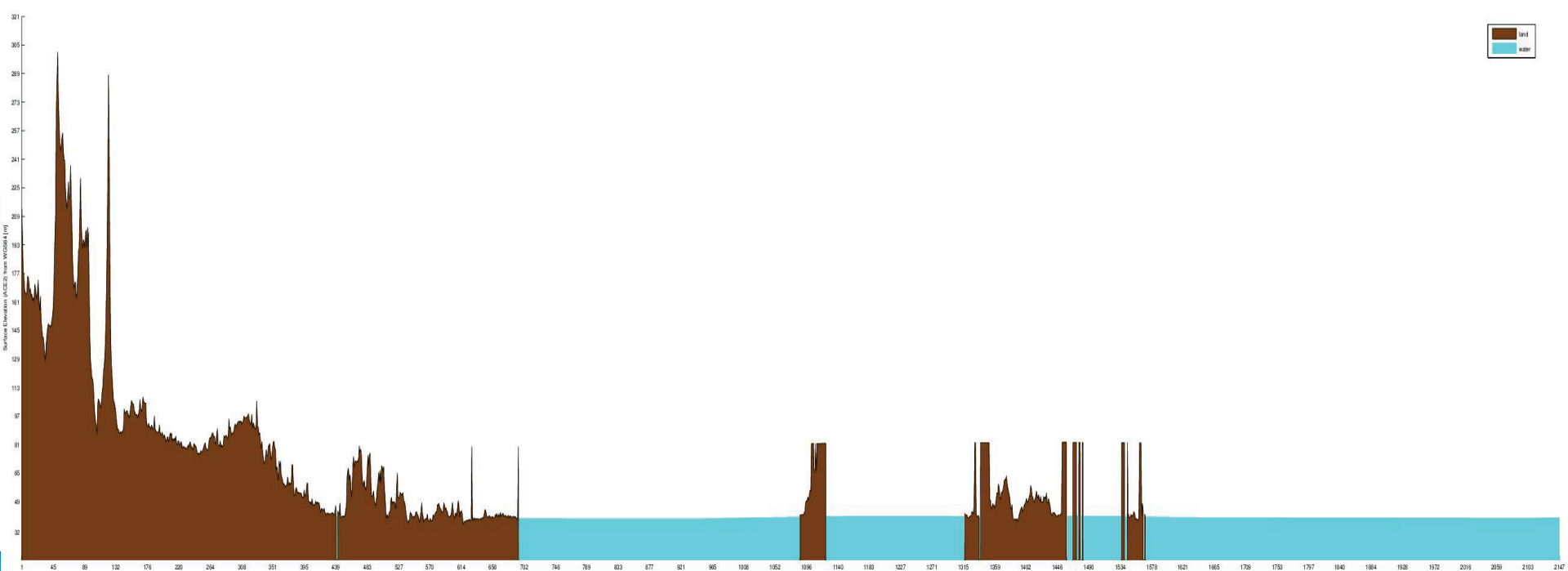
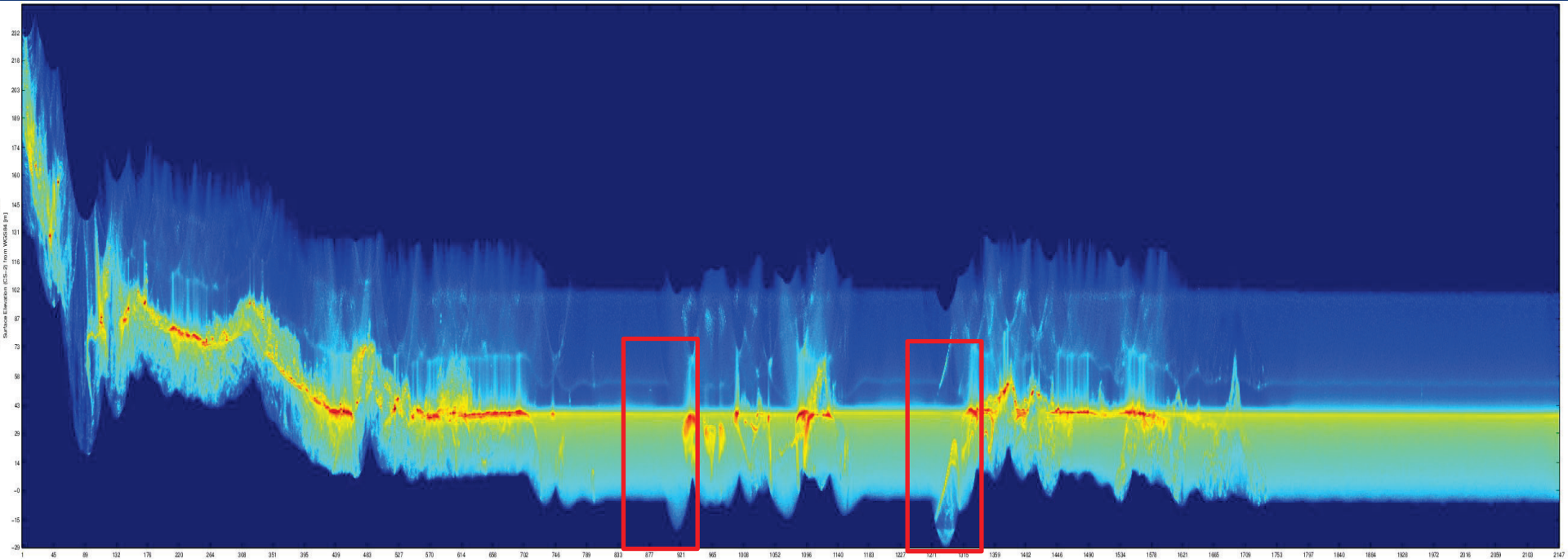
**Default option:** 128 Range Bins

**Coastal Zone recommended:** 256 Range Bins

**Open Ocean recommended:** 128 Range Bins







# L1B Option – Dump Stack Data

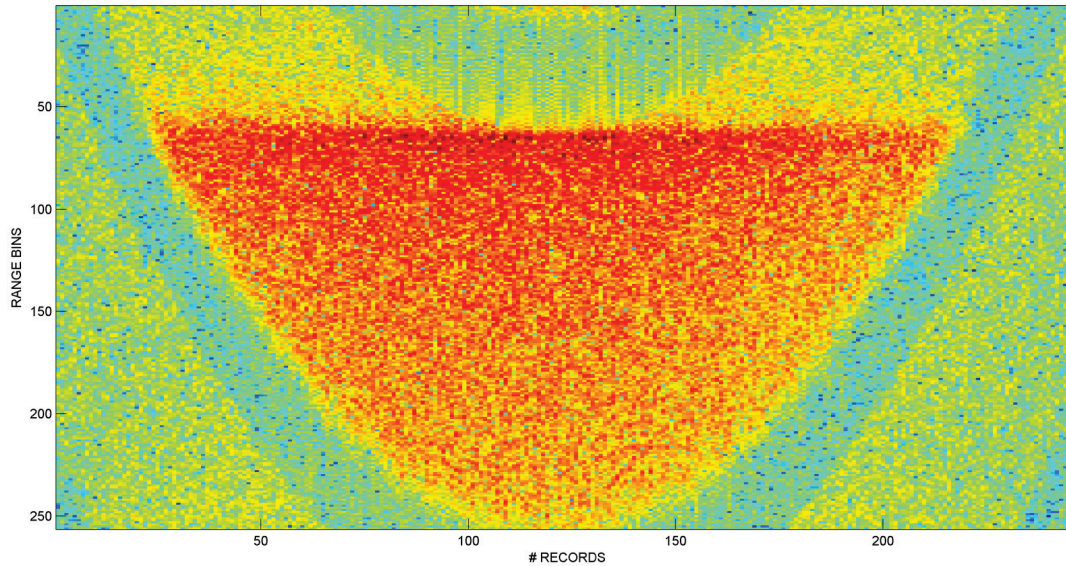
Option Name	Option Value	Option Description
Dump SAR Stack Data in output	- Yes - No	Be aware that SAR Stack Data are bulky data products (around 1 GB for single pass); do not process them massively but limit yourself at around 10/20 passes at the time  Flag to dump the SAR Stack Data in the output package

**Default option: No**



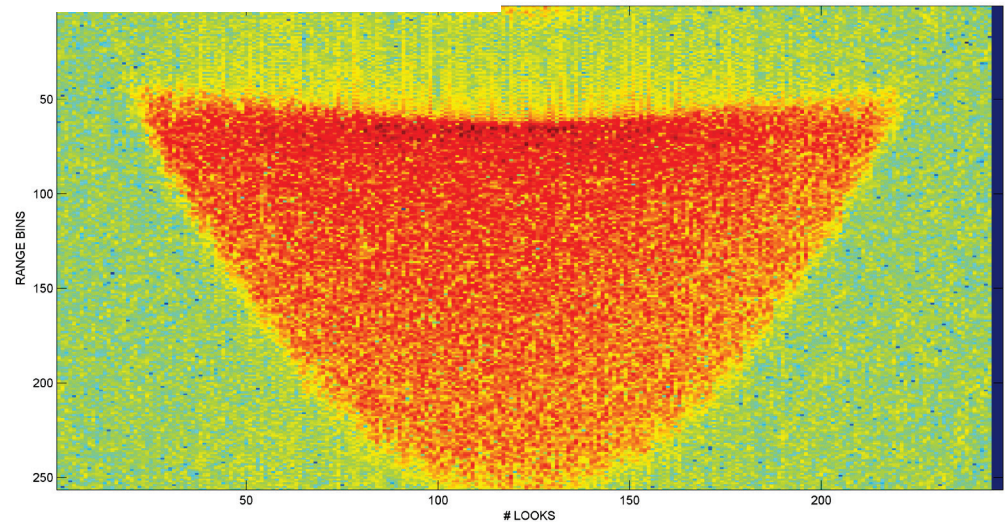
# L1B Option – Dump Stack Data

CRYOSAT-2 STACK DATA OVER OPEN OCEAN (NO HAMMING)



NO HAMMING

OVER OPEN OCEAN (HAMMING ON)

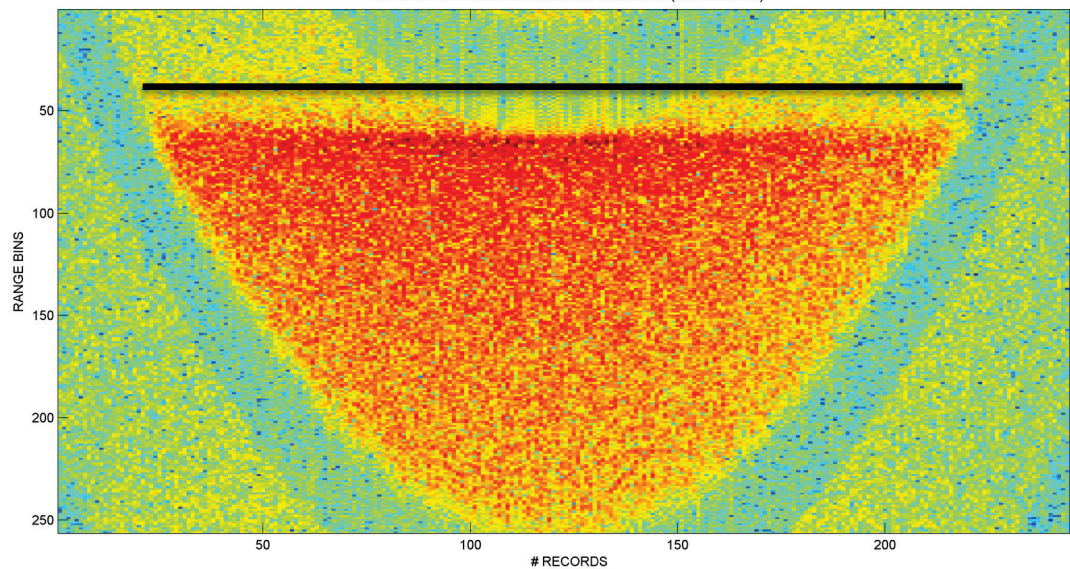


HAMMING ON



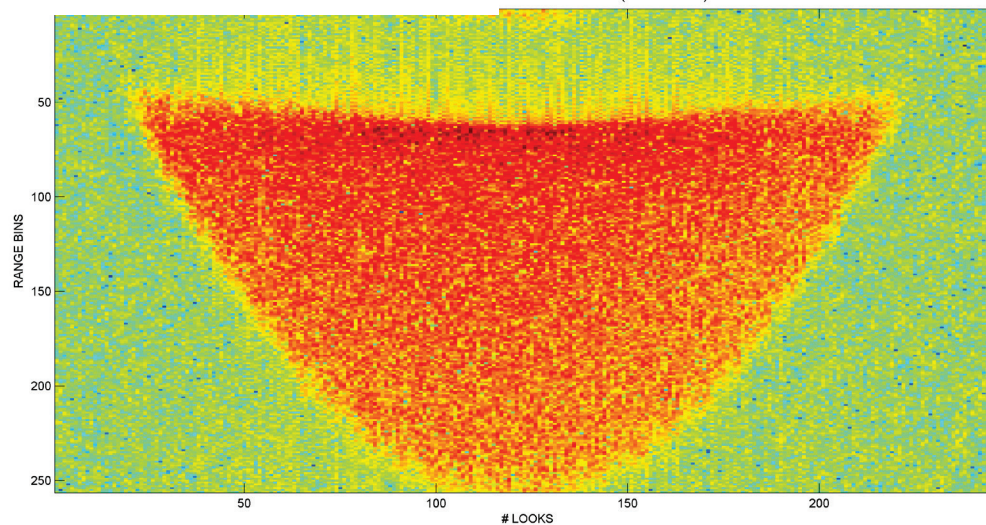
# L1B Option – Dump Stack Data

CRYOSAT-2 STACK DATA OVER OPEN OCEAN (NO HAMMING)



NO HAMMING

OVER OPEN OCEAN (HAMMING ON)

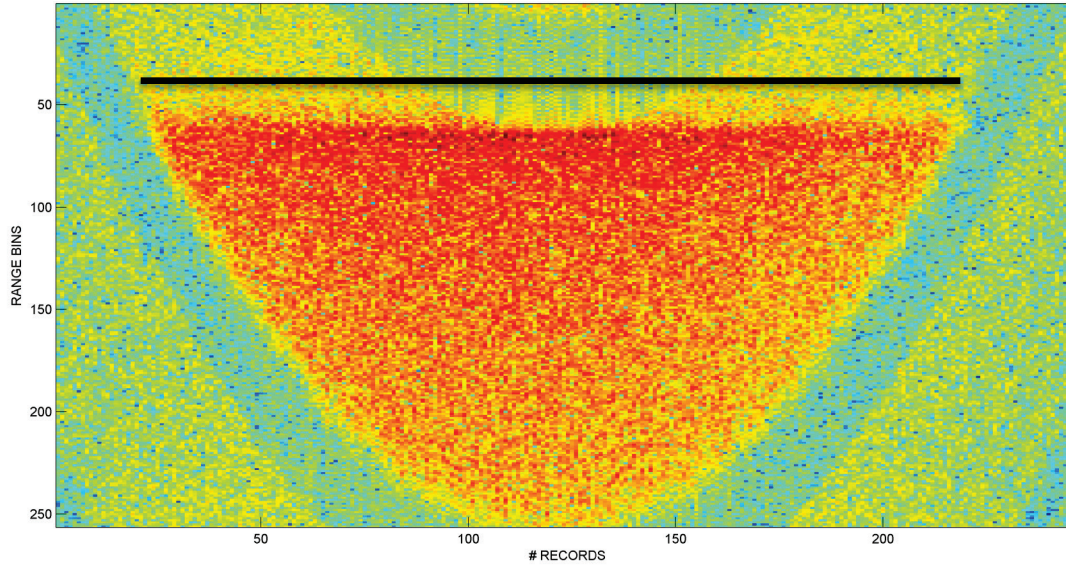


HAMMING ON



# L1B Option – Dump Stack Data

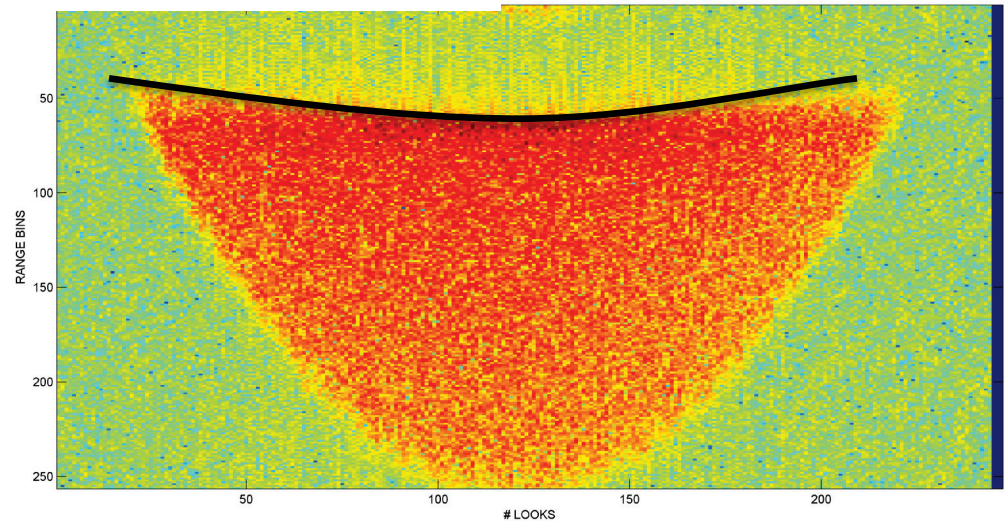
CRYOSAT-2 STACK DATA OVER OPEN OCEAN (NO HAMMING)



NO HAMMING

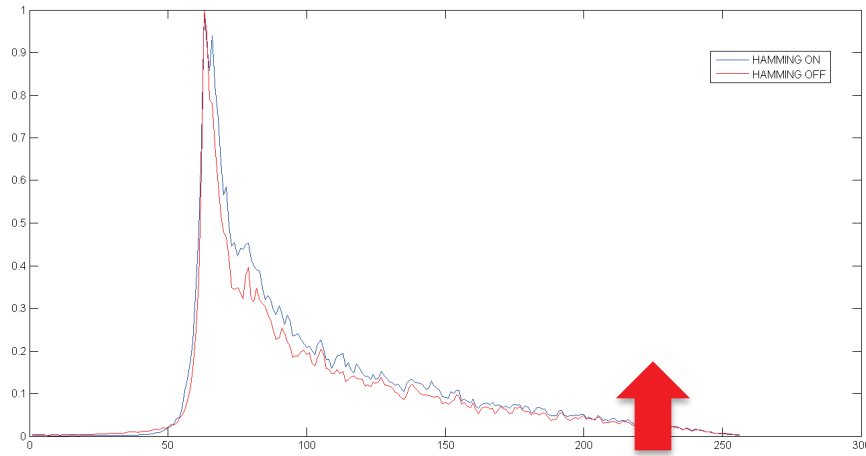
HAMMING ON

OVER OPEN OCEAN (HAMMING ON)

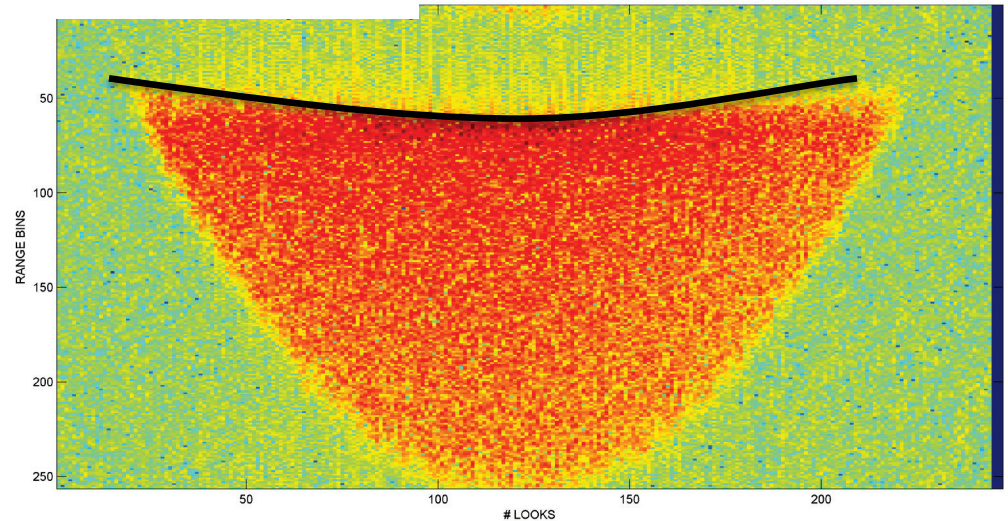




# L1B Option – Dump Stack Data



STACK DATA OVER OPEN OCEAN (HAMMING ON)



HAMMING ON

# L2 Processing Options

Option Name	Option Value	Option Description
Restrict the re-tracking on specific surfaces	<ul style="list-style-type: none"> <li>- Process all</li> <li>- Process only open sea points</li> <li>- Process only water points</li> </ul>	User can decide here whether to process the whole pass, only points in open sea or only water points (points in open sea, coastal zone and inland water)
PTR width alphap parameter	<ul style="list-style-type: none"> <li>- LUT</li> <li>- Constant</li> </ul>	User can decide here whether to use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter
SAMOSAs Model Generation	<ul style="list-style-type: none"> <li>- Use SAMOSA 2</li> <li>- Use SAMOSA 3</li> <li>- Use SAMOSA +</li> </ul>	User can decide here which SAMOSA generation model to use in the processing. The SAMOSA 3 is a truncated version of SAMOSA 2 (only zero-order term). SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain

# L2 Processing Options (2)

Option Name	Option Value	Option Description
Single-Look or Multi-Look Model	<ul style="list-style-type: none"> <li>- Multi-Look</li> <li>- Single-Look</li> </ul>	Flag to set the application of the Model Multilooking (Single-Look or Multi-Look). Single-Look option is indicated for quick look operations while Multi-Look is the most accurate
Dump RIP in output	<ul style="list-style-type: none"> <li>- Yes</li> <li>- No</li> </ul>	Flag to append Range Integrated Power (RIP) in the output netCDF data product
Dump SAR Echo Waveforms in output	<ul style="list-style-type: none"> <li>- Yes</li> <li>- No</li> </ul>	Flag to append the SAR Echo Waveforms in the output netCDF data product



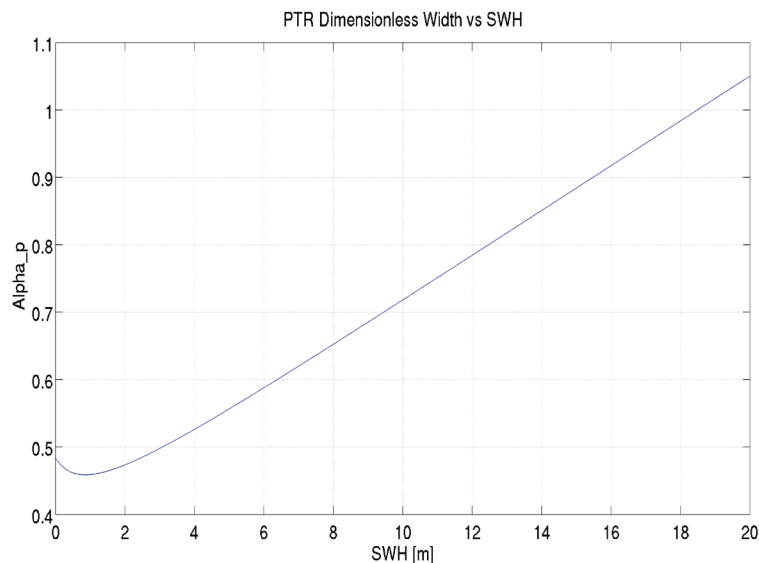
# L2 Options – PTR width (1)

Option Name	Option Value	Option Description
PTR width alphap parameter	- LUT - Constant	User can decide here whether to use a LUT (Look-Up Table) or a constant for PTR (Point Target Response) alphap parameter

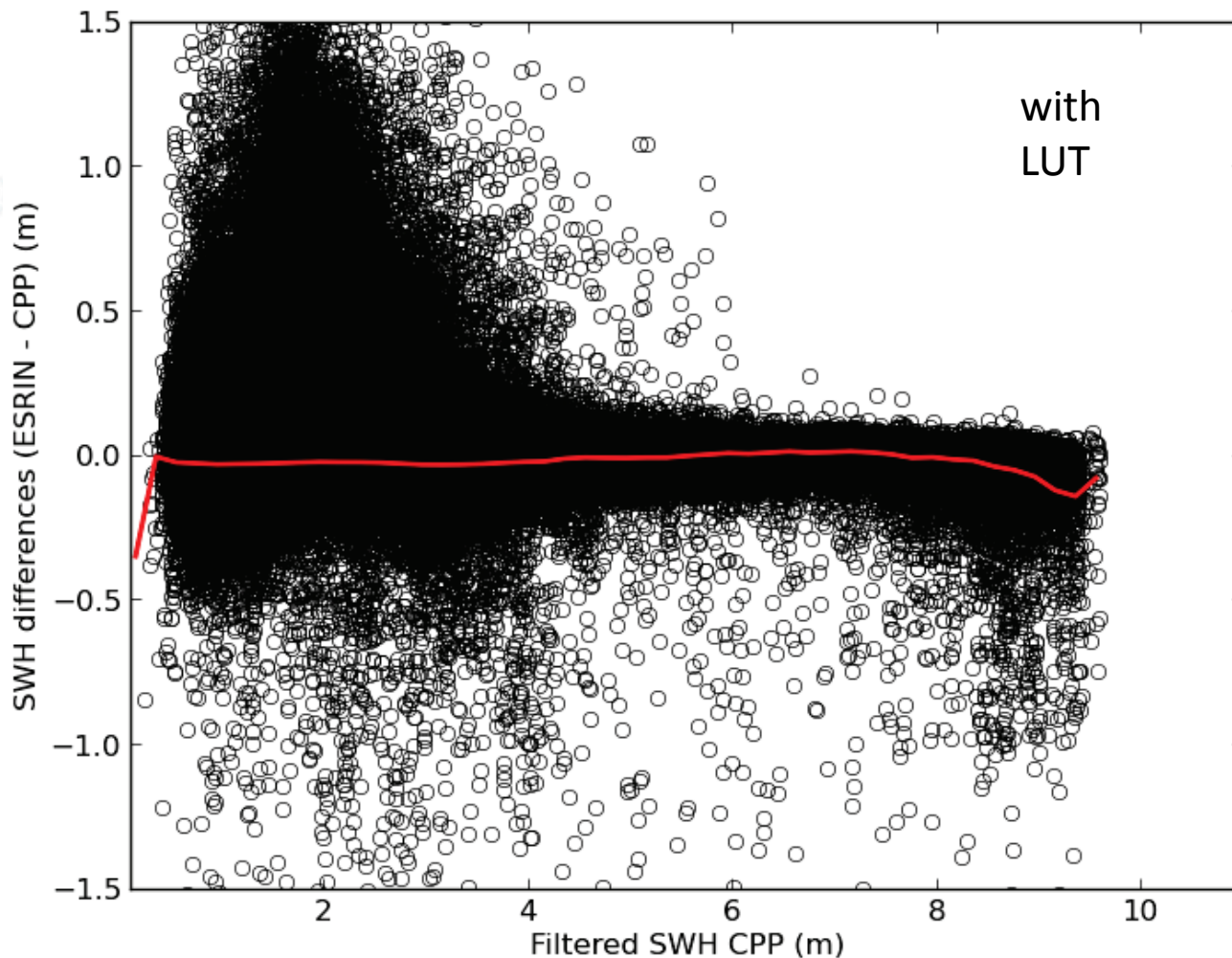
**Default option: LUT**

**Coastal Zone recommended: LUT**

**Open Ocean recommended: LUT**

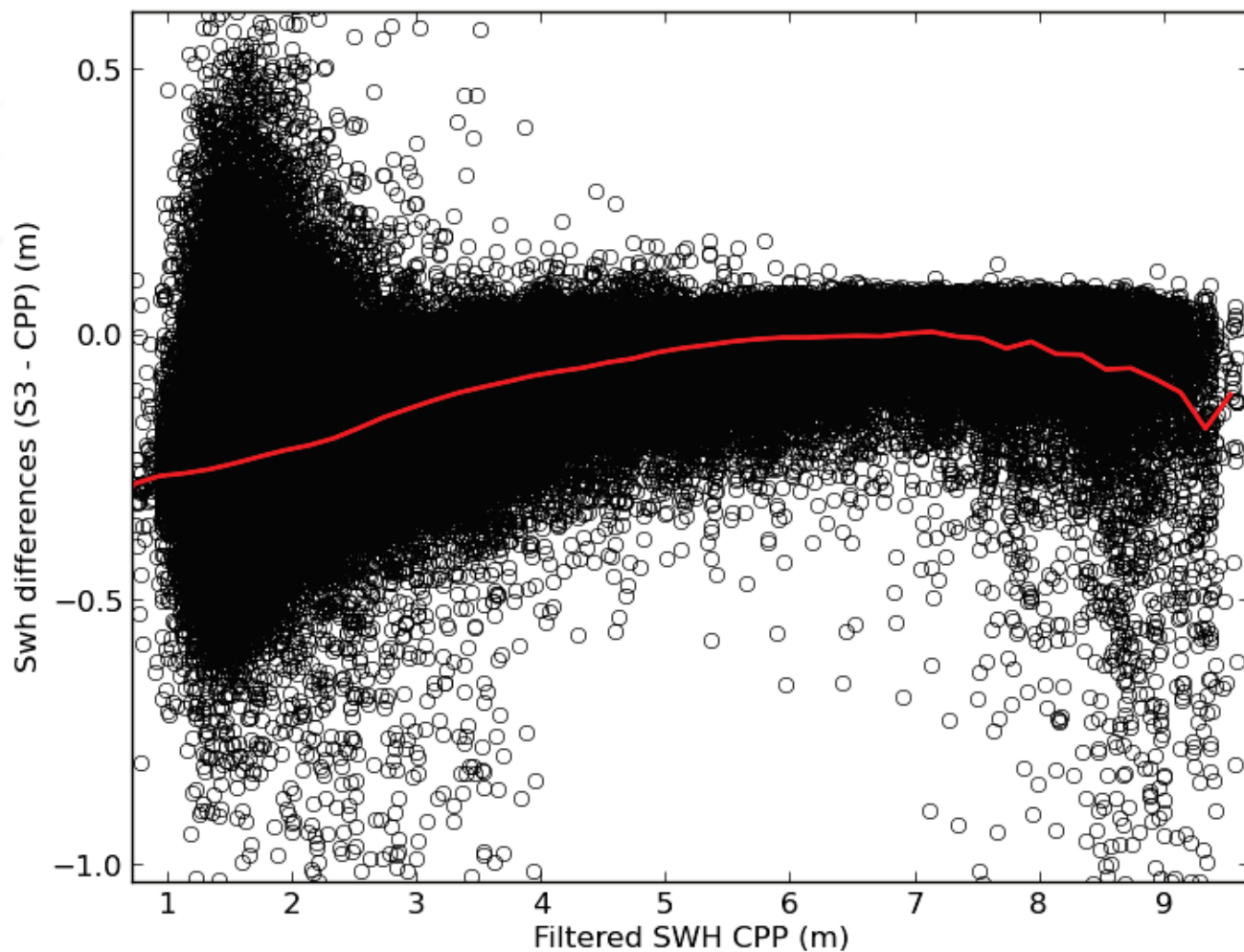


## L2 Options – PTR width (2)



Credits CLS/CNES

## L2 Options – PTR width (3)



“SWH residual depends strongly on wave height (up to 25cm at very low swh) that could be due to the Gaussian approximation for the PTR ”

CNES/CLS



# L2 Options – SAMOSA version

User can decide here which SAMOSA generation model to use in the processing.

SAMOSA Model Generation

- Use SAMOSA 2
- Use SAMOSA 3
- Use SAMOSA +

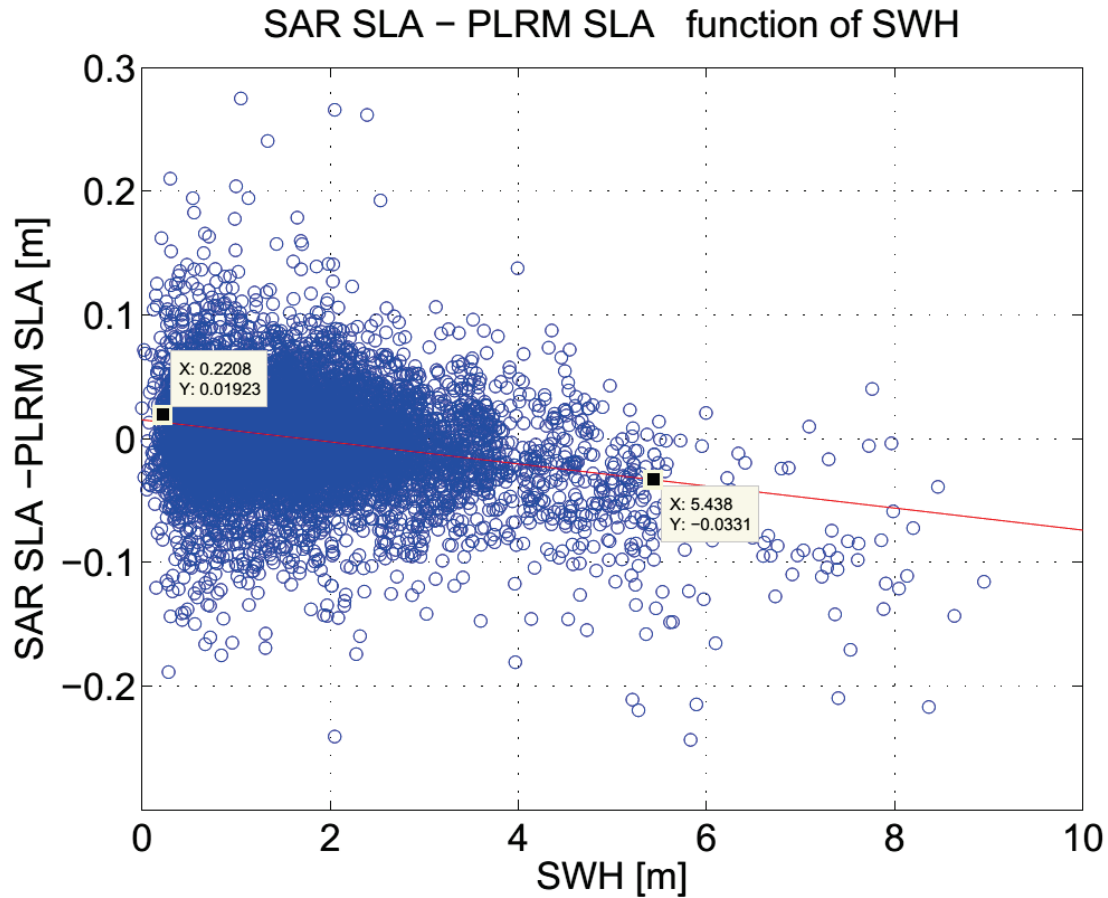
The SAMOSA 3 is a truncated version of SAMOSA 2 (only zero-order term).  
SAMOSA+ is the SAMOSA2 model tailored for inland water, sea ice and coastal zone domain

**Default option:** - Use SAMOSA 2

**Coastal Zone recommended:** - Use SAMOSA 2/SAMOSA+

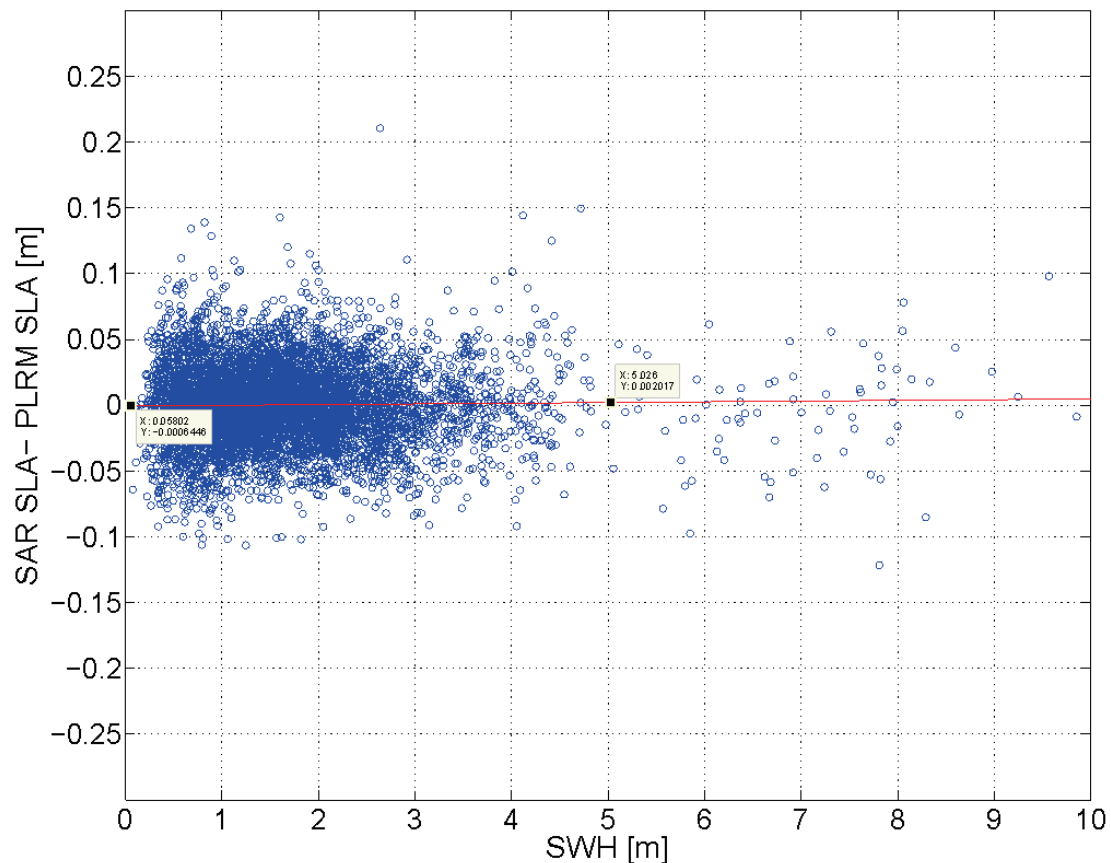
**Open Ocean recommended:** - Use SAMOSA 2

# L2 Options – SAMOSA3



# L2 Options – SAMOSA2

SAR SLA – PLRM SLA function of SWH





# L2 Options – PTR width (1)

Dump RIP in output

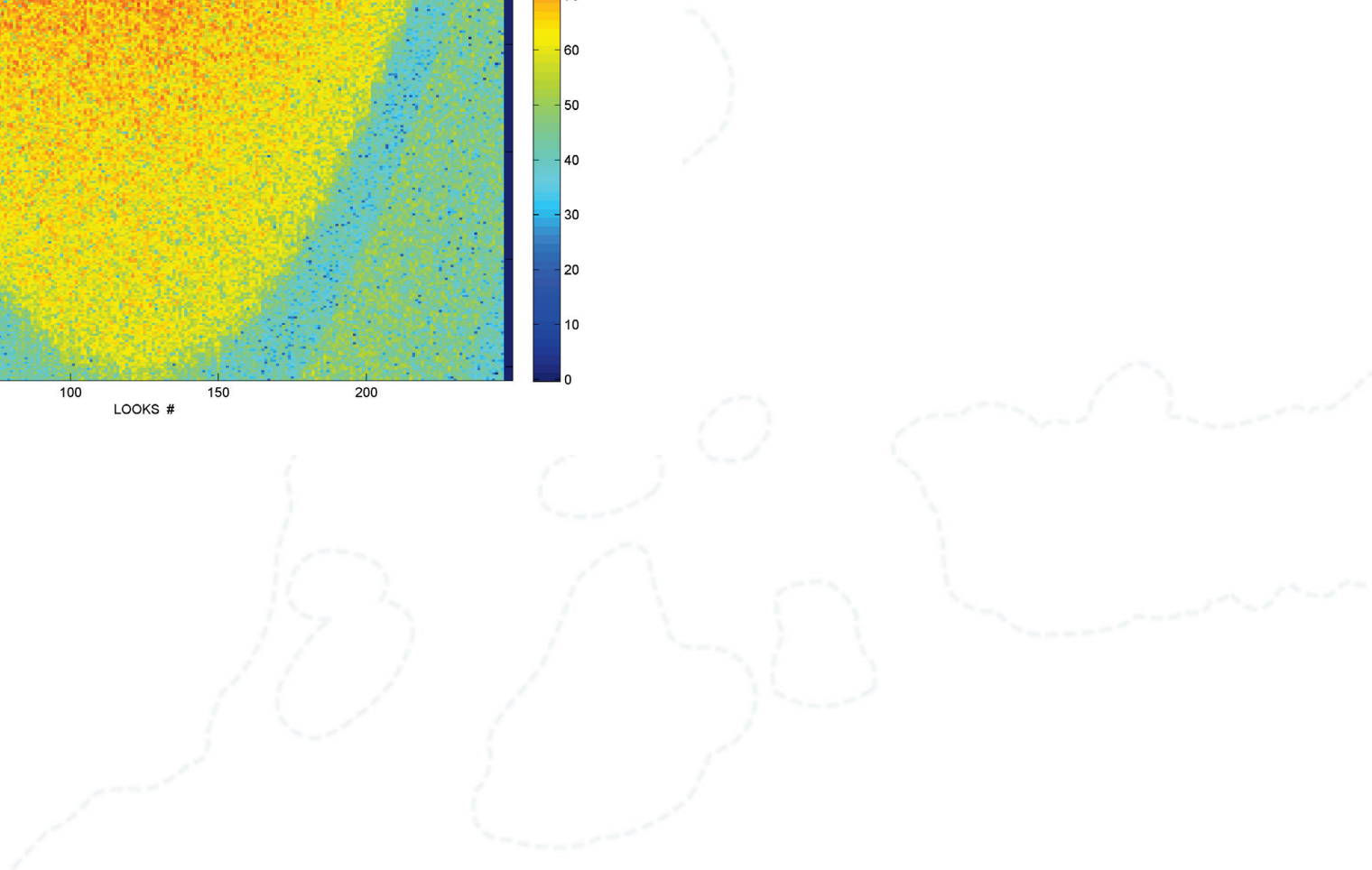
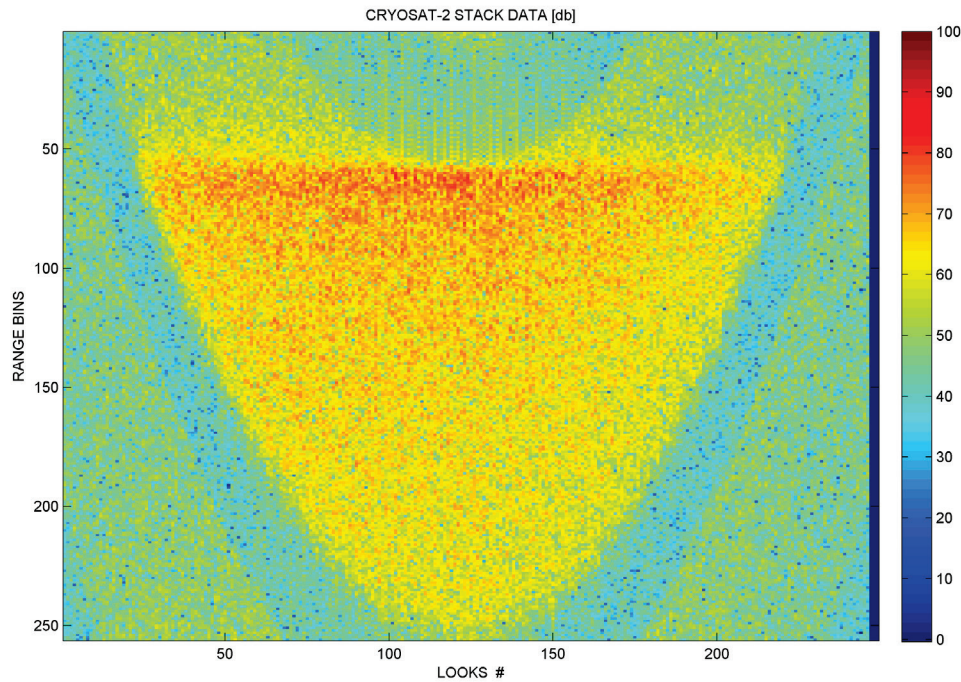
- Yes

- No

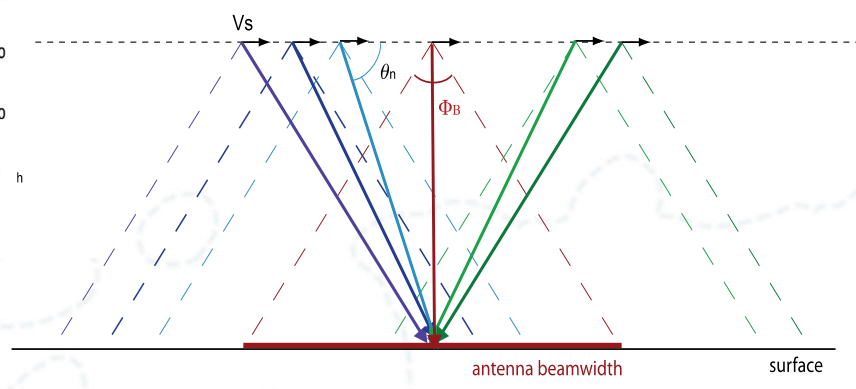
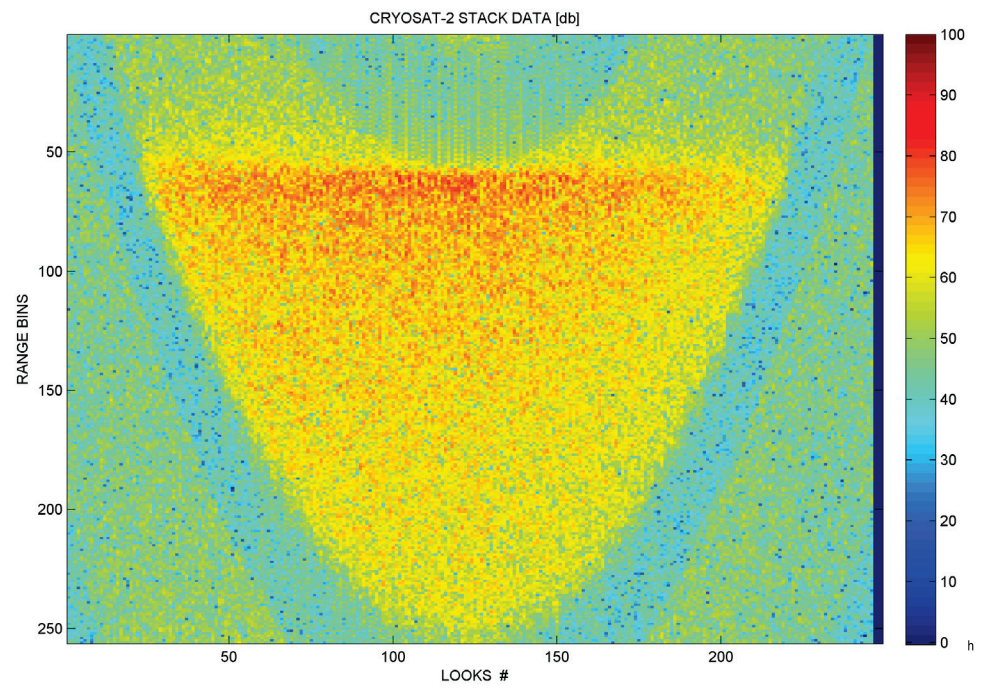
Flag to append Range Integrated  
Power (RIP) in the output netCDF  
data product

**Default option: NO**

So far, SAR users are starting to be familiar with FBR DATA or with L1b Multilooked Waveforms DATA but indeed a third type of data could be exploited: **the STACK DATA**

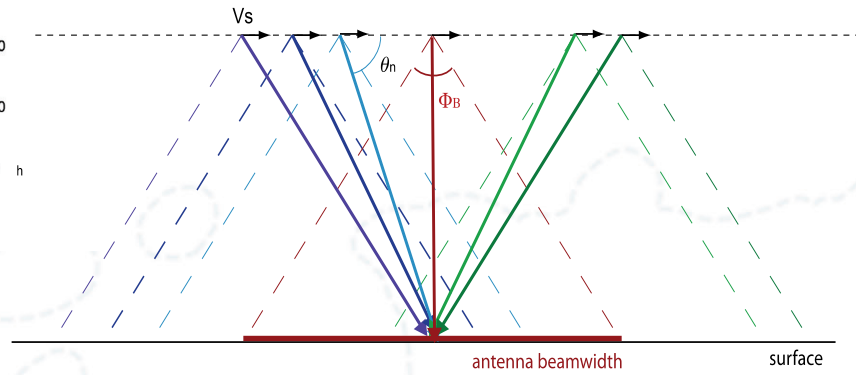
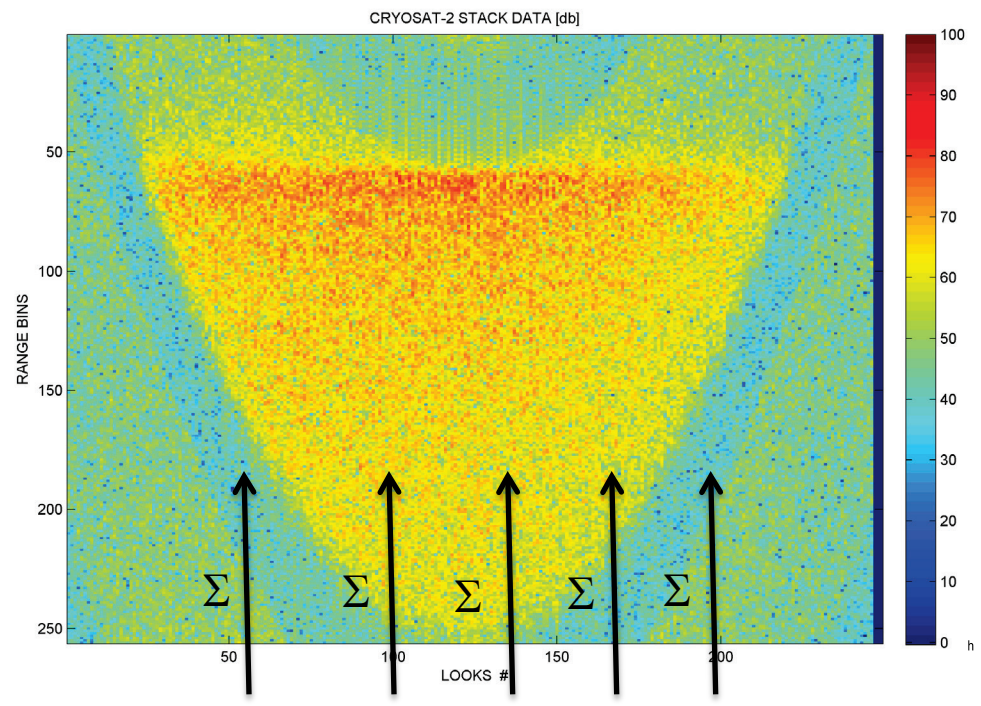


So far, SAR users are starting to be familiar with FBR DATA or with L1b Multilooked Waveforms DATA but indeed a third type of data could be exploited: **the STACK DATA**

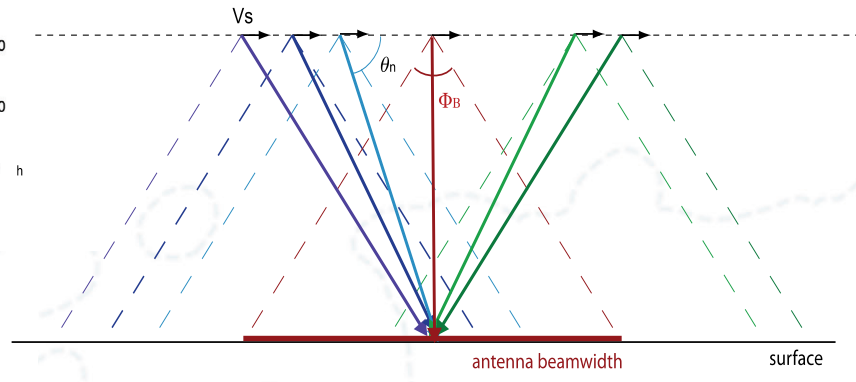
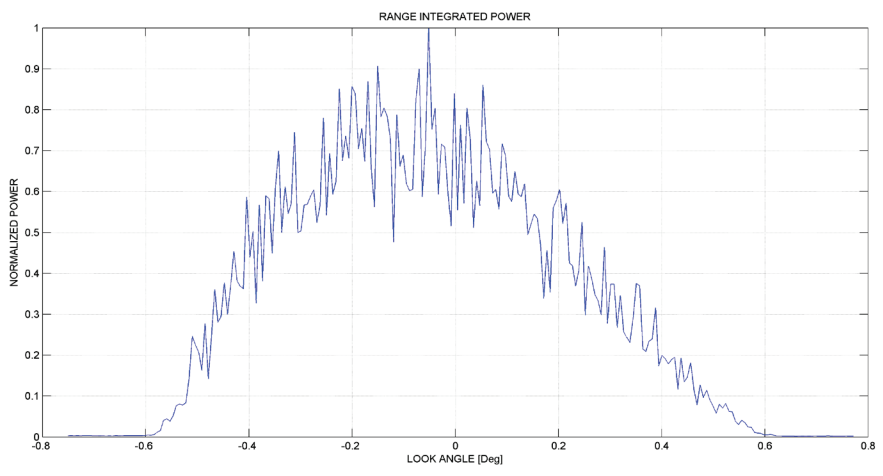
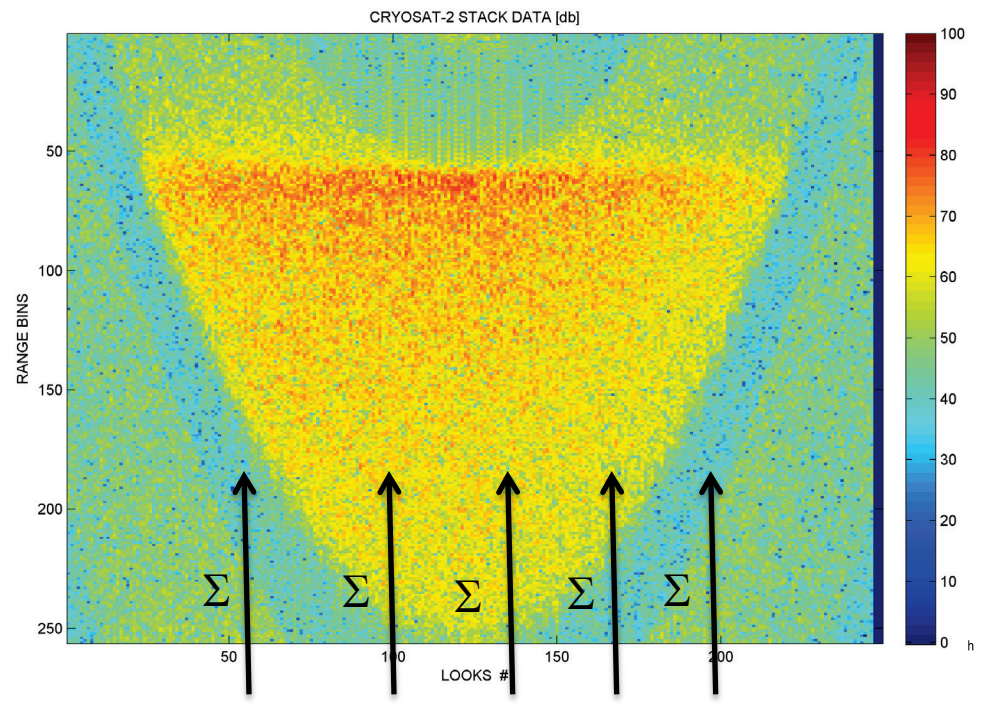




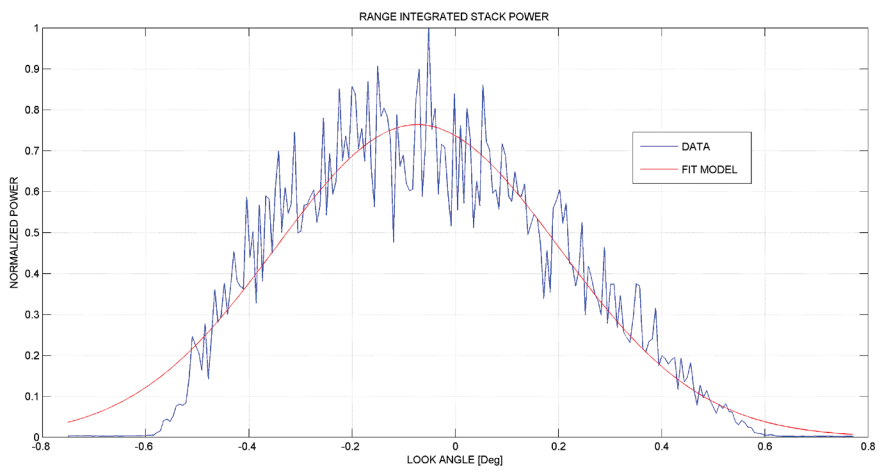
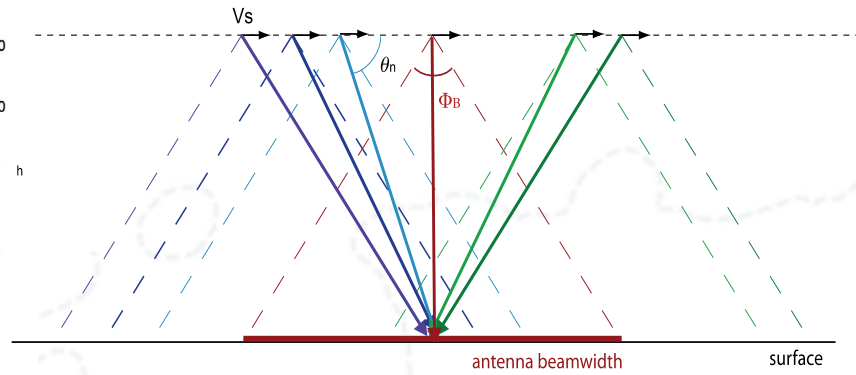
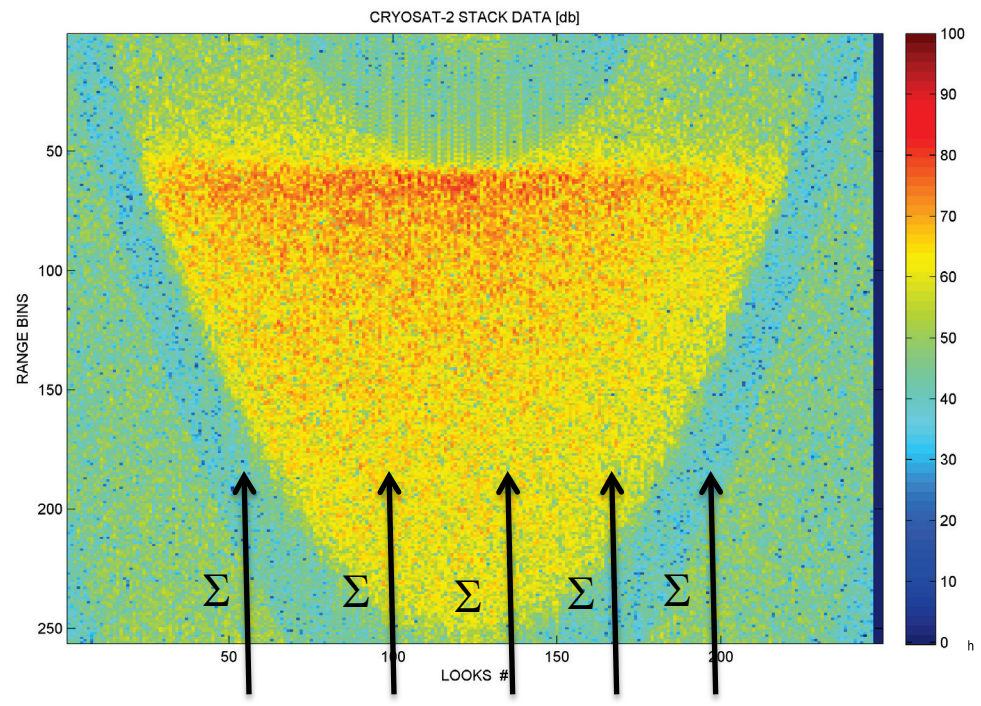
So far, SAR users are starting to be familiar with FBR DATA or with L1b Multilooked Waveforms DATA but indeed a third type of data could be exploited: **the STACK DATA**



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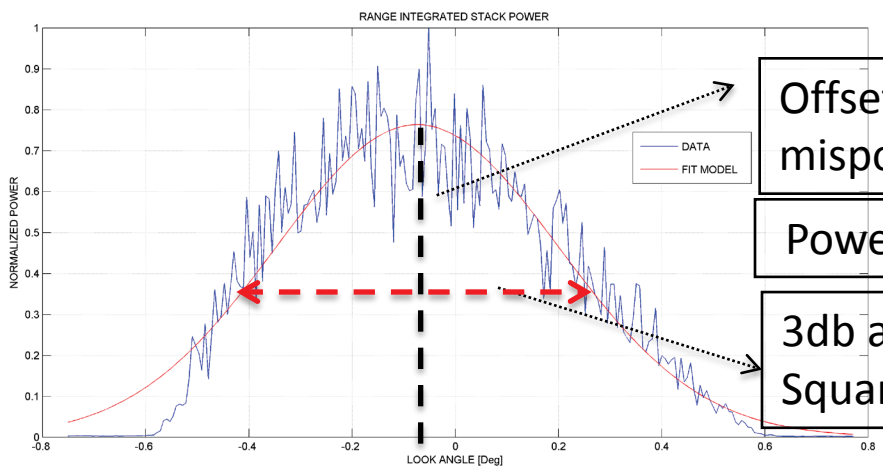
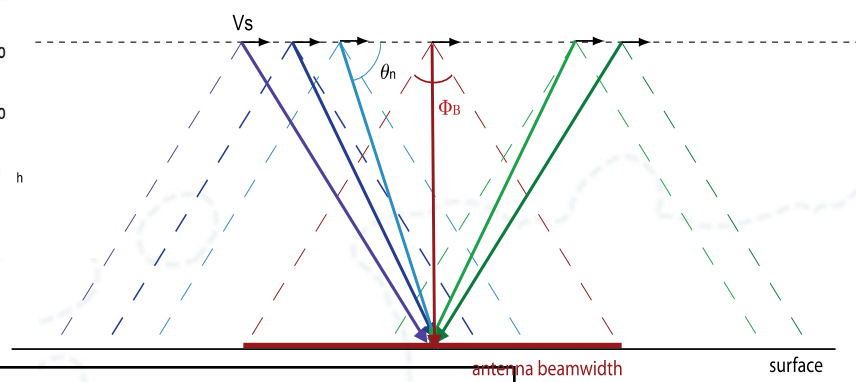
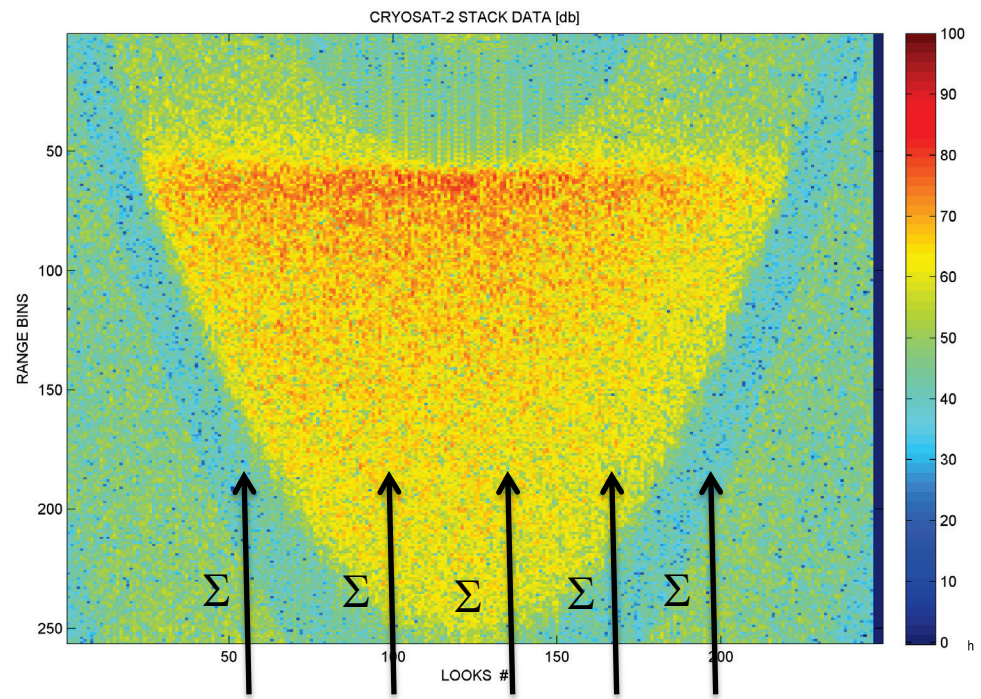


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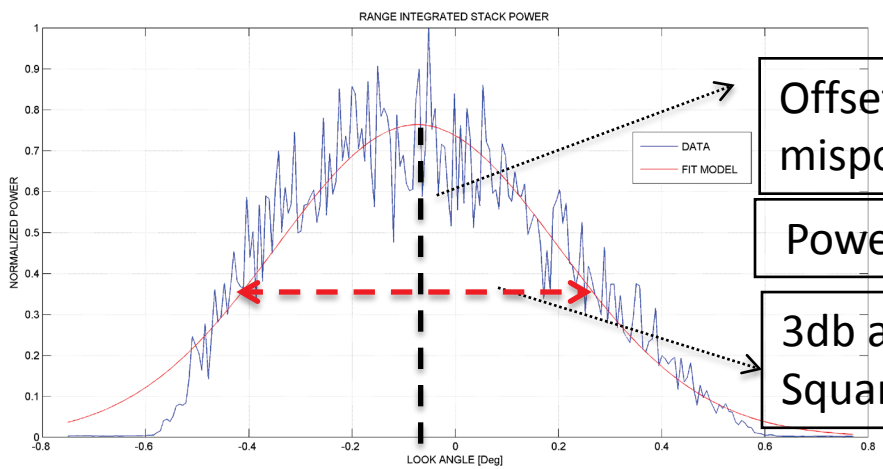


Offset depending on pitch mispointing

Power Distribution with look angle

3db aperture depending on sea surface Mean Square Slope

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Offset depending on pitch mispointing

Power Distribution with look angle

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# L2 Options – Single Look / Multi Look Model

Single-Look or Multi-Look Model

- Multi-Look
- Single-Look

Flag to set the application of the Model Multilooking (Single-Look or Multi-Look). Single-Look option is indicated for quick look operations while Multi-Look is the most accurate

**Default option:** Multilook



## Contacts & References:

- ❑ For any question, bugs and support, please contact us at:  
[altimetry.info@esa.int](mailto:altimetry.info@esa.int)
- ❑ For G-POD platform specific questions please contact:  
[eo-gpod@esa.int](mailto:eo-gpod@esa.int)
- ❑ Service Manual available at: <http://wiki.services.eoportal.org/tiki-index.php?page=GPOD+CryoSat-2+SARvatore+Software+Prototype+User+Manual>
- ❑ Service available at:  
[https://gpod.eo.esa.int/services/CRYOSAT\\_SAR/](https://gpod.eo.esa.int/services/CRYOSAT_SAR/)
- REF1: Guidelines for the SAR (Delay-Doppler) L1b Processing, ESA, 2013
- REF2: SAR Altimeter Backscattered Waveform Model (SAMOSA Model Paper), IEEE-TGARSS, in press