

isardSAT

The Sentinel-6  
(Jason-CS)  
Poseidon-4 GPP:

Processing  
description and  
results with ESA  
simulated Test  
Data delivered to  
users

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1. Sentinel-6/Jason-CS introduction: mission and instrument (P4)
2. Sentinel-6 P4 GPP
3. Validation of S6 P4 GPP
4. S6 P4 GPP data results with simulated data

→ Richard Francis talk this morning in Opening Plenary Session

- Sentinel-6 (Jason-CS) is an operational oceanography programme of two satellites that will ensure continuity to the Jason series of operational mission
- ESA is responsible for the Sentinel-6/Jason-CS Space Segment development along with Astrium GmbH as a prime contractor.
- Poseidon-4 radar altimeter has evolved from the altimeters on-board the Jason satellites (Poseidon-2 of Jason-1, Poseidon-3A of Jason-2 and Poseidon-3B of Jason-3).
- Poseidon-4 also inherits the Synthetic Aperture Radar (SAR) High Resolution Altimeter mode of CryoSat-2 SIRAL and Sentinel-3 SRAL now proven to reduce errors in elevation and SWH retrieval over ocean.

## Main innovations of Poseidon-4 (P4):

1. Includes improved **digital** and radio frequency **hardware**.
2. Includes open burst Ku-band pulse transmission (**interleaved** mode): performs a near continuous transmission of Ku-band pulses. *It will allow simultaneous processing of the measurements to obtain High Resolution along-track (HR or SAR) and Low Resolution along-track (LR or LRM) data.*
3. As previous satellite RA, the P-4 transmits **C-band** pulses in order to retrieve a correction for ionospheric path delay.
4. Implementation of On-board “Range Migration Correction” (**RMC**) processing in order to reduce the amount of data to download to ground

- Implications of main innovations of Poseidon-4 (P4):
  - 1. Digital HW:**

Sampling frequency= 395 MHz ( $\Delta r$  between samples=  $\sim 37.9$  cm),  
different from Bandwidth= 320 MHz ( $\Delta$ resolution=  $\sim 46.8$  cm).
  - 2. Interleaved:**

PRF  $\sim 9$  KHz      **Careful with Doppler ambiguities !**

PRF (or PRI) changes around the orbit.  
PRF constant in reception.

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1. **Digital HW:**

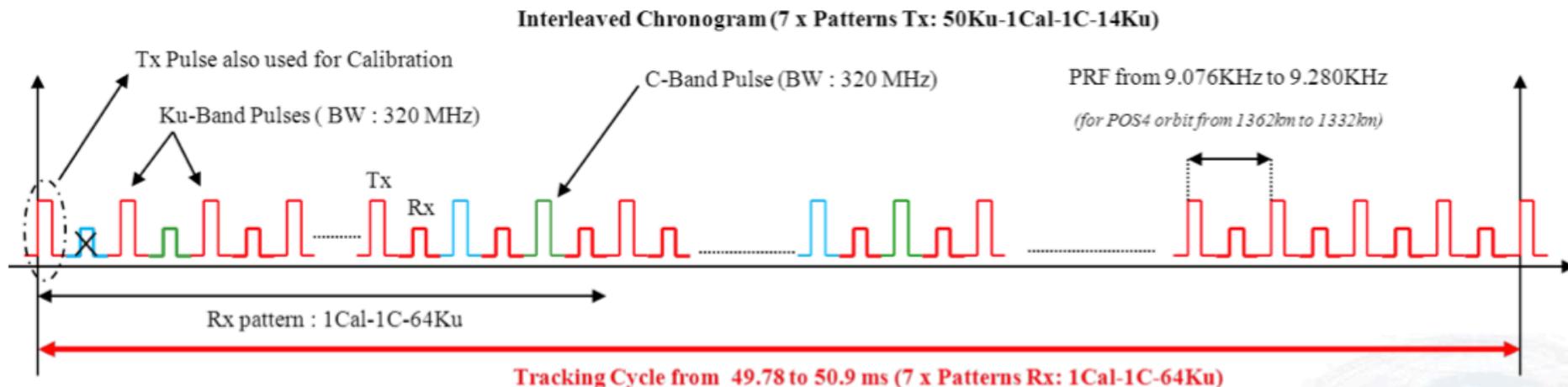
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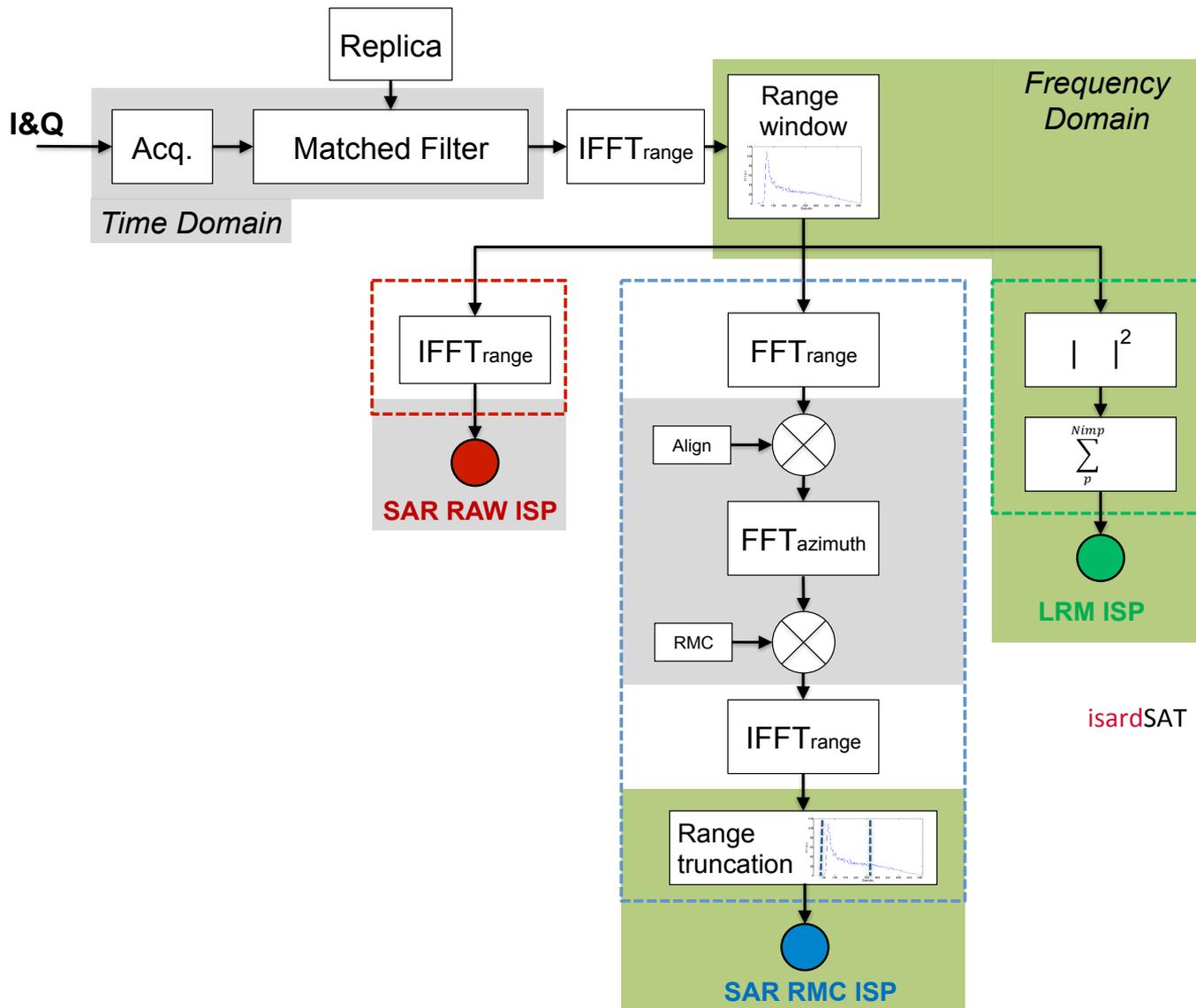


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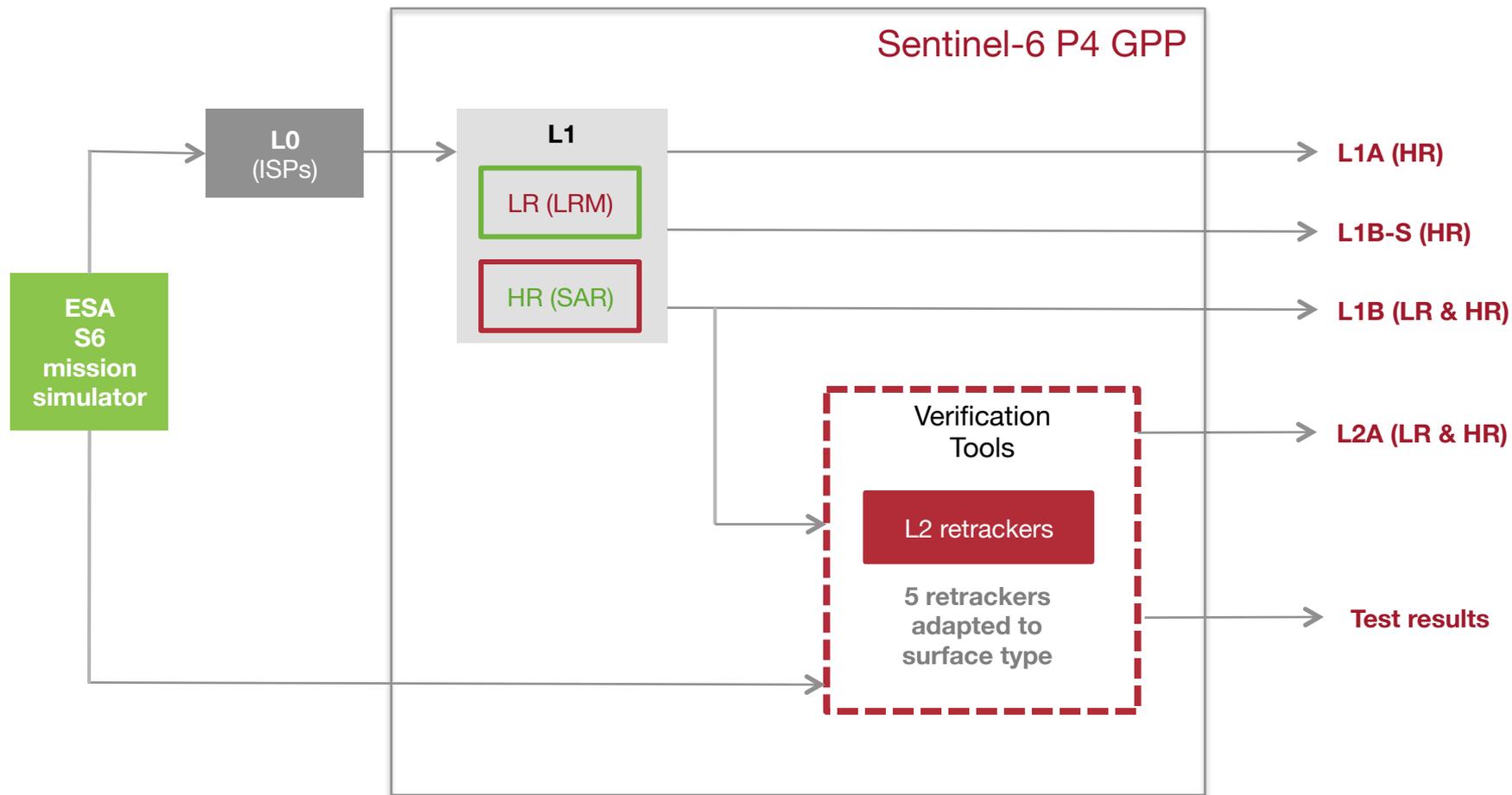
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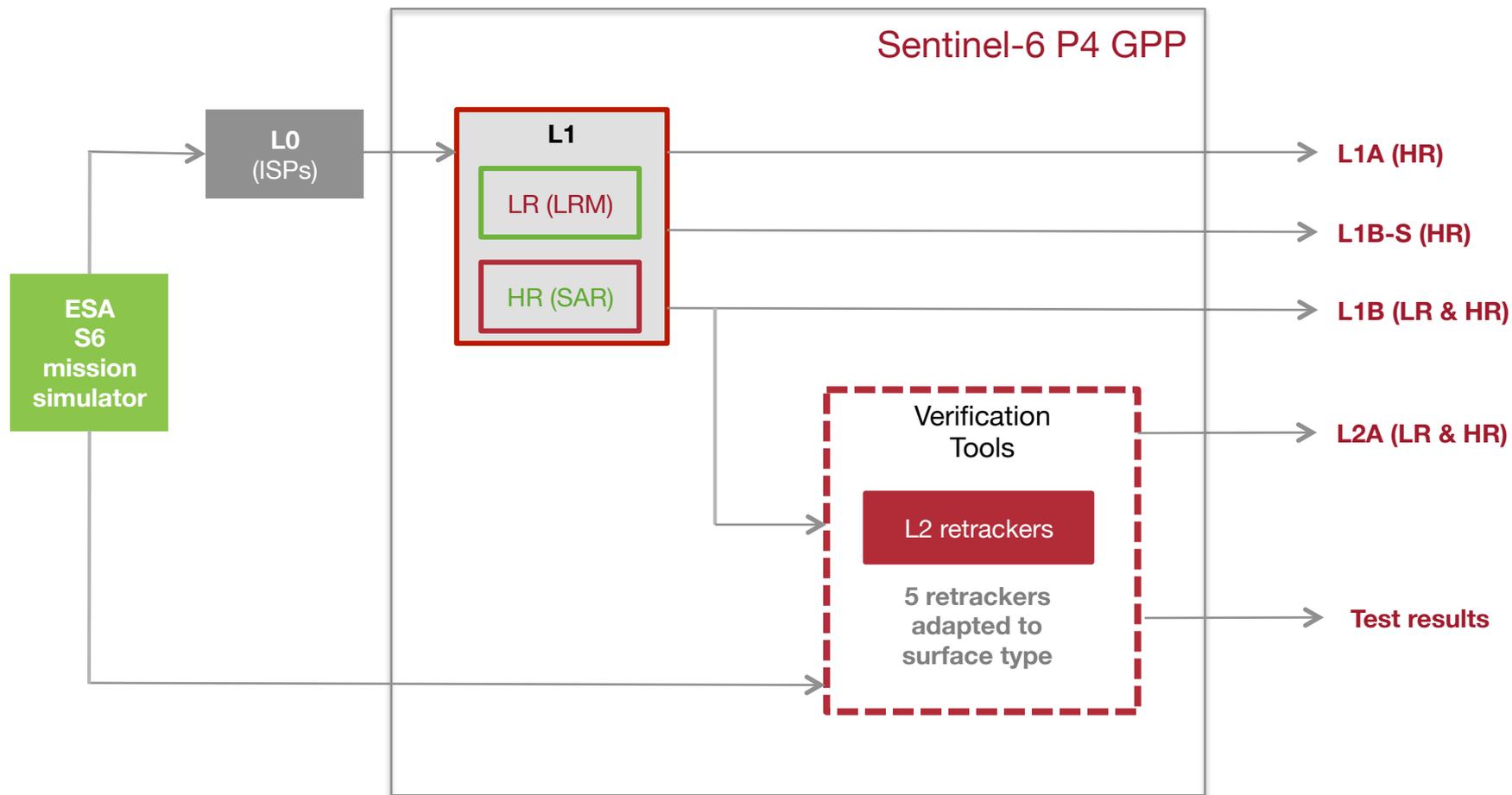
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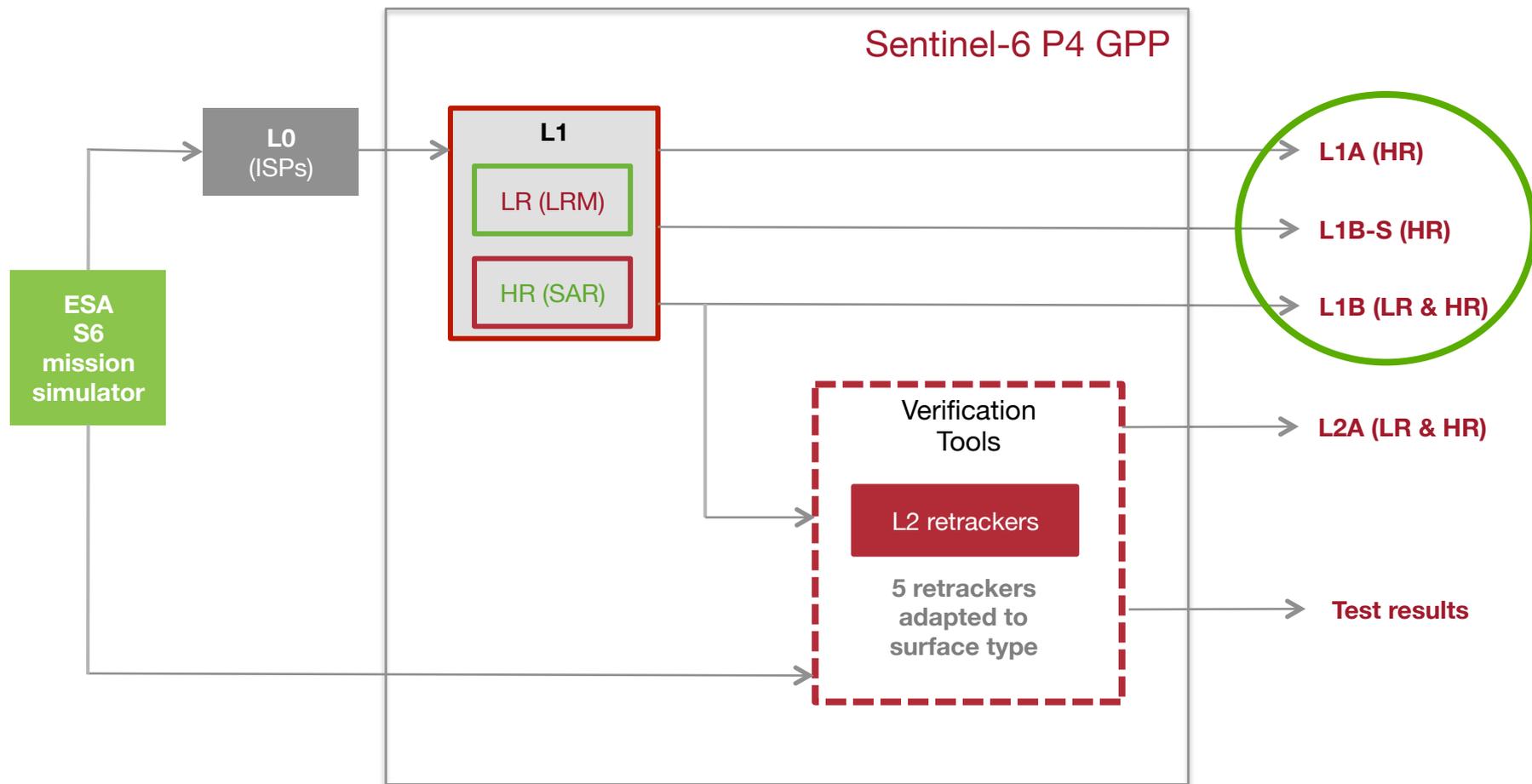
PRF (or PRI) changes around the orbit.  
PRF constant in reception.
  - 3. C-band** pulses also interleaved with Ku-band pulses.  
C-band at 5.41 GHz with Bandwidth= 320 MHz.
  - 4. RMC:** echo cut off (tail).

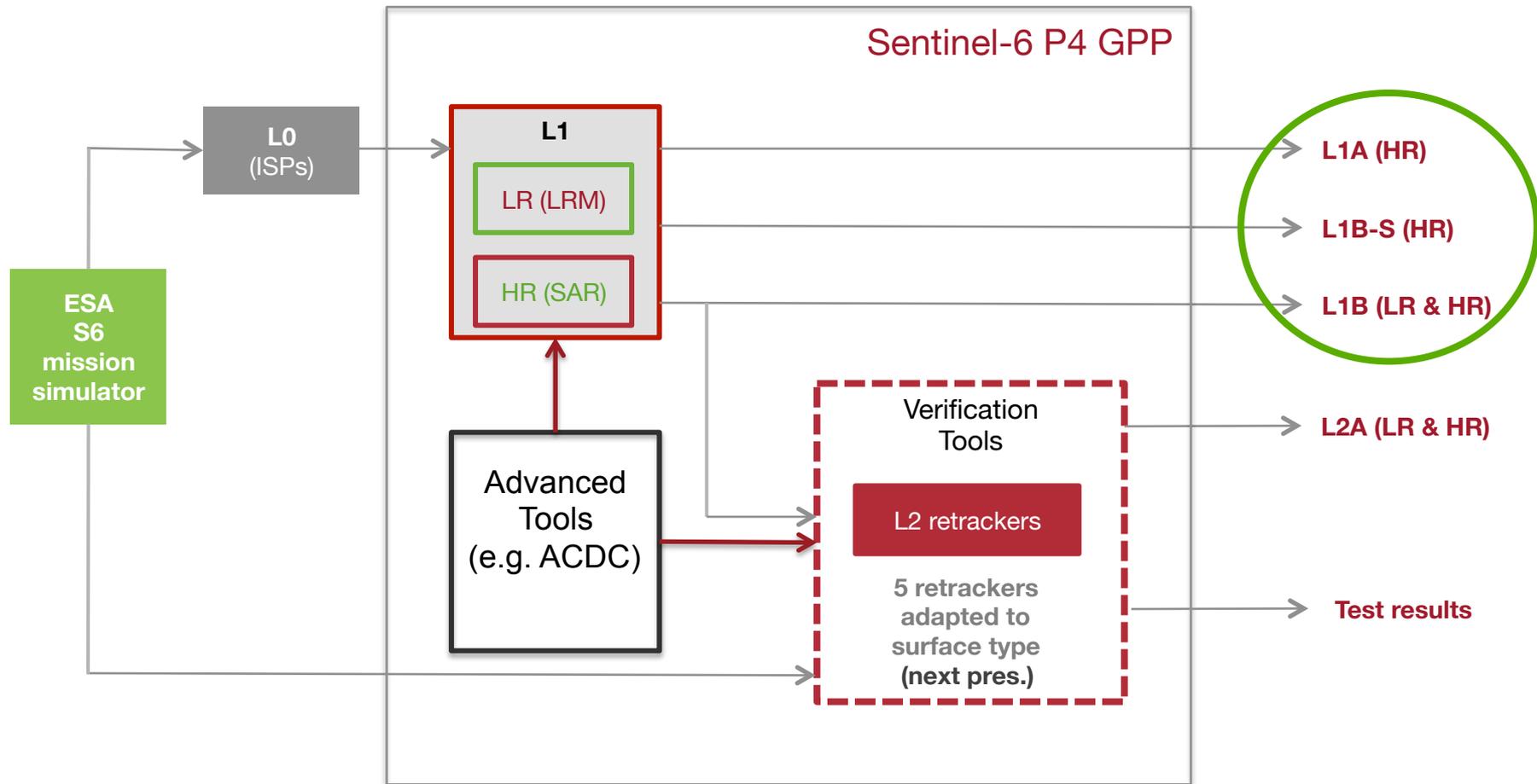


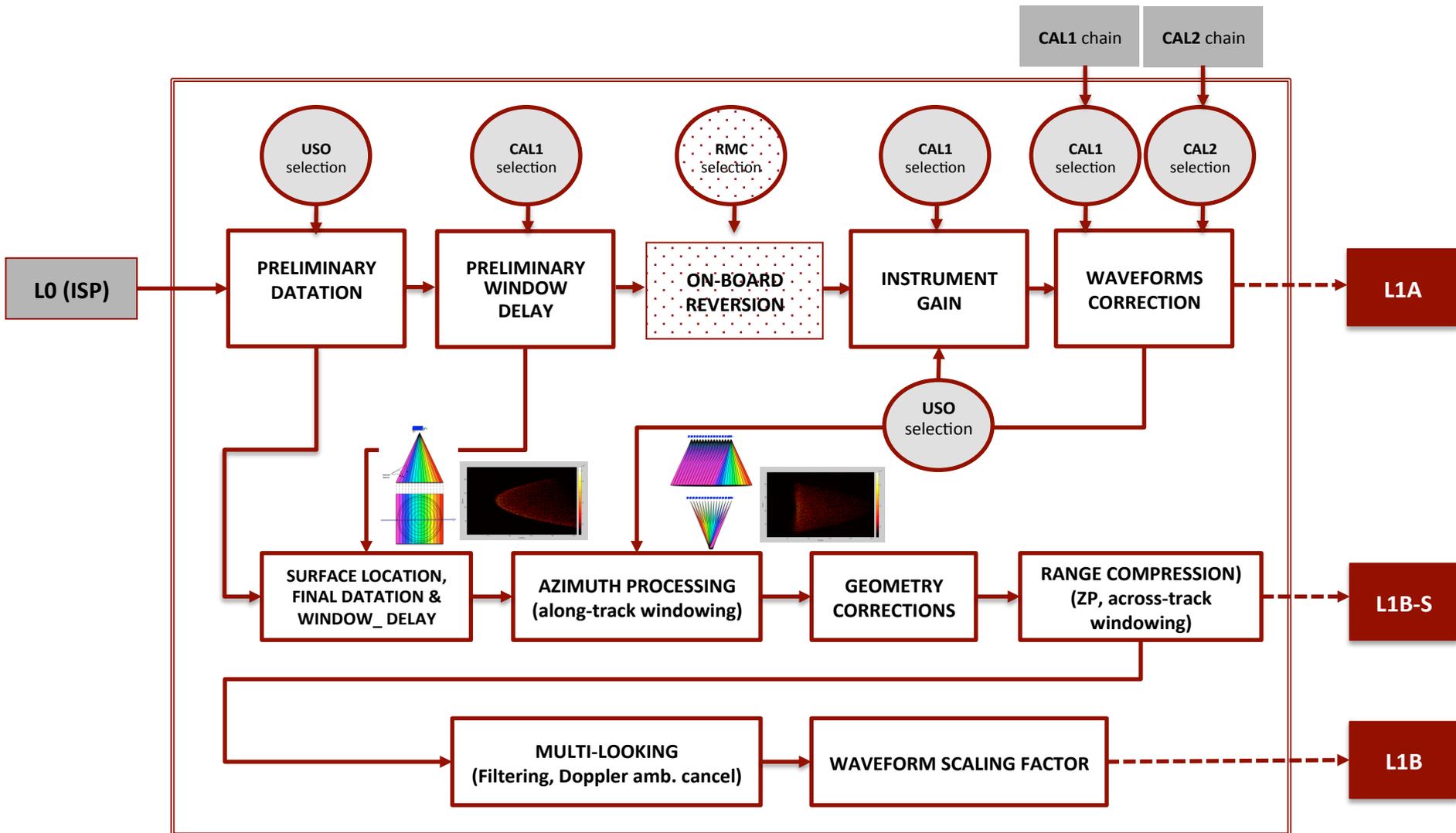
- isardSAT is developing the Ground Prototype Processor (GPP) for the Poseidon-4 under an ESA contract.
- This prototype processes all the chains starting from the Instrument Source Packets (ISPs), and up to the Level 1B (calibrated pulse-width limited or multi-looked SAR data).
- The prototype has been **verified**:
  - Before being adapted to interleaved: using (1) simulated data generated by the Sentinel-6/Jason-CS mission performance simulator and (2) using in-orbit CryoSat data adapted in format to S6 P4.
  - After adapted to interleaved and digital HW: using simulated data generated by the ESA/ESTEC Sentinel-6/Jason-CS mission performance simulator.
- These data have been provided by ESA/ESTEC.



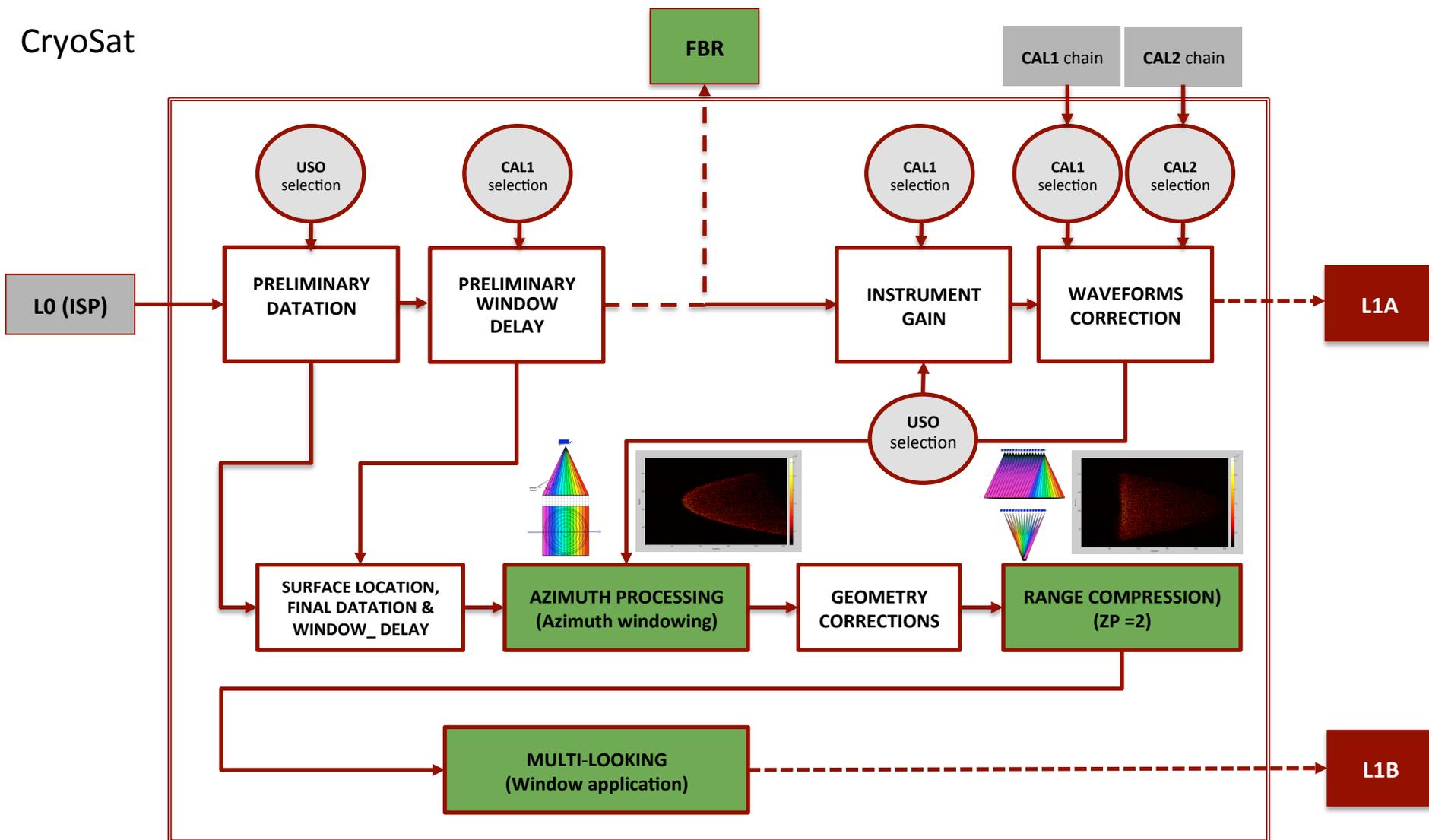


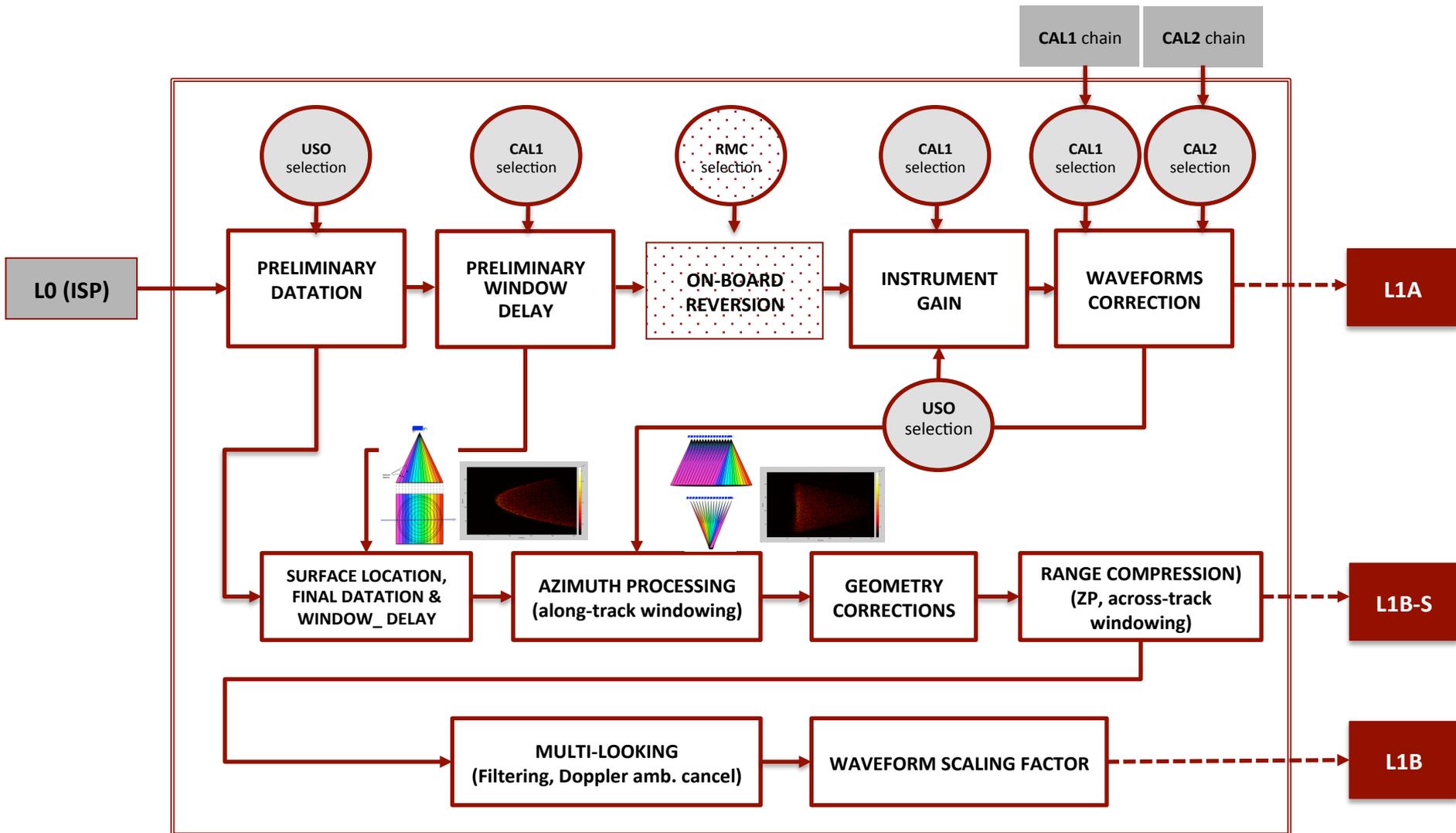




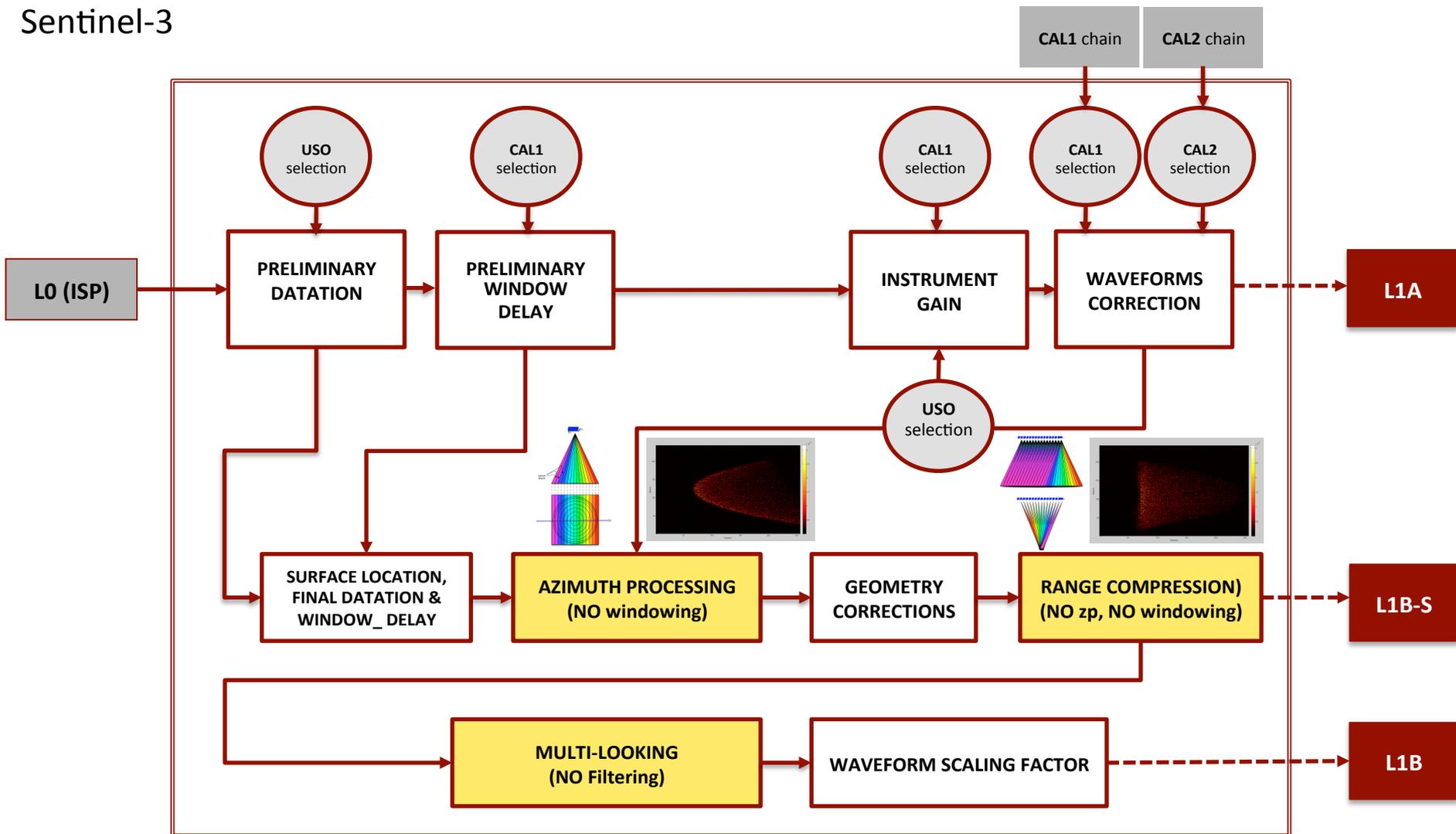


CryoSat





Sentinel-3



- Before adapting GPP to new configuration of Sentinel-6:
  - Validation performed with CryoSat adapted data and simulated data from adapted CRYMPS
- After adapting GPP to new configuration of Sentinel-6:
  - Validation performed with simulated data from ESTEC S6 P4 mission performance simulator
  - Different scenarios:
    - Ocean
    - Point targets
    - Specular surfaces

Data to users:

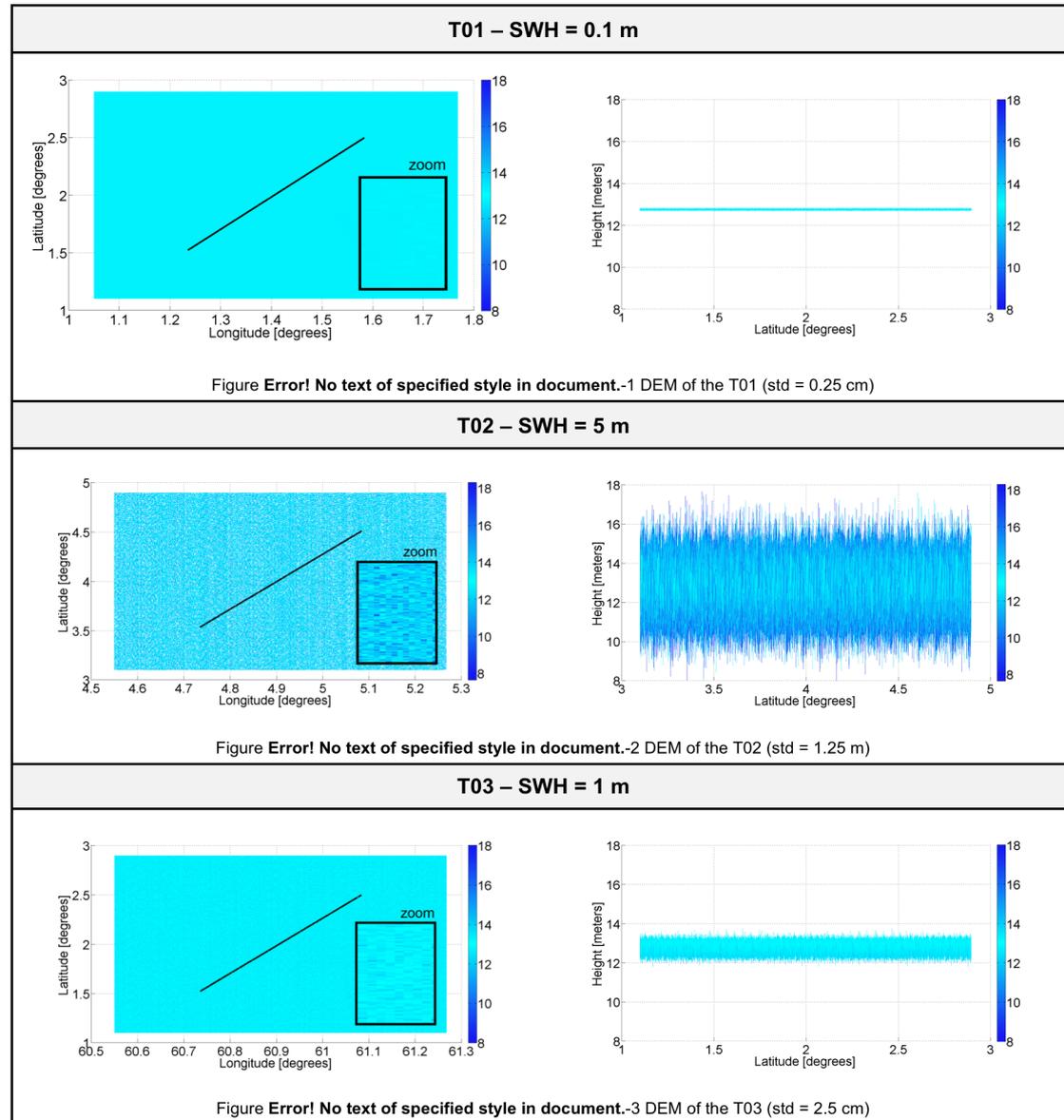
- <ftp.eopp.esa.int>
- sentinel6-science
- yot7+scart

• 3 ocean scenarios:

– SWH:

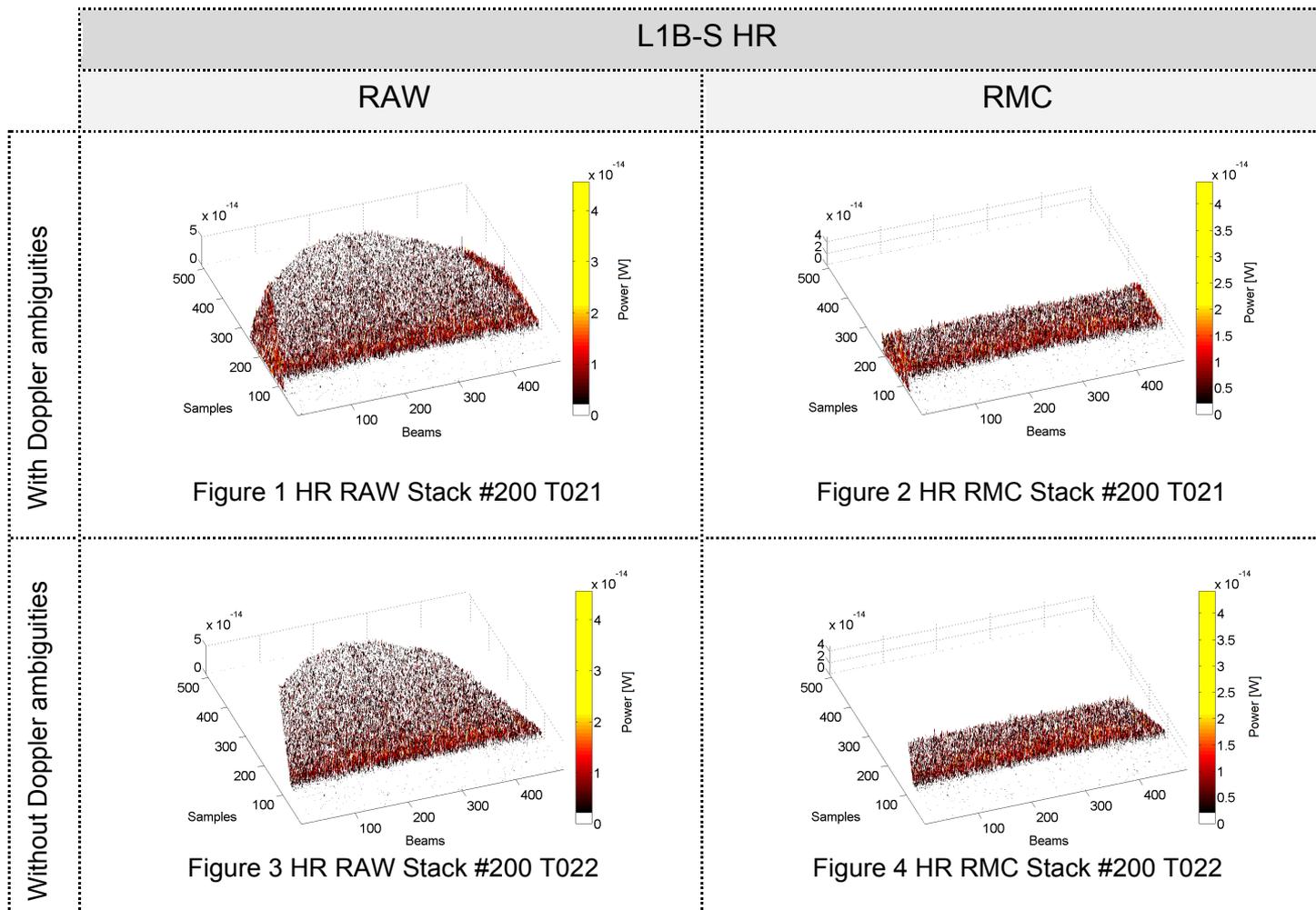
- low SWH = 0.1 m
- mid SWH = 1 m
- high SWH = 5 m

– Same elevation

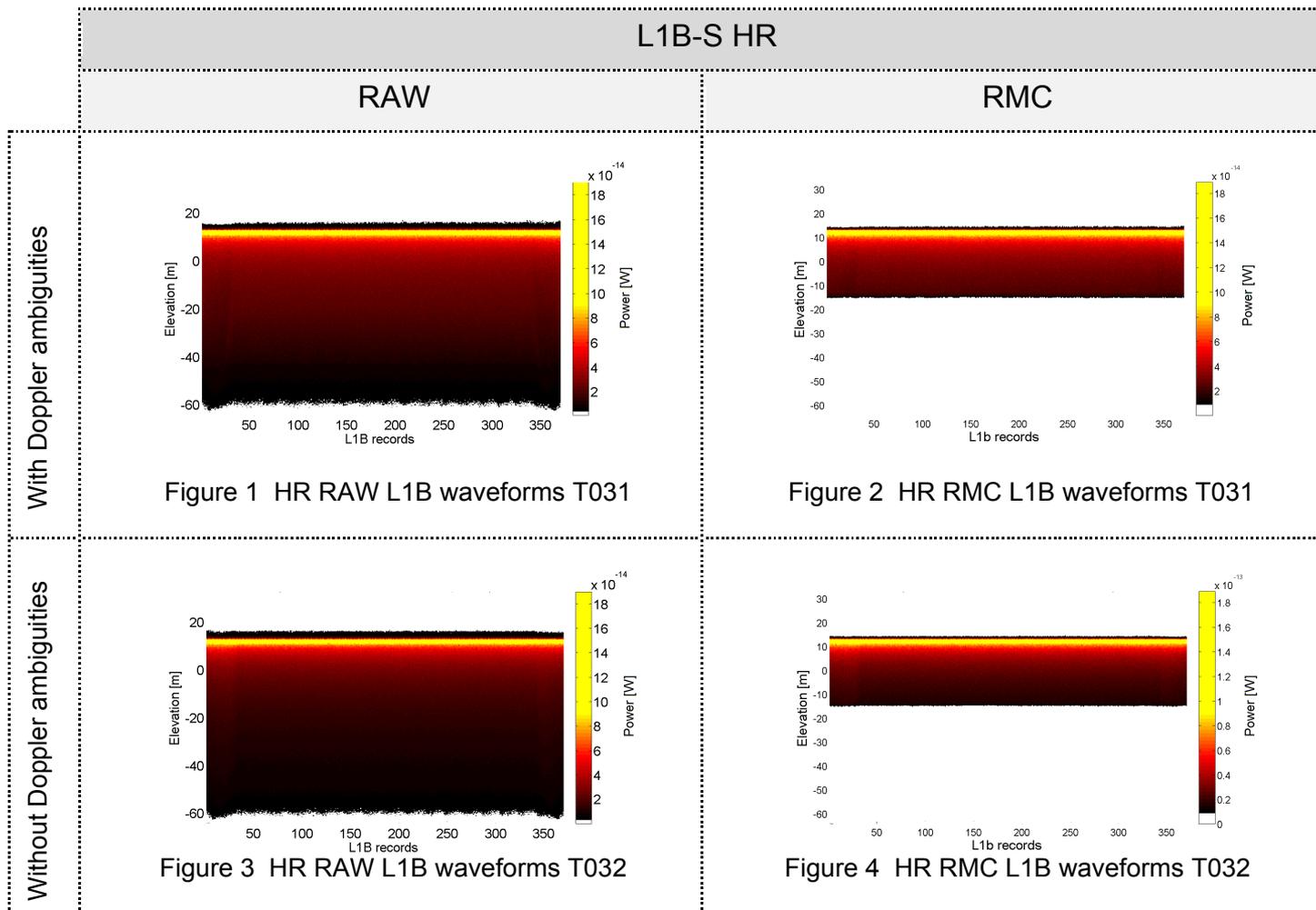


- Data provided:
  - 1 x LR;
  - 2 x L1A: one for each ISP\_RAW and ISP\_RMC;
  - 4 x L1B-S HR: two different processing configurations for each ISP\_RAW and ISP\_RMC;
  - 4 x L1B HR: two different processing configurations for each ISP\_RAW and ISP\_RMC.
- The 2 different configurations:
  - Applying Doppler Ambiguity Mask (DAM) to remove Doppler ambiguities;
  - Not applying the DAM.

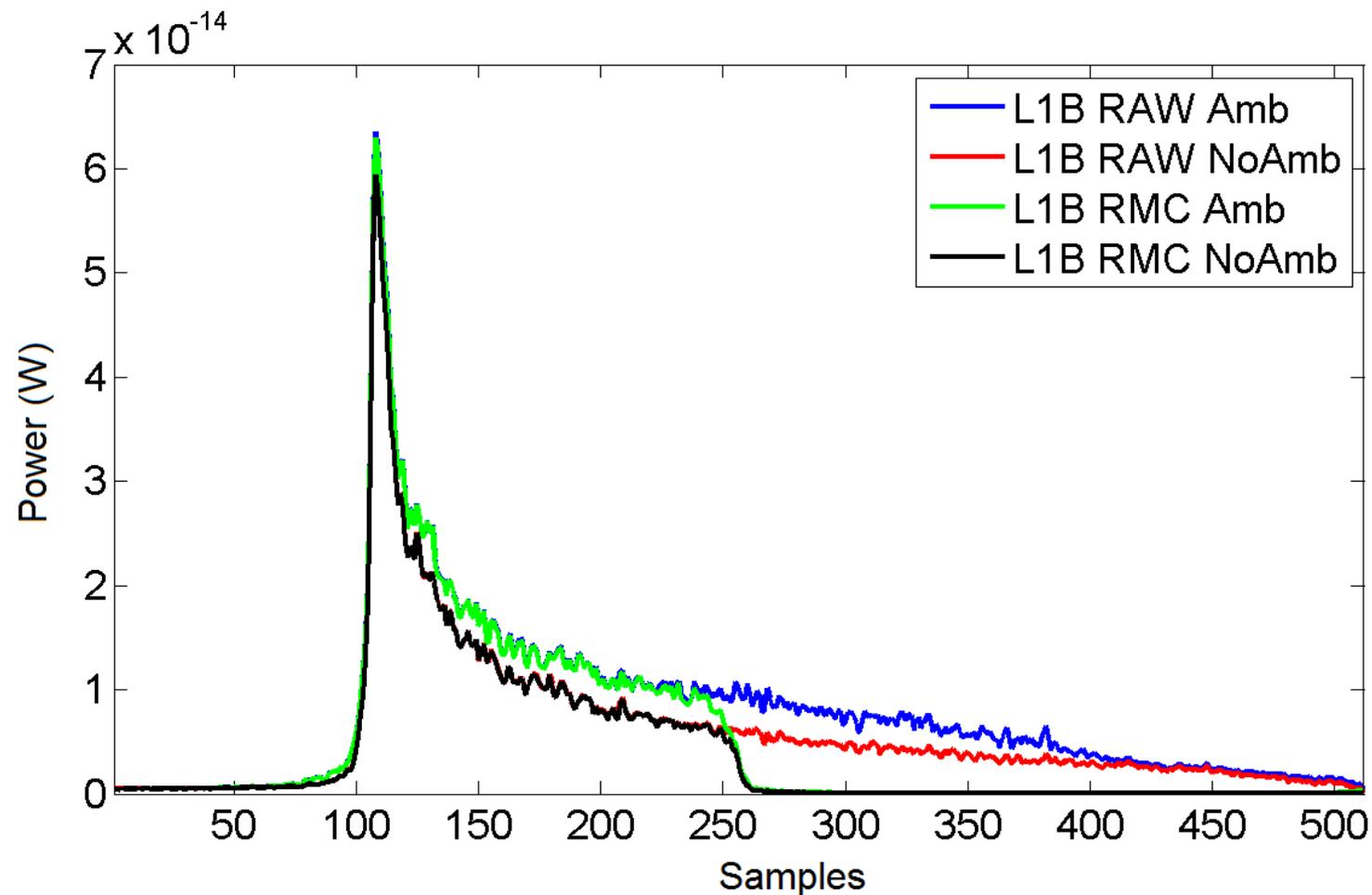
Mid SWH, HR (RAW&RMC) L1B-S stacks, two configurations



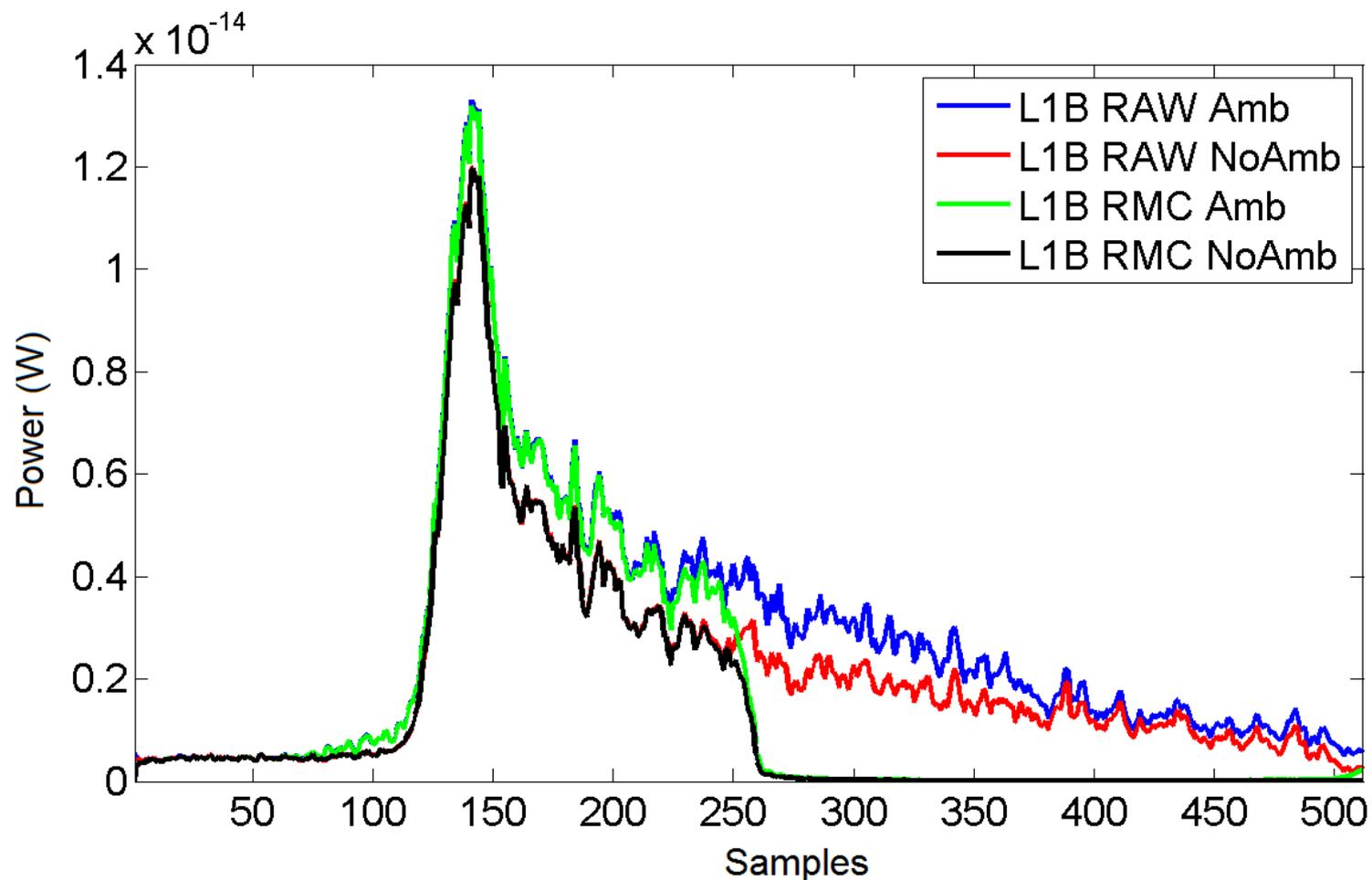
Mid SWH, HR (RAW&RMC) L1B-S stacks, two configurations



Mid SWH, HR (RAW&RMC) L1B waveforms, two configurations

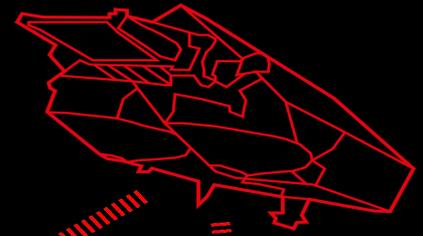


High SWH, HR (RAW&RMC) L1B waveforms, two configurations



- Geophysical retrieval results ... now.

# isardSAT<sup>®</sup>



Thank You!

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