

Sentinel-6 (Jason-CS) Poseidon4: Test data examples for Users

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See related presentation:
OSTST-2014, Instrument Processing: Measurement and retracking (SAR and LRM):
The Sentinel-6 (Jason-CS) Poseidon-4 Ground Prototype Processor: Processing Description and Results with ESA simulated Test Data delivered to users.

Data available at:
FTP server: ftp.eopp.esa.int
Login: sentinel6-science
Password: on request

Sentinel-6 (Jason-CS) will fulfill the objectives of continuing the long-term retrieval of global sea level rise/variability in addition to providing NRT geophysical parameter data, such as wind speed, to operational users. It will follow ocean surface topography reference missions since 1992 and provide improved geophysical parameter retrievals as a result of the use of new technology combined with experience of ESA/CryoSat data over ocean.

The Poseidon-4 altimeter will operate in the so-called 'interleaved mode' that provides simultaneously pulse-limited waveforms (computed on-board and in line with previous reference missions) and Full Rate ~9KHz RAW waveforms that allow SAR processing on-ground. In addition, an on-board processing has been added in order to reduce RAW data volume: the Range Migration Correction (RMC) processing, which will be the baseline data for open ocean. As a result, the Poseidon-4 is capable of generating 3 different data streams: LRM, SAR and RMC.

ESA developed an instrument simulator capable of generating Poseidon-4 instrument source packets in the 3 above modes. The simulator will evolve with the instrument development.

The Poseidon-4 GPP has the functionality of processing the P4 instrument source packets (ISPs) up to L1B. The GPP is currently composed of 2 chains:

- The Low Resolution Chain, in order to process the LRM data and providing pulse-limited data.
- The High Resolution Chain, in order to process RAW and RMC data with SAR processing that allow increasing the along-track resolution up to ~300m.

The output of the P4 GPP are the following 4 L1 netCDF-4 products:

1. **L1A**: Geo-located bursts of ~9 KHz Ku echoes with all calibrations applied.
2. **L1B-S HR**: SAR-processed complex echoes, arranged in stacks prior to echo multi-look.
3. **L1B HR**: Fully calibrated, high resolution multi-looked power echoes.
4. **L1B LR**: Fully calibrated pulse limited power echoes.

On 9 October 2014, ESA released 3 P4 simulations over ocean, processed by the P4 GPP in the 4 L1 products specified above. This poster provides an overview of such TDS.

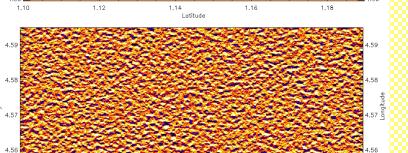


Digital Elevation Models

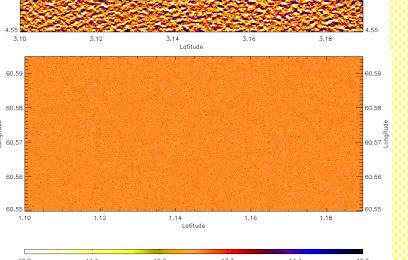
T01:
0.1 m
SWH



T02:
5 m
SWH

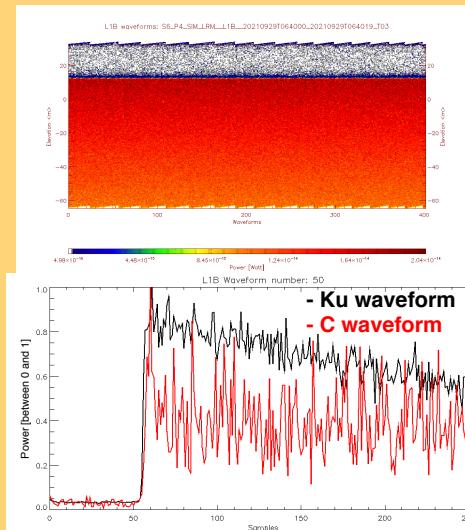


T03:
1 m
SWH

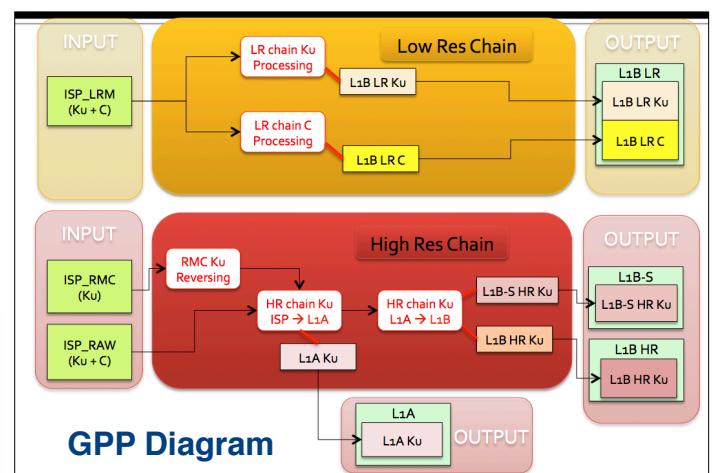


Low Resolution Chain (T03)

L1B LR Ku waveforms

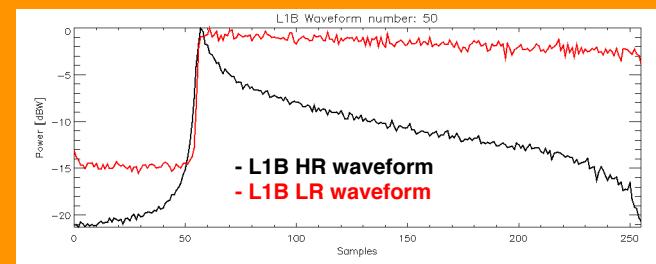


GPP Diagram



High vs. Low Resolution Chain (T03)

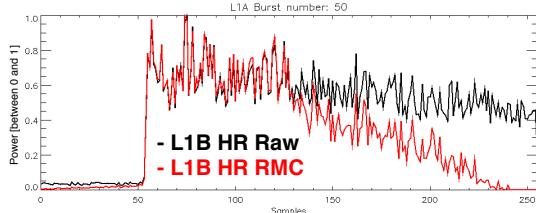
Comparison between L1B HR and L1B LR (ku) waveforms



High Resolution Chain (T03)

L1A (RAW)

L1A Product:
It contains fully calibrated waveforms as I&Q samples in the **time domain**. In these plots, range FFT and power extraction have been performed to the waveforms; moreover each burst has been averaged to reduce the speckle.

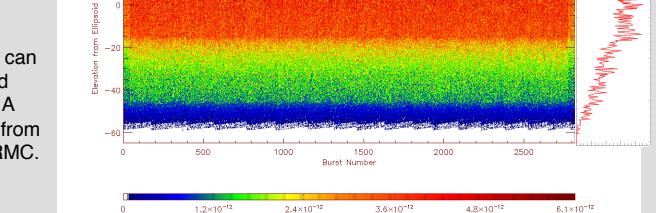


L1A (RMC)

L1A (RMC)

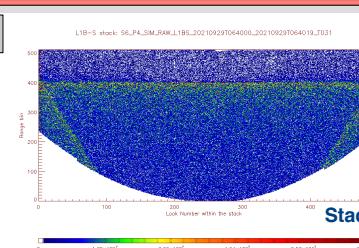
TM Burst-Averaged waveforms: S6_P4_SIM_RMC_L1A_20210929T064000_20210929T064019_T03

Differences can be observed between L1A waveforms from RAW and RMC.



L1B-S (RAW)

L1B-S Product:
It contains the 'stack': the collection of all the fully calibrated and aligned looks relative to a surface locations. Waveforms are given as I&Q samples in the **frequency domain**, with an oversampling factor of 2 (optional). In these plots, power extraction has been performed to the waveforms.



Doppler Ambiguity NOT removed

Stack 0-Mask

It follows the slant range correction

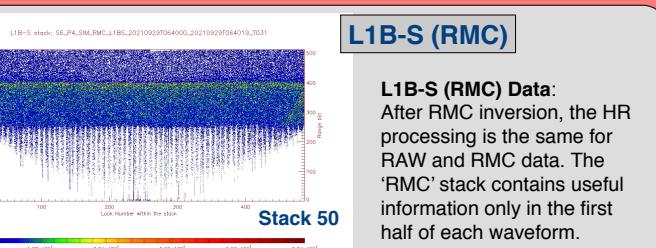
Doppler Ambiguity Removed

Stack 0-Mask

It follows the slant range correction and Doppler ambiguity

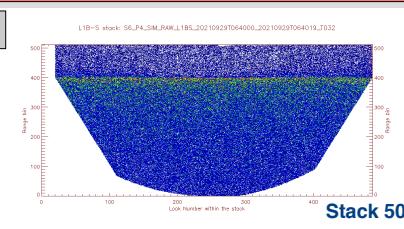
L1B-S (RMC)

L1B-S (RMC) Data:
After RMC inversion, the HR processing is the same for RAW and RMC data. The 'RMC' stack contains useful information only in the first half of each waveform.



L1B-S (RAW)

Doppler Ambiguity:
Doppler Ambiguity can be estimated from the leading edge under the hypothesis of flat surface (ocean-like). The GPP computes the Doppler Ambiguity for each stack and then removes it with the use of a 0-Mask, given in the product.



Doppler Ambiguity Removed

Stack 0-Mask

It follows the slant range correction and Doppler ambiguity

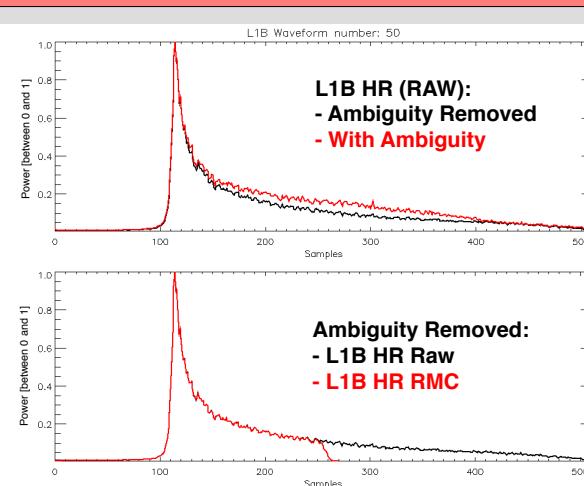
L1B-S (RMC)

Doppler Ambiguity:
Doppler Ambiguity mask is the same for RAW and RMC data. However, less RMC looks are affected by ambiguity, due to their reduced range window size.

L1B HR (RAW)

Doppler Ambiguity removed

The L1B HR waveform is obtained averaging all the available looks (~450-500) in the stack, after power extraction. The L1B HR product contains all the necessary info in order to model each waveform.



Doppler Ambiguity removed

L1B HR (RMC)

The L1B HR waveform from RMC contains a steep discontinuity to 0 toward the middle. This is the effect of the on-board RMC. The first half of the waveform is equivalent between RAW and RMC.

