OSTST 2017

Splinter Introduction: Instrument Processing – Measurement and Retracking (SAR and LRM)

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Tuesday, October 24, 2017

OSTST 2017: Instrument Processing

Start	Title
9:00	Progress on Retracked TOPEX Data for the Climate Data Record
9:15	Evaluating methods to improve the performance of Sentinel-3 SRAL SAR Altimetry in the Coastal and Open Ocean- The SCOOP Project
9:30	Investigation of SWH bias in SAR Altimetry mode
9:45	New stacking method for removing the SAR sensitivity to swell
10:00	Pulse-to-Pulse Correlation Effects on high PRF Low Resolution Mode Altimeters
10:15	Discussion
11:00	Convergent solutions for retracking conventional and Delay Doppler altimeter echoes
11:15	Along-Track Zero Padding for the Processing of Unfocused SAR Altimetry Waveforms
11:30	Covariant errors in ocean retrackers evaluated using along-track cross-spectra
11:45	Delay-Doppler Processing of altimetric SAR data over open ocean: precision evaluation of different algorithms
12:00	ALES+: Adapting a homogenous ocean retracker for satellite altimetry to sea ice leads, coastal and inland waters.
10:15	Discussion
Posters	Sentinel-6/Poseidon-4 altimeter end-to-end simulator to assess the global mission performances
	CryoSat SAR/SARin L1B products: BaselineC assessment and improvements towards BaselineD
	CryoSat/SIRAL Cal1 Calibration Orbits
	S6 P4 GPP: The Sentinel-6 Poseidon-4 Ground Processor Prototype. New simulation results.

OSTST 2017 Instrument Processing Call

- Understanding the differences between Ka and Ku band backscatter, penetration, volume scattering, rain effects, etc.
- Understanding, exploiting, or mitigating correlations in high-rate (20, 40, or 80 Hz) geophysical retrievals, to detect internal waves, reduce correlated noise in the spectral bump, or improve the precision and resolution.
- Understanding or improving multi-mission inter-calibration issues stemming from the individual performance of various altimeters and retracking algorithms.
- Understanding retracker biases and correlated errors as they affect sea state bias models.
- *Understanding the sensitivity, if any, of SAR processing to the direction of winds and waves.
- Specialized algorithms for particular applications (coastal zone, leads in sea ice, inland water, internal wave detectors, etc.)
- What innovative things can we do with stack files, and how can they best be exploited?
- Does fully-focused processing add significant value? Is there some in-between hybrid processing that optimizes the mix of coherent and incoherent processing?
- *Are there concerns about inter-calibration between LRM and SAR altimetry, and can these be investigated empirically with existing data, or will this have to wait for the Sentinel-6/Jason-CS mission?
- What can simulations and empirical studies with existing data tell us about algorithm design or optimal exploitation of future missions such as S-6/J-CS?
- What additional data elements should be added to data structures to enhance the accuracy or utility of the data?
- How shall we exploit or mitigate heterogeneous ocean backscatter within the field of view of the altimeter, for example to detect internal waves, manage sigma-0 blooms or very low SWH events, edit rain events, etc.? Are the answers different for LRM and for SAR?
- Are the sensitivities to mispointing different in LRM and SAR, and what is the best practice for exploiting / mitigating these?
- What LRM or SAR algorithm improvements are available and what is gained by them?

OSTST 2017 Key Points from Project Scientists

- 1 – Are our cal/val methods sufficient to verify the Jason-CS/Sentinel-6 global and regional mean sea level stability requirements?
- 2 – Considering the possibility of switching on the redundant altimeter on JCS/S6 during the cal/val phase with Jason-3. If feasible, what is the number of cycles that the redundant altimeter should operate?
- *3 – Alternative processing approaches such as fully-focused SAR processing are emerging. Will the current Sentinel-3 and Jason-CS/Sentinel-6 systems allow for novel processing approaches to be fully exploited?
- 4 – What would be the impact of descoping MLE3 fields in the baseline for JCS/S6 products (except for sigma0)?
- 5 – Would increasing the frequency of the Jason-3 AMR cold sky calibrations improve the long term stability?
- *6 – What are the open issues that affect the continuity between LRM and SAR modes from SWH, roughness, swell and their impacts on SSH?
- 7 – What areas should S6/JCS RAW SAR data (non-RMC) be collected (acquisition mask)?

OSTST 2016: Main Themes & Major Topics

- Jason-3 instrument performance is good
- Jason-6 optimal waveform averaging has been studied
- TOPEX has been retracked
- Error analysis (several talks/posters)
  - Correlations among errors in geophysical retrievals
  - Effective Number of Looks in Waveforms; Optimal Weighting
- Estimation methods (several talks/posters)
  - Weighted and unweighted retracking
  - Sub-waveform pattern recognition in groups of waveforms
  - Spectral windows
- Calibration issues [for non-sun-synch altimeters, at least?]
  - Variation in σ^0 > 0.1dB due to around-orbit thermal variations
- PEACHI products for Jason-3
- “Fully-focused SAR”
  - Recommendation arising out of IP splinter and SAR splinter

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Draft recommendation that missions enable “fully-focused SAR” processing, if possible

Recognizing that “fully focused SAR processing” has new capabilities and applications that improve precision and resolution of Earth surface properties, the OSTST recommends that SAR altimeter missions provide, insofar as possible, characterization information needed to support coherent processing throughout the time when a point on the ground is visible.

More research and development is required to consolidate our understanding of fully-focused SAR processing performance.