

Surface Water and Ocean Topography (SWOT) Mission

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SWOT Algorithm Theoretical
Basis Documents (ATBDs)

Shailen Desai– JPL Measurement System Engineer
Nicolas Picot– CNES Measurement System Engineer



Introduction

- What are the ATBDs?
 - Algorithm Theoretical Basis Documents
 - Describe the physical and mathematical basis for the algorithms used to generate the science data products.
 - Describe the auxiliary data (static and dynamic) used by algorithms.



SWOT Approach

- Focus on algorithms used to generate the KaRIn science data products.
 - These algorithms are novel for SWOT.
 - Generated by algorithm development team.
 - Reviewed by science team for inputs and concurrence.
- Algorithms for nadir altimeter science data products, including orbit determination(e.g., POE/MOE) have strong heritage from Jason-series (Jason-1/2/3).
 - SWOT to use best available Jason-series standards.
 - ATBDs were comprehensively reviewed during Jason-1 mission development by Ocean Surface Topography Science Team.
 - ATBDs available to SWOT science team on request.



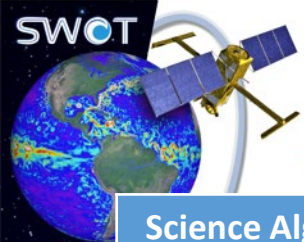
SWOT ATBD Review Approach

- Subject matter experts (SMEs) from science team identified by science leads.
 - Responsible for formal approval of KaRIn ATBDs (including auxiliary data).
 - Provide detailed review and input.
 - Identify single lead point of contact with lead author of each ATBD.
 - Consolidate input from other members of science team.
 - Welcome input from all members of science team through the subject matter experts.
 - Resolve conflicts between science team requests.
 - Iterate with algorithm development team as necessary.
- Prototype software provide basis for generating ATBDs.
 - Algorithm development team currently developing prototype software using simulated data.
 - Baseline algorithms serve as basis for iteration with SMEs.



KaRIn Low Resolution (Oceans) Science Algorithms

Science Algorithm	Description	Subject Matter Experts
L2_RAD	Generates Level 2 radiometer product with measurements of wet troposphere delay and sigma0 atmospheric attenuation from downlinked data.	Shannon Brown FR (TBC)
XOVERCAL	Generates cross-over calibration product to mitigate systematic errors (e.g., bias, roll/phase, baseline length) from KaRIn and nadir altimeter sea surface height measurements.	Ernesto Rodriguez Pascal Bonnefond Christopher Watson
L1B_LR_INTF	Generates Level 1B product with 9-beam interferometric, correlation, and power data corrected for instrument effects from 9-beam downlinked data.	Tom Farrar FR (TBC)
L2A_LR_SSH_PRECAL L2B_LR_SSH_PRECAL L2A_LR_SSH L2B_LR_SSH	Generates Level 2 sea surface height data products. L2A at KaRIn native center-beam with 2/2 km and 250/500 posting/resolution. L2B on geographically fixed grid with 2/2 km posting/resolution. LR_SSH appends crossover calibration to LR_SSH_PRECAL.	Sarah Gille Ed Zaron Emmanuel Cosme Coastal: Nadia Ayoub (TBC)



KaRIn High Resolution (Hydrology) Science Algorithms

Science Algorithm	Description	Subject Matter Experts
L1B_HR_SLC	Generates Level 1B single-look-complex (SLC) data product with SLC images, calibration information, time-varying platform and radar system parameters, and digital elevation model.	Scott Hensley
L2_HR_PIXC	Generates Level 2 pixel cloud data product from SLC product by performing height reconstruction, phase unwrapping, water detection, flagging.	TBC
L2_HR_RIVER_TILE L2_HR_RIVER_SP L2_HR_RIVER_AVG	Generates Level 2 river data products from pixel cloud data and provides center-line locations, widths, heights, slopes, discharge, and flags for sub-reaches and total reach. _TILE product extends over single tile of data. _SP product extends over single pass over continent. _AVG product aggregates over one basin (or region) within one repeat cycle.	TBC
L2_HR_LAKE_TILE L2_HR_LAKE_SP L2_HR_LAKE_AVG	Generates Level 2 lake data products pixel cloud data and provides height, geolocation, and shape. _TILE product extends over single tile of data. _SP product extends over single pass over continent. _AVG product aggregates over one basin (or region) within one repeat cycle.	TBC
L2_HR_RASTER	Generates Level 2 raster product from pixel cloud data product by resampling single-pass data onto a 2-D fixed grid.	TBC



ATBD Schedule

- Through mid-2018: Algorithm development team developing prototype software.
 - Engaging with subject matter experts as prototypes mature.
- mid-2018: Baseline ATBDs provided to science team.
 - Subject matter experts coordinate science team inputs with algorithm team.
- End of 2018: Release version 1 of ATBDs.

- Staggered development approach to various algorithms.
 - ATBDs provided as they become available during 2018.