

# Surface Water and Ocean Topography (SWOT) Mission

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SWOT Algorithm Theoretical  
Basis Documents (ATBDs)

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# Introduction

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- Algorithm Theoretical Basis Documents (ATBDs):
  - Describe the physical and mathematical basis for the algorithms used to generate the science data products.
  - Describe the input and output data for the algorithms.
- ATBDs generated by Algorithm Development Team (ADT).
- Reviewed by members of Science Team for inputs and concurrence.
- Final ATBDs are publicly available.

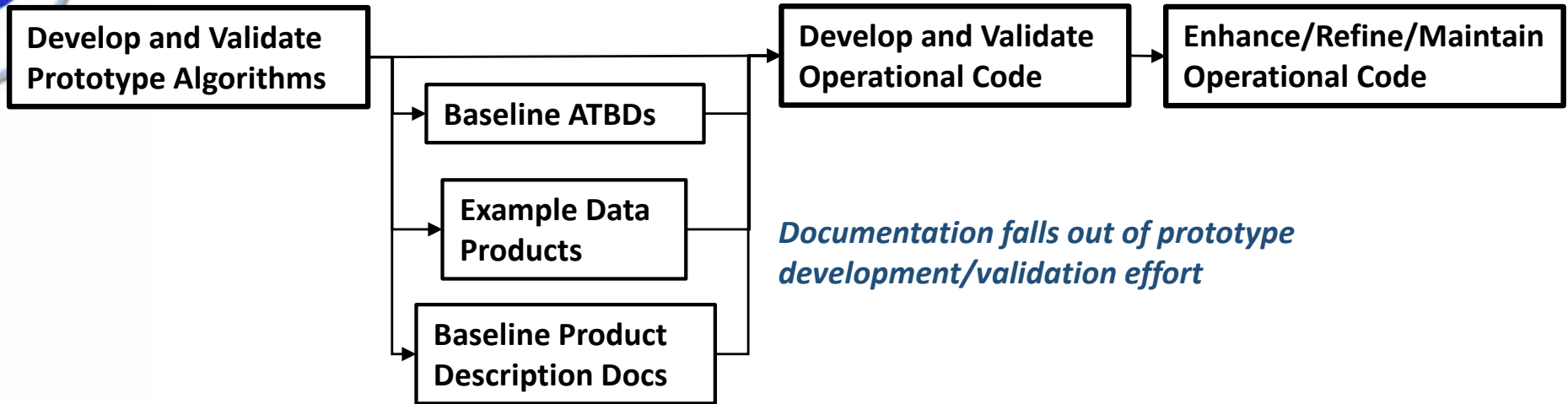


# SWOT Approach

- ATBDs for algorithms used to generate KaRIn science data products are the primary focus for review/input from SWOT science team.
  - These algorithms are novel for SWOT.
- ATBDs for algorithms used to generate 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.
  - Available to SWOT science team on request by end of 2018.



# KaRIn ATBD Development Approach



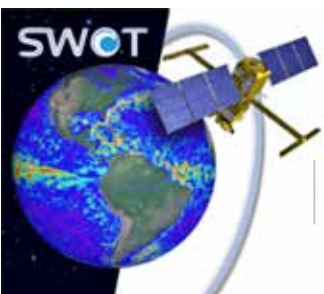
- ATBDs are generated after prototype algorithms and software have been developed and validated.
  - Validation of prototypes performed using simulated data.
- Baseline ATBDs serve as basis for iteration with Subject Matter Experts (SMEs) from Science Team.



# SWOT ATBD Review Approach

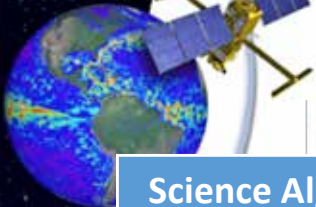
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- Subject matter experts (SMEs) from science team have been identified by science leads.
  - Responsible for inputs and concurrence of KaRIn ATBDs on behalf of science leads.
    - Provide detailed review and input.
    - Request that SMEs be single 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.



# KaRIn Low Resolution (Oceans) Science Algorithms

Science Algorithm	Description	Subject Matter Experts
L2_RAD_GDR	Generates Level 2 radiometer product with measurements of wet troposphere delay and sigma0 atmospheric attenuation from downlinked data.	Shannon Brown B. Picard
INT_LR_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 Co-I : 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 B. Chapron Co-I : A. Mouche
L2A_LR_NativePreCa ISSH L2B_LR_FixedPreCaI SSH L2A_LR_NativeSSH L2B_LR_FixedSSH	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_NativeSSH appends crossover calibration to LR_NativePreCaISSH. LR_FixedSSH appends crossover calibration to LR_FixedPreCaSSH.	Sarah Gille Co-I : Ed Zaron Emmanuel Cosme Co-I : B. Laignel & N. Ayoub



# 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 H. Yésou for the DEM
L2_HR_PIXC	Generates Level 2 pixel cloud data product from SLC product by performing height reconstruction, phase unwrapping, water detection, flagging.	Mike Durand H. Yésou & D. Blumstein
L2_HR_RiverTile L2_HR_RiverSP L2_HR_RiverAvg	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.	Larry Smith P.A. Garambois & S. Ricci
L2_HR_LakeTile L2_HR_LakeSP L2_HR_LakeAvg	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.	Yongwei Sheng J.F. Cretaux & H. Yésou
L2_HR_Raster	Generates Level 2 raster product from pixel cloud data product by resampling single-pass data onto a 2-D fixed grid.	Marc Simard S. Biancamaria, M. Grippa, F. Pappa (for wetlands)



## ATBD Schedule

- Early to mid 2019: Algorithm Development Team (ADT) developing and validating prototype software.
  - Staggered development approach to algorithms.
    - Iteration with SMEs on radiometer ATBDs has started.
  - Continuous interaction with members of science team at ADT meetings.
- Early to Late 2019: Baseline ATBDs provided to Subject Matter Experts (SMEs) as they become available.
  - Engaging with SMEs as prototypes mature.
  - SMEs coordinate science team inputs with algorithm team.
  - SMEs iterate with algorithm team.
- End of 2019: Release first concurred version of ATBDs.