



National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California



Surface Water and Ocean Topography (SWOT) Mission

SWOT Science Team Meeting

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Montreal, Canada

Science Data
Processing Overview

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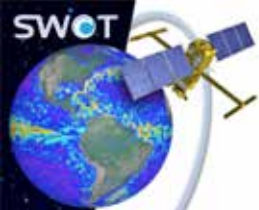
Team Organization

- Joint US+French Algorithm Development Team (ADT):
 - Develops and implements L1 and L2 science processing software
 - Defines L1 and L2 data products for science users
 - ADT includes JPL/CNES Project and Science Team representatives
- JPL and CNES Science Data Systems (SDSs) run common set of science processors built from ADT-delivered code (albeit within different production environments)
 - All L2 data will be distributed by both US and French distribution centers
- Calibration and validation (Cal/Val) of SWOT products will be done by joint US+French team that includes Science Team representatives

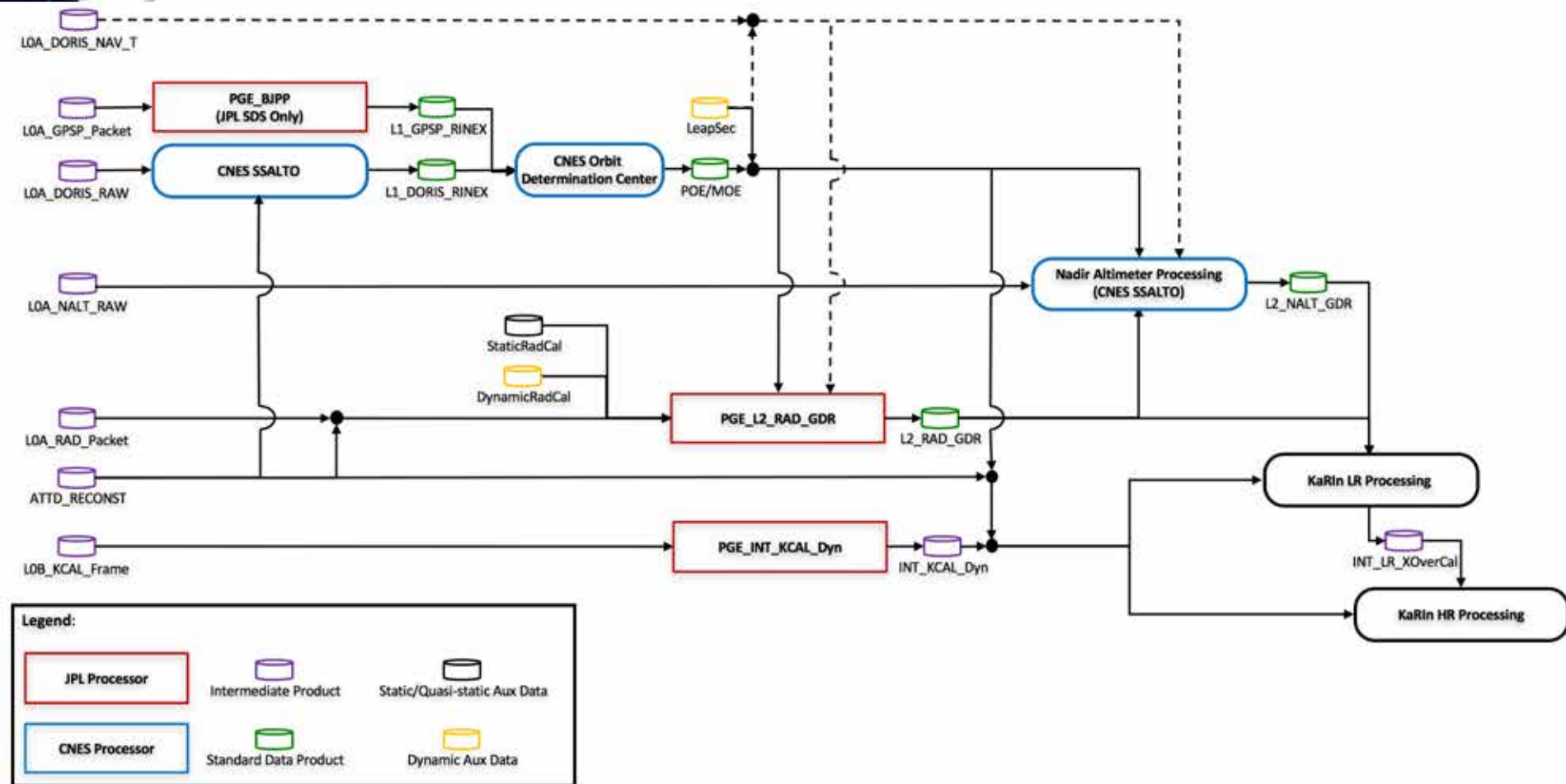


Processing System Organization

- Processing related to Nadir Altimeter (including Radiometer, Orbit Ephemeris, etc.) has high heritage from previous missions
- KaRIn processing is new for SWOT and is main focus of ADT effort
 - Data are split into Low-Rate (LR, ~17 Mbps) and High-Rate (HR, ~350 Mbps) data streams out of KaRIn
 - LR and HR data streams are processed by separate ground processing chains in SDS
 - ♦ HR algorithms are tailored to hydrology
 - ♦ LR algorithms are tailored to oceanography
 - Within each SDS processing chain, flow is split into 'processors' and 'products', which are basic organizational units for documentation, work split, etc.
 - ♦ Processors run ADT-developed algorithms and software to produce data products
 - ♦ Standard data products will be archived and made available to Science Team



Radiometer, Nadir Altimeter, KaRIn Calibration





KaRIn LR Flow

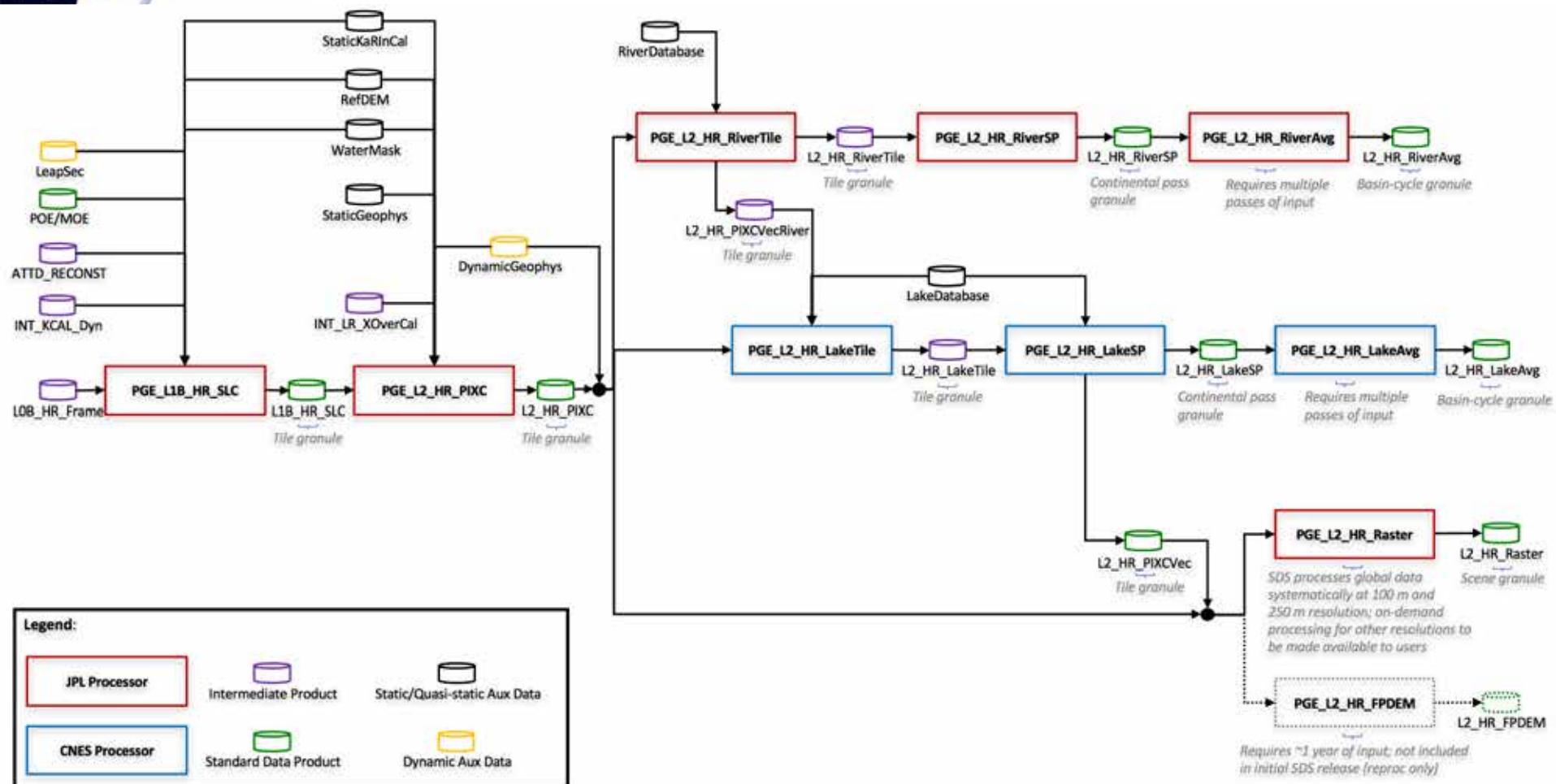


Legend:





KaRIn HR Flow





Science Team Involvement

- Science Team / Science Definition Team representatives to ADT have been involved in data product definitions and algorithm choices to date
- Science Team interaction will continue in many ways:
 - ADT meetings with Science Team representation
 - Direct interaction between algorithm developers and Science Team
 - Review of Algorithm Theoretical Basis Documents (ATBDs); see ATBD topic
 - Review of prototype products
 - Selection and/or provision of geophysical models provided on products
 - Involvement in select code and simulation sharing
 - Science Team meetings, reviews, etc.



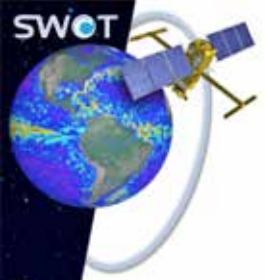
Highlights Since 2017 Toulouse Meeting

- LR (ocean):
 - Resolved simulation/processing issues causing unexplained cross-track errors from angular phase bias correction
 - Sped up previous phase bias correction algorithm to give feasible execution times
 - Converged on baseline L2 LR product definitions
- HR (hydrology):
 - Completed initial layover science assessment
 - Enhanced simulations to make data more realistic
 - Integrated baseline pixel-cloud algorithms
 - ♦ Developed end-to-end error evaluation framework vs. science requirements
 - ♦ Validated performance of water detection, dark water flagging, and phase unwrapping algorithms with large-scale simulated data set
 - Implemented initial version of lake vector processing
 - Developed working definitions of L2 HR products
- Implemented initial versions of LR and HR operational interfaces
- Results and plans were reviewed in December 2017 Measurement Review



ADT Near/Medium-Term Priorities

- Baseline product definitions for all standard products and create example L2 data products for ST users [staggered, 2018-2019]
- Continue nominal-case validation of algorithms, prioritized by risk [2018-2019]
 - HR pixel-cloud algorithms (phase unwrapping, dark water flagging, water detection, layover mitigation)
 - LR phase-bias correction algorithm with antenna dispersion
- Document baseline algorithms in ATBDs and review with subject matter experts from science team (see ATBD talk)
- Deliver scheduled versions of operational software, test data, and documentation to SDS to allow SDS system development [staggered 2018-2019]
- Perform stress and robustness testing on operational processors [2019+]
- Continue refinement and enhancement of all algorithms [2019+]



Backup