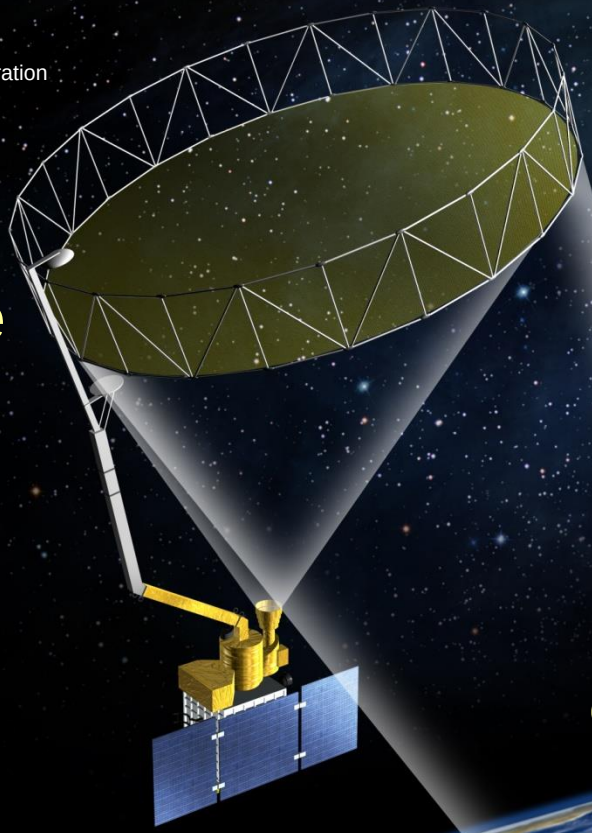
National Aeronautics and Space Administration

Soil Moisture Active Passive Mission

SMAP

4th Cal/Val Workshop



Cal/Val Rehearsal 2: L2-L4 Data Product Validation Activities

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Outline

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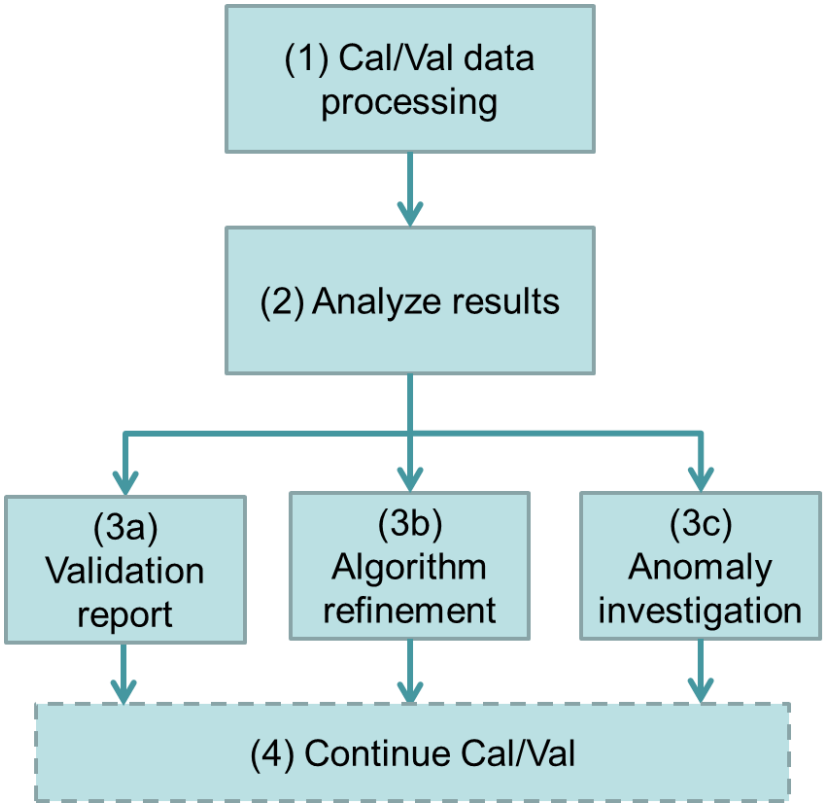
- Scope of Rehearsal-2 Data Assessment Activities
- Cal/Val Partner Status

Scope of Rehearsal-2

- **Rehearsal-2 will include 3b and 3c**
- **Full set of cal/val data sources with contemporary input for each product**



Overview of Rehearsal-2 Activities: Data sets

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Simulated SMAP data products
- GLOSIM (with contemporary input)
- SMOS TB
- Aquarius S0
- PALSAR-2 (TBC)

(1) Cal/Val data processing

- All core sites
- Sparse networks (SM+FT)
- Satellite products (SMOS SM, GCOM-W SM, ASCAT SM)
- Model products (ECMWF SM, NCEP SM)

(2) Analyze results

(3a) Validation report

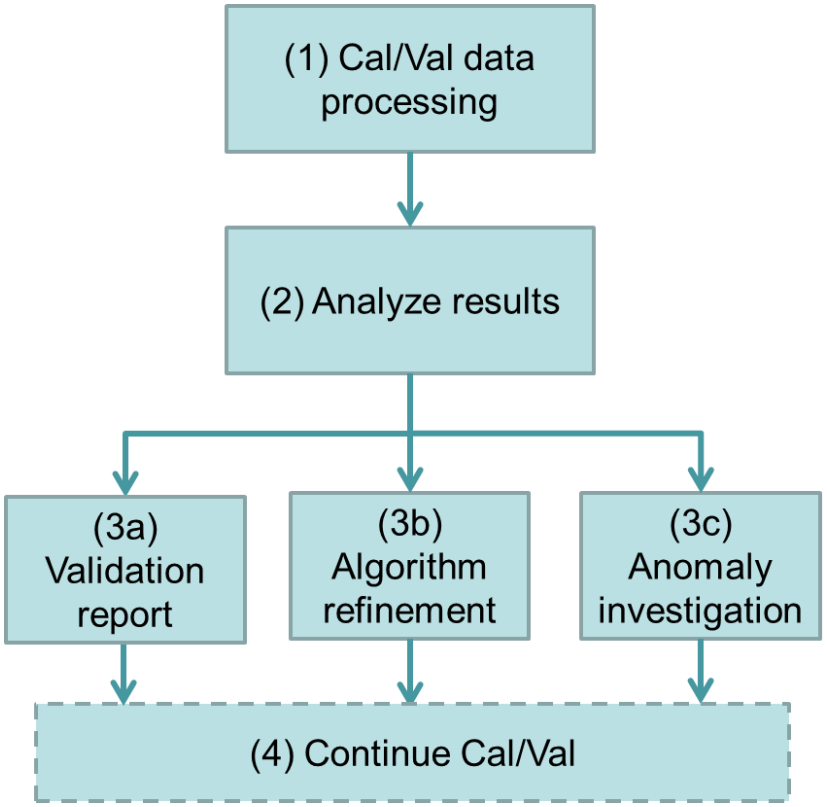
(3b) Algorithm refinement

(3c) Anomaly investigation

Phase 2 Rehearsal Evaluation

Scope of Rehearsal-2

- Rehearsal-2 will include 3b and 3c
- Full set of cal/val data sources (with contemporary input for each product)
- **Multiple versions of SMAP products (as per algorithm updates) which means multiple match-ups**



Scope of Rehearsal-2

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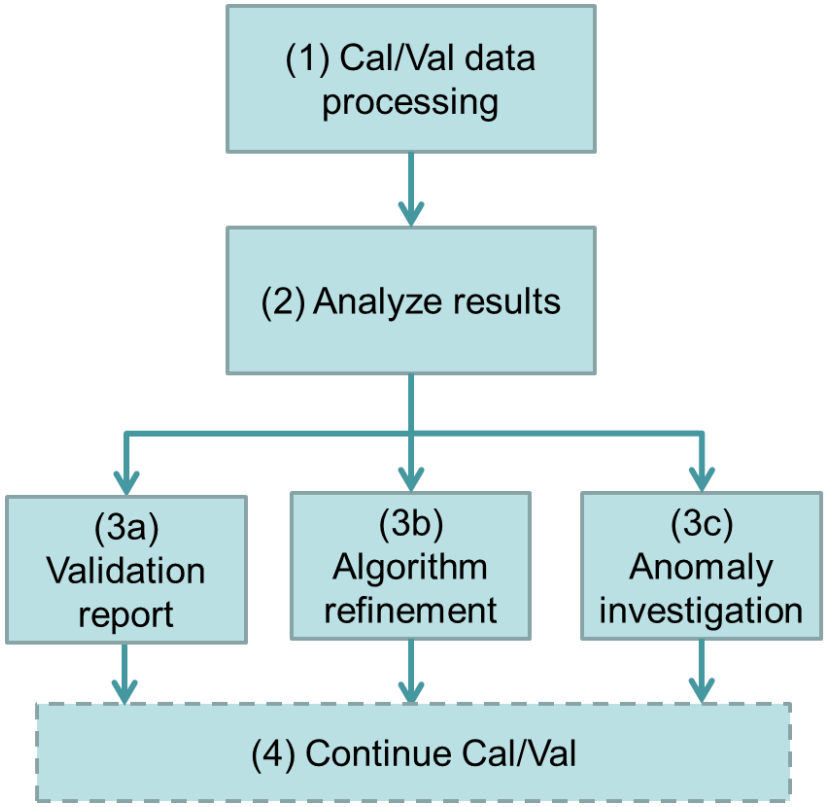
- Rehearsal-2 will include 3b and 3c
- Full set of cal/val data sources (with contemporary input for each product)
- Multiple versions of SMAP products (as per algorithm updates) which means multiple match-ups
- **Complete versions of sparse-network comparison tools**
- **Complete versions of the tools for the comparisons with respect satellite-based and model-based products**
  - **Spatial scales**



L2-L4 SM Tools

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- Based on cal/val use cases a set of tools was developed for Rehearsal 1 (the Table below)
- The tools are divided in “Data Processing Tools” and “Data Analysis Tools” according to the use case categories
- During Rehearsal 1 most Data Processing Tools and many of the Data Analysis Tools (Statistics computation) exercised; the rest will be developed by Rehearsal 2

	Tool category	Name	Description
Data Processing Tools	Data transfer	In situ data transfer tool	This tool will be used to transfer data from the Core and Contributing Validation sites to the SDS data repository.
	Data formatting	In situ data formatting tool	This tool will be used to transform the original data of the Core and Contributing Validation sites to uniform format.
	Quality control	In situ data quality control tool	This tool will be used to check the quality of the incoming in situ data. Nominally the data is quality controlled by the provided. This tool offers some assurance of that quality.
	Up-scaling	In situ site up-scaling tool	This tool will be used to scale the in situ measurements of Core and Contributing Sites up to the SMAP grid cell sizes (3 km, 9 km and 36 km).
	Match-up	In situ match-up tool	This tool will be used to match-up the up-scaled in situ measurements with the concurrent and coincident SMAP data products.
		Sparse network match-up tool	This tool will be used to match-up the data from the sparse networks with the concurrent and coincident SMAP data products.
		Satellite product match-up tool	This tool will be used to match-up the other satellite data products with SMAP data products.
		Model product match-up tool	This tool will be used to match-up the operational model data products with SMAP data products.
		Data extraction tool	Extract data fields from other satellite-based and model-based products for comparison (triple-collocation in particular)

L2-L4 SM Tools (cont.)

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	Category	Name	Description
Data Analysis Tools	Statistic computation	Validation metric computation tool	This tool will be used to compute the validation metric over the core validation sites.
		In situ comparison statistics tool	This tool will be used to extract and track differences between in situ data sources and SMAP data products.
		Satellite product comparison statistics tool	This tool will be used to extract and track differences between satellite data products and SMAP data products.
		Model product comparison statistics tool	This tool will be used to extract and track differences between model data products and SMAP data products.
		Triple collocation tool	This tool will take three data sources, normalize them and compute the error distribution between the products according to the triple collocation method.
		Tool for cross-comparison between SMAP soil moisture products	This tool will compare the consistency between different SMAP soil moisture products.
	Visualization	Visualization tool	These tools will plot products and calibration and validation results and metrics for visual inspection.
		Flag visualization tool	Identify the areas where the retrievals have not been compromised by the surface conditions (for example, precipitation, VWC, F/T, water bodies, and urban area).
		Ancillary Information Visualization Tools	These tools will help in visualization of the retrieval conditions based on ancillary and auxiliary data.
	Dynamic flag evaluation	Water body flag tools	Tools assess the water body flags generated from the SMAP radar measurements
		Freeze/thaw flag tools	Tools assess the freeze/thaw flags generated from the SMAP radar measurements and utilized by the soil moisture algorithms.
	Analysis	Threshold limit tools	Assess the threshold limits of conditions when algorithms meet soil moisture accuracy requirements.
		Ancillary cross-comparison tools	Cross-compare against various ancillary information and land covers
	Field campaign	Field experiment tools	Product specific airborne data pre-processing.

Scope of Rehearsal-2

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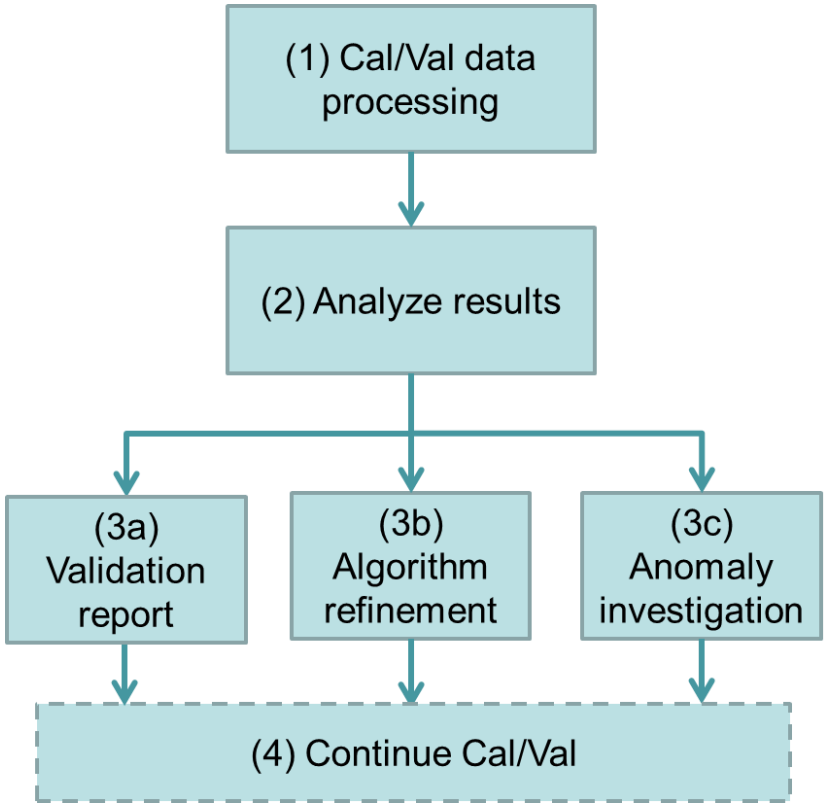
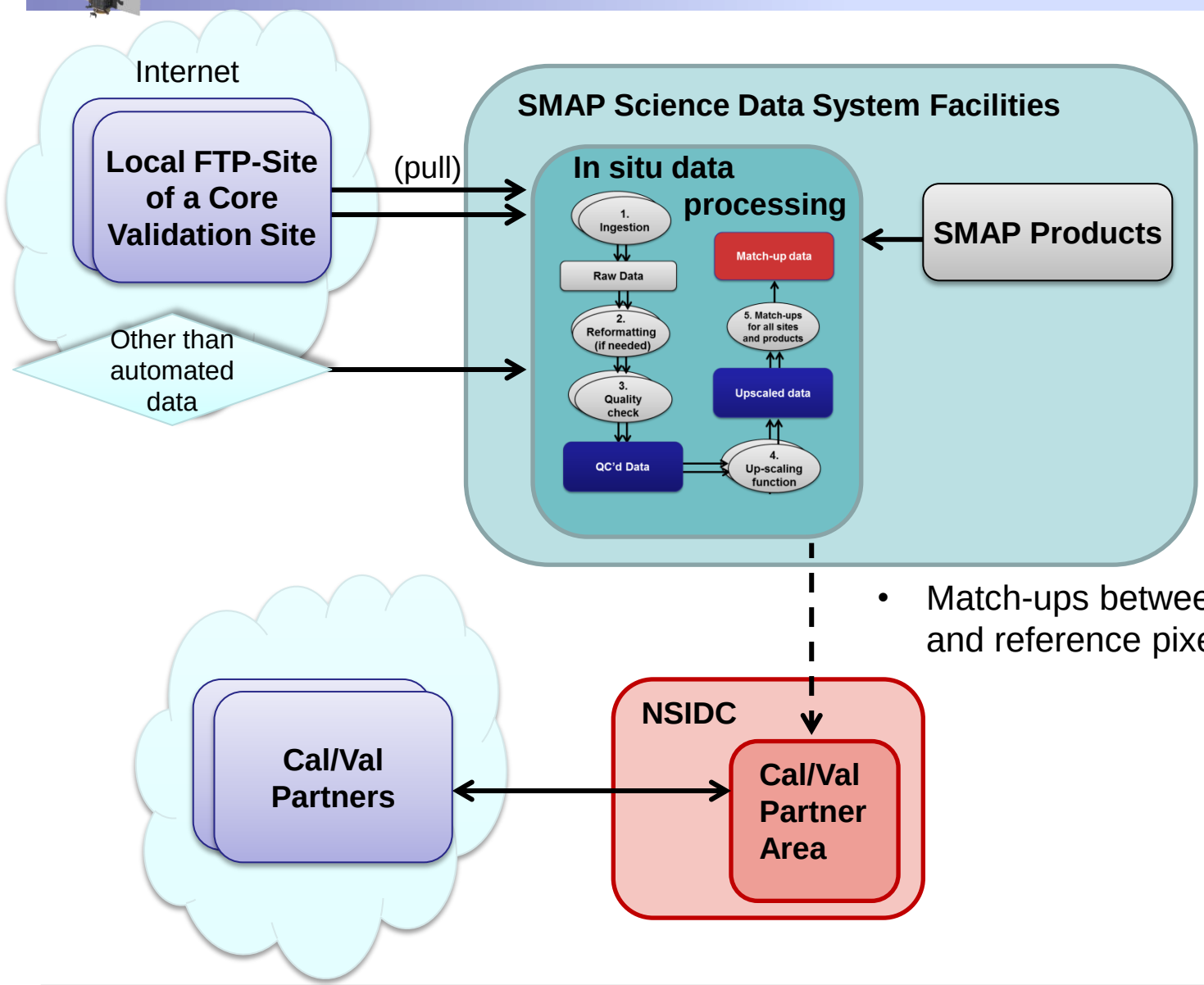
- Multiple versions of SMAP products (as per algorithm updates) which means multiple match-ups
- Complete versions of sparse-network comparison tools
- Complete versions of the tools for the comparisons with respect satellite-based and model-based products
  - Spatial scales
- **Complete data flow including NSIDC**



In situ cal/val data flow



- Match-ups between SMAP products and reference pixels

Rehearsal-2 Objectives

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- Continuously run the validation tools
  - Test standard operation
  - Test how well the anomalies in different scenarios can be identified
  - QC tool
    - Automated checks similar to what implemented for ISMN (Dorigo)

- One of the main outputs will be the determination of the final set of reference pixels for each soil moisture product
  - Objective is to bring on-line everybody who can identify an interface for automated download

Cal/Val Partner Status

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