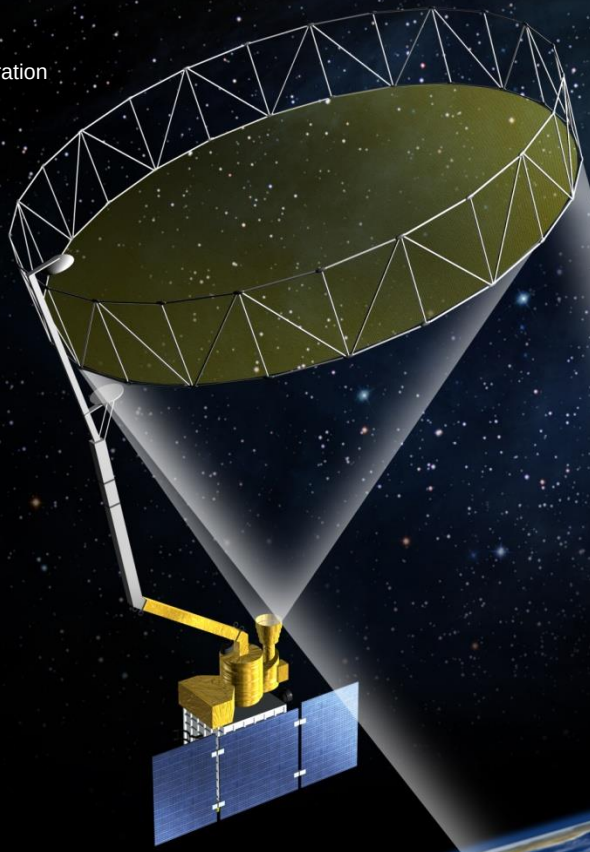
National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology

Soil Moisture Active Passive Mission

SMAP



4th Cal/Val Workshop

Nov. 5-7, 2013

Workshop Overview

Project Status

Cal/Val Overview

Phase 1 Rehearsal

Cal/Val Partners

L1 Cal/Val Plan
- Overview
- Topics
- Inter-calibration/satellite programs

L2-L4 Topics
- In situ sensors
- Sparse networks
- Field experiments
- Triple Co-location

Phase 2 Rehearsal

Cal/Val Workshop Agenda-Day 3

Thursday (November 7)		
	L2-L4 Topics	
0815	Triple Co-location and Sparse Networks	Crow
0845	Model-based Validation of Soil Moisture Products	Crow
0915	Discussion	
0930	*Break*	
	Phase 2 Cal/Val Rehearsal	*Yueh (Lead)*
0945	Scope, Roles, and Responsibilities	Yueh
1000	L1 Plan	Spencer
1020	L2-L4 Algorithms Plan	Dunbar
1045	L2-L4 Validation Plan	Colliander
1110	Science Data System Plan	Weiss
1130	Schedule and Summary (Discussion)	
1200	***Workshop Summary and Actions***	Jackson/Yueh/Entekhabi/Njoku
1300	*End*	

L2-L4 Validation Methodologies

Methodology	Role	Constraints	Resolution
Core Validation Sites	Accurate estimates of products at matching scales for a limited set of conditions	• In situ sensor calibration • Limited number of sites	• In Situ Testbed • Cal/Val Partners
Sparse Networks	One point in the grid cell for a wide range of conditions	• In situ sensor calibration • Up-scaling • Limited number of sites	• In Situ Testbed • Scaling methods • Cal/Val Partners
Satellite Products	Estimates over a very wide range of conditions at matching scales	• Validation • Comparability • Continuity	• Validation studies • Distribution matching
Model Products	Estimates over a very wide range of conditions at matching scales	• Validation • Comparability	• Validation studies • Distribution matching
Field Campaigns	Detailed estimates for a very limited set of conditions	• Resources • Schedule conflicts	• Airborne simulators • Partnerships

SMAP Cal/Val Phase 2 Rehearsal Goals

- Demonstrates the use of the operational environments and facilities and all of the tools required for the cal/val effort
  - *Effective use of tools in an operational setting*
    - Tools function in the operational environment
    - Tools operate on selected input data sets
    - Tools generate anticipated output
    - Tools run on same hardware that will be used during cal/val
  - *Effective use of the available data*
    - Incorporates SMAP data products
    - Incorporates validation data sets
    - Incorporates QA products and analysis products
  - *Effective use of communication channels and process tools*
    - Employ all established means that the team will use to communicate issues and results and exercise tools for changes

Phase 2 Cal/Val Rehearsal Procedures

- Prerequsites
  - *Mission hardware is configured for cal/val*
  - *Data repositories are configured for cal/val*
  - *Software tools and applications are configured for cal/val*
  - *Software tools and applications reside where they will be used during cal/val*
- Exercises
  - *Schedule specific time periods in May/June 2014 to run test cases*
  - *Assign team members to execute specific parts of the exercise*
  - *Run all tools with available data with resources intended for mission use*
  - *Employ all report mechanisms and repositories*
  - *Evaluate results and, if necessary, modify procedures accordingly*
- Some exercises will test the use of procedures and tools under anomalous conditions
- Demonstrate mission readiness in time for ORR in August

Phase 2 Cal/Val Rehearsal Planning

- Generate cal/val use cases
  - *The full set of use cases covers all planned cal/val activities*
  - *Use cases will ensure that*
    - The data storage plan provides necessary data sets
    - The tool development plan covers necessary functions
- Document procedures that are common to all cal/val activities.
  - *Those procedures will specify:*
    - Facilities in use and how to access them
    - Location of various data sets
    - Communication methods the cal/val team will use to share information and prepare reports
- Document cal/val procedures that are specific to each use case.
  - *Those procedures will specify:*
    - Prerequisite conditions for each use case
    - Specific sequence of activities
    - Alternatives for expected anomalous conditions

Phase 2 Cal/Val Rehearsal Misc.

- What will be the SMAP data simulator for each product: including L1
- How will DAART operate? Will there be a sub-group for L2 SM?
- The in situ activities before and during Phase 2 should be designed so that by the end of P2
  - *All sites that will be used in the CV Phase are integrated and evaluated*
  - *Core sites should be selected (after the exercise)*
  - *Sparse network sites should be quality controlled to identify the subset that will be used in CV*
  - *Scaling approach defined for each site, network, and product*
- If modeling will be used as a scaling tool, this needs to be ready for Phase 2
- Address satellite and model product comparisons

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Next Activities

- What needs to be done with CV Partners
  1. *MOU*
  2. *Test data set evaluation by SMAP*
  3. *Data transfer operational*
  4. *QC of individual sites*
  5. *Rehearsal feedback and action*
  6. *Calibration*
  7. *Scaling for multiple resolutions*
  8. ***Field experiments***
- Making sense of statistical CV and Triple co-location
  - *Sparse*
  - *Core*
  - *Satellite and model products*
- Should we establish that if a site does not participate in Phase 2 then we will not use the data in the CV Phase?
- What can we tolerate in terms of latency?
- Between now and Phase 2
  - *ADT and CV Partners-continue to add and advance sites*
  - *CV Partners: address the issues of calibration, referencing, and scaling.*

Message to CV Partners

- In situ data are used for assessment of products
- This comparison provides error estimates and a basis for modifying algorithms and/or parameters
- We want to believe that the scaled soil moisture provided from each site is close to the true average 0-5 cm soil moisture (or other variable)
  - *What convinces us? Evidence that*
    - Sensors are calibrated
    - Relationship established between the sensor measurement and the satellite reference (i.e. 0-5 cm soil moisture)
    - A reasonable basis for the scaling function (i.e. n is large)
- If we are convinced of the above, the cause of the difference can be assumed to be in the satellite retrieval (not the in situ)

Message to ADT

- In situ data are one of several methodologies used for assessment of products
- Comparisons of in situ and algorithm products provides error estimates and a basis for modifying algorithms and/or parameters
- If we are convinced that the in situ data is reliable, the cause of the difference can be assumed to be in the satellite retrieval
- You can’t cherry-pick data; the basis for using or rejecting in situ data must be established a priori and not after comparison

4th SMAP Cal/Val Workshop: Objectives

- Closure on Phase 1 of the Cal/Val Rehearsal and lessons learned.
- Increased engagement of the Cal/Val Partners and provide them with a better understanding of the Project needs.
- Feedback on the L1 Cal/Val Plan
- Establish a relationship with the L-band inter-calibration working group
- Feedback on the plans for post-launch field campaigns
- Feedback on the Phase 2 Cal/Val Rehearsal plan