2nd SMAP Cal/Val Workshop

Workshop Goals and Expected Outcomes

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May 3-5, 2011

Presentations

- Please use the meeting computer
- Upload before session
- Presentations will be saved to SMAP SDS site for reference and will not be shared or reproduced without author consent.
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Outline

- General SMAP Cal/Val Plan
- 2nd Cal/Val Workshop Goals
- Agenda

SMAP L1 Req. Impacting Cal/Val

Level 1 (Baseline) Science Requirements and Mission Success Criteria

Provide estimates of soil moisture in the top 5 cm of soil with an error of no greater than *0.04 m^3/m^3 volumetric (one sigma) at 10 km spatial resolution* and 3-day average intervals over non-excluded regions.

Provide estimates of surface binary freeze/thaw state in the region north of 45N latitude, which includes the boreal forest zone, with a *classification accuracy of 80% at 3 km spatial resolution* and 2-day average intervals.

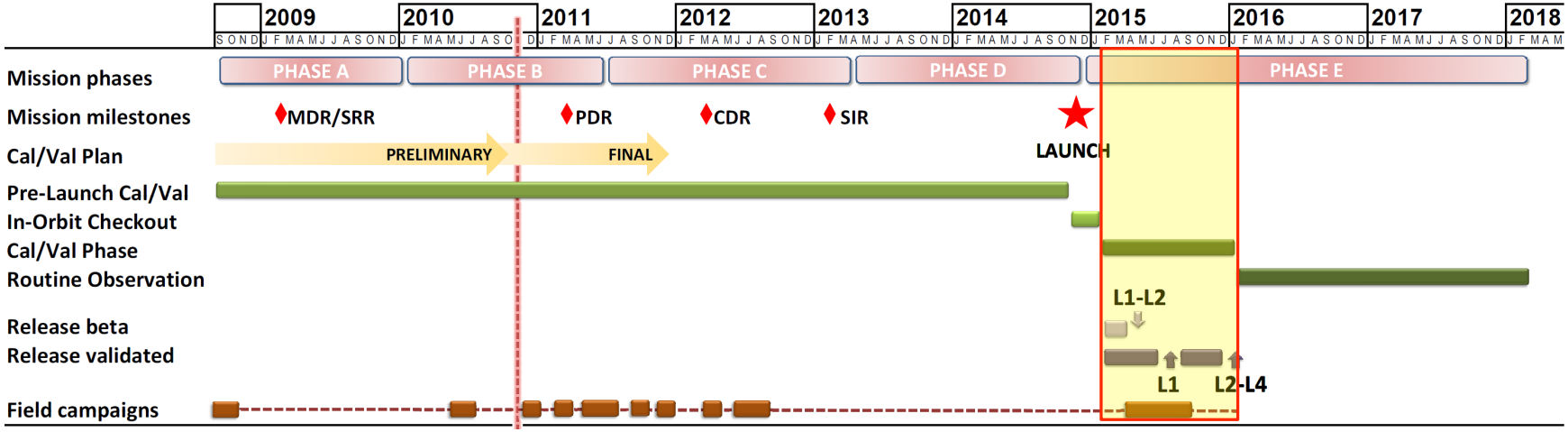
Conduct a calibration and validation program to verify data delivered meets the requirements.

Threshold mission requirements are 0.06 m3/m3 and 70%

SMAP Cal/Val Plan Objective, Time Line and Approach

Focus here is on the L2-L4 Products

- Objective: Calibrate and validate L1 through L4 algorithms and products relative to the mission requirements and schedule constraints.



- Approach: Mission Phase Focus
  - Pre-Launch: validating that there are means in place to fulfill the mission objectives
    - Algorithm development (ATBD identified activities)
    - Infrastructure needed for post-launch
  - Post-Launch: validating that the science products meet their quantified requirements
    - Validation
    - Product Improvement

SMAP Validation Methodologies

Methodology	Role	Issues	Actions
Core Sites	Accurate estimates of products at matching scales for a limited set of conditions	Calibration Comparability Limited number	In Situ Testbed NSPIRES DCL
Sparse Networks	One point in the grid cell for a wide range of conditions	Calibration Comparability Up-Scaling	In Situ Testbed Scaling Methods NSPIRES DCL
Satellite Products	Estimates over a very wide range of conditions at matching scales	Validation Comparability Continuity	Validation Studies CDF Matching
Model Products	Estimates over a very wide range of conditions at matching scales	Validation Comparability	Validation Studies
Field Campaigns	Detailed estimates for a very limited set of conditions	Resources Schedule Conflicts	Simulators Partnerships Communication

2nd SMAP Cal/Val Workshop Goals

- All methodologies are important for validation; this workshop focuses on two pre-launch issues that require early action
  - Establishing the in situ observation infrastructure necessary for post-launch validation
  - Planning field experiments that will support algorithm development and post-launch validation
- Future workshops will address the other methodologies.
- Value input from broader community.

Some Considerations

- Following the 1st SMAP Cal/Val Workshop, activities were initiated to support the objectives of Cal/Val. Progress on these will be reviewed and used as guidance in future plans.
  - Field campaigns to provide specific data sets for the algorithm teams.
    - Algorithms have matured and may have new validation requirements.
    - Need to resolve field experiment plans (objectives, schedule, and $).
  - Development of tower and aircraft-based simulators.
  - Methods for integrating the diverse in situ resources available for validation.
  - Increasing the in situ validation resources.
- New issues and opportunities need to be considered.

Expected Workshop Outcomes

- Updated list of algorithm Cal/Val requirements
- Consensus on objectives, locations, and components of SMAPVEX12
- Consensus on objectives, locations, and components of CanEx-FT
- Feedback for the In Situ Sensor Testbed and up-scaling initiatives
- Engagement of the DCL selections (In Situ C/V Team)
- Collaboration with international in situ programs
- Initiate a Standards of Practice sub-group related to soil moisture as an Essential Climate Variable (ECV) to prepare a white paper for distribution.

Overview of Agenda

- Tuesday
  - SMAP Project
  - Algorithm Requirements
  - Recent International SMAP Field Campaigns
- Wednesday
  - FY12 and FY13 Field Campaign Planning
  - In Situ Infrastructure
- Thursday
  - International Collaboration
  - Validation Data Issues

Past and Future C/V Workshops

- Oct. 2009
  - Presentation of preliminary plan, new initiatives
- May 2011
  - Review initiatives, field campaign planning, in situ coordination
- May 2012
  - Standards, calibration, and scaling
  - Initiative implementation with in situ teams
  - Satellite and model products for validation
- May 2013
  - Reviews of 2012 and 2013 field campaigns
  - Plan validation rehearsal; all methodologies
- May 2014
  - Updates on in situ preparations and rehearsal exercise
  - Final field campaign planning
- May 2015
  - First validation results

Agenda-Day 1 (Part 1)

0830 Workshop Goals and Expected Outcomes (Jackson)

SMAP Project Perspectives

0915 NASA HQ Programs and Projects Related to SMAP (Entin)

0930 SMAP Project Status (Kellogg/Njoku)

0945 SMAP Science Plan (Entekhabi//Njoku/O'Neill)

1000 Break

SMAP Products and Cal/Val

1015 Summary of L1 Product Cal/Val Requirements (Colliander)

1045 Summary of L2 Soil Moisture Cal/Val Requirements (Moghaddam)

1115 Summary of L2 Freeze-Thaw Cal/Val Req. (McDonald/Kimball)

1145 Summary of L4 Product Cal/Val Requirements (Reichle/Kimball)

1215 Lunch

SMAP Products and Cal/Val

- Algorithms have matured and may have new validation or better articulated requirements.
- If data are needed pre-launch, we are running out of time and options for acquiring it in a timely manner.
- Need to begin discussions on how post-launch validation will be conducted.
- Suggested coverage:
  - Product Description and Mission requirements
  - Algorithm(s) under consideration
  - Post-launch approach to calibration/validation
  - Near-term issues that could be resolved with field campaigns and suggestions.

Agenda-Day 1 (Part 1)

SMAP Products and Cal/Val

1015 Summary of L1 Product Cal/Val Requirements (Colliander)
1045 Summary of L2 Soil Moisture Cal/Val Requirements (Moghaddam)
1115 Summary of L2 Freeze-Thaw Cal/Val Req. (McDonald/Kimball)
1145 Summary of L4 Product Cal/Val Requirements (Reichle/Kimball)
1215 Lunch

SMAP Field Experiments

- Role: Provide detailed estimates of mission products for a very limited set of conditions.
  - Pre-launch: Algorithm development and risk reduction
  - Post-launch: Validation of L1 through L2 products
- Limited resources and time constraints.
- Workshop Objectives/Process
  - Review algorithm requirements and prioritize.
  - Review experiments to date and lessons learned.
  - Discuss overall field experiment goals.
  - Design SMAPVEX12 (Soil moisture)
  - Design CanEX-FT (Freeze thaw)

SMAP Major Field Experiments

Year/ Quarter	1	2	3	4
2008			SMAPVEX08	
2009				SMOS
2010			SMAPEx-1 CanEx-SM	SMAPEx-2
2011		Aquarius	SMAPEx-3	
2012	GCOM-W		SMAPVEX12	
2013		CanEx-FT		ALOS-2
2014	SAOCOM			SMAP
2015	SMAPVEX15	SMAPVEX15	SMAPVEX15	

Satellite Launches are in Red

International Collaboration

Canada

Australia

Agenda-Day 1 (Part 2)

Field Campaigns

1315 Discussion of Algorithm Req. Related to Field Campaigns (O'Neill)

1400 CanEx-SM10 Results Presentations (Belair)

- Stephane Belair (EC): Overview of the CanEx-SM10 field experiment (5 min)
- Anne Walker (EC): Passive airborne measurements during CanEx-SM10 (15 min)
- Iliana Mladenova (USDA): Active airborne measurements with the UAVSAR during CanEx-SM10 (15 min)
- Scott Hensley (JPL): UAVSAR interferometry during CanEx-SM10 (15 min)
- Aaron Berg (Univesity of Guelph) / Brenda Toth (EC): Ground measurements over agricultural sites during CanEx-SM10. (15 min)
- Mahta Moghaddam (University of Michigan): Ground measurements over the Boreal Ecosystem Research and Monitoring Sites (BERMS) during CanEx-SM10. (15 min)
- Ramaga Magagi (Sherbrooke University): Preliminary evaluation of soil moisture retrievals for CanEx-SM10 (15 min).
- Ramata Magagi (Sherbrooke University): Summary and availability of CanEx-SM10 datasets. (10 min)
- All: Open discussion on lessons learned from CanEx-SM10. (20 or 25 min)

1600 SMAPEx Results and Status (Walker)

1630 General Discussion of Field Experiment Objectives (Jackson)

1730 End Day 1

Agenda-Day 2 (Part 1)

0830 Development of a Pre-launch Soil Moisture Field Campaign (Jackson)

-ComRAD (O'Neill), CARVE/PALS (Colliander), UAVSAR (Hensley), AirMOSS (Moghaddam)

1030 Break

1045 Development of a Pre-launch Freeze-Thaw Field Campaign (Belair/ McDonald/Jackson)

1145 Lunch

1245 Status of the Aquarius Mission (Le Vine)

1250 SMOS Validation Experiences Presentations (Kerr)

-Yann Kerr, Mattias Drusch, Alan Robock

SMAP Validation Initiatives

- Following the 1st SMAP Cal/Val Workshop, activities were initiated to support the objectives of Cal/Val, primarily in situ methodologies.
- Progress on these will be reviewed and used as guidance in future plans.
  - Methods for integrating the diverse in situ resources available for validation.
    - ISST
    - Up-scaling
  - Increasing the in situ validation resources.
    - NSPIRES DCL
    - Collaboration and the ISMN (Thursday)
- Review progress to date and plans.

Agenda-Day 2 (Part 2)

SMAP Validation Initiatives

1330 In Situ Sensor Testbed Presentations (Cosh)

- Mike Cosh,Tyson Ocher, Marek Zareda, Eric Small

1415 Up-Scaling Methodologies Presentations (Crow)

- Wade Crow, Aaron Berg, Binayak Mohanty

SMAP In Situ Cal/Val Team

1500 Overview of Core Validation and Other Resources (Jackson)

1515 Core Validation Site Presentations (Jackson)

- 5 min. each, TBD selection and attendance

1700 Discussion

1730 End Day 2

Strengthen and Coordinate International Collaboration

- Focus is on in situ but it requires consideration of satellite aspects at the same time.
- Three major issues:
  - Essential Climate Variables
  - Standards of Practice
  - ISMN

Agenda-Day 3

International Programs and Collaboration

0830 Potential Partners
- NEON (E. Ayres)
- CZO (H. Lin)
- GCOM-W (I. Kaihotsu)
- Vietnam Activities (D. Chung)

0930 Goals of the GEWEX International Soil Moisture Working Group (van Oevelen)

0950 Goals of the CEOS Land Product Validation Team on Soil Moisture (Jackson)

- Soil moisture as an Essential Climate Variable (Jackson)Break

1010 Break

1025 Issues in Satellite and Land Surface Model Soil Moisture Validation (Drusch)

1045 The International Soil Moisture Network: Implementation (Dorigo)

1115 Challenges faced by Operational and New In Situ Soil Moisture Networks

- SwissSMEX (Mittelbach, ETH Zürich), Bibeschbach experimental catchment (Matgen, Gabriel Lippmann Centre), A. Robock

1145 Discussion

1215 Lunch

Other SMAP Components Related to Cal/Val

1330 SMAP Cal/Val Data Archiving (Colliander)

1500 Discussions and Actions (Jackson)

1630 End Day 3

SMAP Cal/Val Data Archiving

- Current and future plans for archiving field experiment and in situ data.
  - SDS
  - DAAC
- Issues?

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Action Items

- Update the SMAP Cal/Val Plan and Next Workshop
  - Jackson, Colliander, …..
- Conduct PALS-Scanning test flights in Oklahoma this summer
  - Jackson, Colliander, Cosh, …..
- Prepare a preliminary SMAPVEX12 plan
  - Jackson, Cosh, Colliander, Dinardo, ……
- Prepare a preliminary CanEx-FT plan
  - Belair, Berneir, McDonald, Jackson, ….
- ISST report
  - Cosh, ….
- Up-scaling peer-reviewed paper
  - Crow, ….
- In Situ C/V Team Database
  - Jackson, Colliander, …
- ECV/SOP White Paper
  - ?
- ISMN-US
  - Cosh, ….