THE SOIL MOISTURE FOCUS AREA IN THE CEOS LAND PARAMETER VALIDATION SUBGROUP

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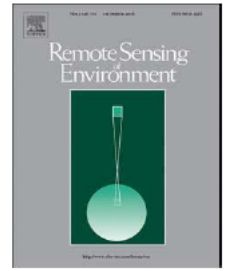
Validation good practices guidelines

Remote Sensing of Environment 244 (2020) 111806

Contents lists available at ScienceDirect

Remote Sensing of Environment

journal homepage: www.elsevier.com/locate/rse



Review

Validation practices for satellite soil moisture retrievals: What are (the) errors?

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Validation good practices document

- Definitions
- Scales
- Validation metrics
- Models (dielectric mixing, SM retrievals)
- Satellite missions
- Advanced products (combined, downscaled, root zone SM, …)
- ISMN as main data repository
- In situ monitoring methods (gravimetric, TDR, capacitance, cosmic ray, …)
- Airborne campaigns
- Calibration efforts
- Scaling challenges
- Validation stages – current status
- Validation strategies
- Reporting

Committee on Earth Observation Satellites
Working Group on Calibration and Validation
Land Product Validation Subgroup

Soil Moisture Product Validation Good Practices Protocol

Version 1.0 – October 2020

Editors: Carsten Montzka, Michael Cosh, Jaime Nickeson, Fernando Camacho

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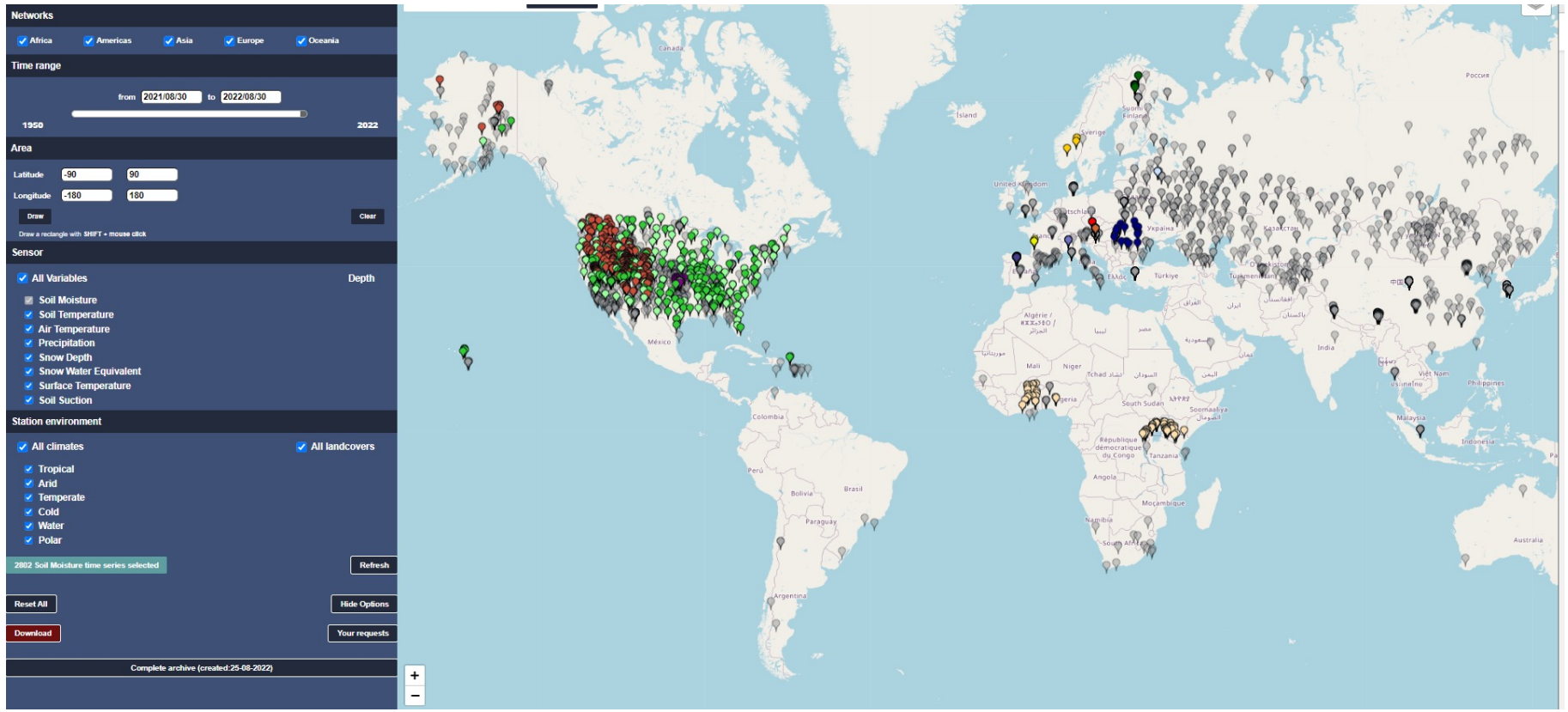
International Soil Moisture Network (ISMN)

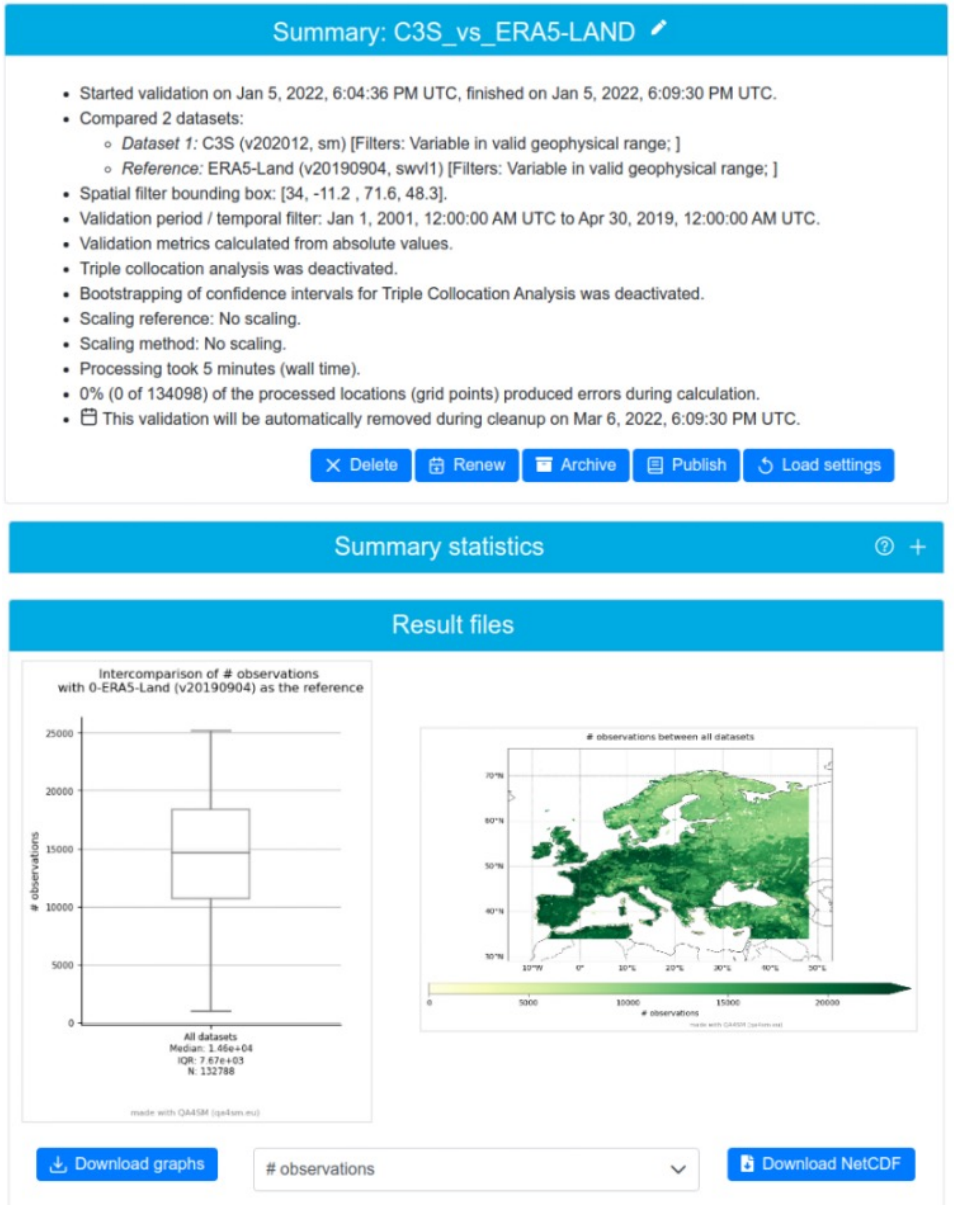
- ISMN has been successfully transferred from TU Vienna to its new host International Center for Water Resources and Global Change at the German Bundesamt für Gewässerkunde (ICWRGC/BfG) in December 2022.



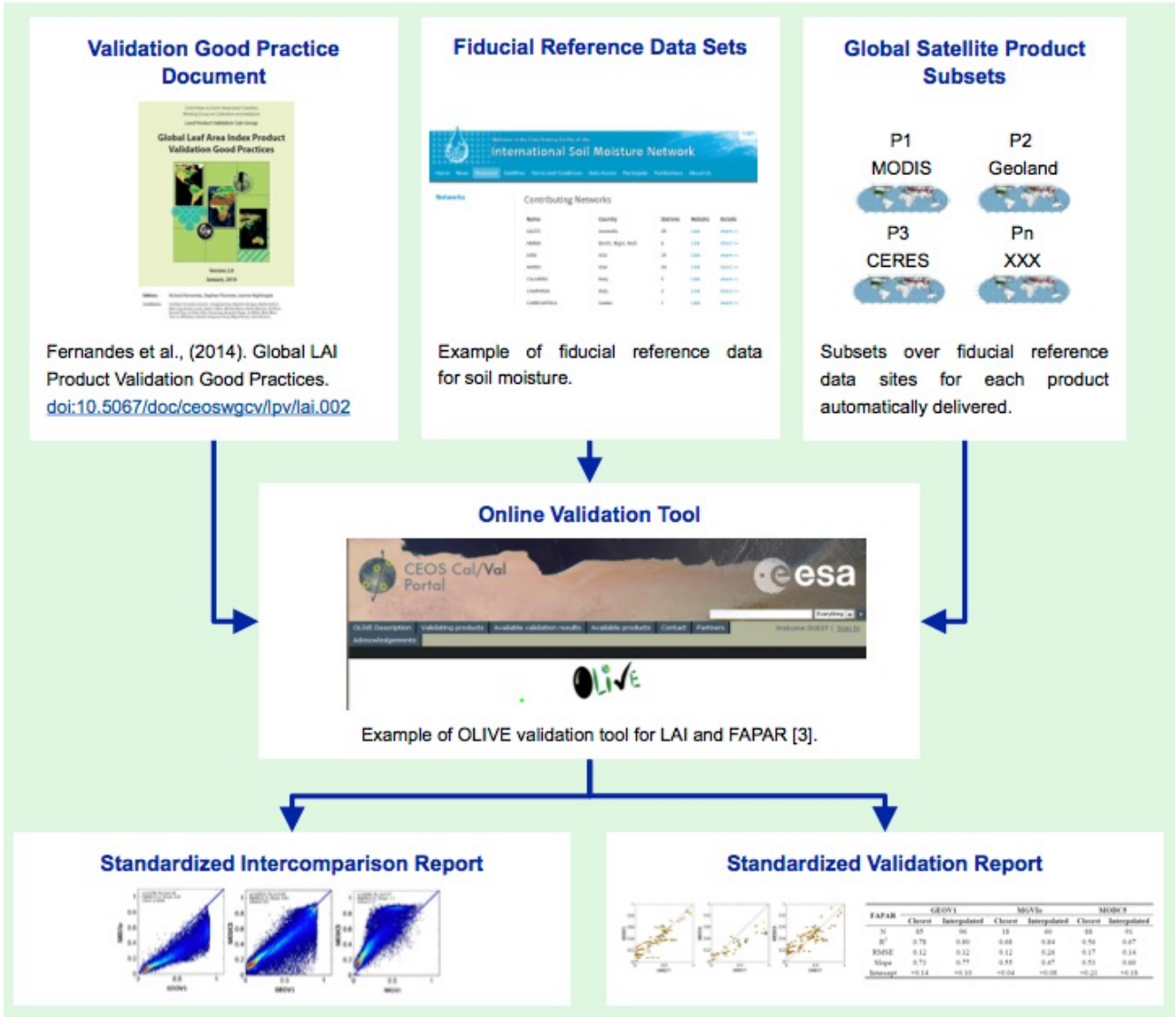
QA4SM

Aim: to bring together methodologies and protocols used for validation and quality control of soil moisture data products and provider users with traceable validation results

- An easy-to-use interface for comparing satellite soil moisture data against land surface models and the international soil moisture network
- A traceable and consistent methodology for all comparisons
- Various filtering and scaling options to assess the impact of these on the validation results
- Traceable validation results in netCDF format and as visualizations (graphs and maps)
- User data upload possible!



Validation Framework

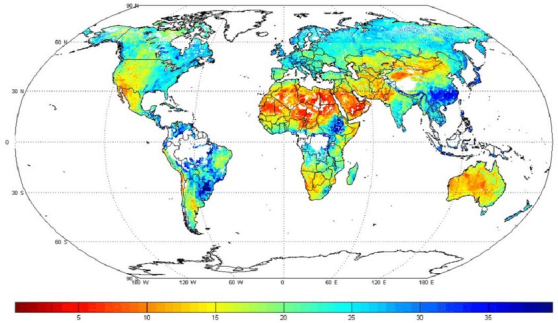


Validation Framework

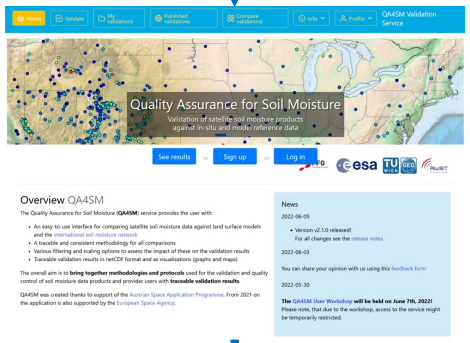
Good Practices Document

Fiducial Reference Data Repository

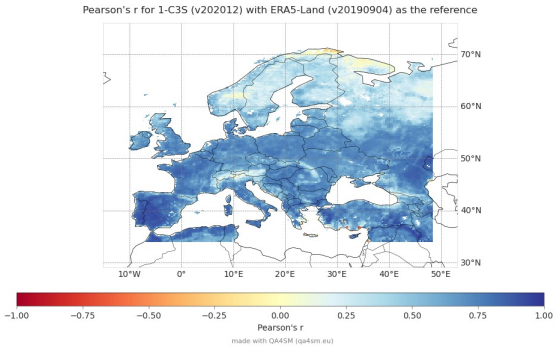
Global Satellite Data



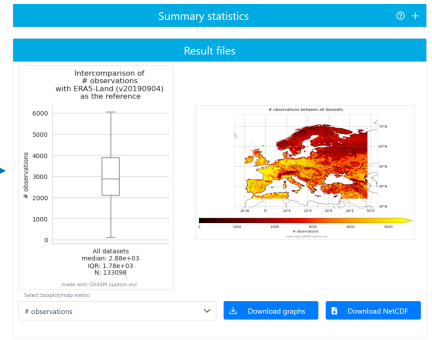
Online Validation Tool



Standardized Intercomparison Report



Standardized Validation Report

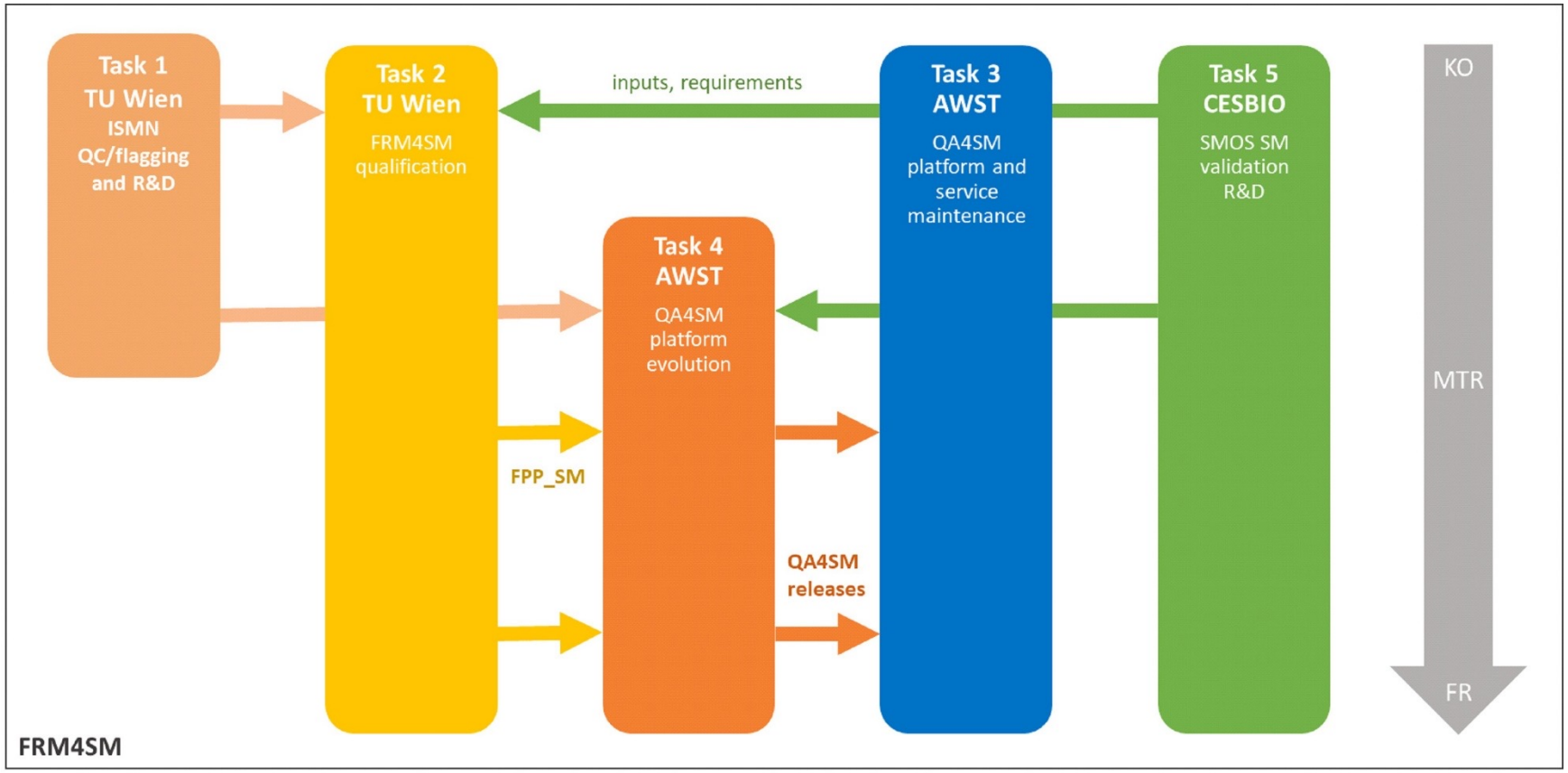


Validation stages

	Validation Stage - Definition and Current State	Variable
0	No validation. Product accuracy has not been assessed. Product considered beta.	
1	Product accuracy is assessed from a small (typically < 30) set of locations and time periods by comparison with in-situ or other suitable reference data.	**Snow** **Fire Radiative Power** **Biomass**
2	Product accuracy is estimated over a significant (typically > 30) set of locations and time periods by comparison with reference in situ or other suitable reference data. Spatial and temporal consistency of the product, and its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	**fAPAR** **Phenology** **Burned Area** **LAI**
3	Uncertainties in the product and its associated structure are well quantified over a significant (typically > 30) set of locations and time periods representing global conditions by comparison with reference in situ or other suitable reference data. Validation procedures follow community-agreed-upon good practices. Spatial and temporal consistency of the product, and its consistency with similar products, has been evaluated over globally representative locations and time periods. Results are published in the peer-reviewed literature.	**Vegetation Indicies** **Albedo** **Soil Moisture** **LST & Emissivity** **Active Fire**
4	Validation results for stage 3 are systematically updated when new product versions are released or as the interannual time series expands. When appropriate for the product, uncertainties in the product are quantified using fiducial reference measurements over a global network of sites and time periods (if available).	**Land Cover**

FRM4SM

- Identify or establish ground-based fiducial reference data for a particular variable
- Specify the protocols and procedures to establish and verify such fiducial reference data
- Validate relevant satellite products against established FRM data.



Soil Moisture School 2022

Day 0 (July 5)

- 3:00pm-5:00pm Check-in at UMASS Amherst
- 6:00pm-7:00pm Dinner in cafeteria
- 7:30pm Welcome and logistics /GRSS education program
- 8:00pm Science and application talks – Local early history in Northeast, Climate and water cycle science talks

Day 1 (July 6) – UMASS Amherst

- 7:00am-8:30am Breakfast in cafeteria
- 8:30am-12:00pm Soil Moisture Remote Sensing Algorithms (radiometry, radar, reflectometry, active-passive, scaling)
- 12:00pm-1:30pm Lunch in cafeteria
- 1:30pm-5:00pm Soil Moisture Remote Sensing Algorithms (radiometry, radar, reflectometry, active-passive, scaling)
- 6:00pm Dinner in cafeteria
- 7:30pm Science and application talks – General hydrology/ecosystem science talks (multi-missions)

Day 2 (July 7) Harvard Forest

- 7:00am-8:00am Breakfast
- 8:00am-9:00am Transportation to Harvard Forest
- 9:00am-12:00pm In situ measurement techniques (Soil moisture, Vegetation, Surface roughness, and Scaling/Networking) and hands on practice
- 12:00pm-1:30pm Lunch (catering)
- 1:30pm-4:00pm Tour of Harvard Forest Measurement Facilities
- 4:00pm-5:00pm Closing
- 5:00pm-6:00pm Transportation to UMASS
- 6:00pm Dinner in cafeteria

Soil Moisture Network Operators Workshop

Soil Moisture Network Operators Workshop,
July 25, 2023, Davenport, IA

Please join the American Association of State Climatologists (AASC) and the National Coordinated Soil Moisture Monitoring Network (NCSMMN) for this one-day peer-to-peer workshop for mesonet operators and other interested parties on the collection and generation of soil moisture data from in situ resources. The workshop will be followed by the AASC Mesonet Community Meeting, July 26–28, 2023 (requires separate registration).

Registration for the Soil Moisture Workshop closes on June 30. In addition, the hotel discount (accessible via the AASC meeting website) ends on **June 26**.

Events

- 7th Satellite Soil Moisture Validation and Application Workshop, June 2024?, USA (Details and location are still TBD)

Conclusions and outlook

- Advanced objective validaton methods available and in use
- Good practices documents available
- Just minor add-ons need to be implemented for reaching final validation stage 4
- Already great efforts of the community – thanks to all contributing!

Future aims:

- Support the soon established International Soil Moisture School (ISMS) to teach also validation good practices
- Make ISMN data fiducial