MOISST WORKSHOP 2018
Worksheet No. 1: Day 1

Step 1: Reflect

Focusing on your background and knowledge in soil moisture research and applications, jot down your answers to the questions below. Once you've completed your notes, be prepared to share with others tomorrow morning:

A. What is your opinion of what the National Soil Moisture Network (NSMN) should be?

- A consortium of organizations and individuals with shared goal to collect and integrate SM information across spatial scales to advance applied research and decision support.
- It is a great idea.
- A compilation of existing networks housed at one portal.
- High – quality, standardized (as in quality controlled) in-situ soil moisture network (one stop shop…)
- A standard (minimum requirement that a site should inert in terms of instrumentation, data resolution, etc)
- High resolution soil moisture station: this will help several stakeholders to conserve water better and use it more efficiently.
- Multi-scale, multi-sensor, coordinated, not just microwave (e.g. Thermal, ET, etc.)
- An aggregation of in-situ soil moisture observations
- Gathered soil moisture data for all the stock
- Database of QA/QC'ed soil moisture (and meteorological) observations easily accessible by the science community.
- Integrated framework for national-scale soil moisture data storage, normalization, QC, and distribution.
- A resource for anyone who could be benefitted from it.
- A network of researchers and agency staff who collaborate primarily to develop national gridded soil moisture products based on in-situ measurements and to advance applications of soil moisture information.
- Connection of state, federal, and private networks – similar to the national mesonet program
- An integration of all in-situ networks in the U.S. and a framework that establishes necessary standards that can be applied throughout the network. Goal of one measurement by county.
- The NSMN should be a one-stop shop for data and information. Regarding soil moisture observations from local, state, and federal soil moisture network.
- Consortium of scientists sharing experiences, methods, and data.
- Can be a testbed for land surface models: Model development, validation
- The NSMN should be a one-stop shop for national in-situ soil moisture data. It would allow the user to plot percentile, VWC, FAW, etc, and filter based on which networks compute each variable.

- Gridded and in-situ data and application central resource. Provide guidance on which data sets best used for what. Possibly grouped by application? Flood, drought, gardening, agriculture
- A network that integrates in-situ soil moisture measurements with modeled soil moisture. Provides nationwide soil moisture products, spatially and in various formats.
- A repository of soil data that is capable of housing individual contributors data dynamically. It must allow for recalibration and QC updates by the sponsors of the data.
- NSMN should bring together the many individual networks that make quality soil moisture measurements and can report in near real time daily and hourly data.
- A standardized (as much as possible) database of soil moisture and other soil property variables of value to users that is easy to access/use.
- Wide-ranging inclusion of state networks, USDA, DOE, NOAA climate monitoring sites, etc. available in a single database.
- Integrate in-situ & remotely-sensed SM observations, for multiple depths to provide for diverse user groups.
- A public-facing system comprised of data and products (in-situ, remotely sensed, and modeled) that allows researchers and decision makers the ability to work together as partners
- A decision support tool
- NSMN should be a community of academics and agencies working on SM monitoring
- Open to what this means. Needs in-situ physical measurements from several types of sensors.

B. Who should be responsible for the NSMN?

- All partners in the consortium. These with funding empower those without – everyone step up with contributions and leadership.
- Federal government/NASA.
- Someone with stable funding over the long term – NIDIS? Or someone already doing it: SCAN/CRN
- Federal Agencies (USGS, NOAA,…)
- Federal government, such as NASA or UDSA
- NOAA/USDA
- ?
- There should be a national archive with exploration of cloud service provides
- Soil scientists, climatologist
- Devoted group within, e.g. USDA, NOAA, whose key role is to oversee the NSMN
- Not sure… tough question, above my pay grade!
- Those who use it often
- NOAA?
- Federal agency such as USDA
- A coalition of academic institutions and federal agencies (such as is done for the USDM). However, it might make sense for one academic institution (e.g. Ohio State, Nebraska) to be the host institution.
- I feel it should be a federal agency. Maybe NSSC

- ?
- All related agencies: USDA, NOAA, Forest, NASA, NSF
- NIDIS? USDA? Probably a Fed.
- A federal entity with reputation for disseminating point and gridded data.
- Regional climate centers
- NOAA/USDA
- A federal agency with sufficient funding to collect, QC, and archive data and producer use-driven products for significant use categories: monitoring drought, inputs to models, etc.
- A central institution (probably the one that can access funding!)
- USDA – lead, other agencies share funding of it
- NOAA or NRCS
- It should be a partnership between NOAA and USDA, possibly leading a panel of experts from other communities (similar to the NIDIS Executive Council)
- Need to keep multiple contributors but should have a single administrator.
- NIDIS and Fed agencies

C. Finally, who do you envision using the products and/or tools created under the NSMN?

- Decision makers, educators, producers, environmental managers, researchers.
- Researchers/Media
- What tools? Is this an actual thing?
- Researchers (model validation, process understanding) state climatologists, USDM authors
- Scientists, farmers
- Ag., hydrology, drought/flood monitoring
- Initializing hydrology models
- Everyone from soil scientists to farmers to the media
- Mostly crop and soil scientist, climatologists
- 1) Data assimilation into NWP and surface models. 2) Researchers in academia and NOAA and others for a myriad of scientific research questions. 3) Decision makers
- Researchers, mainly. Soil scientists, agronomists, hydrologists, modelers, etc. Potentially producers or decision-makers.
- Students, researchers, policy makers, media
- Researchers, state and federal agencies, public citizens
- Academic researchers; ag community; weather community; federal, state, local agencies; etc.
- Drought monitor authors, researchers, etc… If could also be of we to a lot of agricultural producers for decision making purposes if there are enough observations in the appropriate locations.
- Soil scientists, atmospheric scientists, researchers, agricultural extension agent.
- Broad audience
- Important soil parameters for description of soil, model simulations, and model validation

- Drought decision makers will use it. Ideally it would be something produces can use too, but drilling down to field scale is hard.
- Federal, state, private – everyone. Currently there are so many sources, but it is challenging to find which is best and when most applicable.
- NWS RFCs, university researchers, irrigation districts, state/federal government, USDA, Corps of Engineers, US Bureau of Reclamation
- Hydrologists/Meteorologists/Water Managers/State and County governments
- USDM, NCEI, SCOs – monitoring; USDA – ag applications; USGS – hydrology; NWS - model forecasting, runoff prediction, etc
- Anyone – different tiers for different uses, perhaps
- Agriculture, researchers, modelers – model validation, reanalysis products – NOAA
- Drought monitor = key, but more number of other potential user groups
- Modelers, USDM authors, and the private sector
- Natural resource agencies, climatologists, state government, producers
- NOAA, USGS, DOI-CLM, USDA, DOD, Insurance companies

D. If you had a million dollars a year in federal research funding for the foreseeable future, where should it go and what should it do?

- Cross – scale integration and development of AI data assim/integration methods and development of integrated in-situ ATMOS/SM/VEG monitoring and analysis systems – tying in AI of cross-scale look
- To develop soil moisture products at different scales for farmers, soil, climate, and environmental scientists.
- 90% to networks – operators need $ and 10% to data management
- Split USGS and NOAA NCEI
- 1) Maintenance (both physical sites and websites) 2) Research 3) Expansion
- Cope with climate change to conserve water, generate enough food for the growing population: food and water severity
- ?
- Bridge the gaps between in-situ network (due to soil depths, sensor type, and other irregularities) and satellites
- Go for the research related to wild fire and drought monitoring
- More observations in areas not represented and also targeted observations in areas with known poor model performance
- Additional remote sensing soil moisture missions and improving outputs from current missions.
- Climate modeling, water resources, crop production
- Should go to a lead institution who awards competitive sub-contracts to others to accomplish NSMN goals with requirement that all code and data generated be placed in a shared public repository.
- Payment to network for data and organization of national program to collect and distribute the data (would require significantly more than a million)
- Increase the spatial coverage of sensors and set aside enough funding such that a committee (like a steering committee) could be compensated for their time and effort, while ensuring that sufficient time and effort is contributed toward management.

- It should be used primarily to standardize in-situ soil moisture monitoring.
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- 1) High resolution 2) Complete matric (texture, water contents, water potential) 3) New instruments 4) Ground measurements, model outputs, and remote sensing
- We wouldn't have to eat kraft dinners, but we would eat kraft dinners. Well of course we would, we'd just eat more.
- Improved gridded data informed by in-situ and academia research. Independent panels to determine best data set applications for various business lines.
- Fill in voids of in-situ measurements, data validation and model calibration, and data storage and dissemination.
- In-situ soil surveys and standardization of soil moisture of observing capability
- 1) Central data collection, QC processing, archive, product release. 2) Grants for product development. 3) Annual meetings to guide system
- Accumulating and standardizing (repackaging) existing soil moisture data sources into a centralized database.
- Fill in missing locations with SM measurements. Standardize on LSM/SWC probes.
- More expansion in in-situ etc. networks → better distribution of real on-ground data at dif. Depths and money for QC of data system.
- Half would be spent on expanding network/retro-fitting existing networks in partnership with other groups doing research at the regional level, either in arid or underserved areas. Other half would be for integration, NSMN data into existing models to gauge value of data
- 1) Additions of sites @ SM sensors (selectively chosen to fill in gaps) 2) Development of website and web services 3) Dedicated staff to maintain and develop
- Sensor intercomparison studies and remote sensing data assimilation

Step 2: Be prepared to discuss your thoughts at the beginning of Day 2.

Step 3: Turn in your notes at the end of the recap on Day 2.