Open Science Practices in Hydrology Research

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Roots for Resilience Program

- Forging new interdisciplinary collaborations
- Bring people together from different programs
- Global scale environmental problems
- Data science techniques and large amount of data
- Building teamwork and team science skills

RESEARCH, INNOVATION & IMPACT
Data Science Institute

CYVERSE®

RESEARCH, INNOVATION & IMPACT
Arizona Institutes for Resilience

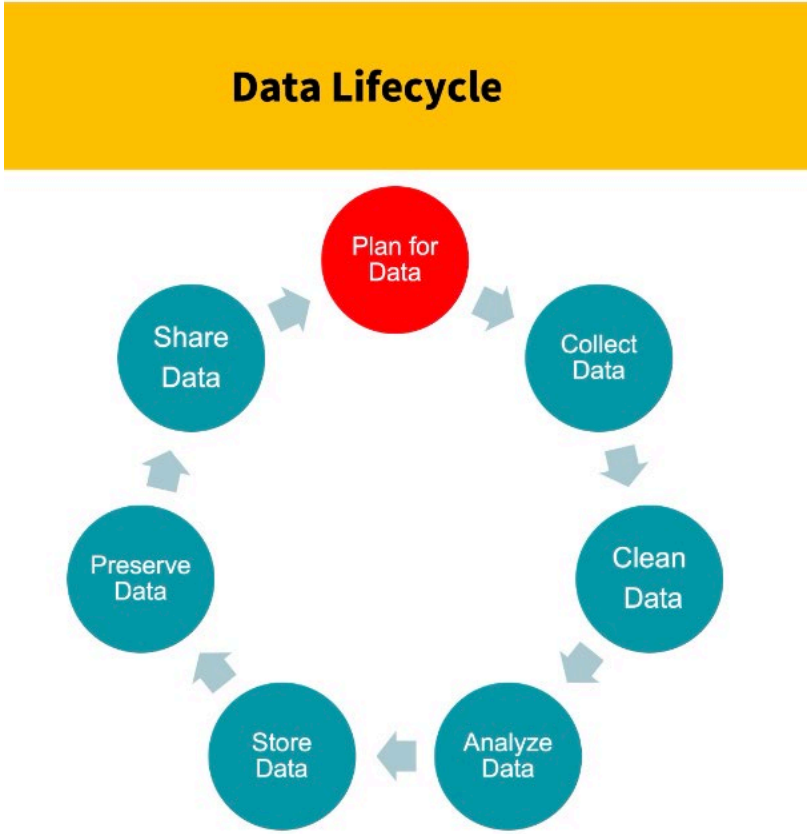
Open Science

- Making science accessible for all
- Open Access Publications
- Open Data
  - FAIR Principle
- Open Educational Resources
- Open Methodology
- Open Source Software
- Open Peer Review

2023 is the year of Open Science

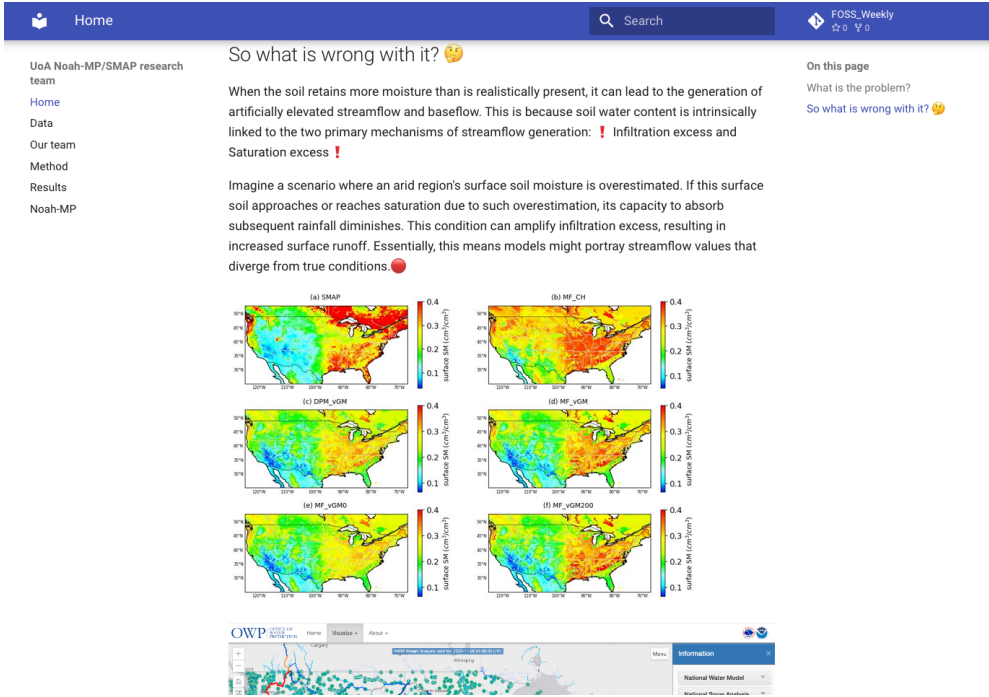
Data Management Plan

- What is DMP?
- Why should you care about data management?
- Elements of a good DMP
  - Information about data & data format(s)
  - Metadata content and format(s)
  - Policies
  - Long-term storage



Documentation & version control

- Project Documentation
- Scientific papers
- Public Repositories for Documentation
- Using GitHub for version control
- https://mfarmani95.github.io/FOSS_Weekly/



Application of Soil Moisture Memory to evaluate parametrization of soil hydraulic schemes in Noah-MP.

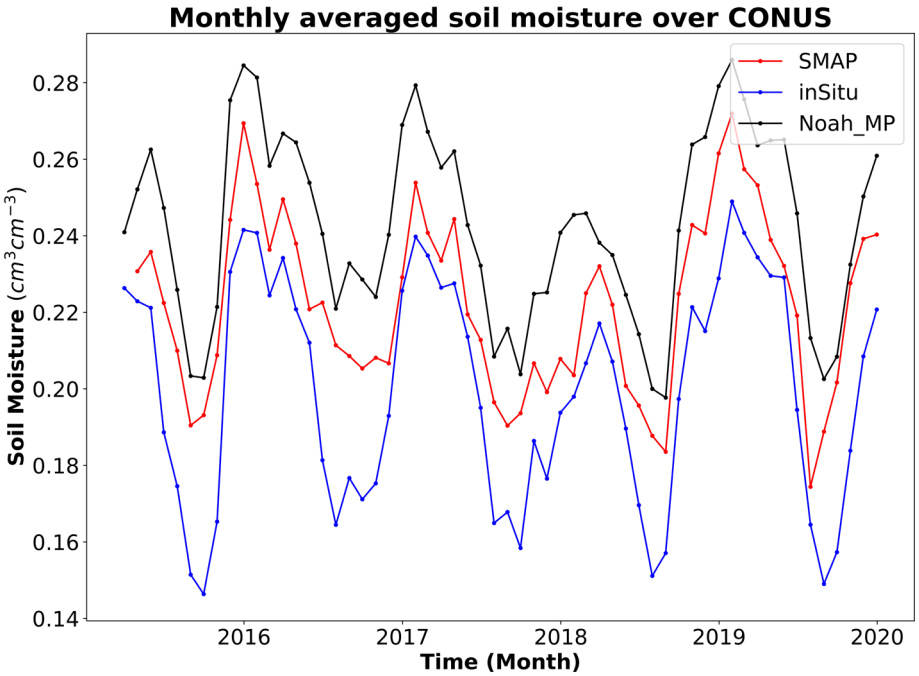
Mohammad Farmani, Guo-Yue Niu, Ali Behrangi

Motivations

- A prevalent trend observed in Land Surface Models (LSMs) is the overestimation of surface soil moisture when compared to SMAP and in-situ observations.
- This results in the unrealistic representation of the soil moisture-precipitation coupling feedbacks

Soil moisture variation

- Noah-MP Control-Run overestimate soil moisture compared to SMAP

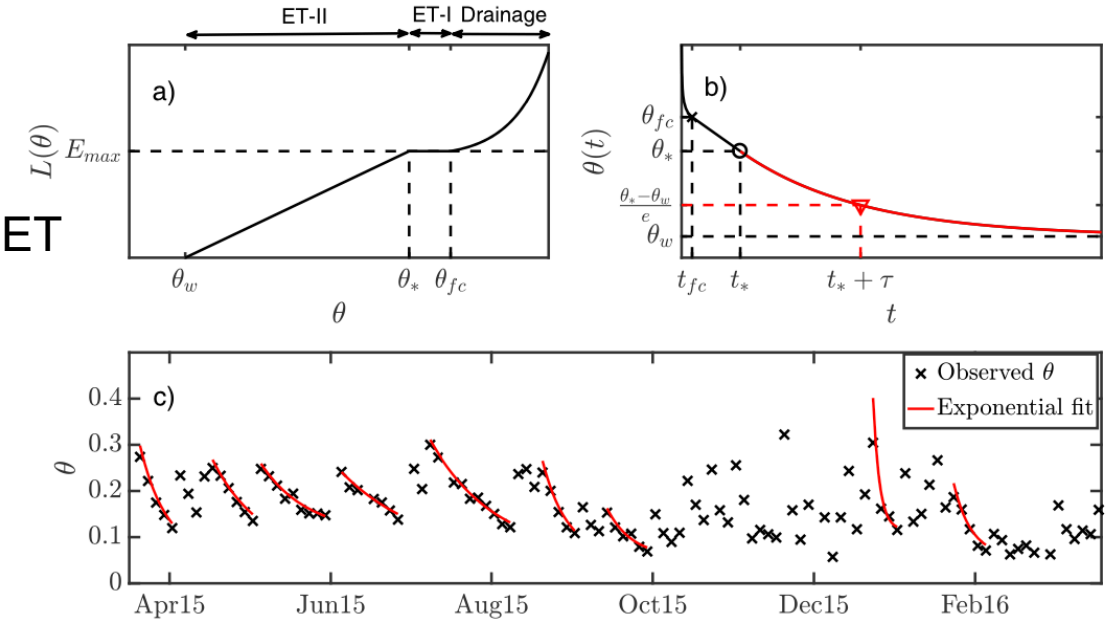


Objective

- Implementing soil moisture memory to enhance soil moisture dynamic in Noah_MP using SMAP and InSitu soil moisture, particularly during dry periods.

Soil Moisture Loss function

- Hybrid model developed by McColl et al. (2019)
- Drainage dominated and Stage-I ET as Energy-limited
- Stage-II ET as Water-limited



Schematic of surface water loss process adopted from McColl et al. (2017),

Data

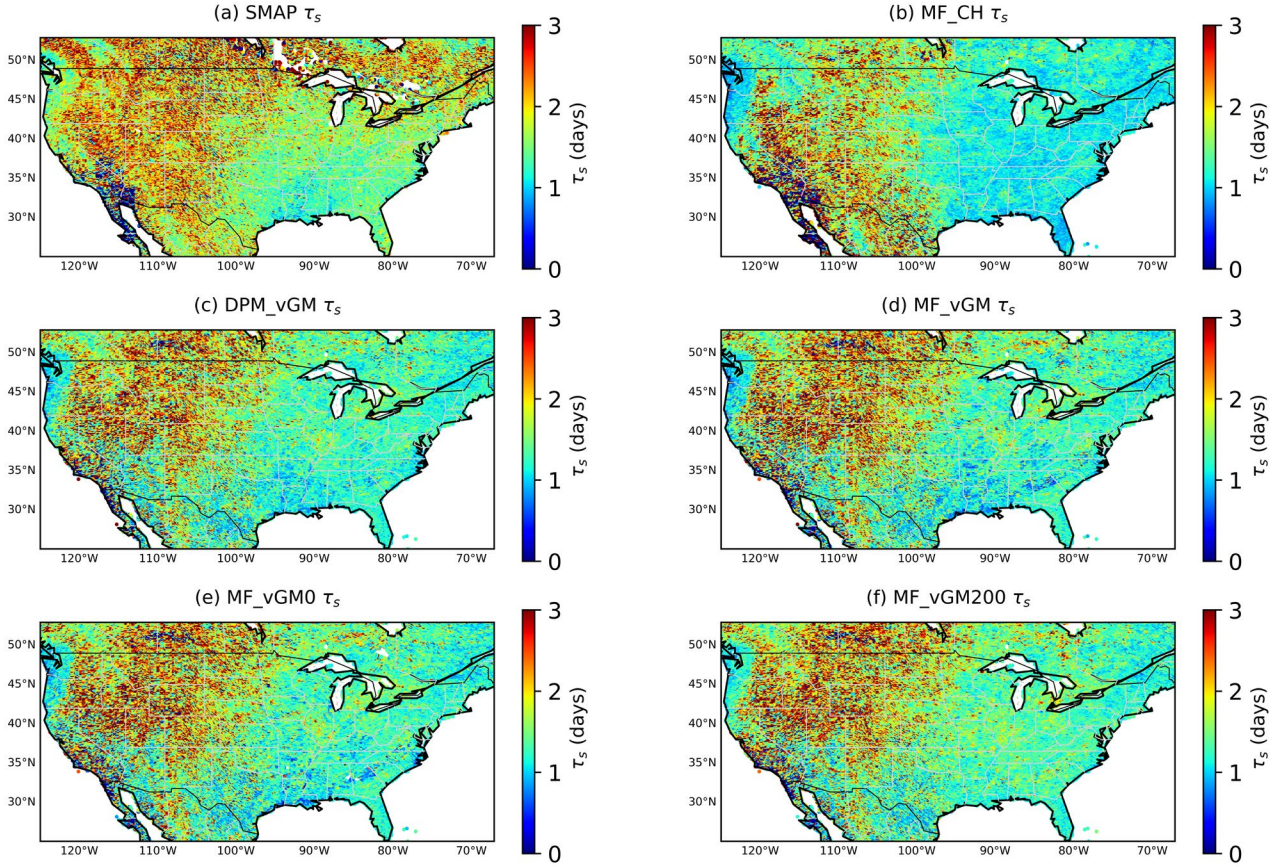
- SMAP L3 surface soil moisture
- International Soil Moisture Network (ISMN) root zone soil moisture
- Noah-MP surface and root zone soil moisture

Noah-MP Scenarios

Scenario	Infiltration scheme	Water retention scheme	Ponding depth threshold (mm)	
MF_CH	Matrix flow	Clapp and Hornberger	50	NWM uses this scheme
DPM_vGM	Preferential Flow (Dual permeable)	Van Genuchten	50	
MF_vGM	Matrix flow	Van Genuchten	50	
MF_vGM0	Matrix flow	Van Genuchten	0	
MF_vGM200	Matrix flow	Van Genuchten	200	

Short-term surface SMM

- various parametrizations are consistent with SMAP



Conclusion

- CH generates higher SSM and SMM compared to VG.
- An increase in ponding depth leads to a rise in surface soil moisture, as well as enhanced soil moisture memory, both long-term and short-term.
- The presence of macropores enhances infiltration, thereby resulting in a reduced long-term memory and an increase in short-term memory of Soil Surface Moisture (SSM).

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