

Validation of SMOPScdr Product using ISMN observations

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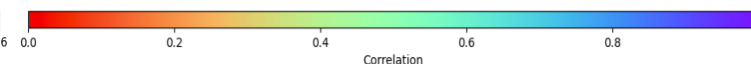
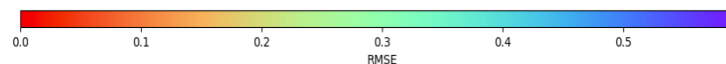
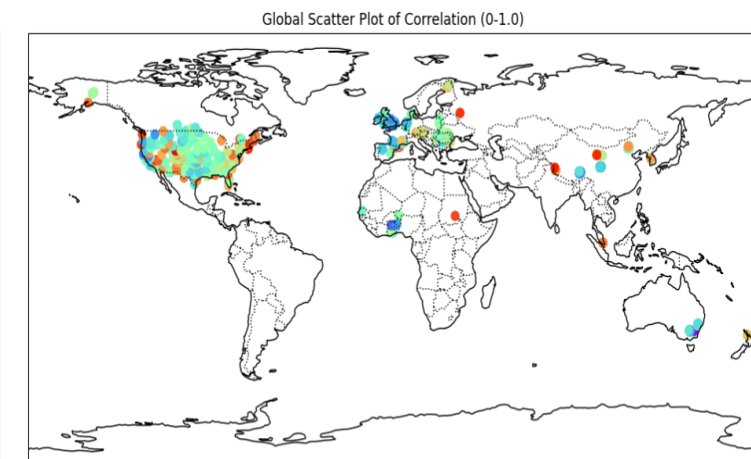
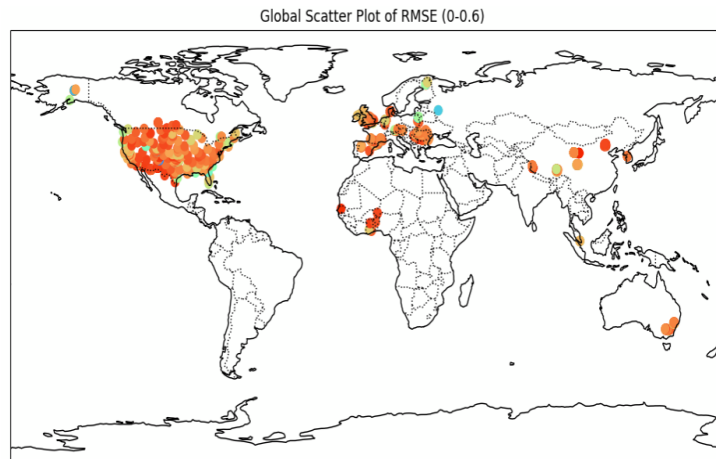
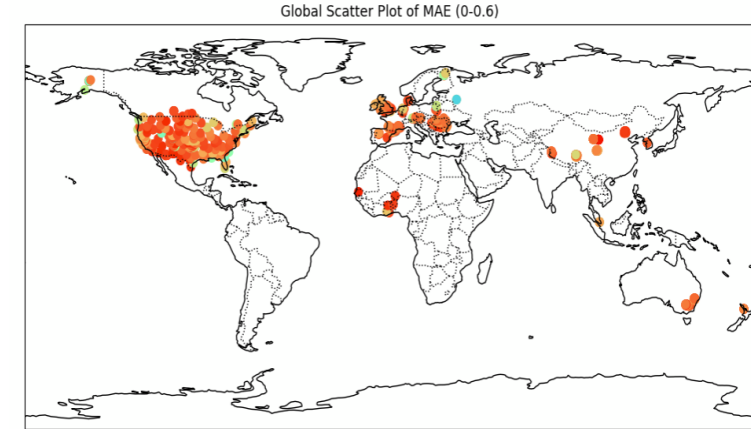
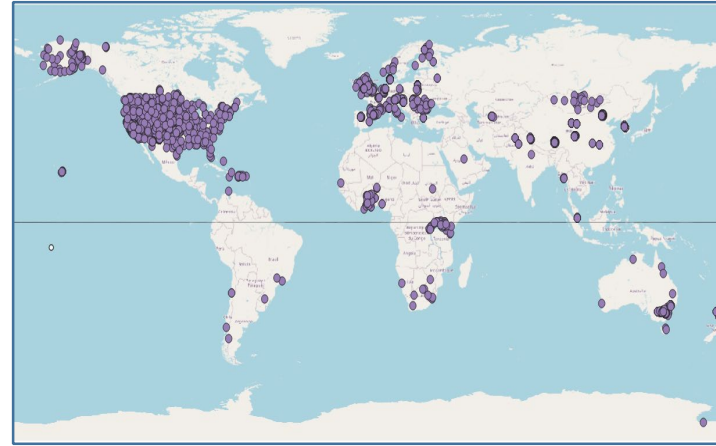
Objectives

- Collection of ground observations from International Soil Moisture Network (ISMN);
- Preprocess and quality Control ISMN data;
- Validations of Soil Moisture Products System (SMOPS) with the quality-controlled ISMN soil moisture observations.

Results

- ISMN exhibits geographical location affects the consistency of data;
- Validation results showed close alignment of in-situ and SMOPS data in term of their agreement;
- SMOPS shows a better performance during fall, spring, and summer over winter.

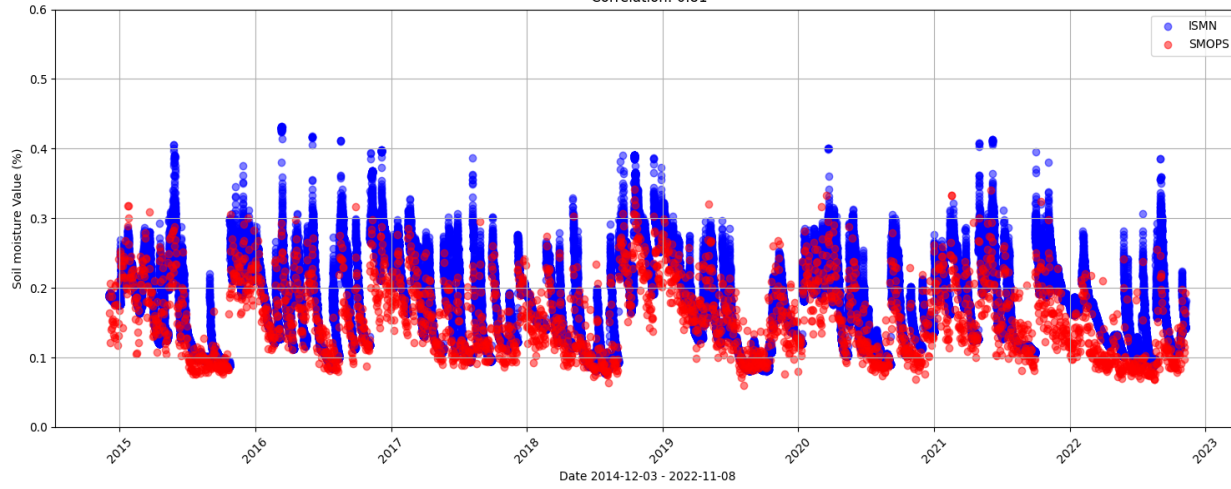
Overall Validation (2002/03-2024/06)



Typical Site Analysis

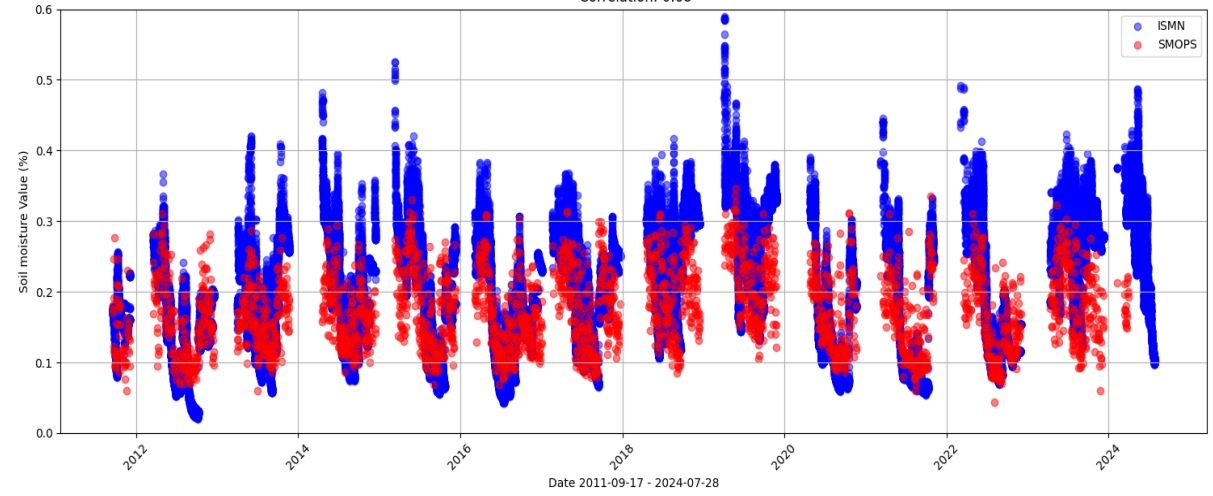
Comfort, TX

Soil moisture time series (CR200_28, 30.4613, -98.8451)
ISMN: Avg=0.18
SMOPS: Avg=0.16
MAE: 0.03
RMSE: 0.04
Correlation: 0.81



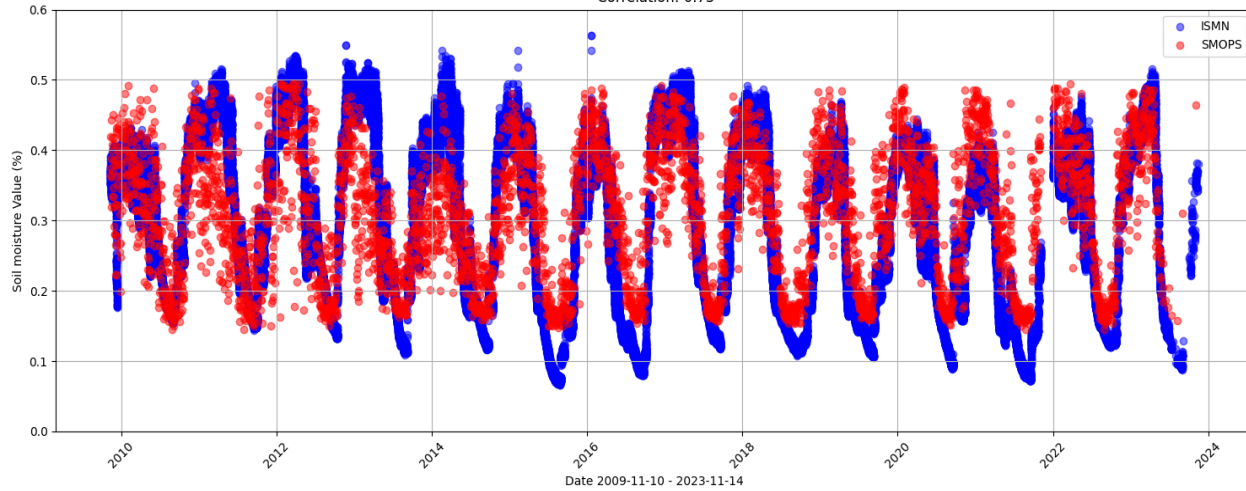
Sundance, WY

Soil moisture time series (Sundance_8_NNW, 44.5169, -104.4363)
ISMN: Avg=0.20
SMOPS: Avg=0.18
MAE: 0.06
RMSE: 0.07
Correlation: 0.68



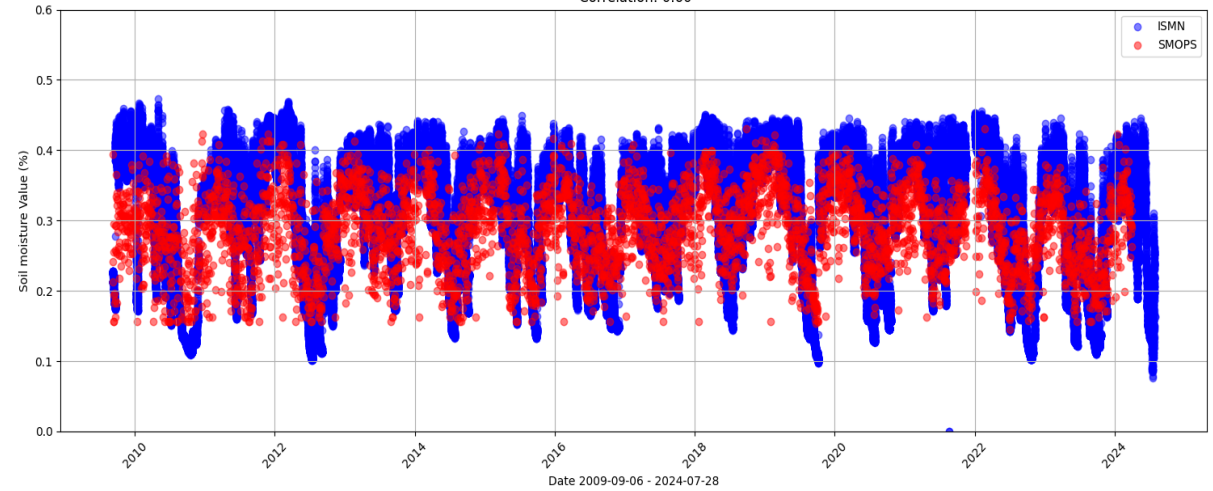
Corvallis, OR

Soil moisture time series (Corvallis_10_SSW, 44.4185, -123.3257)
ISMN: Avg=0.30
SMOPS: Avg=0.31
MAE: 0.06
RMSE: 0.08
Correlation: 0.75



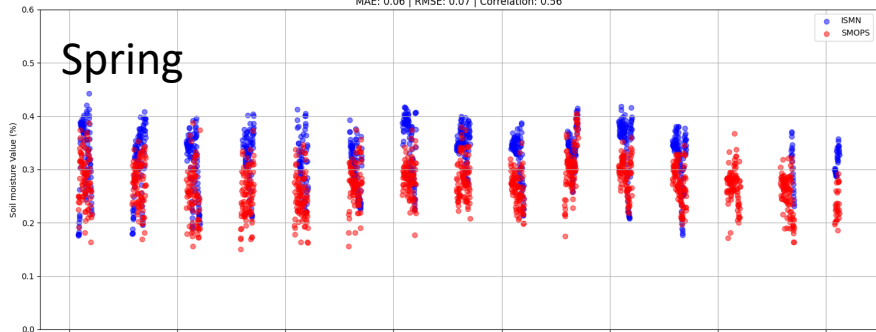
Versailles, KY

Soil moisture time series (Versailles_3_NNW, 38.0945, -84.7465)
ISMN: Avg=0.31
SMOPS: Avg=0.29
MAE: 0.06
RMSE: 0.07
Correlation: 0.60

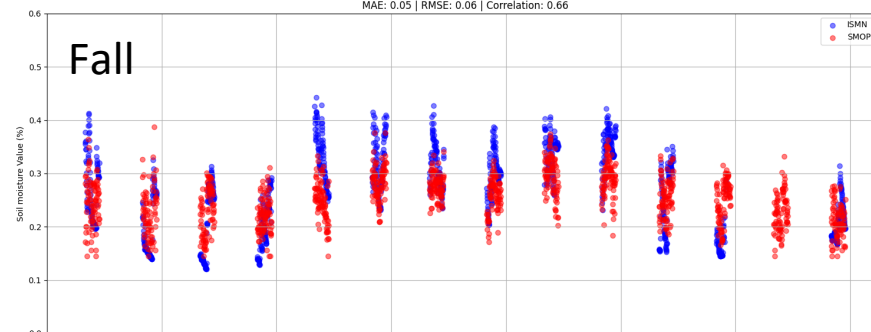


Factors in affecting the satellite Data

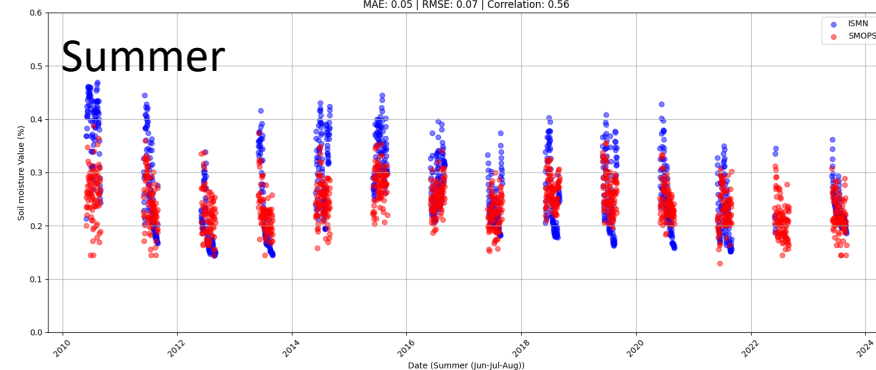
Soil moisture time series (Des Moines) - Spring (Mar-Apr-May)
 ISMN: Avg=0.33 | SMOPS: Avg=0.27
 MAE: 0.06 | RMSE: 0.07 | Correlation: 0.56



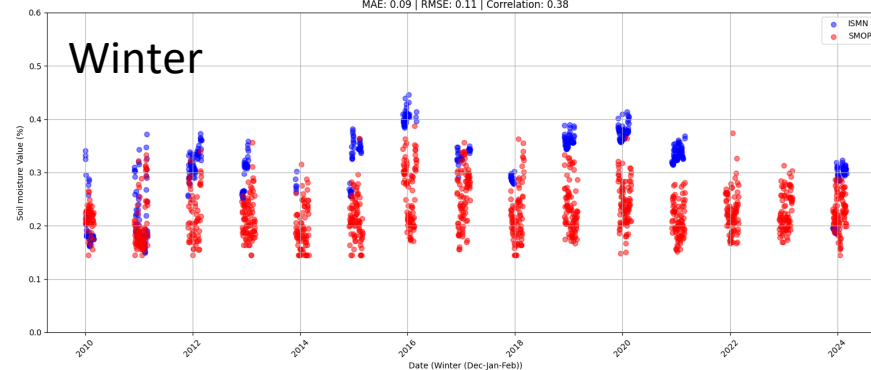
Soil moisture time series (Des Moines) - Fall (Sep-Oct-Nov)
 ISMN: Avg=0.27 | SMOPS: Avg=0.25
 MAE: 0.05 | RMSE: 0.06 | Correlation: 0.66



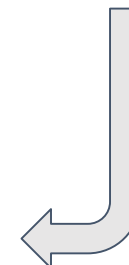
Soil moisture time series (Des Moines) - Summer (Jun-Jul-Aug)
 ISMN: Avg=0.27 | SMOPS: Avg=0.24
 MAE: 0.05 | RMSE: 0.07 | Correlation: 0.56



Soil moisture time series (Des Moines) - Winter (Dec-Jan-Feb)
 ISMN: Avg=0.30 | SMOPS: Avg=0.22
 MAE: 0.09 | RMSE: 0.11 | Correlation: 0.38



Climate factor: seasonal variation in the farming area, larger bias in winter.
 Des Moines, Iowa

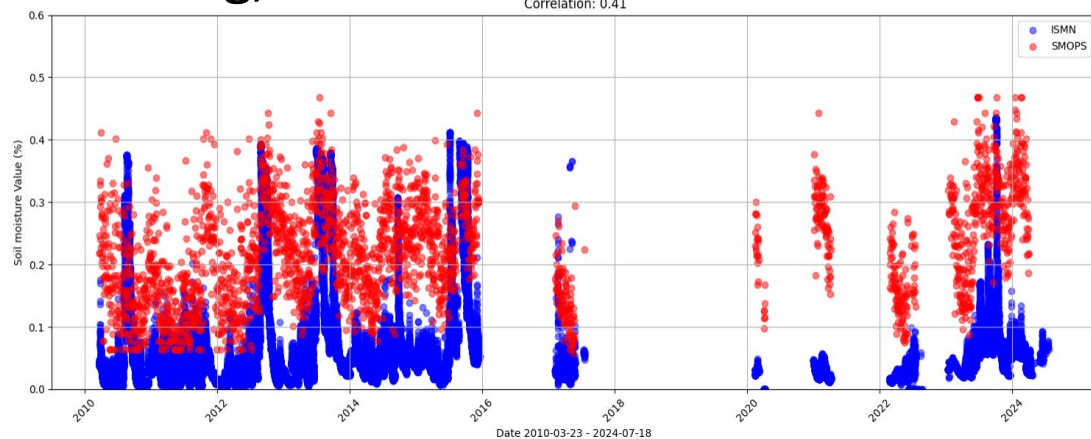


Geography factor: *Desert region:* Strong evaporation and ground absorption.



Soil moisture time series (Sebring) - Spring (Mar-Apr-May)
 ISMN: Avg=0.06
 SMOPS: Avg=0.24
 MAE: 0.17
 RMSE: 0.18
 Correlation: 0.41

Sebring, FL



Geography factor: *lower latitude coastal sites:* Frequent precipitation, strong wind.



Soil moisture time series (Mercury_3_SSW, 36.624, -116.0225)
 ISMN: Avg=0.03
 SMOPS: Avg=0.09
 MAE: 0.05
 RMSE: 0.06
 Correlation: 0.13

Mercury, NV

