A Two-Step Data Assimilation Framework to Improve Soil Moisture Data

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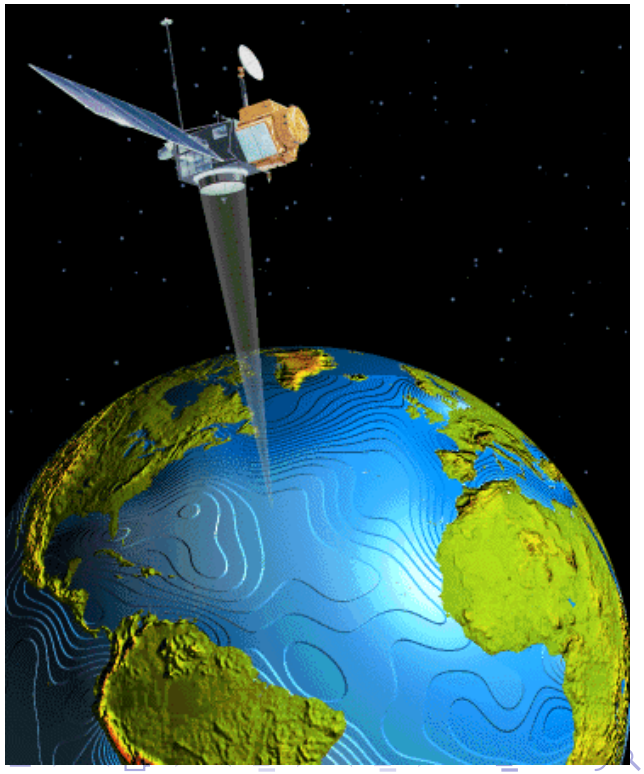
June 2, 2010

Satellite Soil Moisture Data

- **Soil moisture**: a crucial input for hydrological and weather forecasting applications



Retrieval of Satellite Soil Moisture

Radiative transfer model (RTM)

- Use satellite brightness temperature
- Retrieve satellite soil moisture
- Land Parameter Retrieval Model (LPRM)

Challenges: why assimilate?

- Variable accuracy
- Deeper soil layers

Soil Moisture Data Sources

Satellite soil moisture data

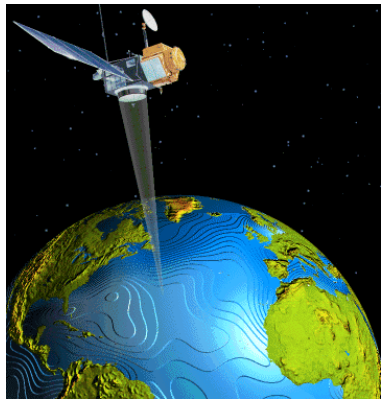
- Advanced Microwave Scanning Radiometer (AMSR-E)
- Grid size: 50×50 km

Insitu soil moisture data

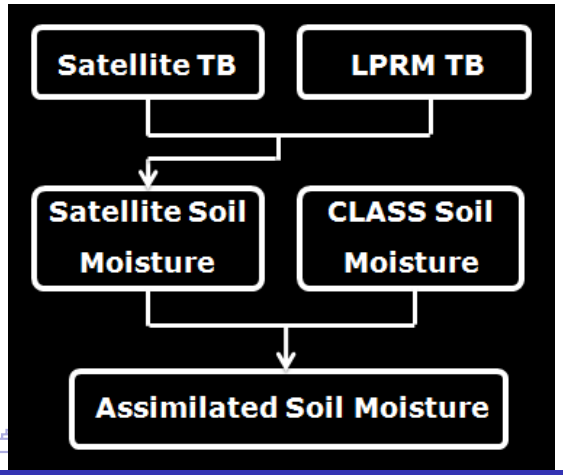
- 16 soil moisture networks
- part of Brightwater creek, Saskatoon

Improving Soil Moisture Estimates Through a 2-Step Data Assimilation

A joint assimilation of brightness temperature (TB) and soil moisture

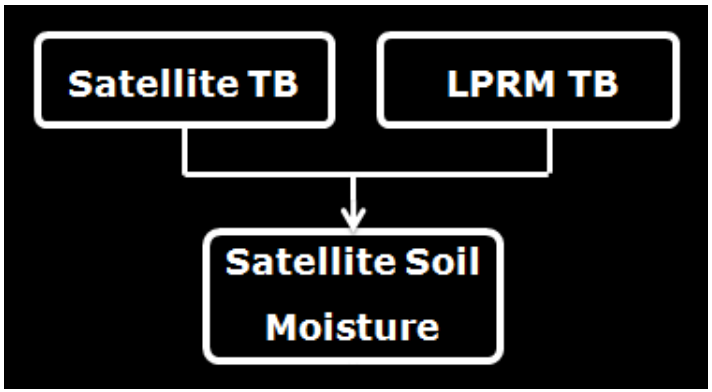


- Merge two soil moisture estimates:
- Satellite soil moisture (LPRM)
- Land surface scheme (CLASS)
- Objectives: Bias, RMSE, Cost function
- Validate with in-situ dataset

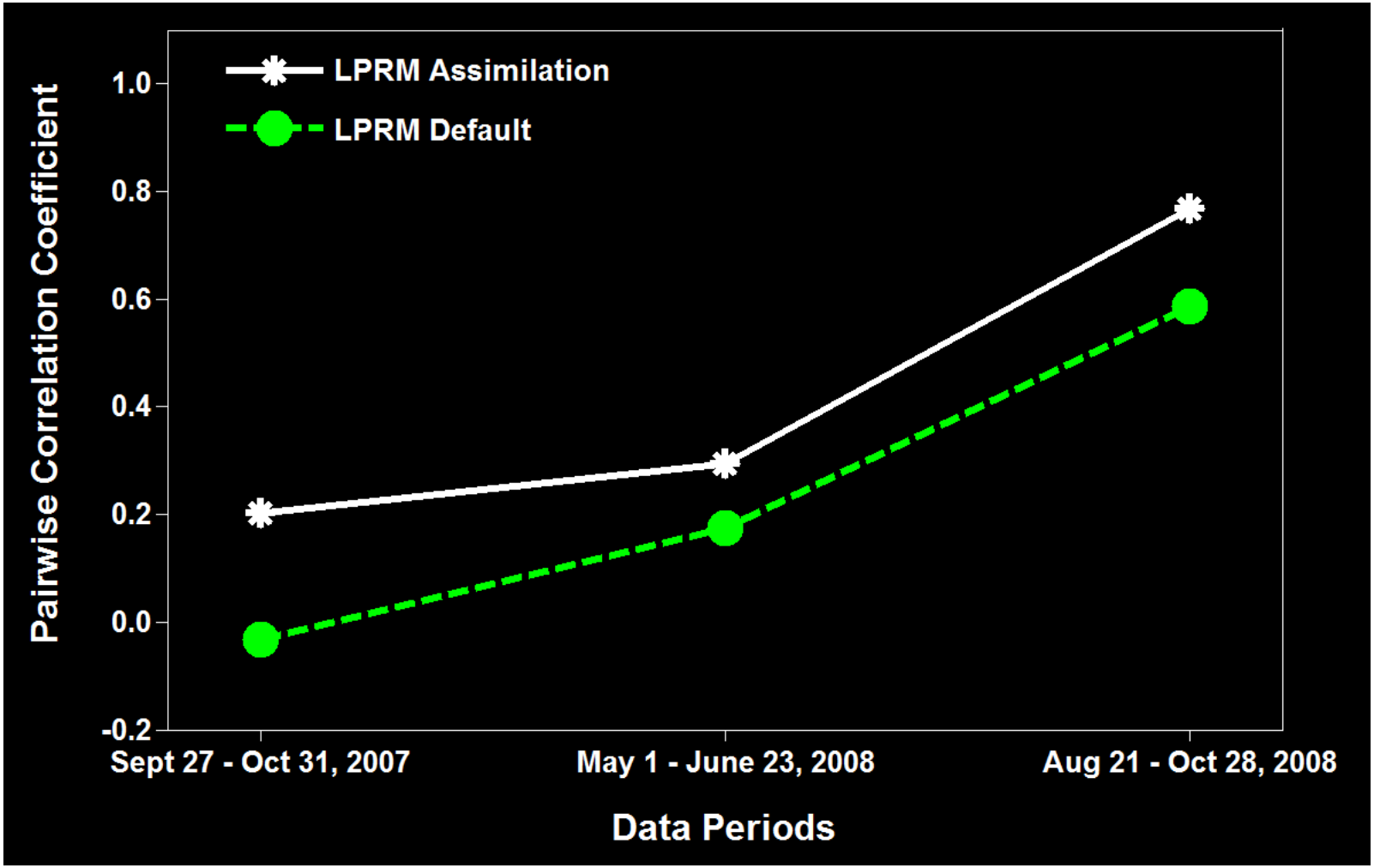


Step One: Assimilation of Satellite TB Into LPRM

- Observed TB from satellite
- Simulated TB from LPRM
- Merge observed and simulated TBs

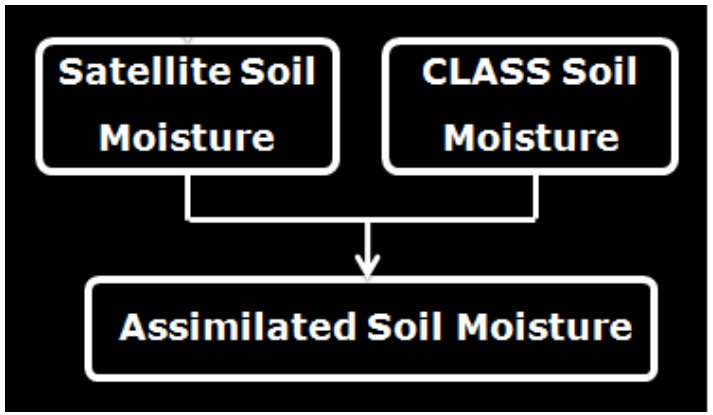


Comparison Between Assimilation and LPRM Default

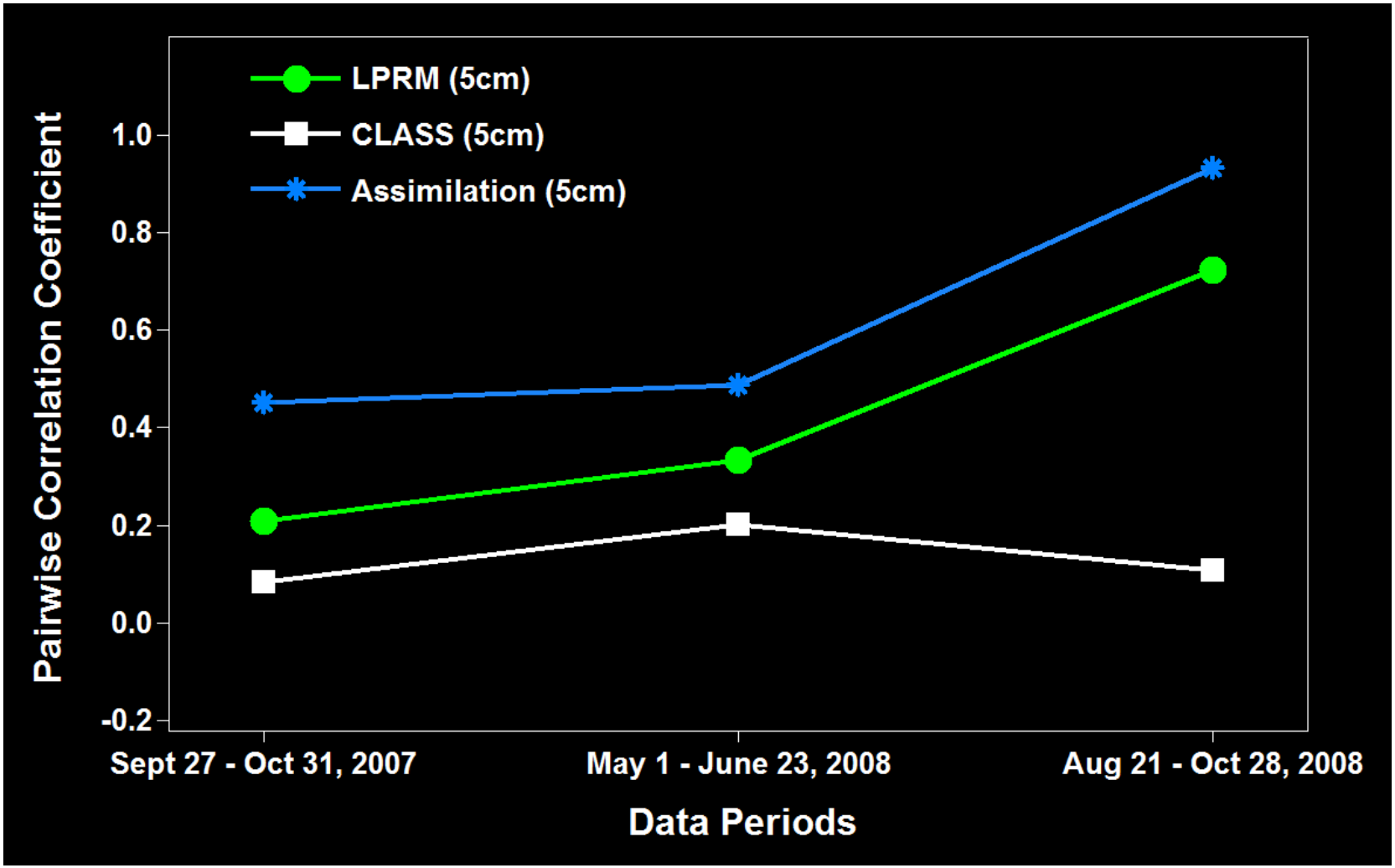


Step Two: Assimilate Satellite Soil Moisture Into CLASS

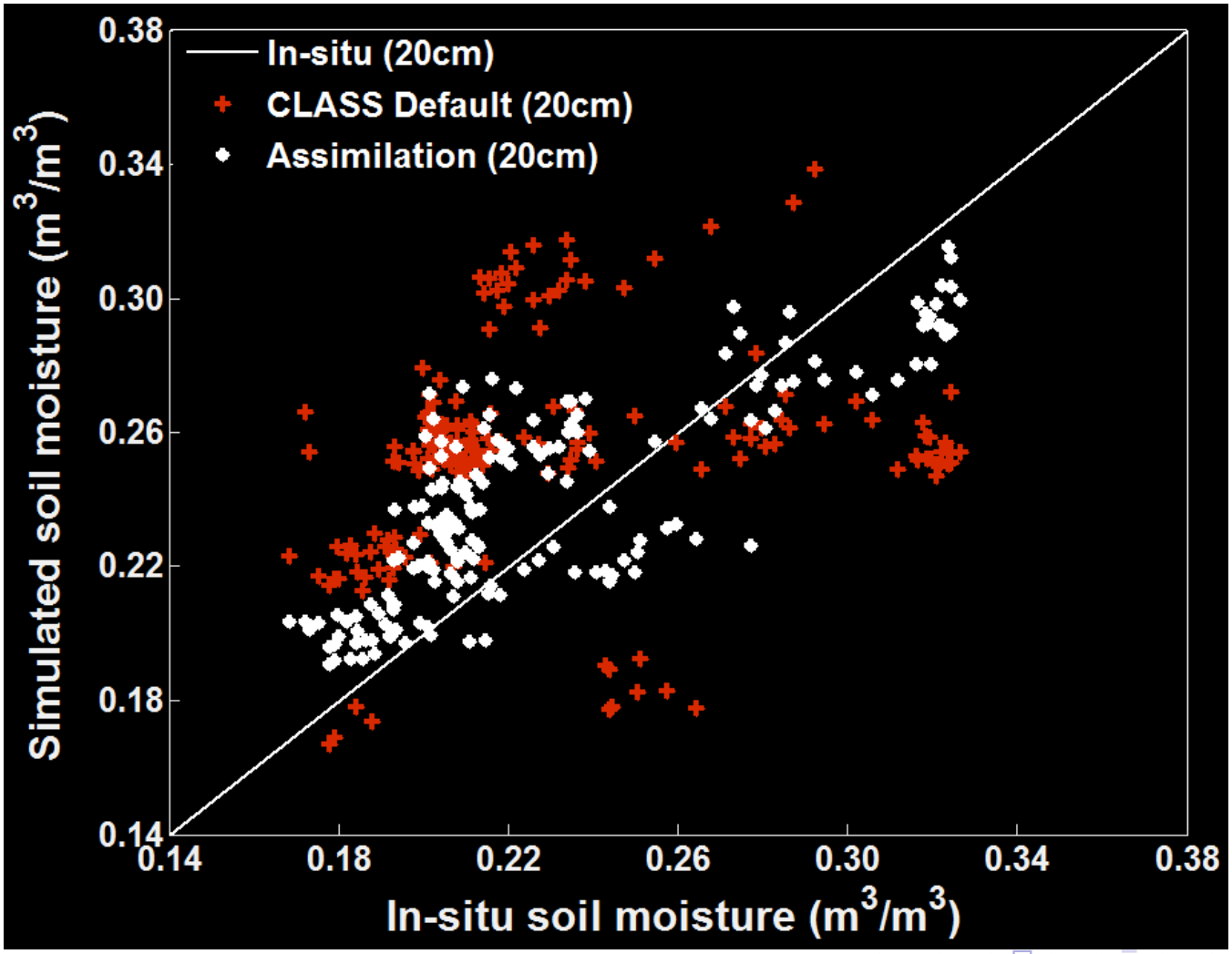
- Satellite soil moisture from LPRM
- Simulated soil moisture from CLASS
- Merge two soil moisture estimates



Comparison Between Soil Moisture Estimates



Validation for Soil Moisture at 20cm Depth



Summary and Conclusions

- Improve soil moisture estimate by assimilating satellite TB into LPRM
- Generate an improved soil moisture through a merger between satellite soil moisture and CLASS
- Continuous updating for real-time soil moisture assimilation