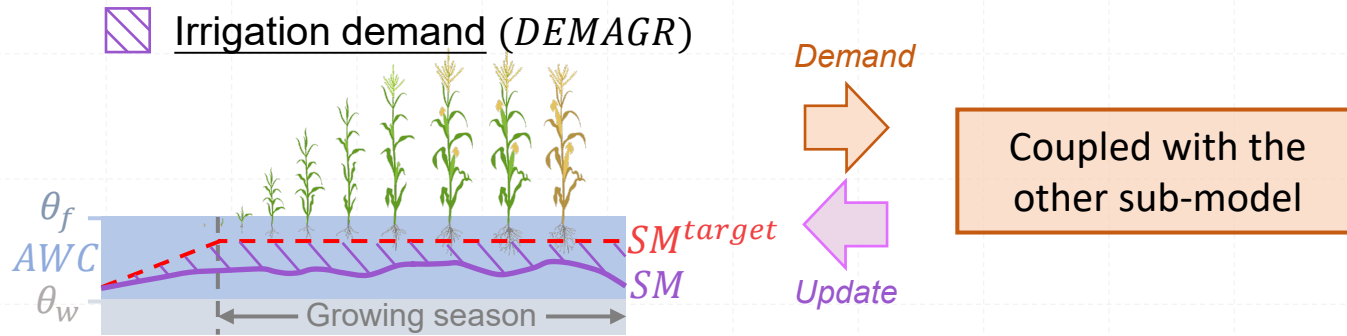


- **How Standard H08 (one of the Global Hydrological Models) Calculate Irrigation** (Hanasaki et al., 2008a 2008b 2018)



Generally...

- Non-rice: keep **soil moisture** at **75%** of the available water capacity (AWC)
- Rice: **100%** of AWC

- **Key Challenges: Soil Moisture of Satellite and H08 is NOT Comparable !**

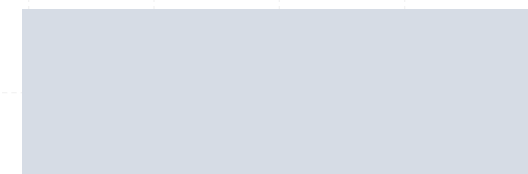
*It is unknown how high H08 soil moisture should be with irrigation from SMAP perspective*

Satellite: **SMAP L3\_E**

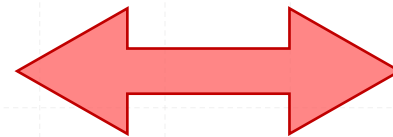


- Surface layer (typical 5 cm)
- Observation based

GHM: **H08**



- 1 m soil layer (differs in GHMs)
- Model-specific definition

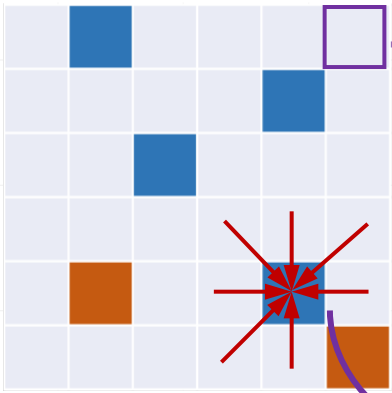


**Research Question:** How to translating irrigation information embedded in satellite observations into the model-specific soil moisture states in GHMs?

- **Solution: Developing A Two-season CDF-matching Technique**

*To provide a H08-compatible soil moisture reference based on satellite soil moisture*

**CDF matching separately for Winter-Spring (W-S, Low irrigation)**  
**and Summer-Autumn (S-A, Peak irrigation)**

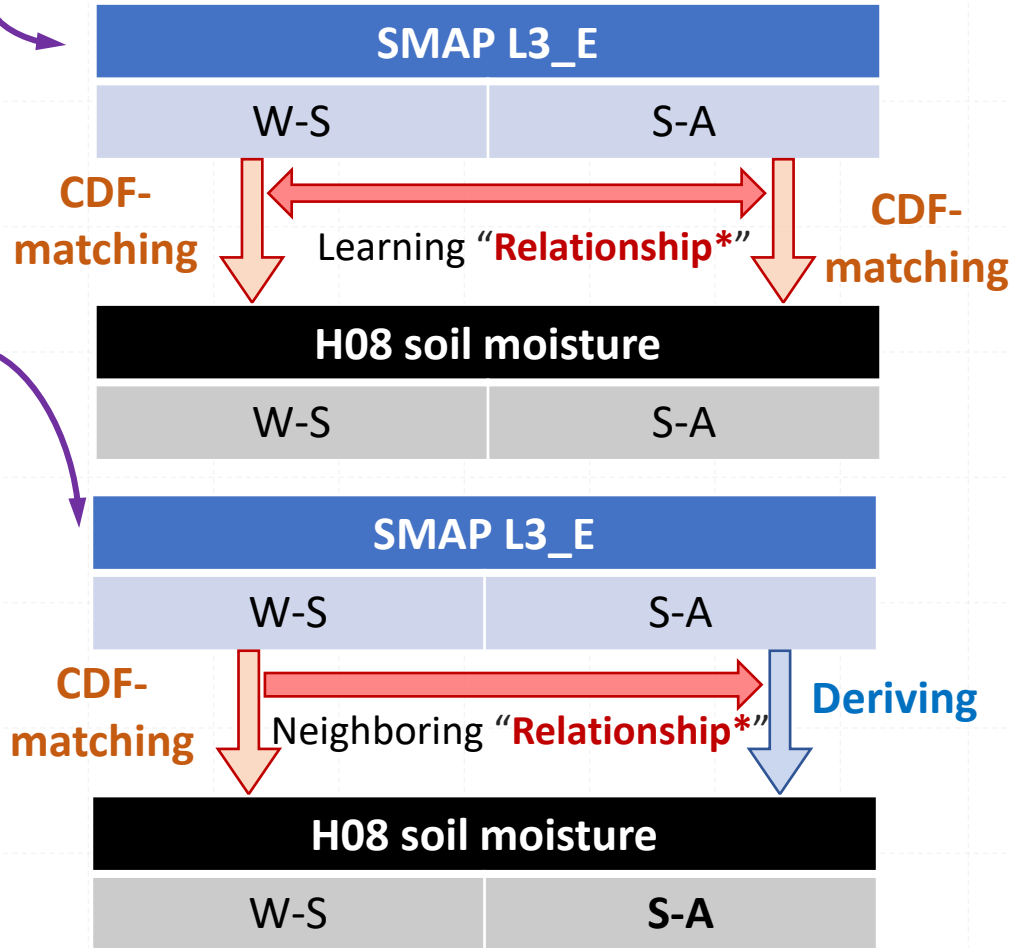


Non-irrigated grid cells for fitting  
 Non-irrigated grid cells for testing

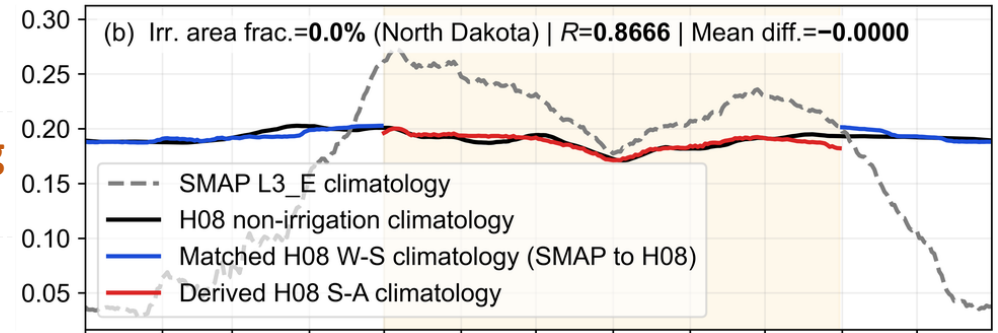
**Irrigated** grid cells

**Neighboring Relationships**

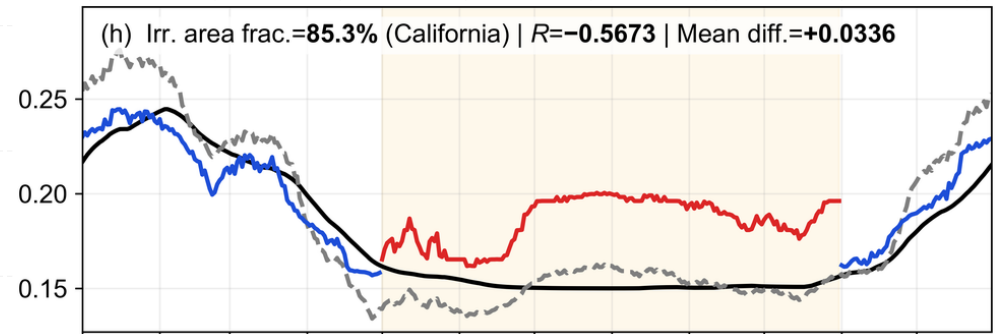
*Relationship\* detailed in Cp4. Supple.*



**Method validated in non-irrigated grid cells:**

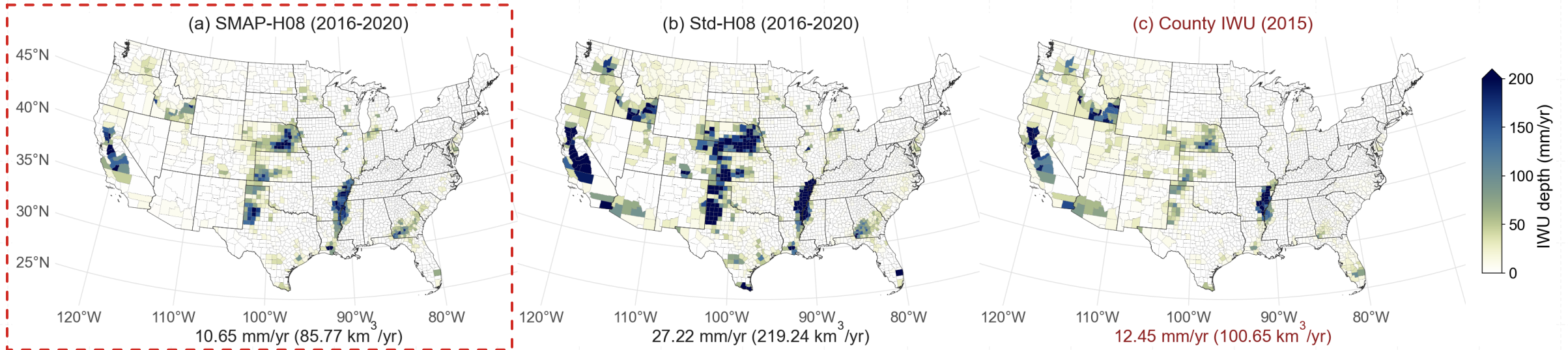


**Method applied for irrigated grid cells:**

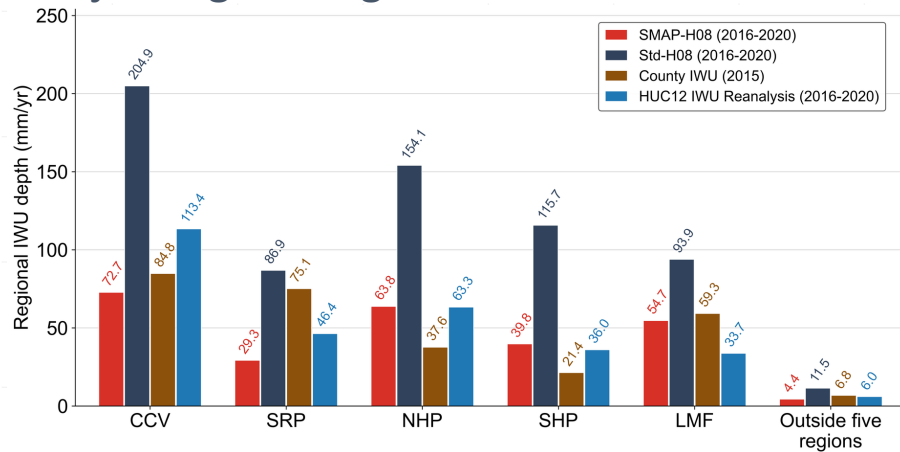


- Results: Applying the Satellite-derived Reference to H08 Model Improves the Performance**

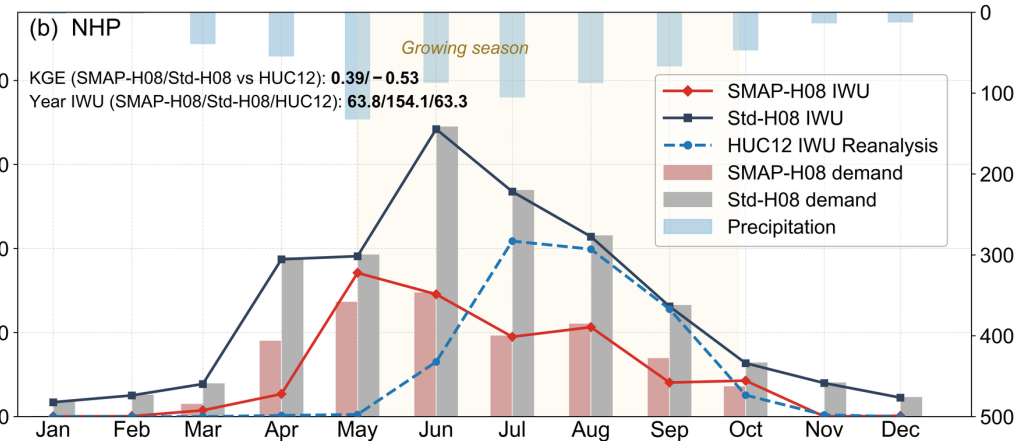
### County-level spatial comparison



### Major irrigated regions



### Timeseries comparison



**The satellite-incorporated H08 constrains irrigation simulation and improves seasonal/spatial performance**