Patterns of Hydrologic Changes in the Kruger National Park: A Remote Sensing Perspective

Sarah Daly, Jasmeet Judge, Laura Almendra-Martín, Christiane Schmullius, and Gregory Kiker.

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CENTER FOR REMOTE SENSING
UF IFAS UNIVERSITY of FLORIDA
SCHOOL OF NATURAL RESOURCES AND ENVIRONMENT
FRIEDRICH-SCHILLER-UNIVERSITÄT JENA
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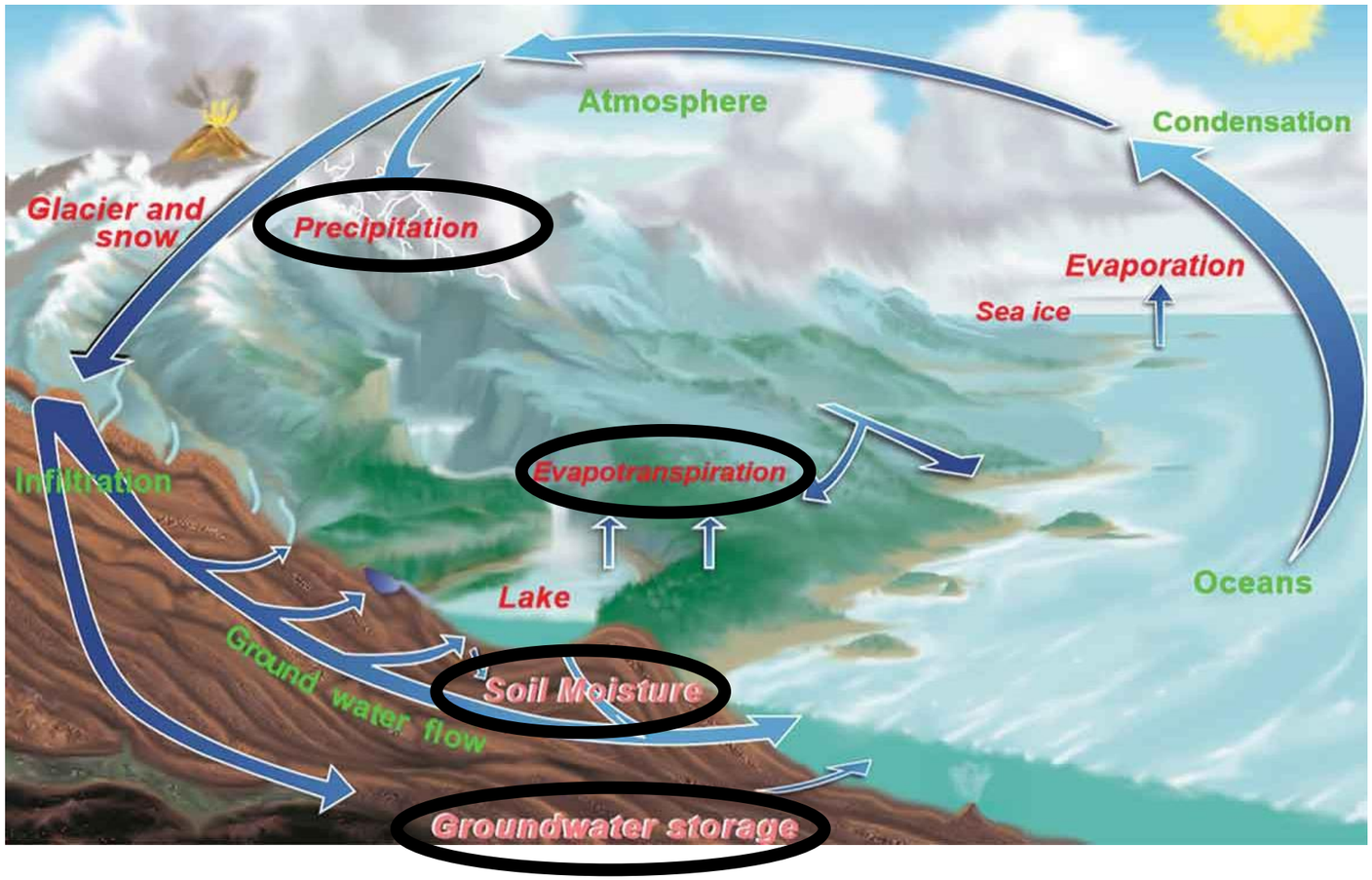
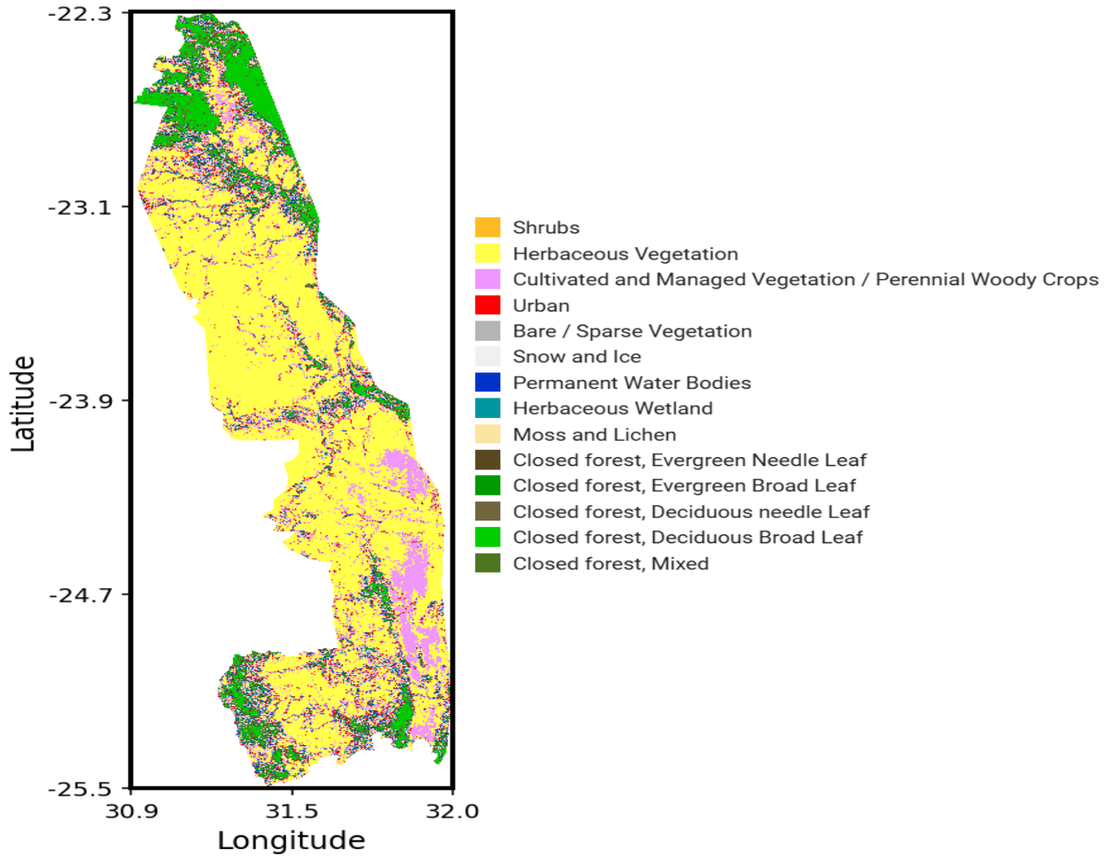
Agricultural & Biological Engineering

Hydrological Cycle



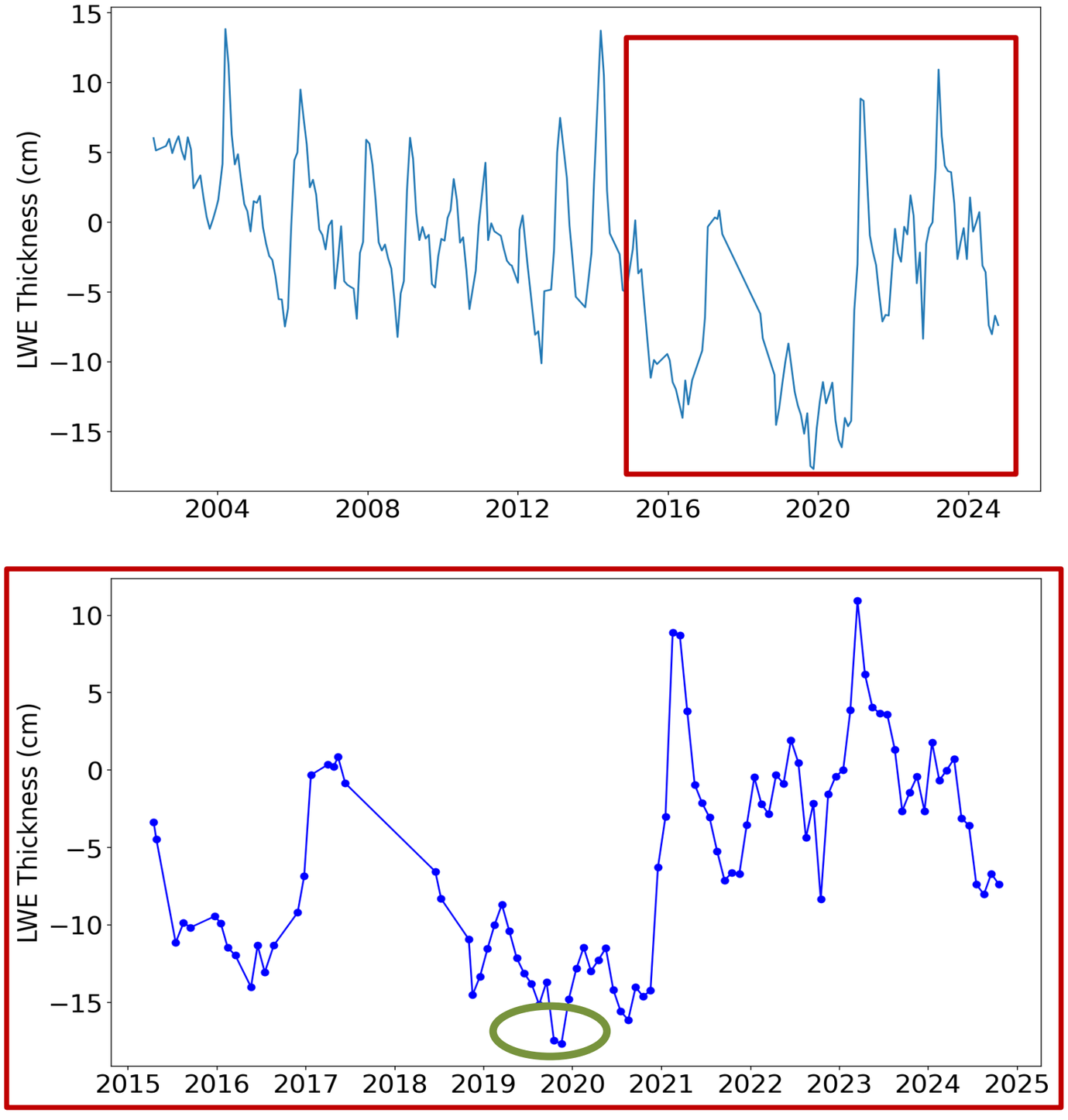
Kruger National Park



Variable	Product	Satellite
Total water storage	Liquid water equivalence (LWE) anomalies	GRACE
Precipitation	Precipitation	CHIRPS
Soil moisture	Soil moisture	SMAP
Evapotranspiration	Normalized Difference Vegetation Index (NDVI)	Landsat 8

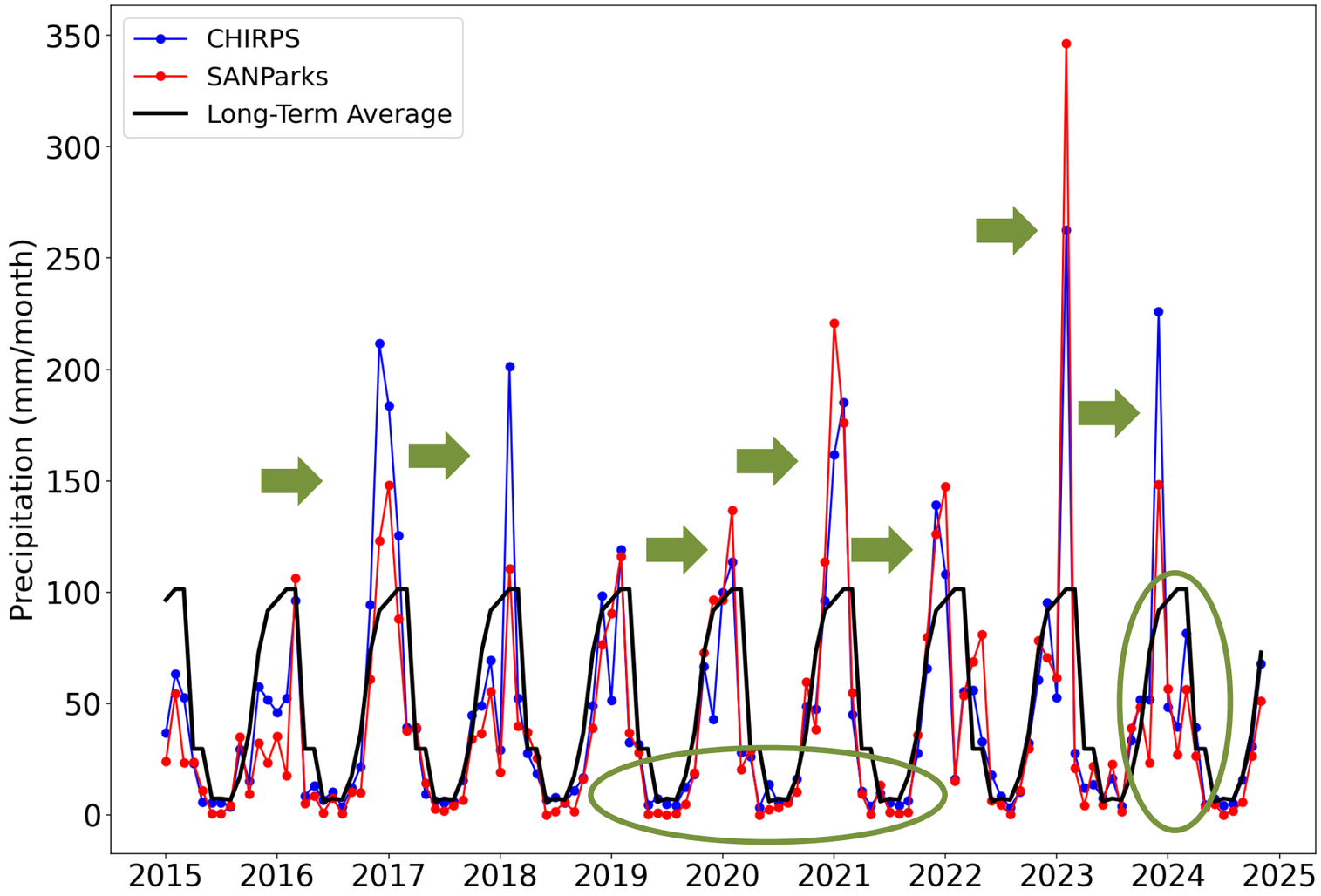
GRACE: Total Water Storage (LWE)

- Decrease in LWE during the 2015/2016 drought
- Hydrological recovery indicated by an increase in LWE since 2021
- The lowest values recorded in 2020



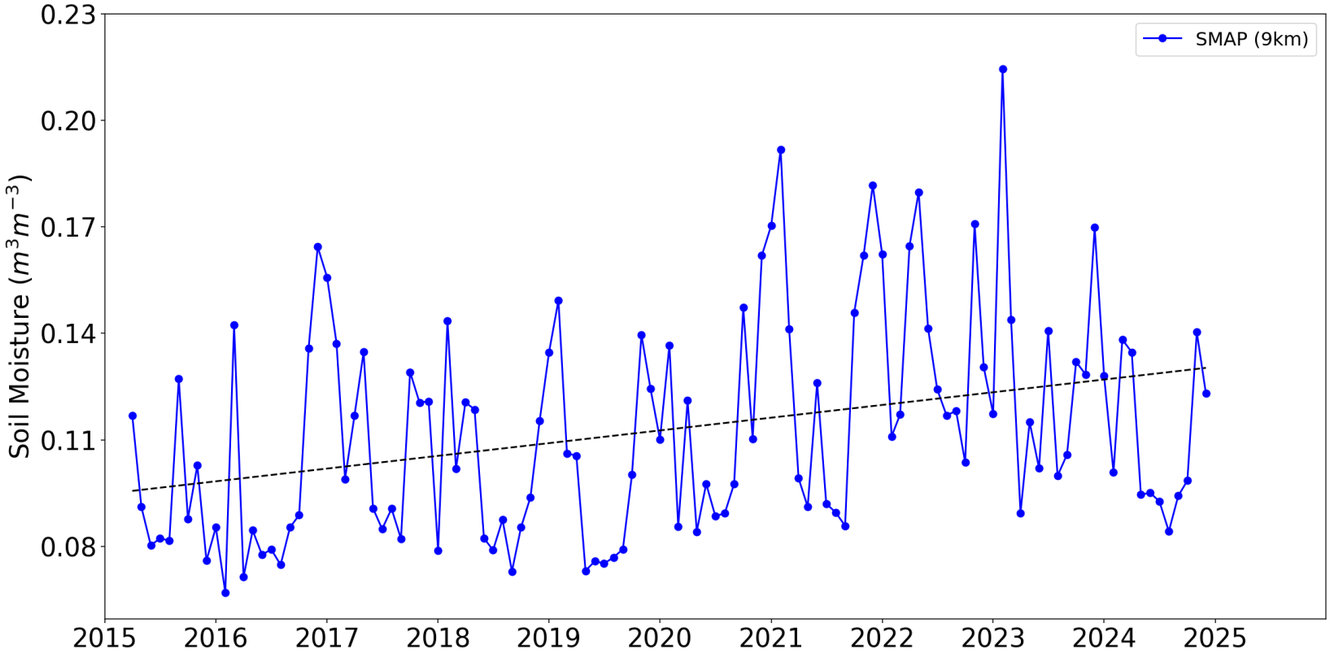
CHIRPS: Precipitation

- CHIRPS and SANParks monthly precipitation data show a strong positive correlation
- **Seasonal Shifts:**
  - slight dry season decline
  - wet season shift toward more intense monthly rainfall
  - increased variability.



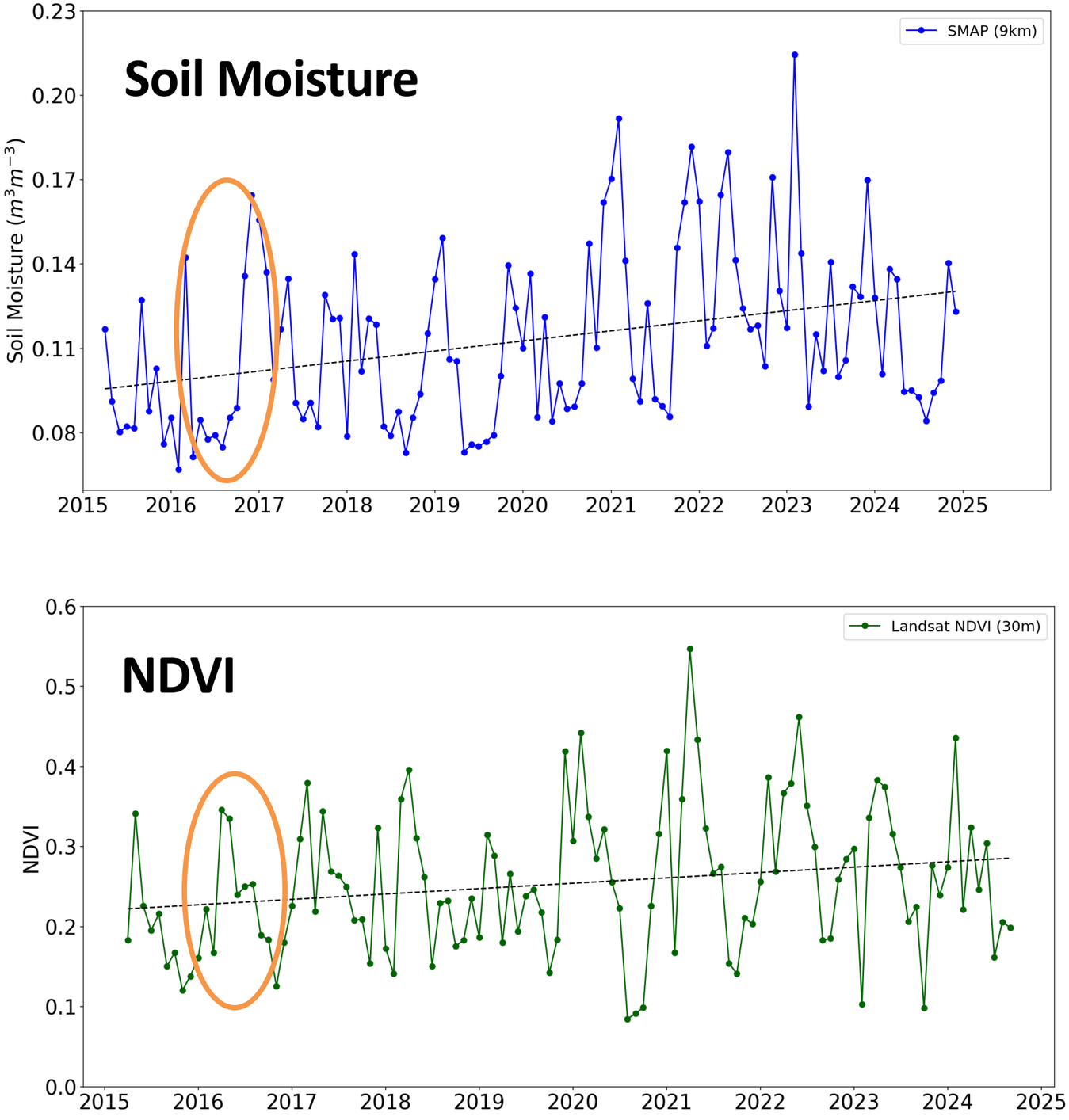
NASA-SMAP: Surface Soil Moisture

- Distinct wet and dry season peaks and troughs
- The dataset captures the post-drought increase in soil moisture

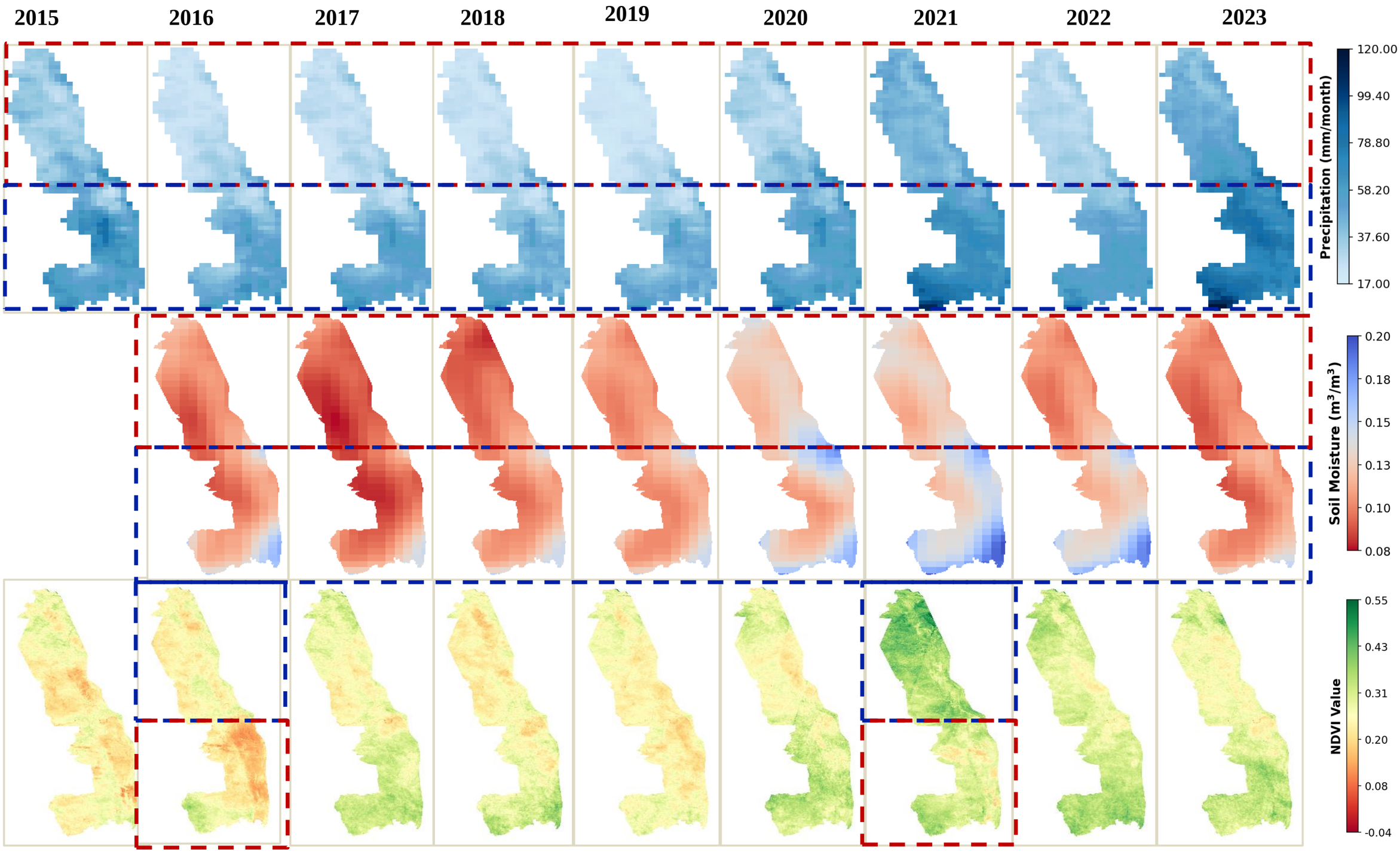


NASA-SMAP Surface Soil Moisture & Landsat-8: NDVI

- Distinct wet and dry season peaks and troughs
- The dataset captures the post-drought increase in soil moisture
- Trends indicate increased vegetation greenness and recovery from the 2015-2016 drought



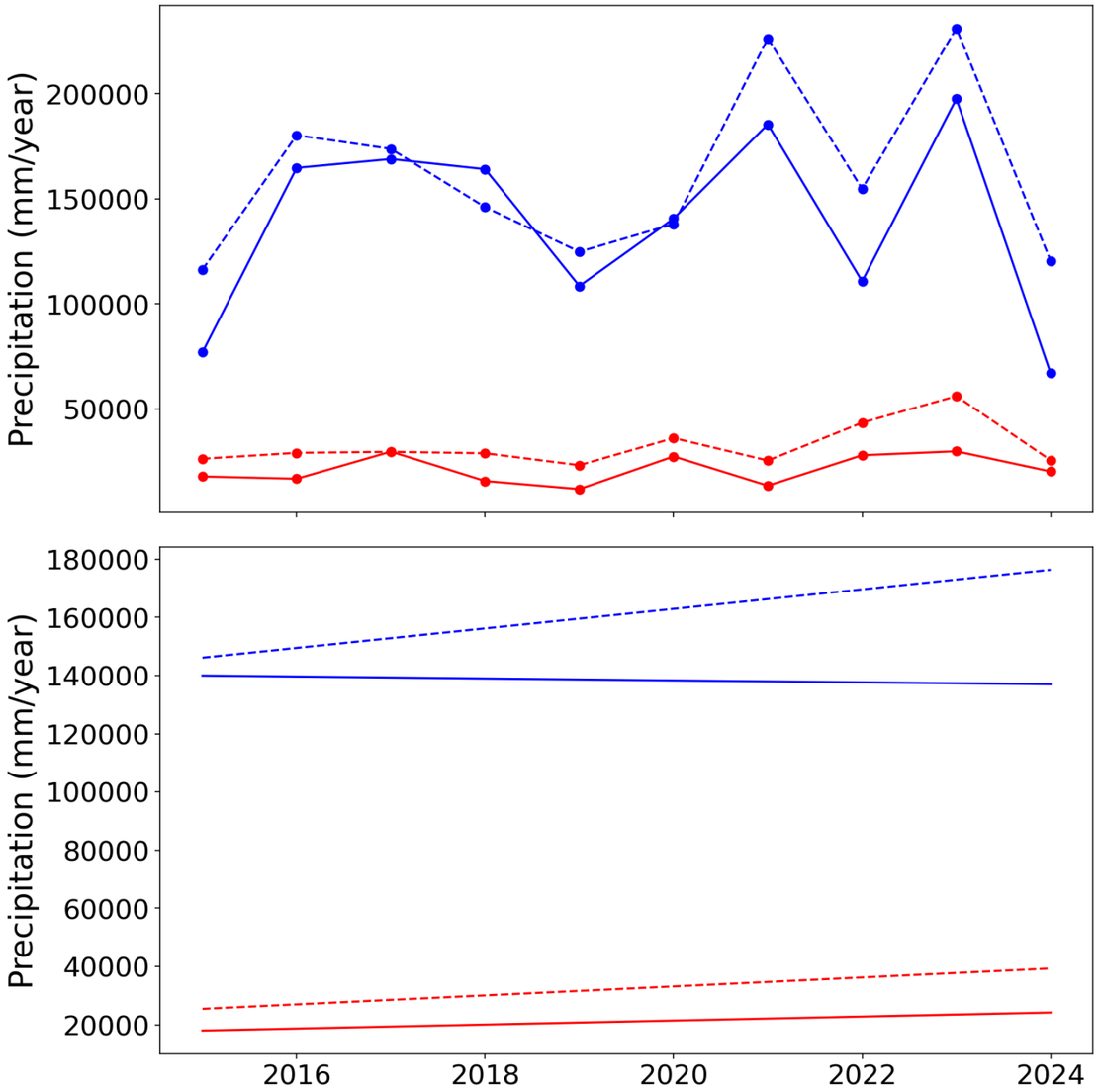
How is the hydrological cycle changing spatially in KNP?



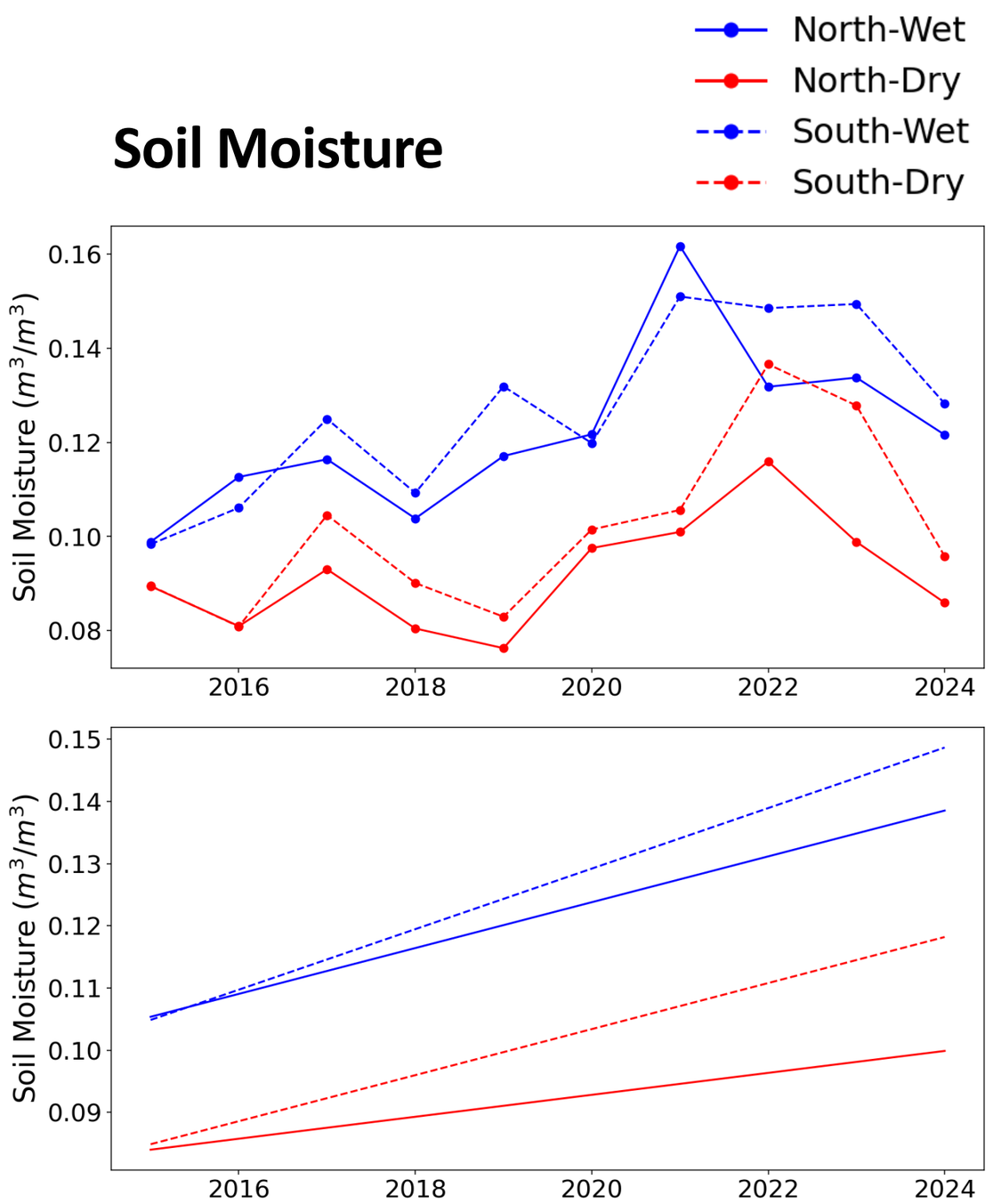
- **Precipitation and Soil Moisture:** wet (southern) and dry (northern) regions
- **Vegetation:** variable spatial patterns

How is the Hydrological Cycle different in the Northern and Southern Regions of KNP?

Precipitation



Soil Moisture



- **Precipitation:** Increasing spatial variability during the **wet season**
- **Soil Moisture:** Increasing spatial variability during the **dry season**
- Increasing spatial and seasonal variability

SUMMARY

- **Importance of Spatial Monitoring**: Regional differences were highlighted for KNP
- **Need for ground-based data**
- **Future Considerations:** the upcoming NISAR mission

NISAR
NASA - ISRO SAR Mission