Regional Trends and Physical Controls of Streamflow Drought Characteristics in Tropical Catchments

Picture Credit: UNCCD (June,2021)

27/05/2022

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EGU General Assembly 2022

Paper ID: EGU22-1239

DST SERB, Funding ID: SRG/000044

Streamflow Drought: Regional and Global Impacts

We are experiencing more hot-dry extremes!!!

WATER

Every fifth child faces water scarcity globally: Unicef report

More than 155 million children in South Asia live in areas with high or even extremely high water vulnerability, Unicef says

(Source- Down To Earth,2021)

Drought forever

Severe drought strikes India every eight to nine years and is a major reason for perpetuating poverty

(Source- Mahapatra, R. Down To Earth,2015)

WATER

India's water crisis: The seen and unseen

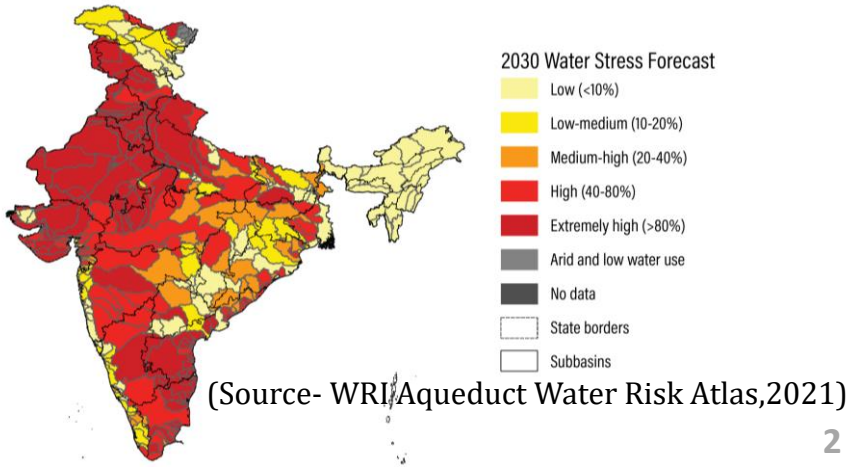
As many as 256 of 700 districts reported critical or over-exploited groundwater levels as of 2017

(Source-Nathan, M. Down To Earth,2021)

Water crisis due to low rainfall hampers energy, power generation in India

Climate change is likely to increase the frequency and intensity of droughts

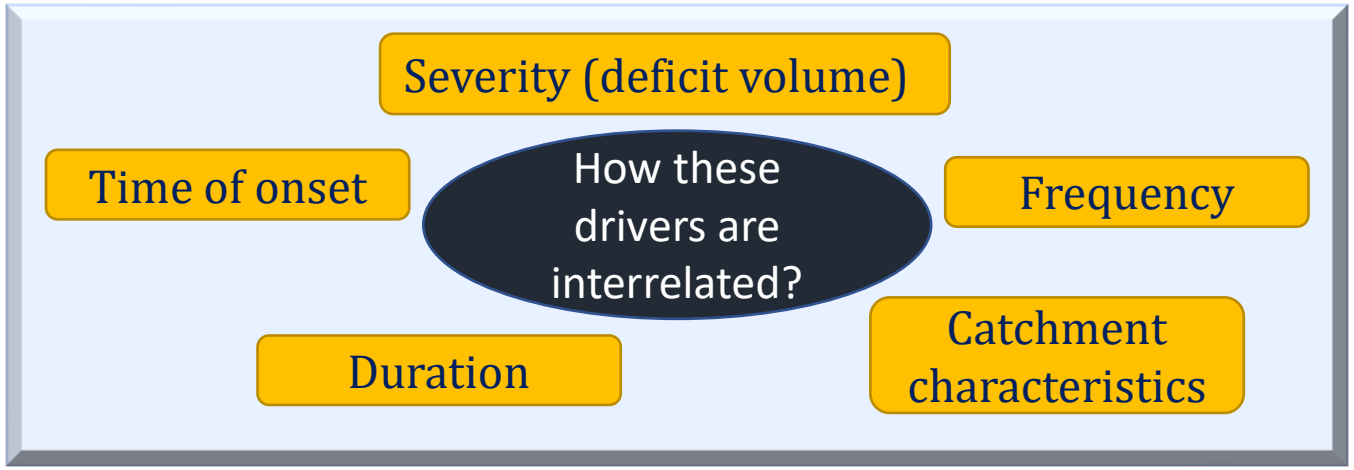
(Source- Business Standard,2017)

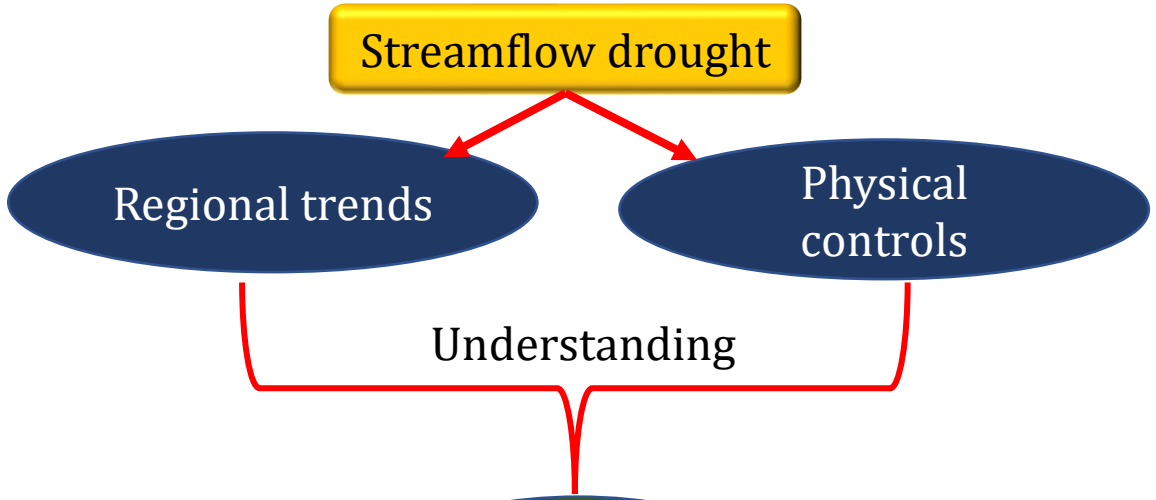


(Source- WRI Aqueduct Water Risk Atlas,2021)

Rationale & Research Gaps

Ever wonder the relationship between onset timing and deficit volume?



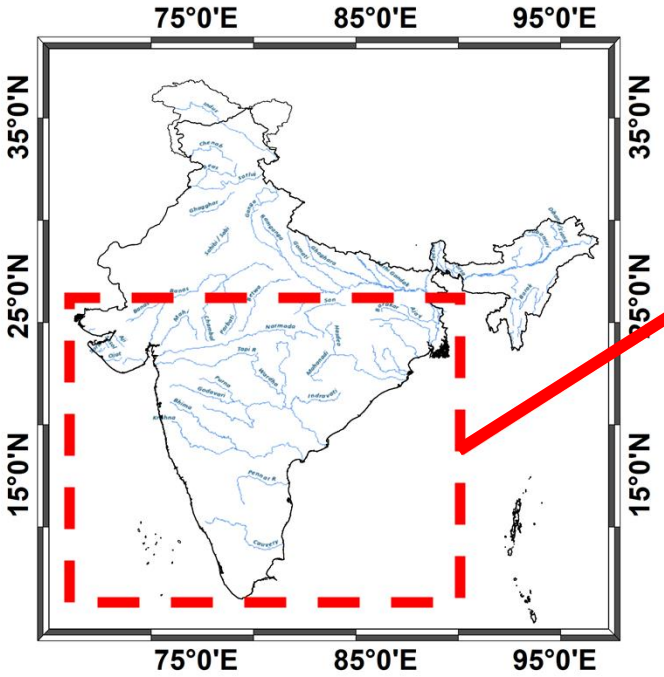


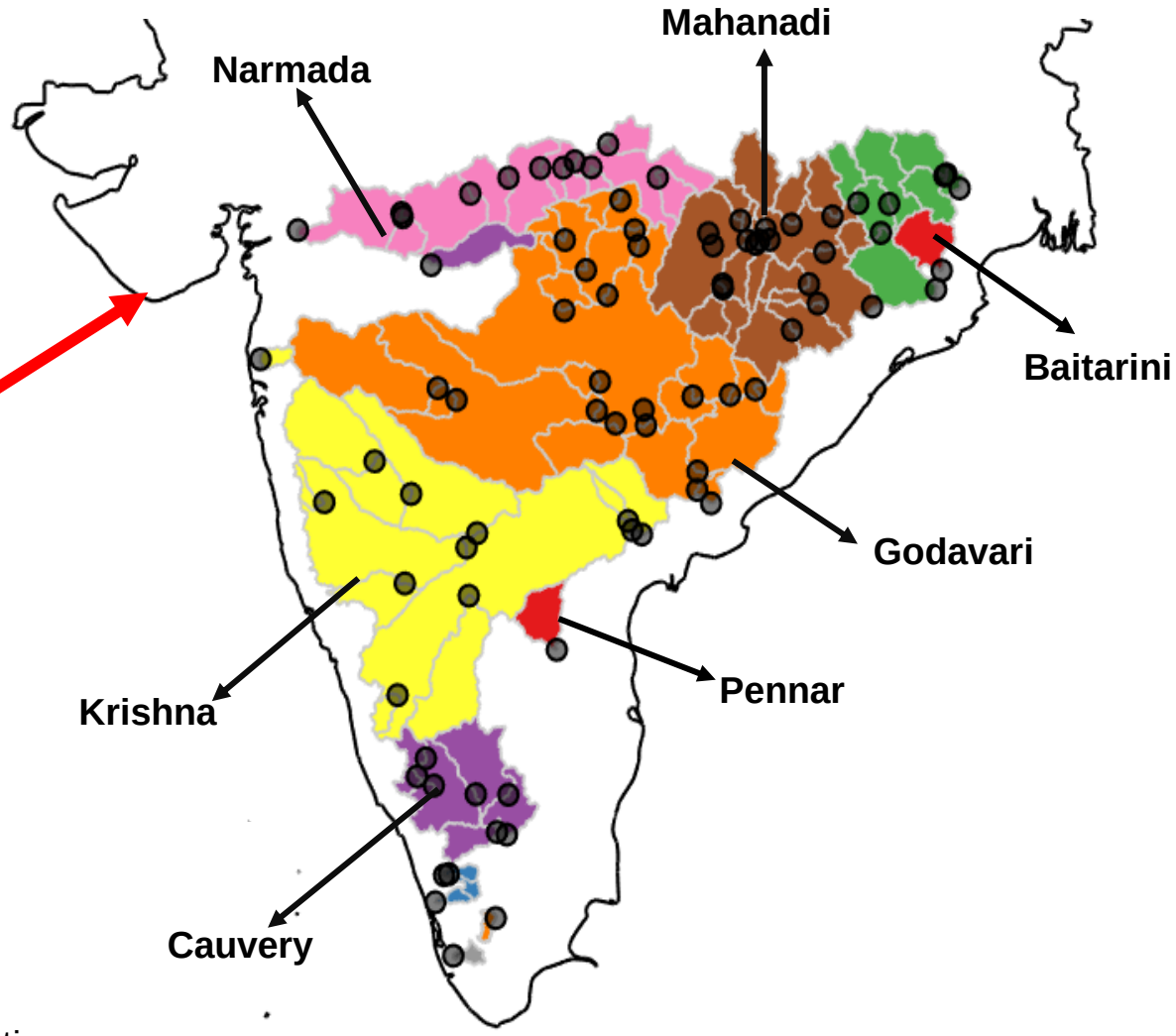
- No studies have investigated concurrent trend in drought onset & severity.
- Similar studies were found for floods (Chen *et al*. 2012; Wasko *et al*. 2020).
- Drought rich/poor period & it's drivers (Physical controls) were not investigated.

onset timing ?

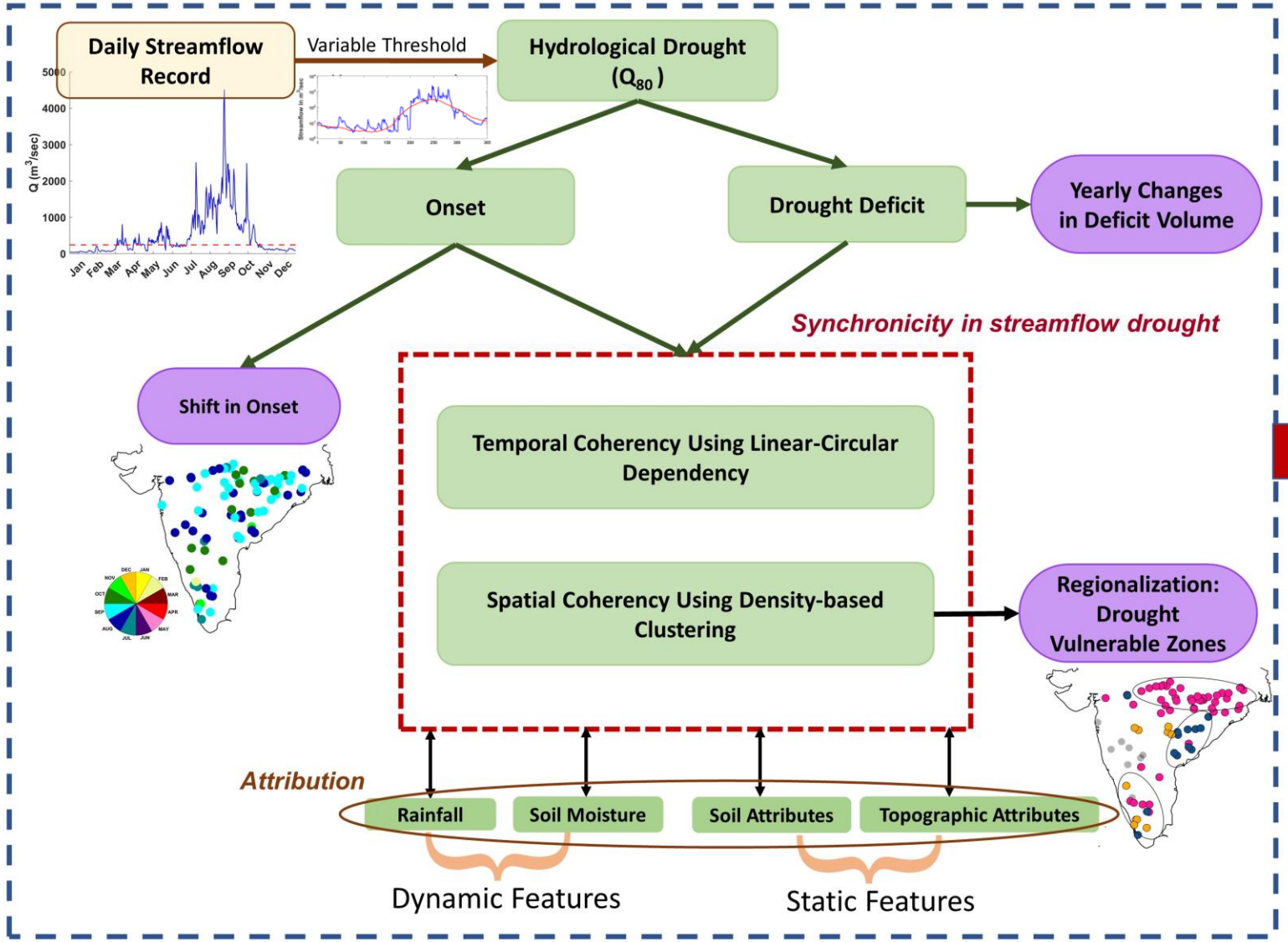
River Basins in Peninsular India

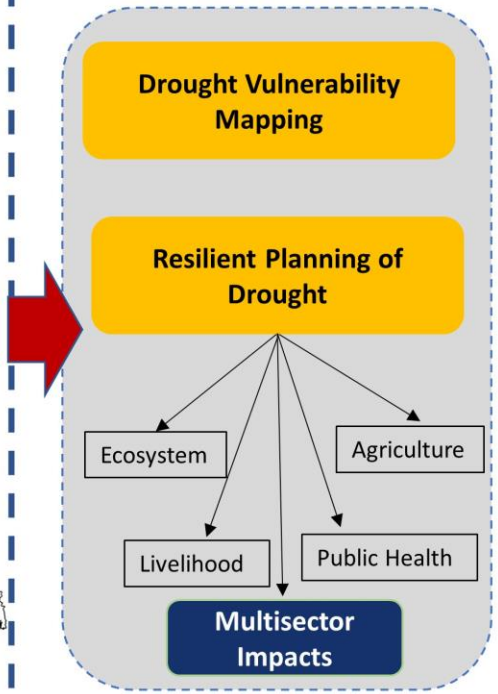
- 82 Gauge station - Observed data (1965 -2018)
- Peninsular catchments - solely rainfall-fed



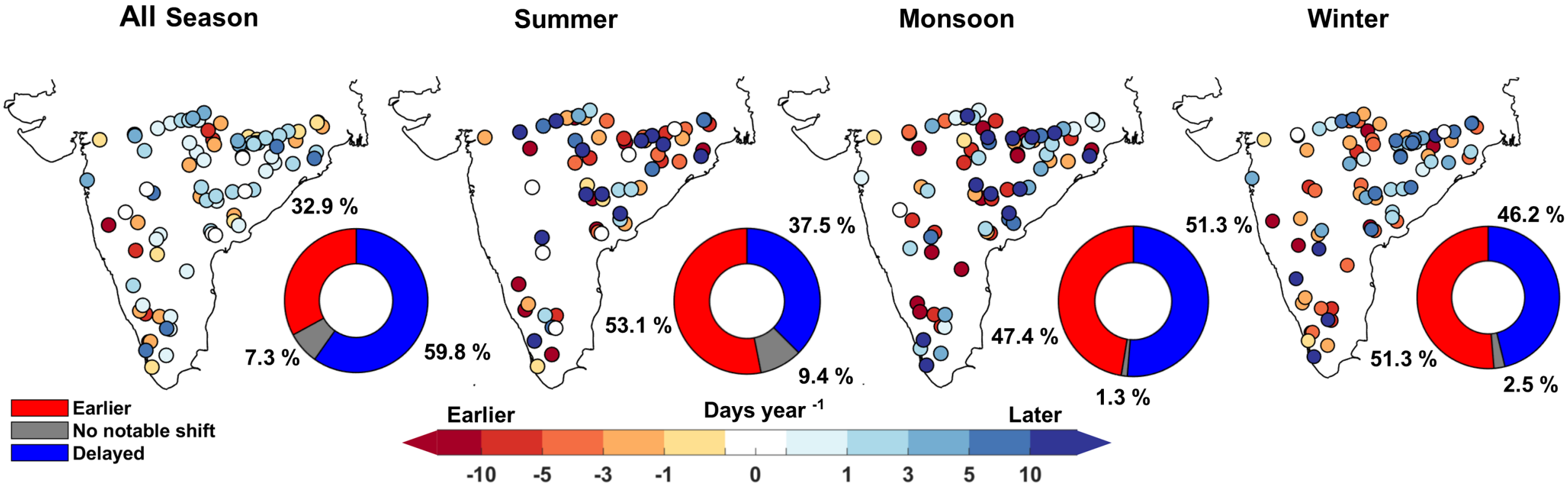


Regionalization of Drought: Concurrence of Onset-Deficit Volume

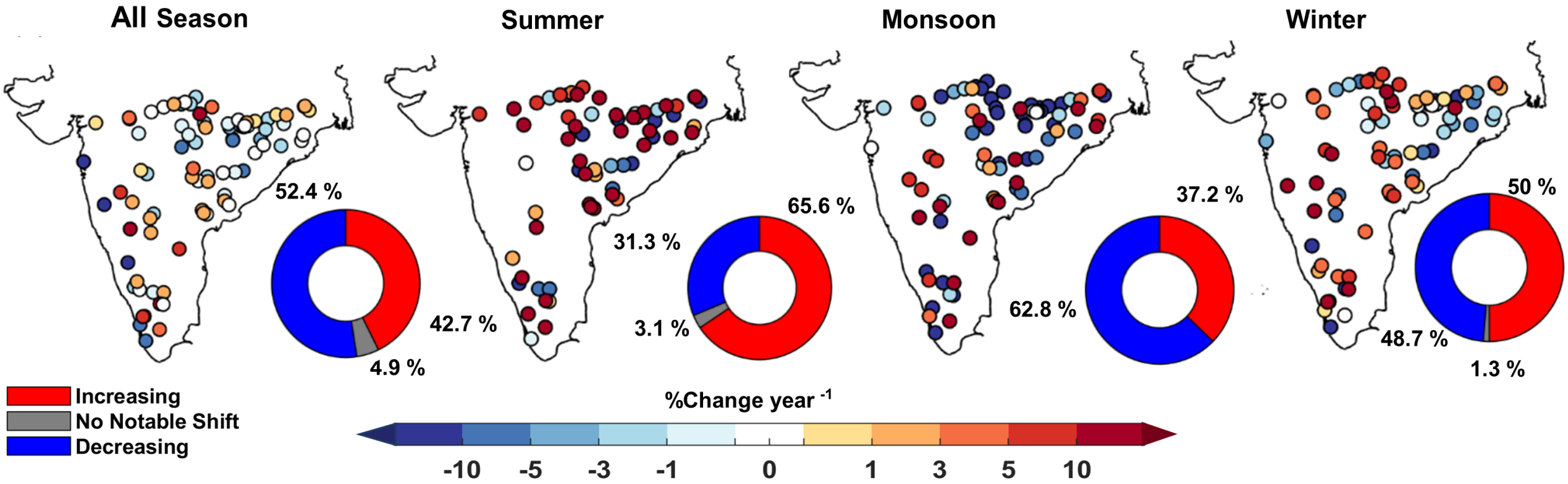




Annual & Seasonal Trends in Drought Onset

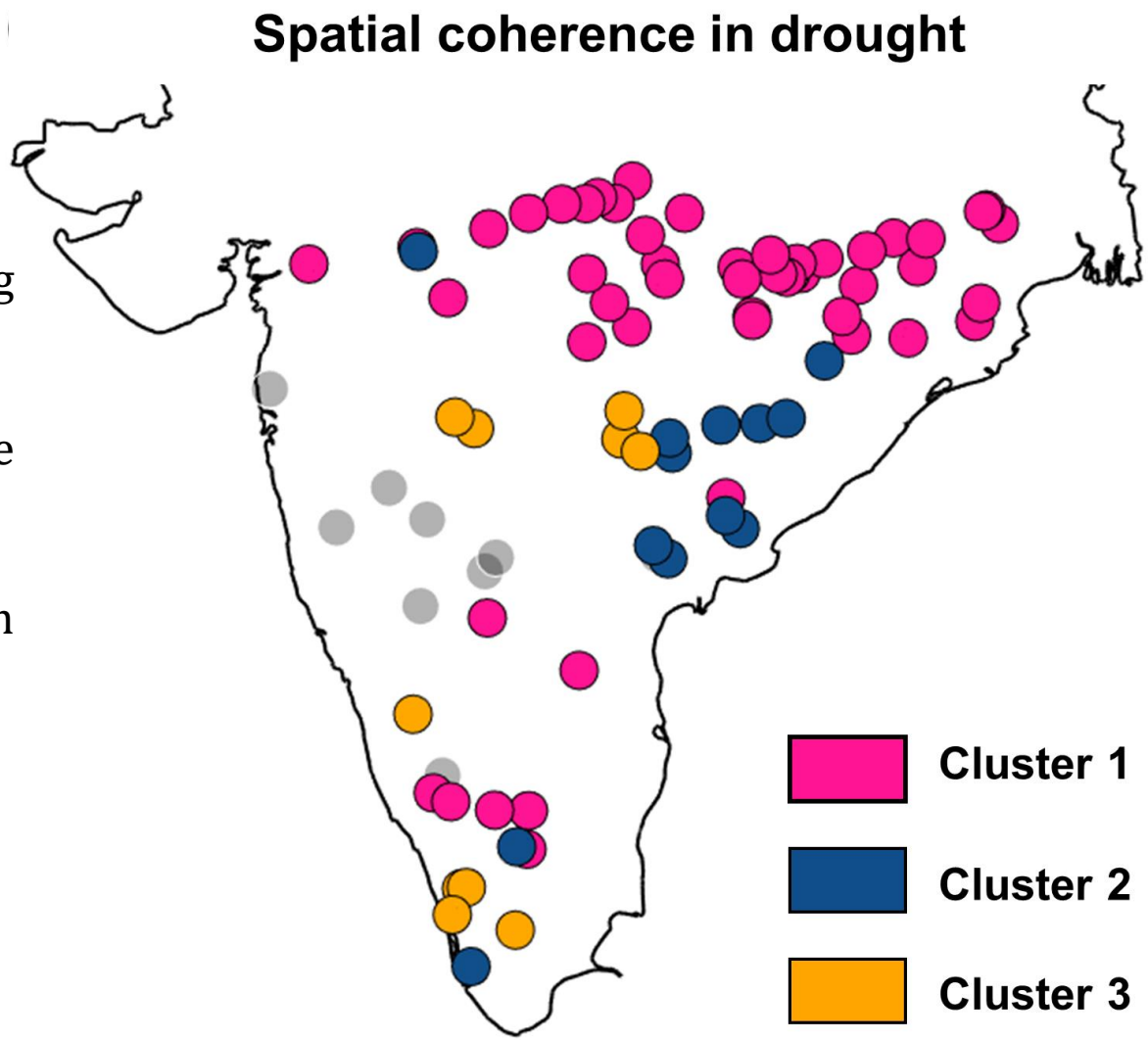


Annual & Seasonal Trends in Deficit Volume

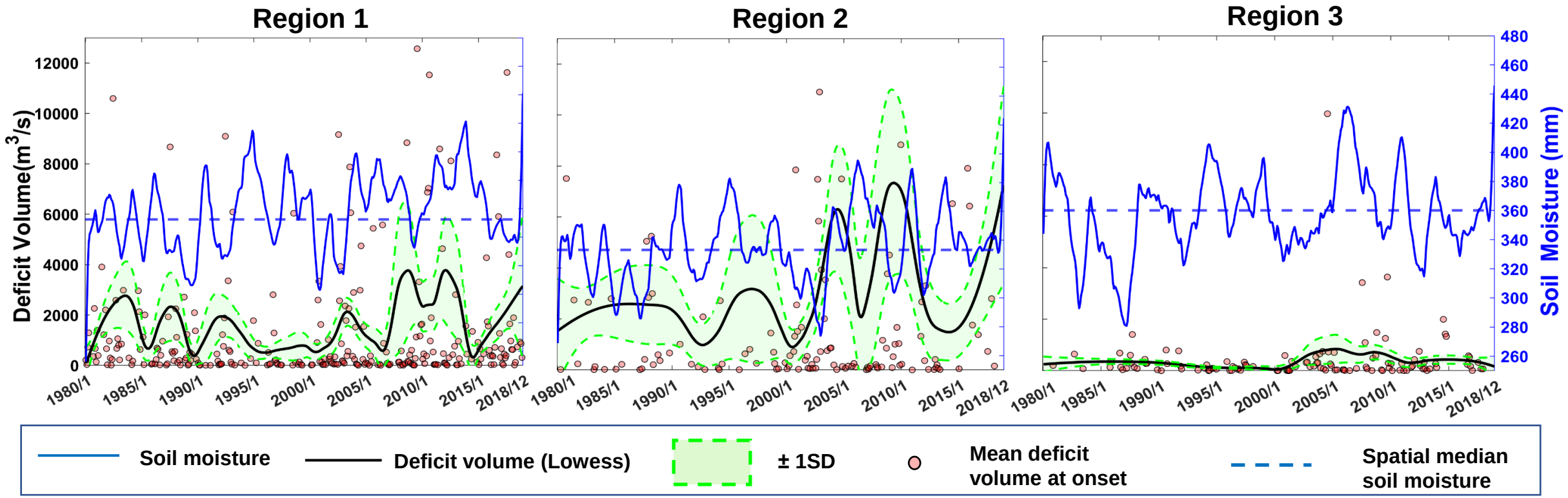


Spatial Clustering of Droughts

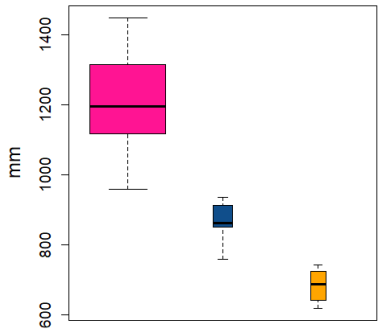
- Spatial Clustering by using Density based clustering method.
- The concurrence between onset and deficit volume considered as a variable while clustering.
- Baseflow Index, mean rainfall, mean onset time & mean severity are the other variables.



Dynamic Controls: Rainfall & Soil Moisture



Average rainfall

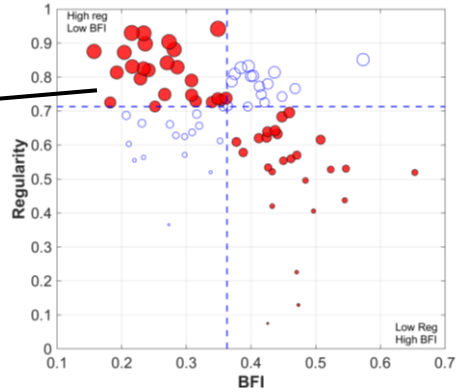


Region 1

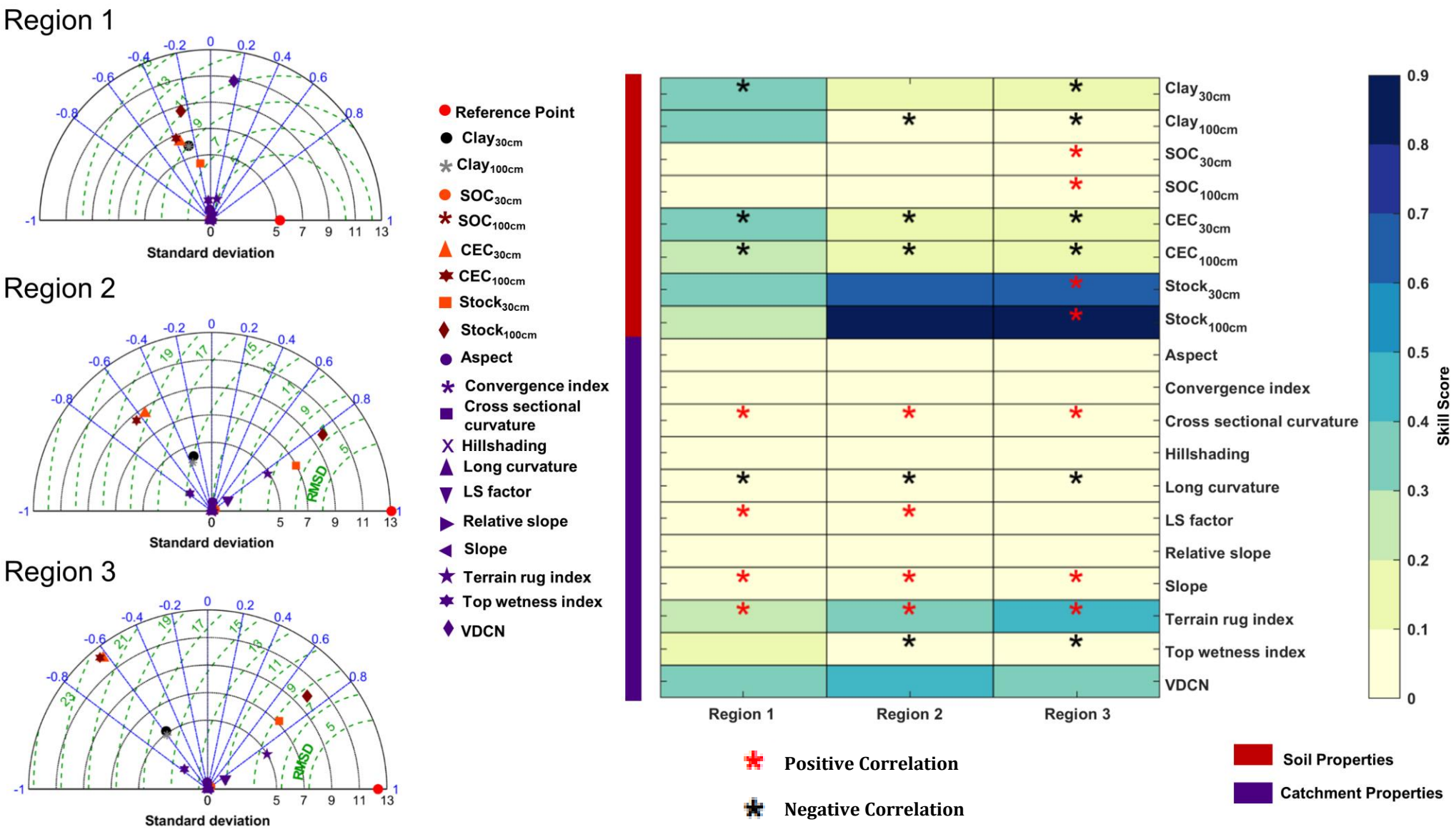
Region 2

Region 3

Low BFI: High Regularity in onset day



Static Controls: Soil & Terrain Features



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Thanks!

Youtube link: https://youtu.be/epNeNFpGVLE

Scan to Visit:

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