

# SHAPING THE FUTURE OF SCIENCE

**AGU** FALL  
MEETING



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# THE HYDROCLIMATE–VEGETATION RELATIONSHIP IN THE SOUTHWESTERN AMAZON DURING THE LAST 20 YEARS

Omar Gutierrez-Cori, Jhan Carlo Espinoza, Laurent Z.X. Li, Sly Wongchuig-Correa,  
Paola A. Arias, Josyane Ronchail, Hans Segura

**B128 - Tropical Forests Under a Changing Environment II**

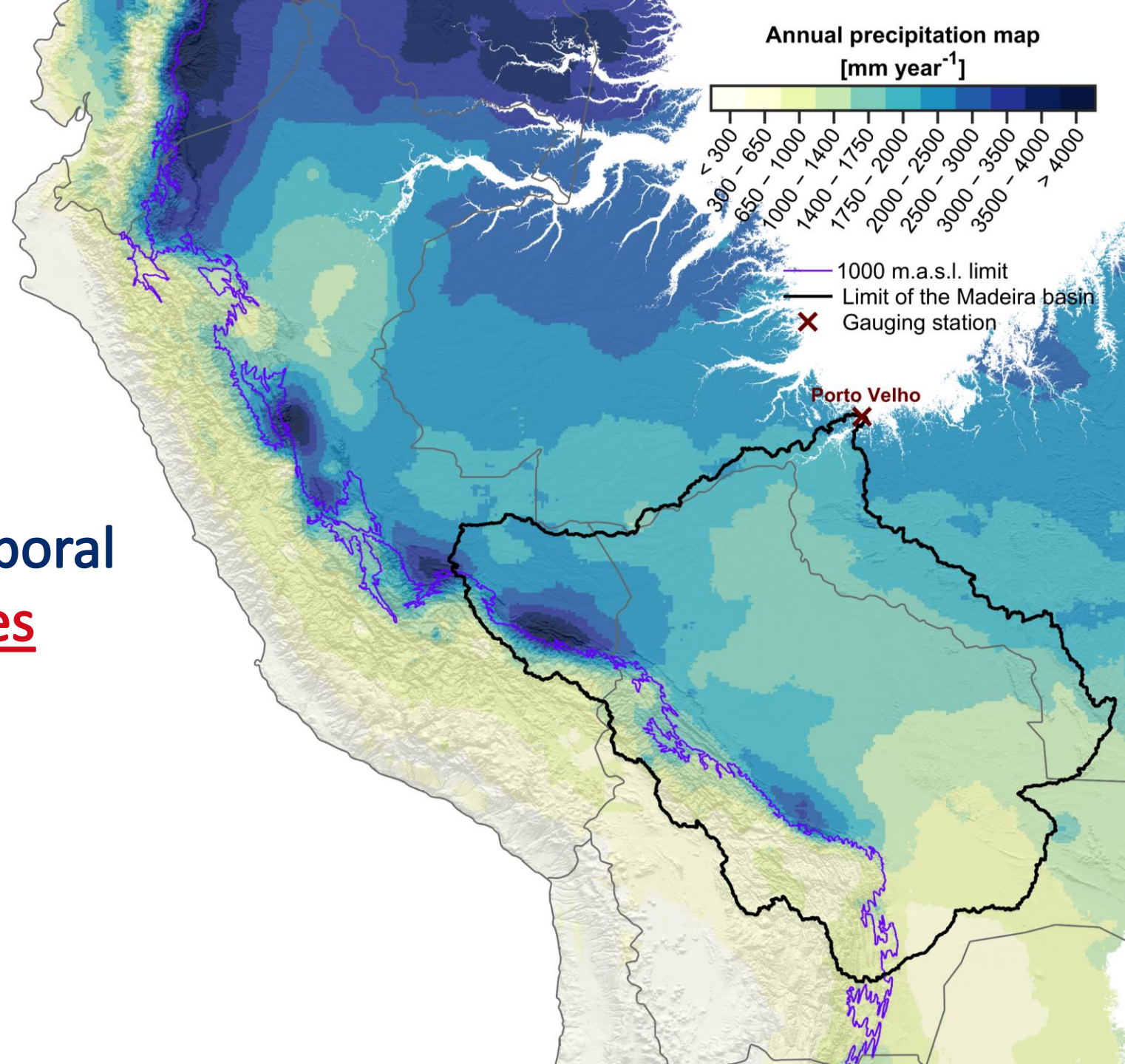
Thursday, 17 December 2020

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# THE SOUTHWESTERN ANDEAN-AMAZON BASIN

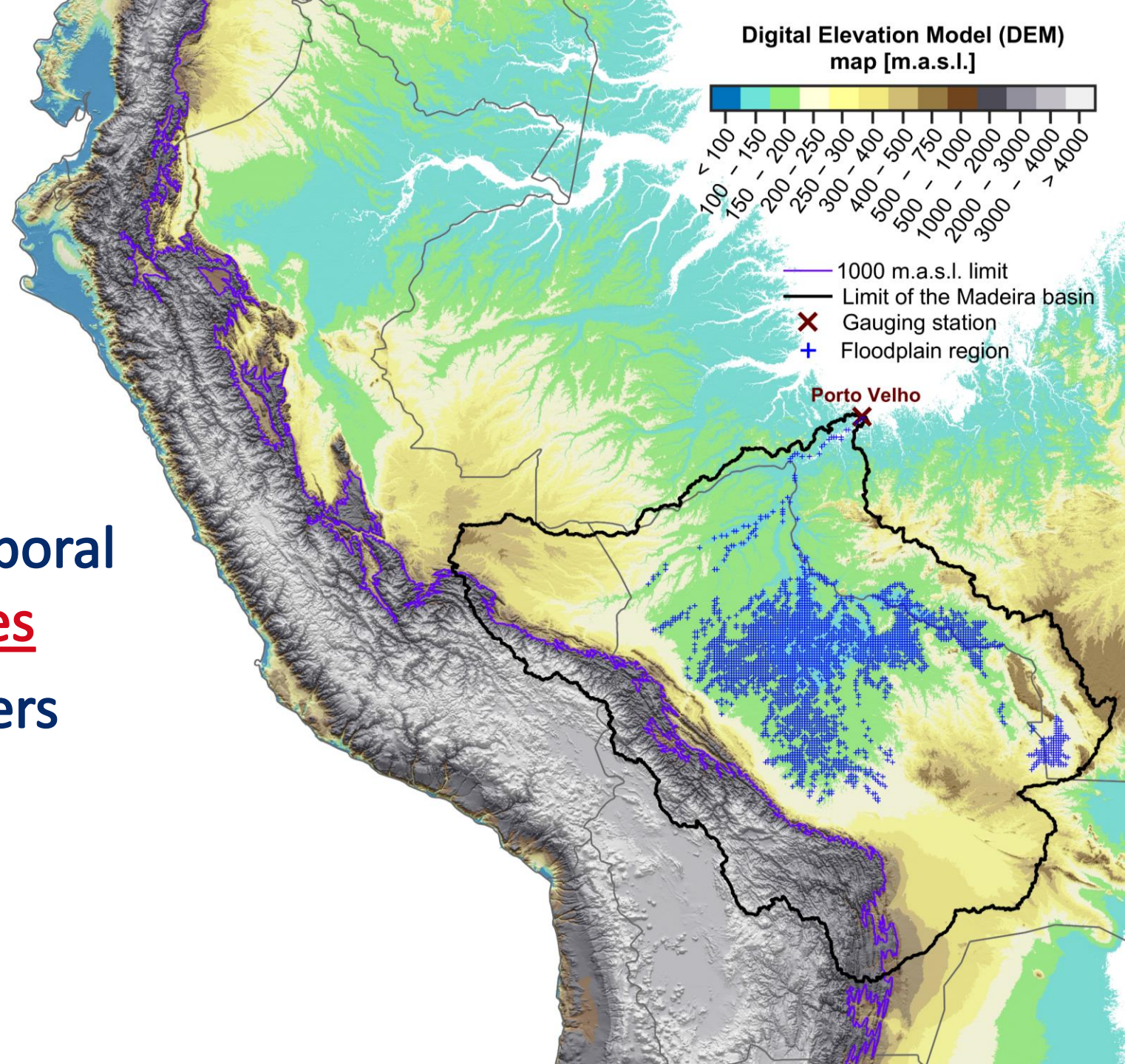
- Region of high spatio-temporal variability in rainfall regimes





# THE SOUTHWESTERN ANDEAN-AMAZON BASIN

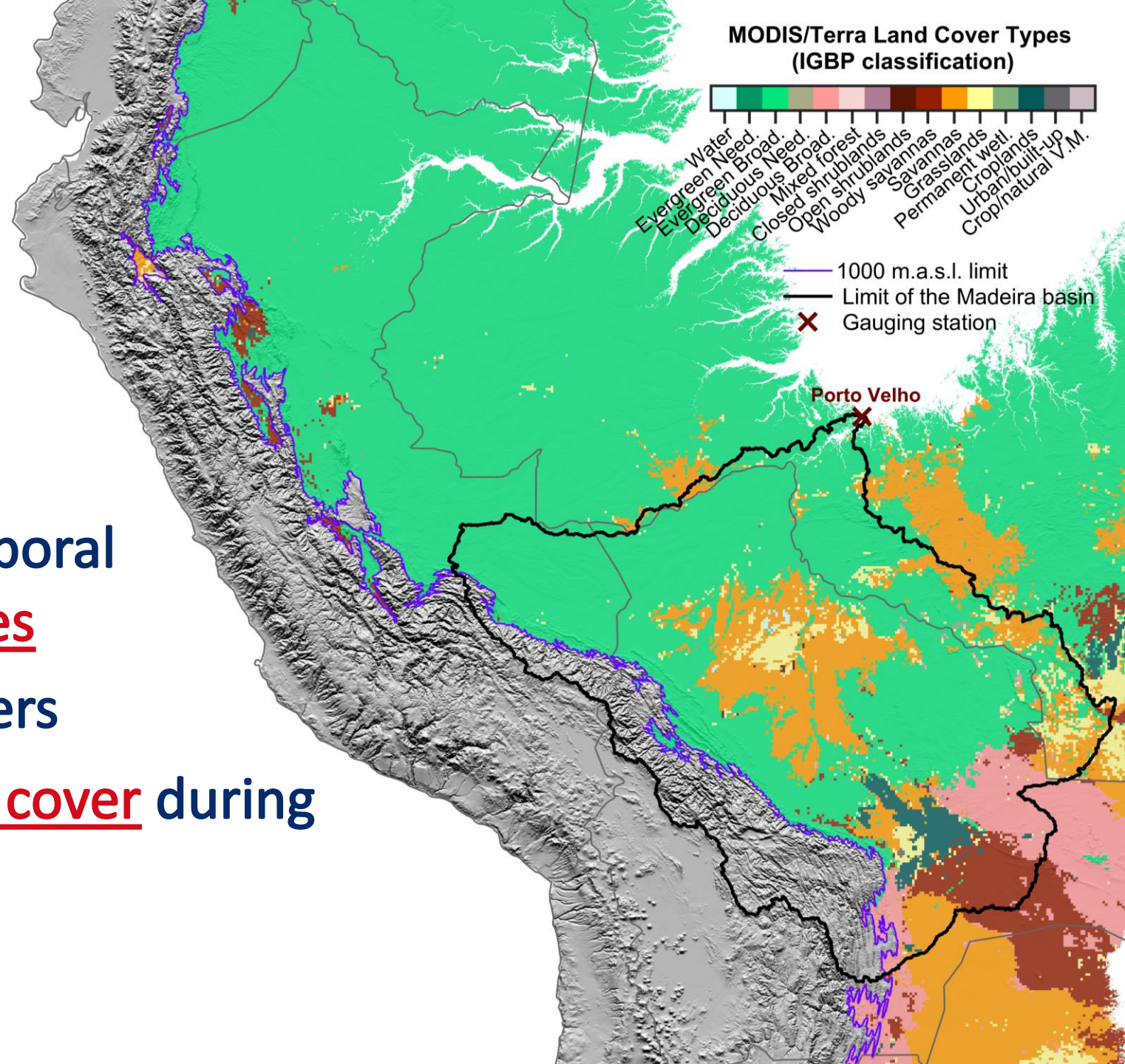
- ❑ Region of high spatio-temporal variability in rainfall regimes
- ❑ Elevation: 100 – 4000 meters





# THE SOUTHWESTERN ANDEAN-AMAZON BASIN

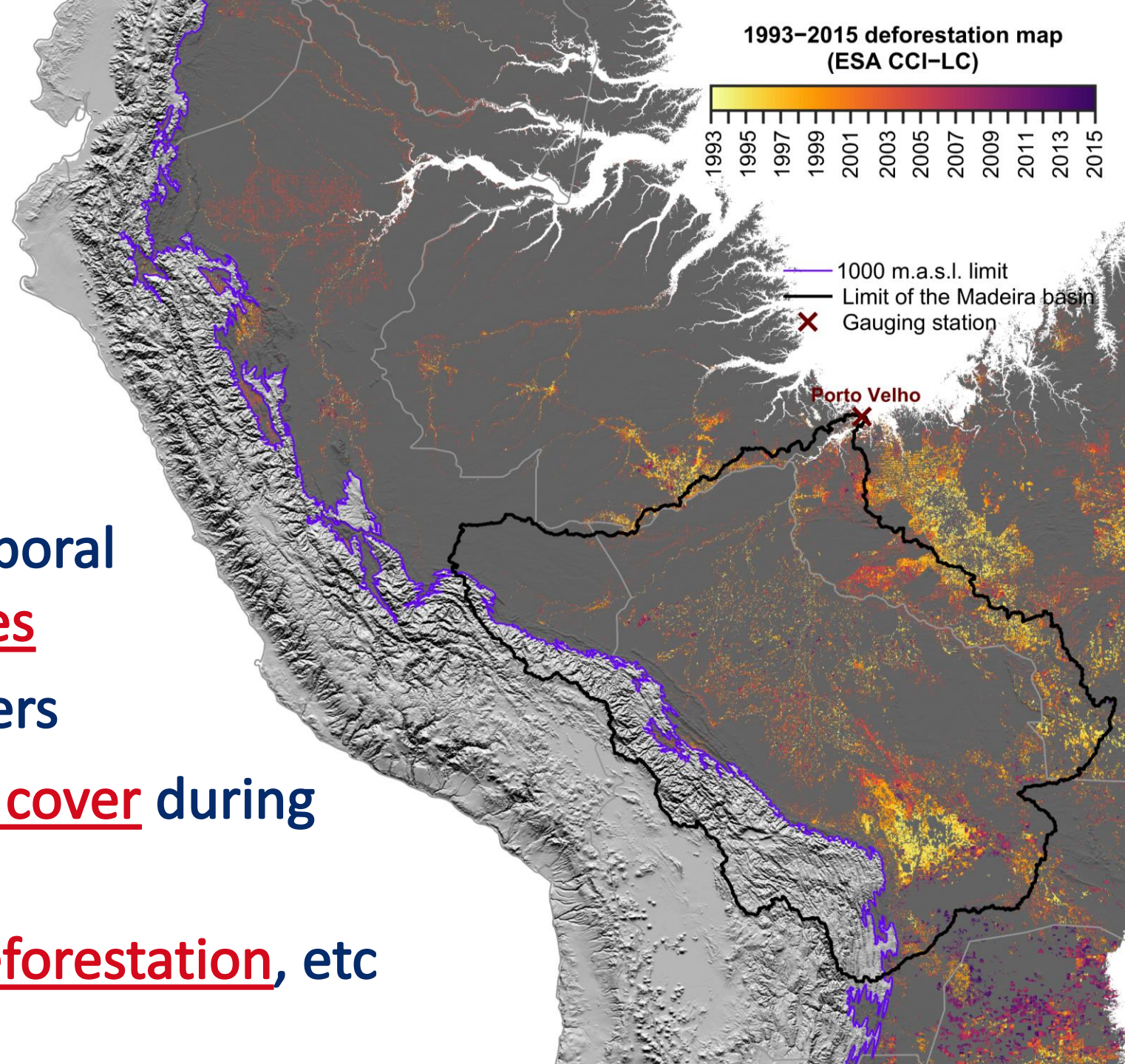
- ❑ Region of high spatio-temporal variability in rainfall regimes
- ❑ Elevation: 100 – 4000 meters
- ❑ Significant changes in land cover during the last years



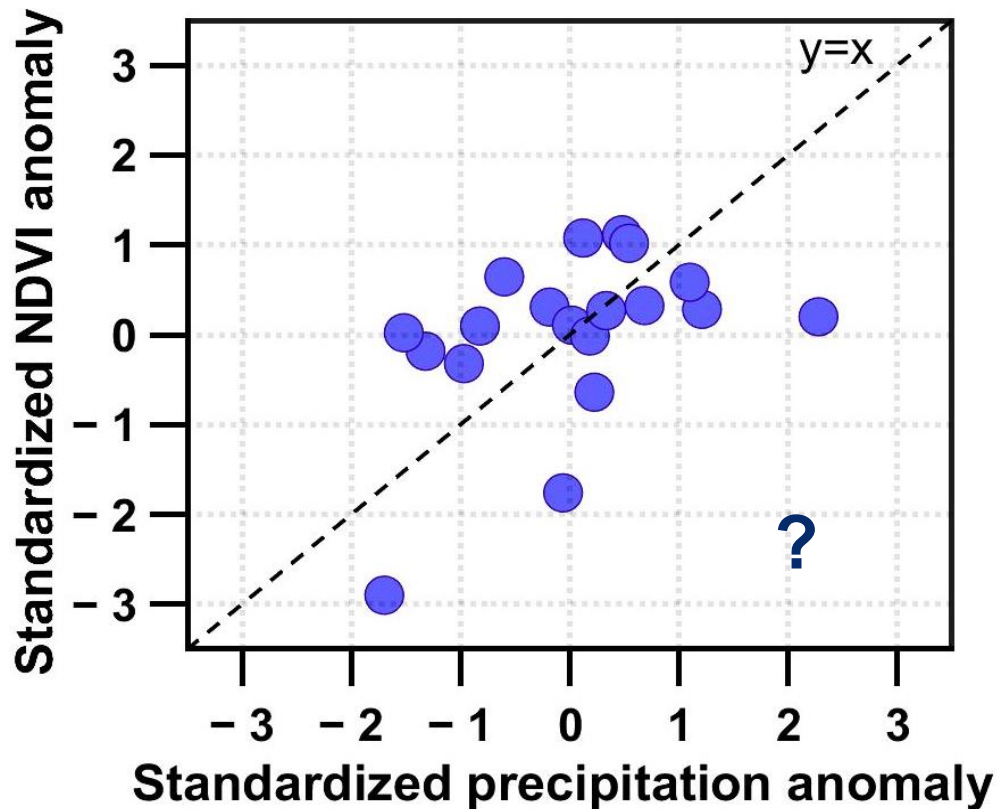


# THE SOUTHWESTERN ANDEAN-AMAZON BASIN

- ❑ Region of high spatio-temporal variability in rainfall regimes
- ❑ Elevation: 100 – 4000 meters
- ❑ Significant changes in land cover during the last years
- ❑ Forest fires, agriculture, deforestation, etc



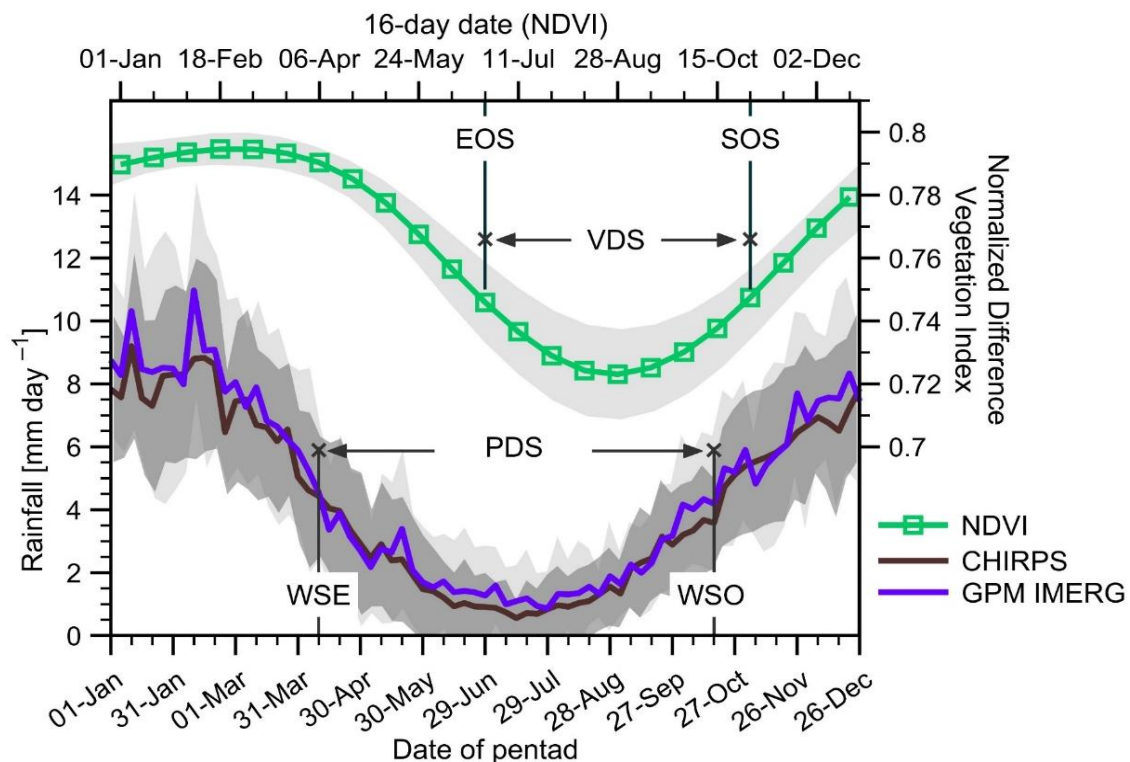
# MOTIVATION



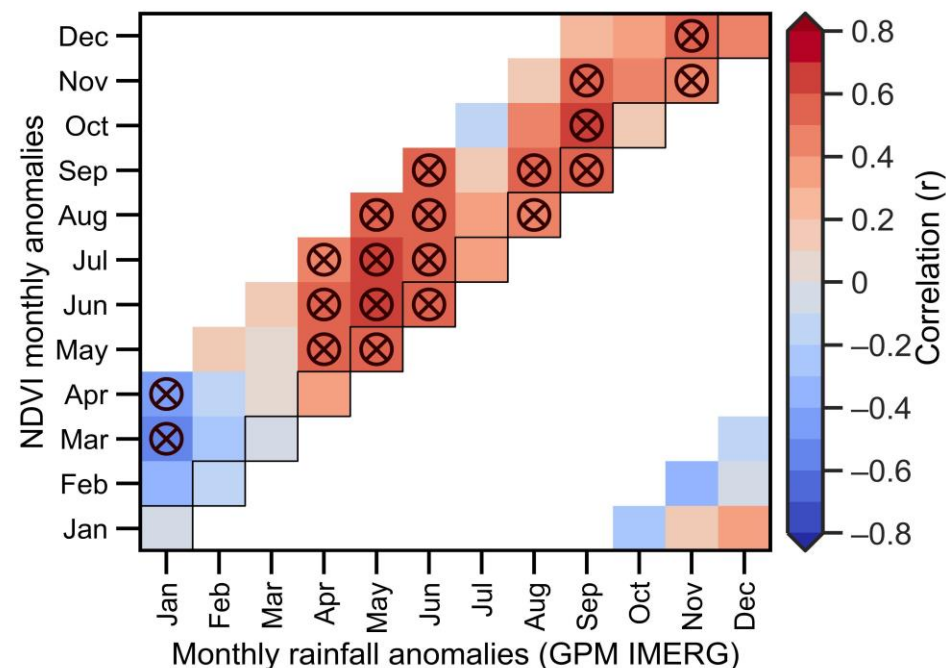
- ☐ The hydroclimate-vegetation relationship is not clear
- ☐ Amazon forests are energy-limited or water-limited?
- ☐ What happens during years of extreme droughts?



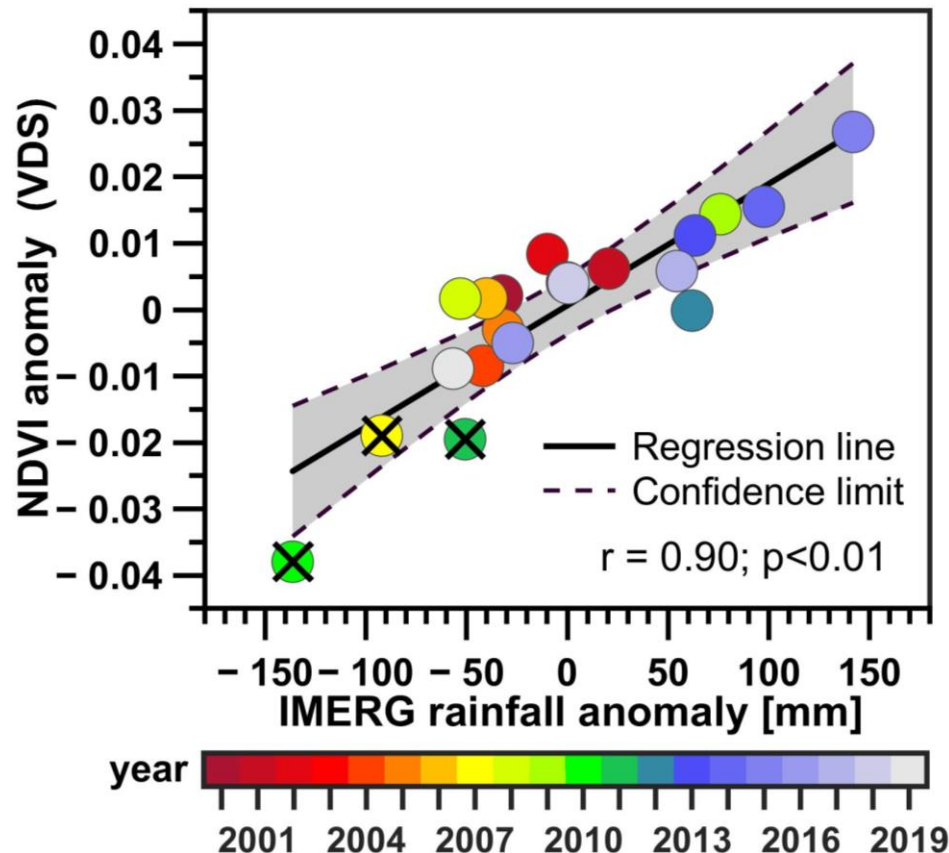
# SEASONALITY IN RAINFALL AND VEGETATION



- WSE: wet season end
- WSO: wet season onset
- PDS: precipitation dry season
- EOS: end of growing season
- SOS: start of growing season
- VDS: vegetation dry season



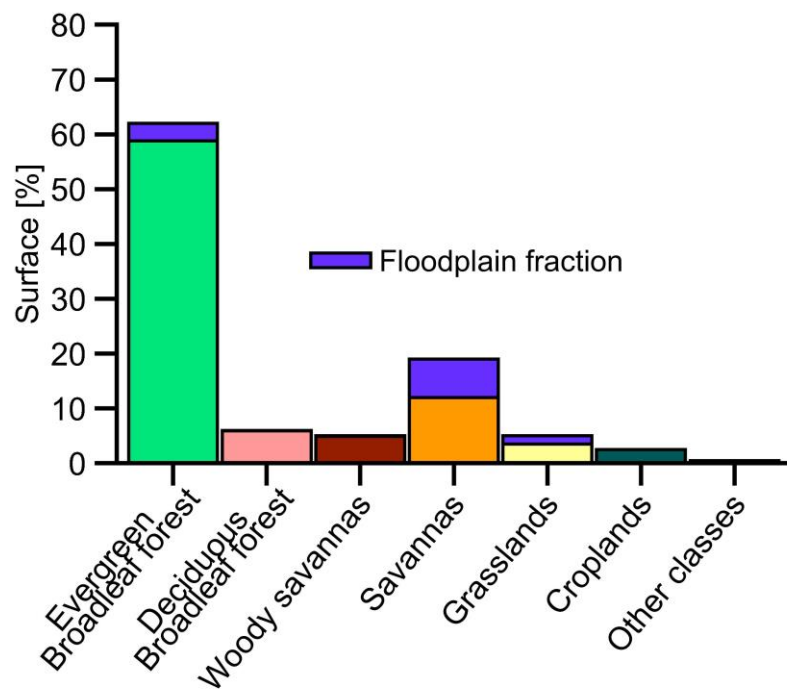
# THE RAINFALL AND VEGETATION DURING THE DRY SEASON



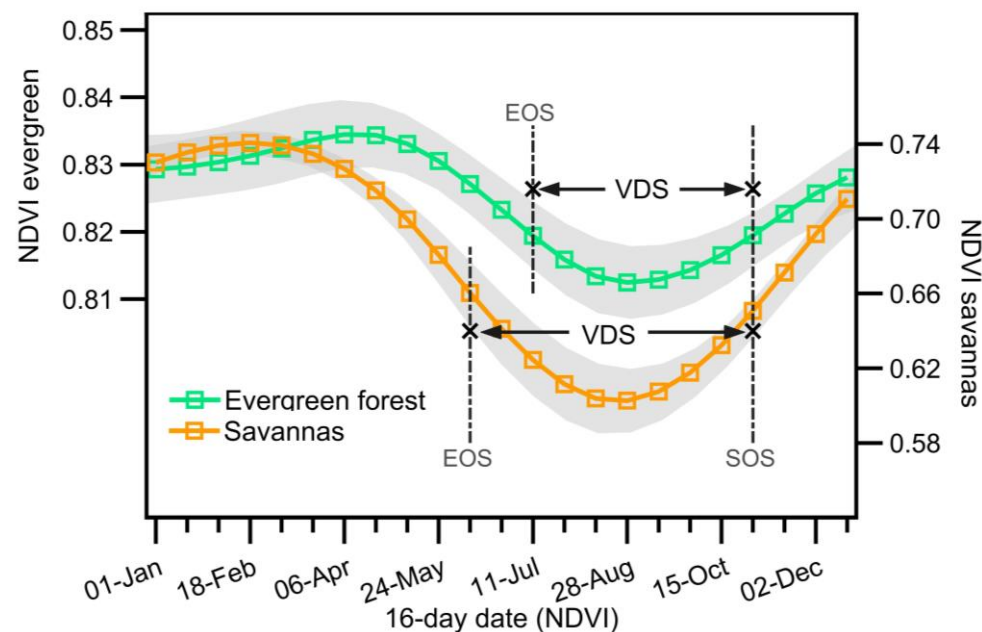
- 2007, 2010 and 2011: years of extreme drought
- Vegetation depends mainly on water availability, particularly during the vegetation dry season (VDS)



# VARIABILITY AND SEASONALITY BY LAND COVER TYPES

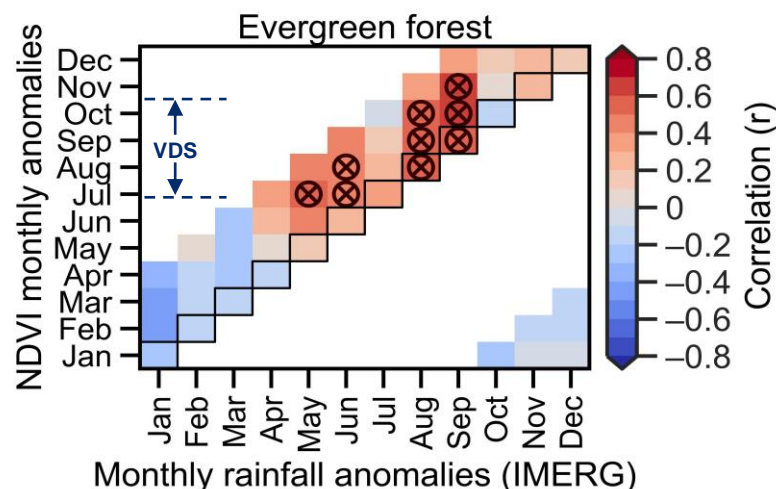
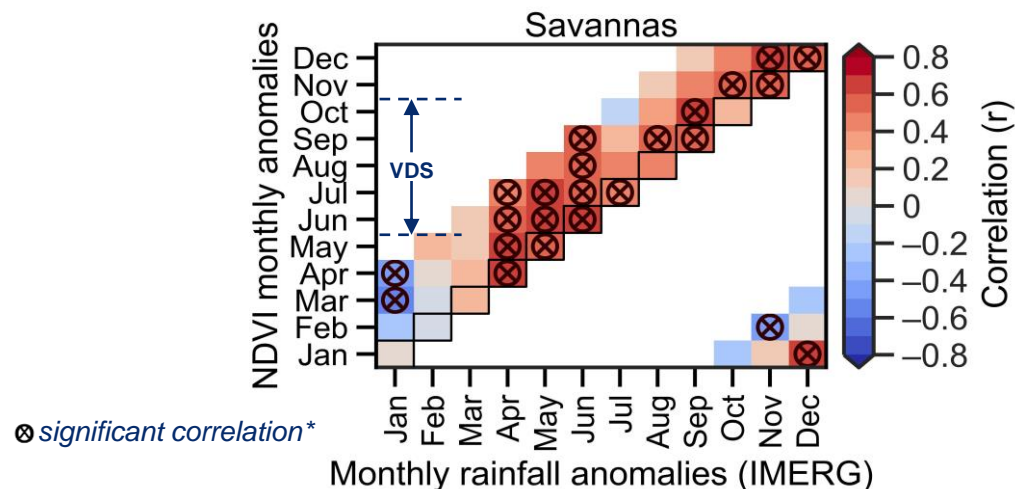


- 62% Evergreen forest
- 20% Savannas

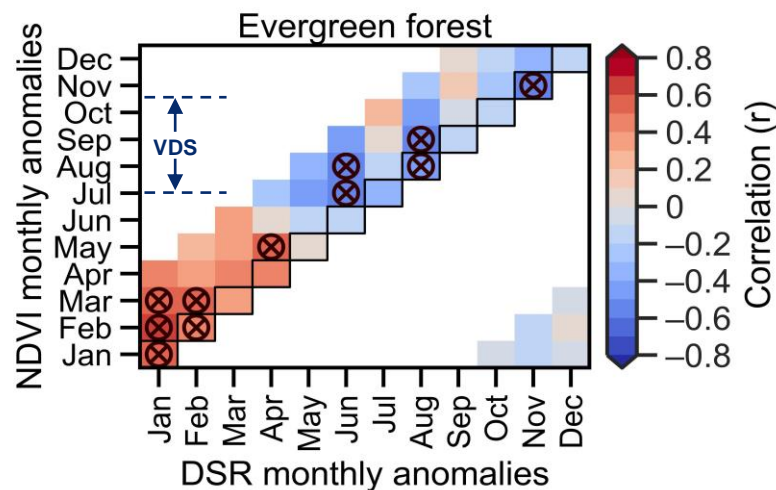


- Differences in the Vegetation Dry Season (VDS)

# THE RELATIONSHIP BY LAND COVER TYPES

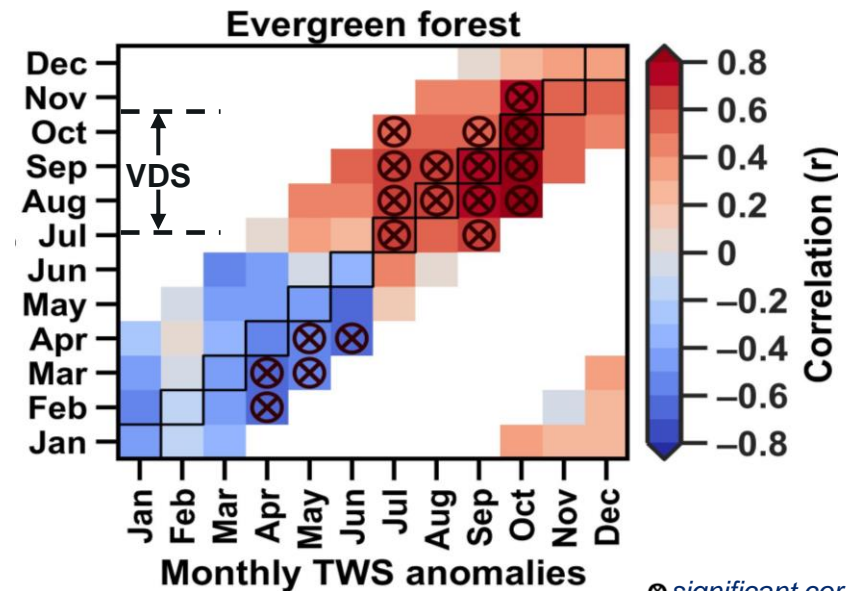
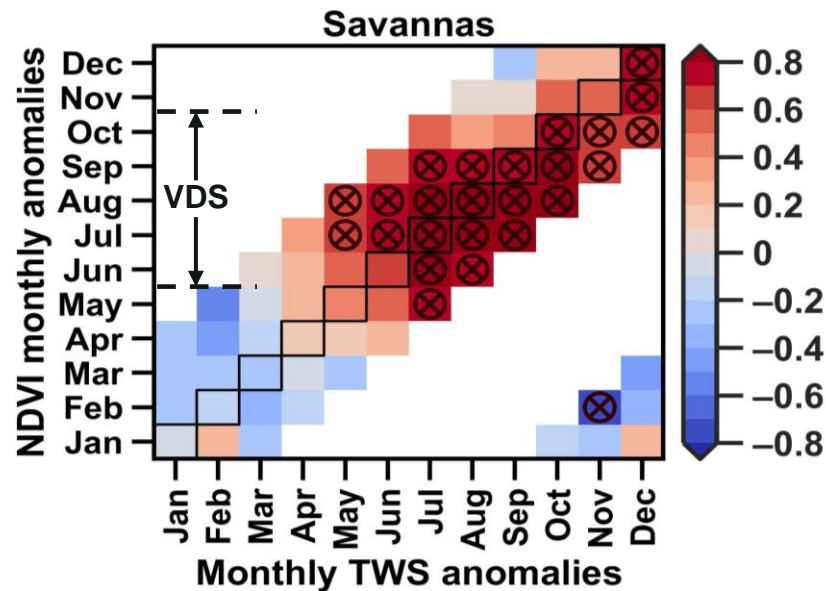


- ☐ **Water-limited** during dry season (VDS)
- ☐ **Energy-limited** during wet season
- ☐ The vegetation varies from energy- to water-limited throughout the year





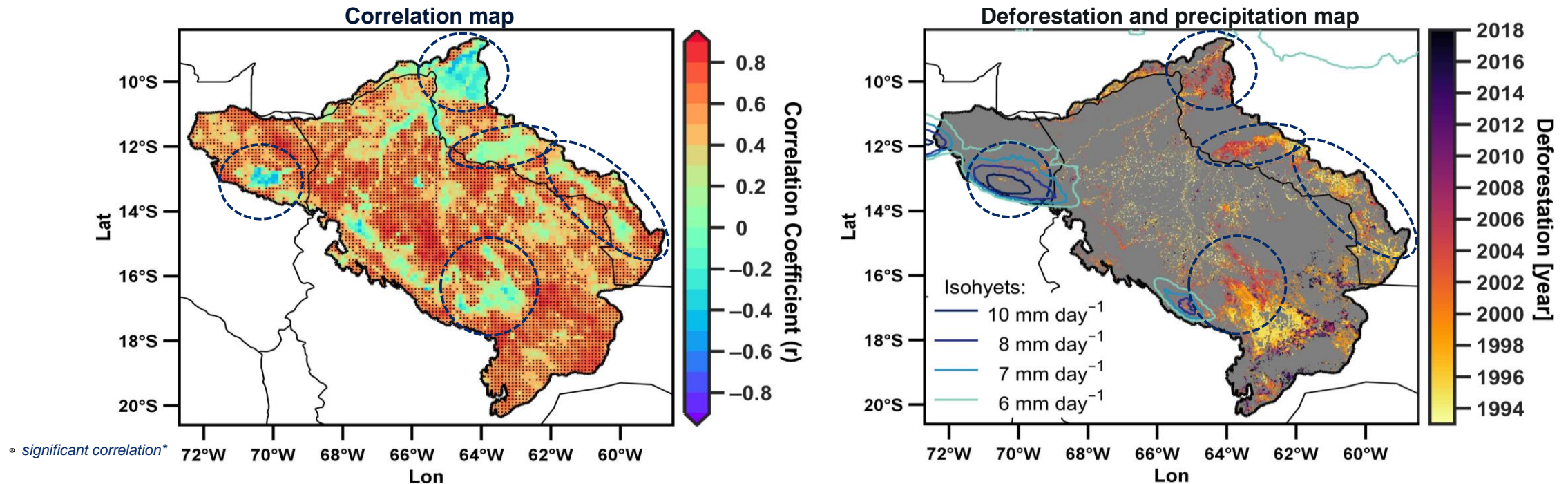
# THE VEGETATION AND TERRESTRIAL WATER STORAGE (TWS)



⊗ significant correlation\*

- ❑ Vegetation is more dependent on the availability of water in the soil during the Vegetation Dry Season (Water-limited)
- ❑ TWS is a better indicator of NDVI variability in evergreen forests

# ROLE OF LAND-COVER CHANGE IN THE RAINFALL-NDVI RELATIONSHIPS



Specific areas do not show significant hydroclimatic-NDVI correlations during the dry season:

- Very **wet conditions** during most of the year
- Recent **deforested areas**: break the natural response the hydroclimate-vegetation system

Gutierrez-Cori et al., submitted



# THANK YOU

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