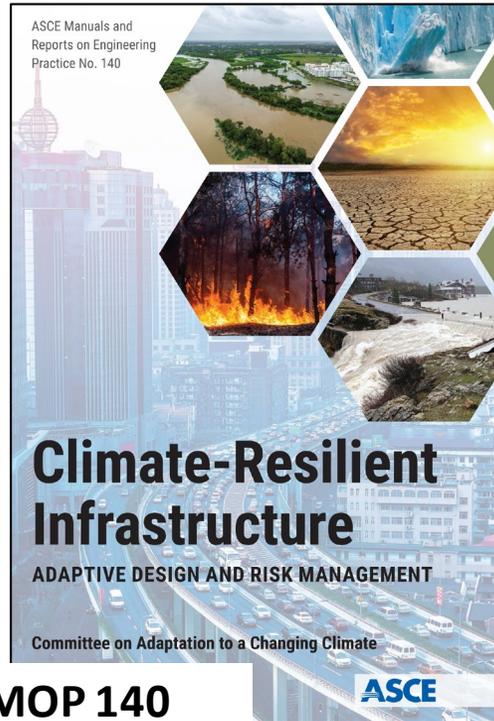


What can Earth Systems Science and Engineering provide for each other?

Quid accidit Engineering?



<https://www.nytimes.com/2018/10/14/us/hurricane-michael-florida-mexico-beach-house.html>

Outline

□ Due Diligence and Engineering Judgement

Design & Function
Deep Uncertainty
Complex Interacting Systems

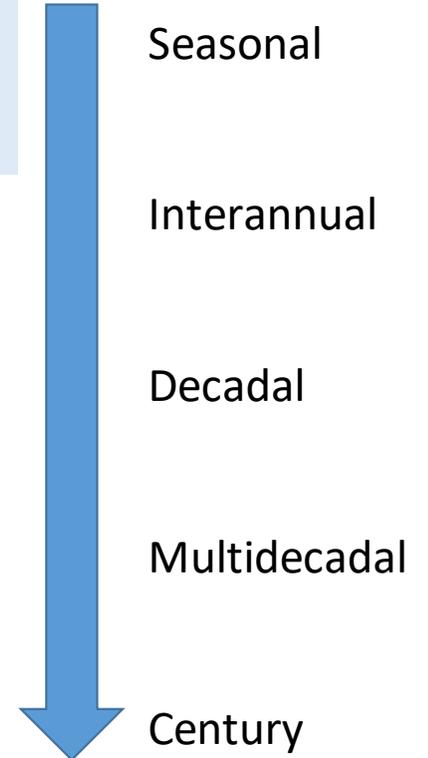
□ Learning Consequences /Impacts

□ Innovation for Adaptation

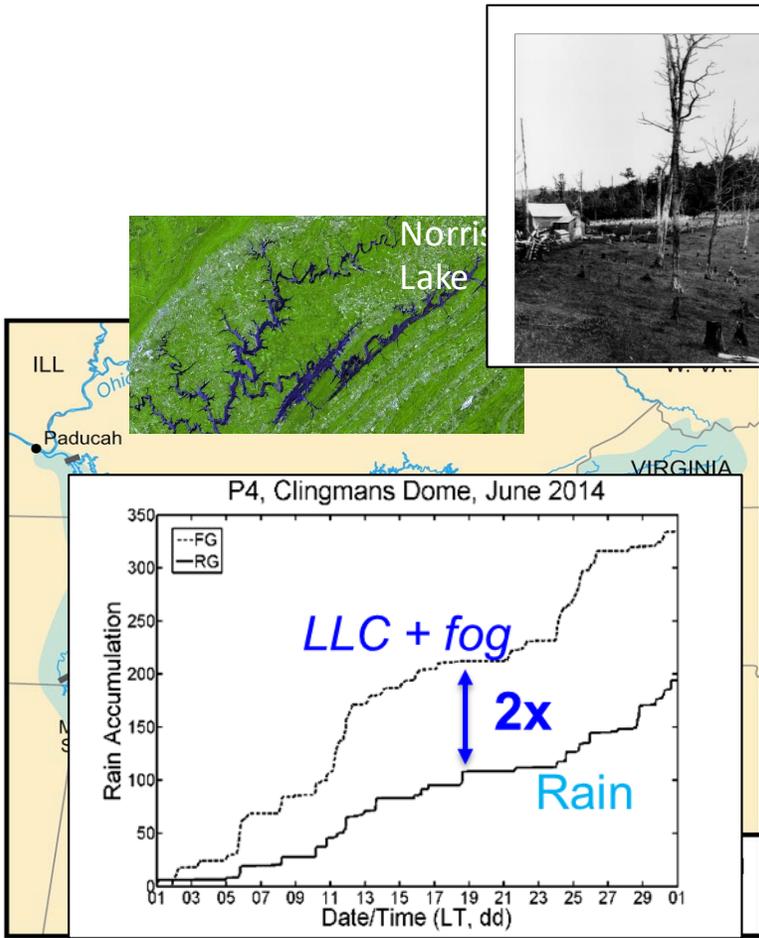
□ Nonstationarity and Positioning Risk

□ Earth System Intelligence

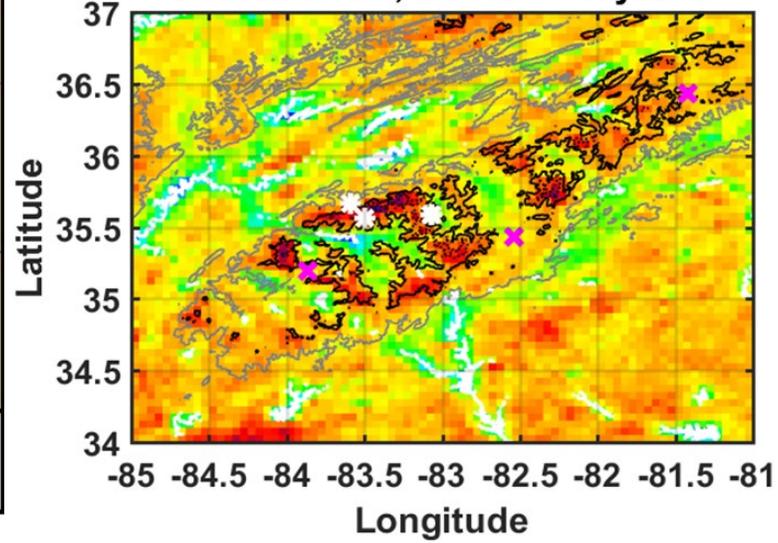
Information
Understanding



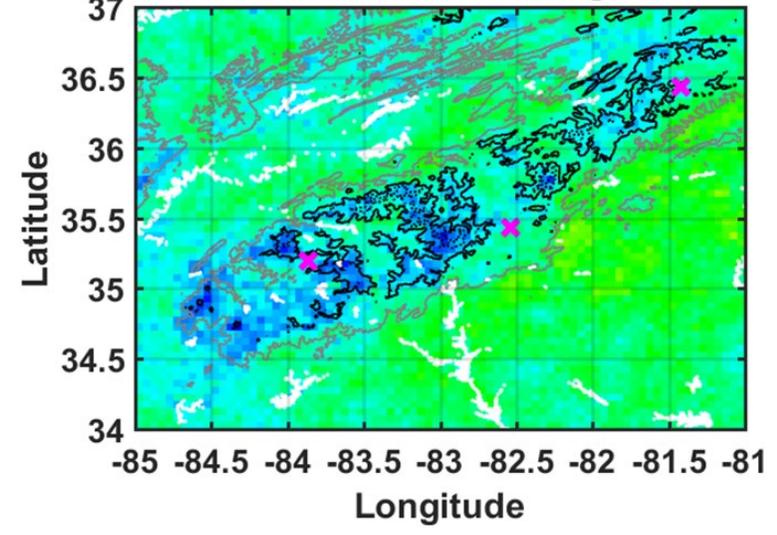
“Unexpected” Consequences



MODIS LLCF, Summer Daytime



MODIS LLCF, Summer Nighttime



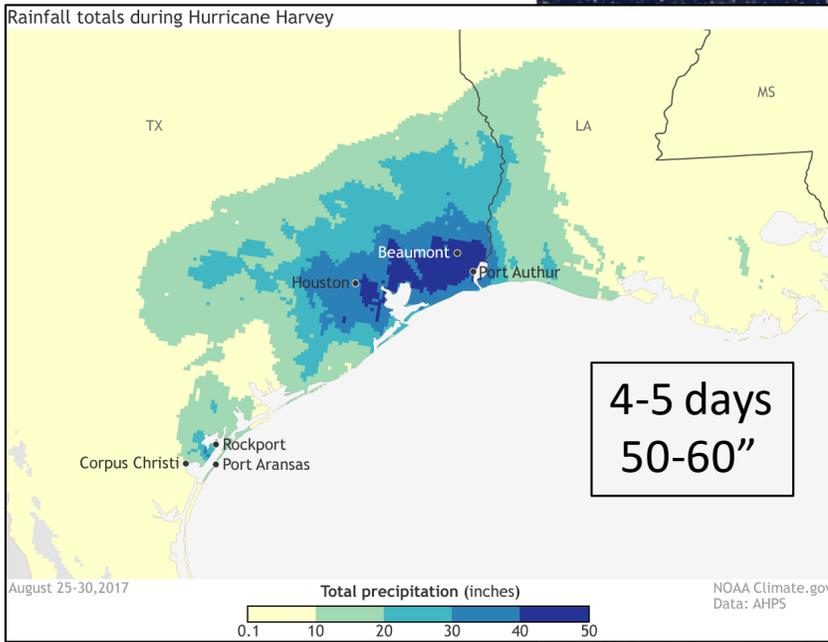
THE TENNESSEE VALLEY AUTHORITY

Wilson and Barros, 2014
Barros and Arulraj, 2020

Duan and Barros, Remote Sensing, 2017

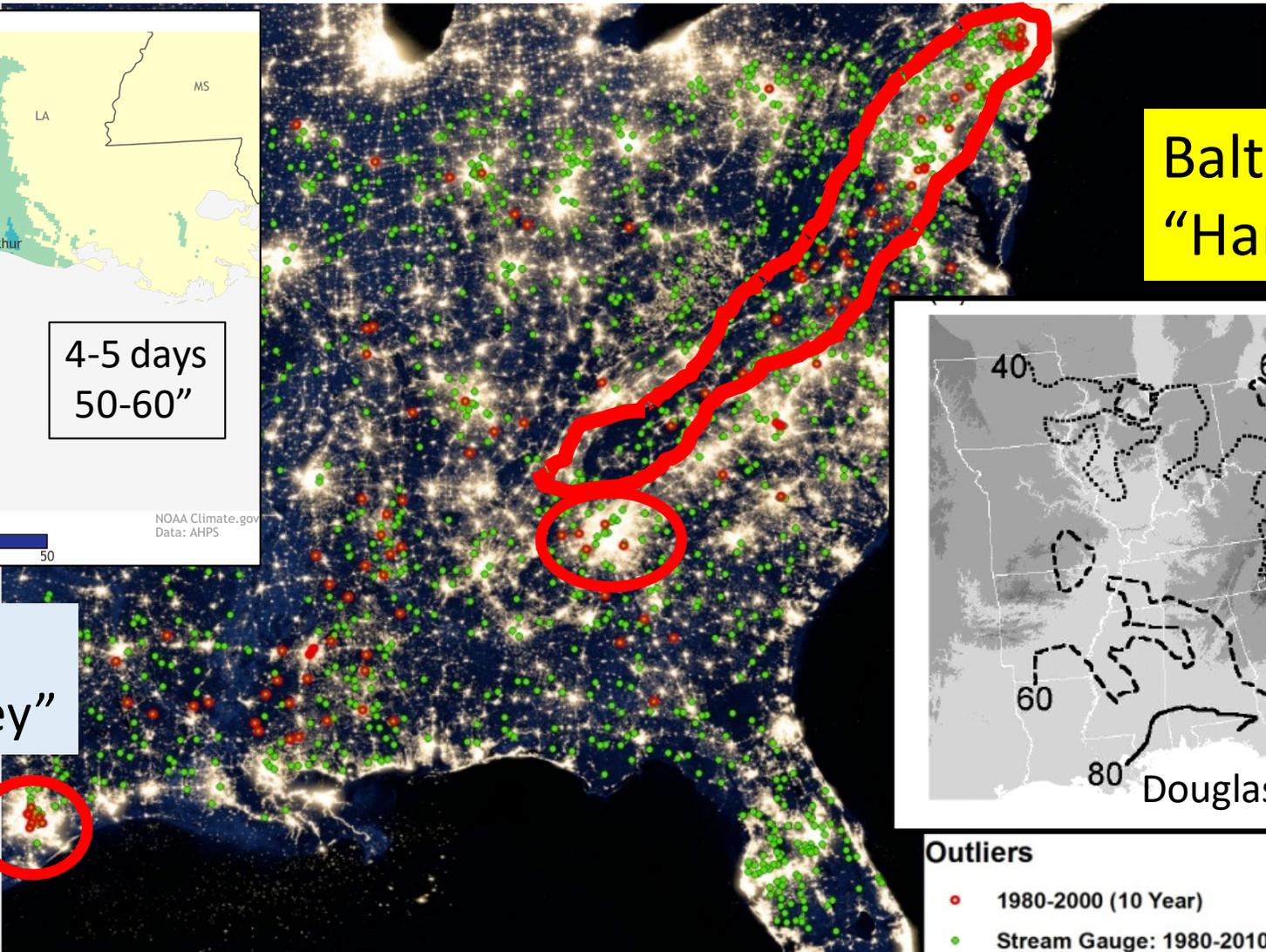


Monitoring & Predicting the Coupled Human-Natural System

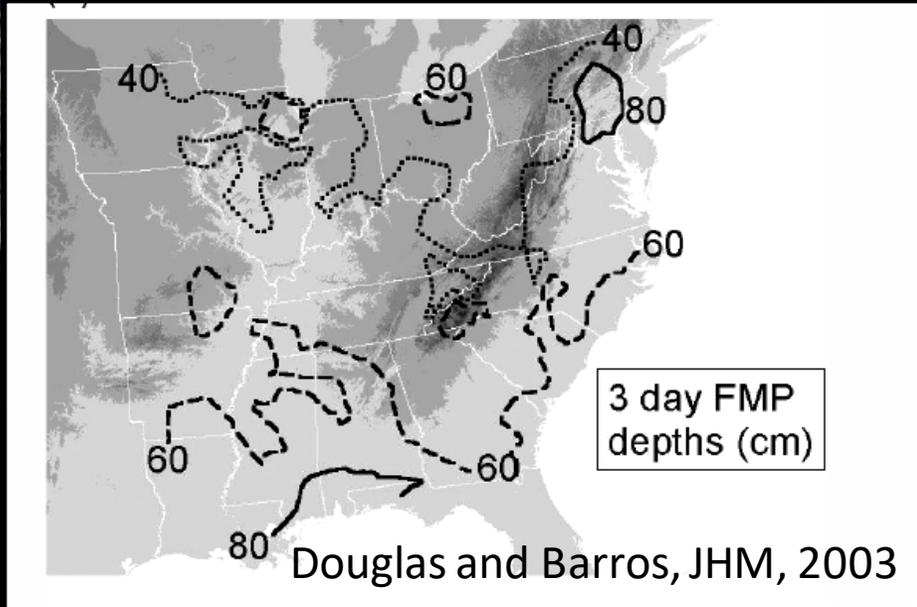


4-5 days
50-60"

Houston
"Anticipating Harvey"



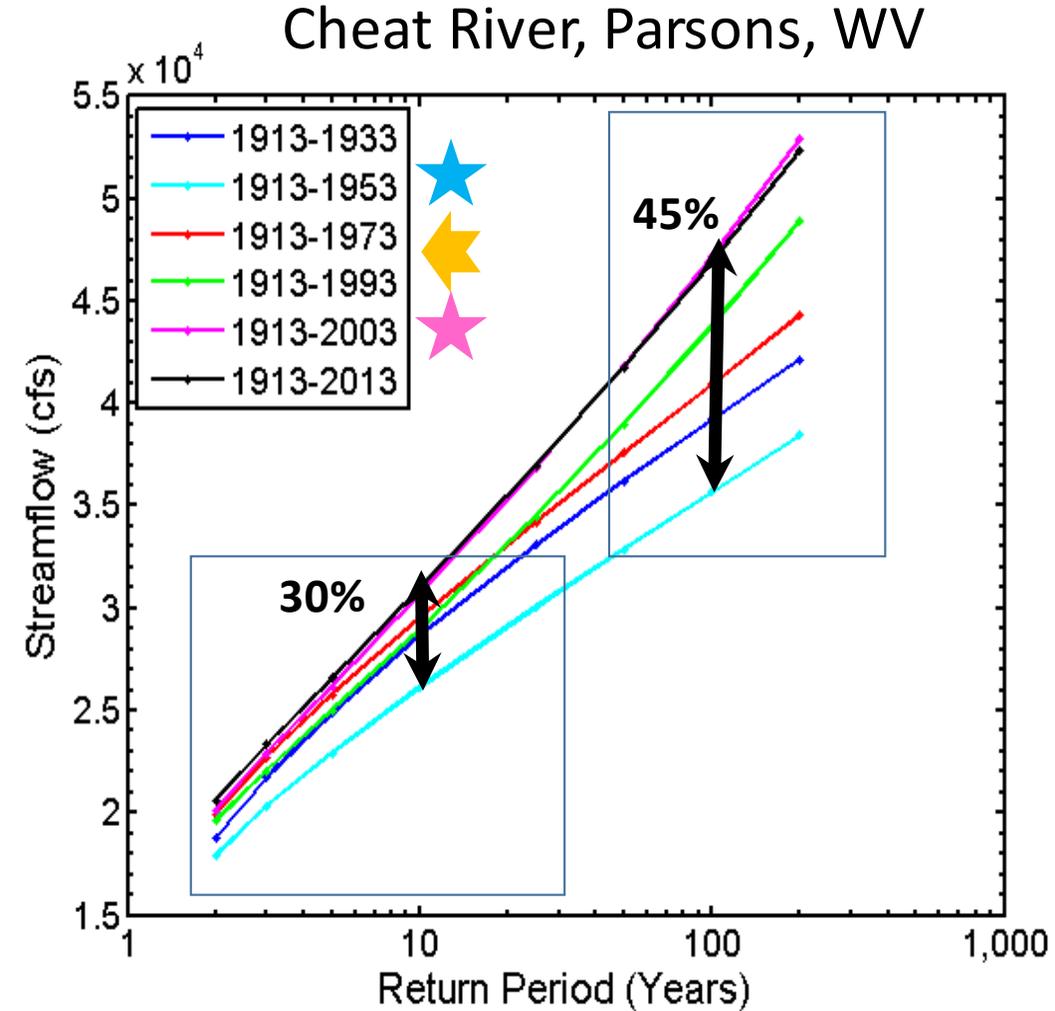
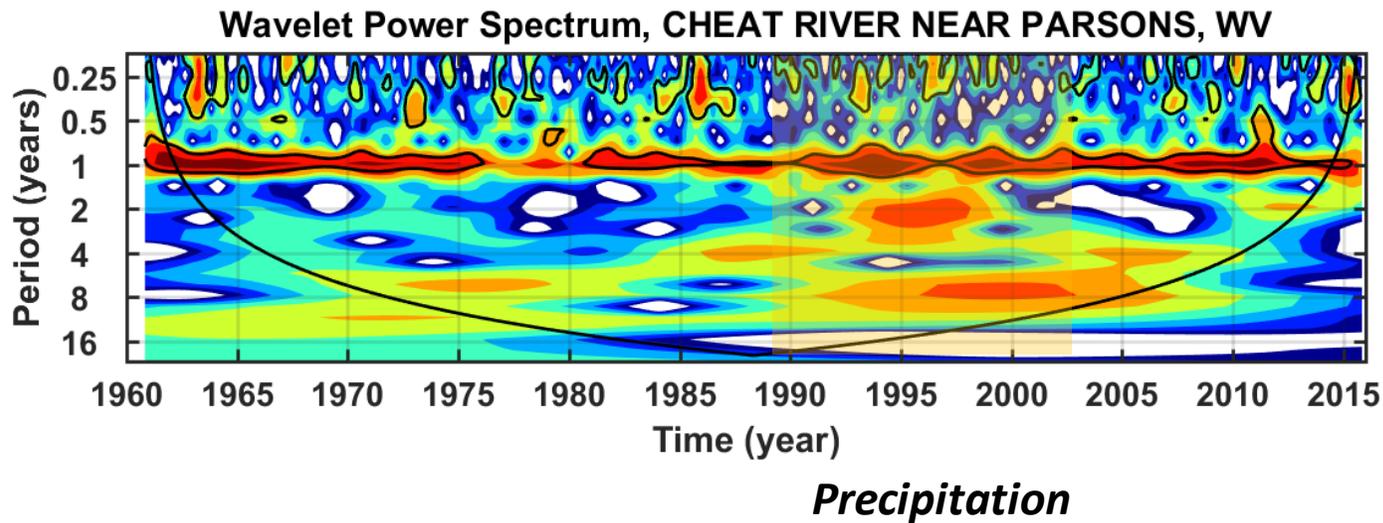
Baltimore's
"Harvey-in-waiting"



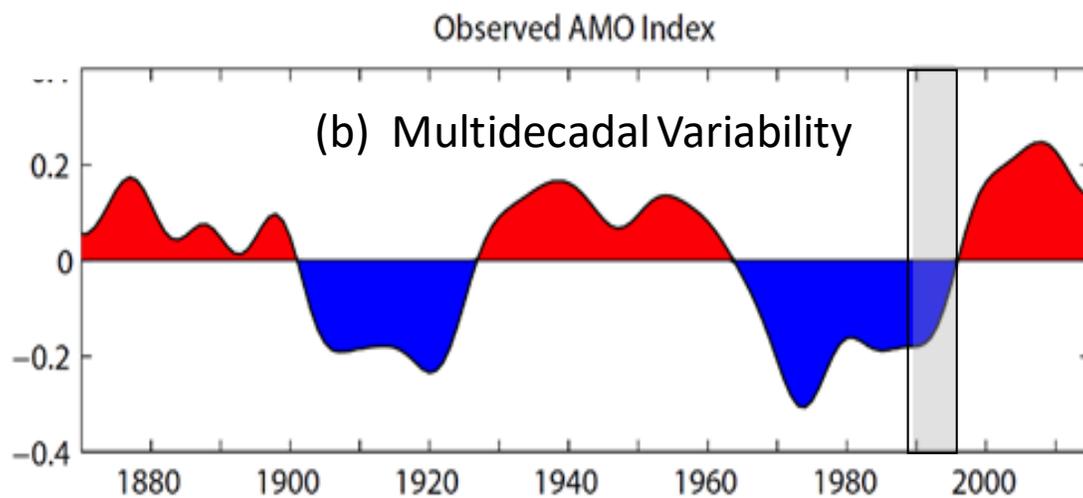
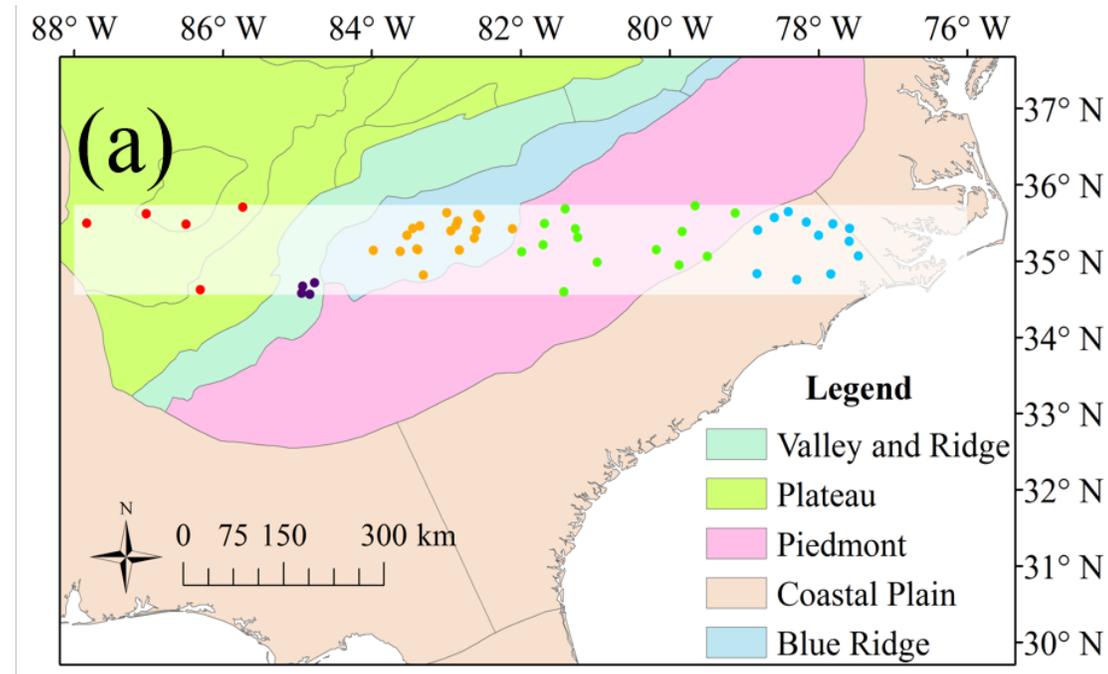
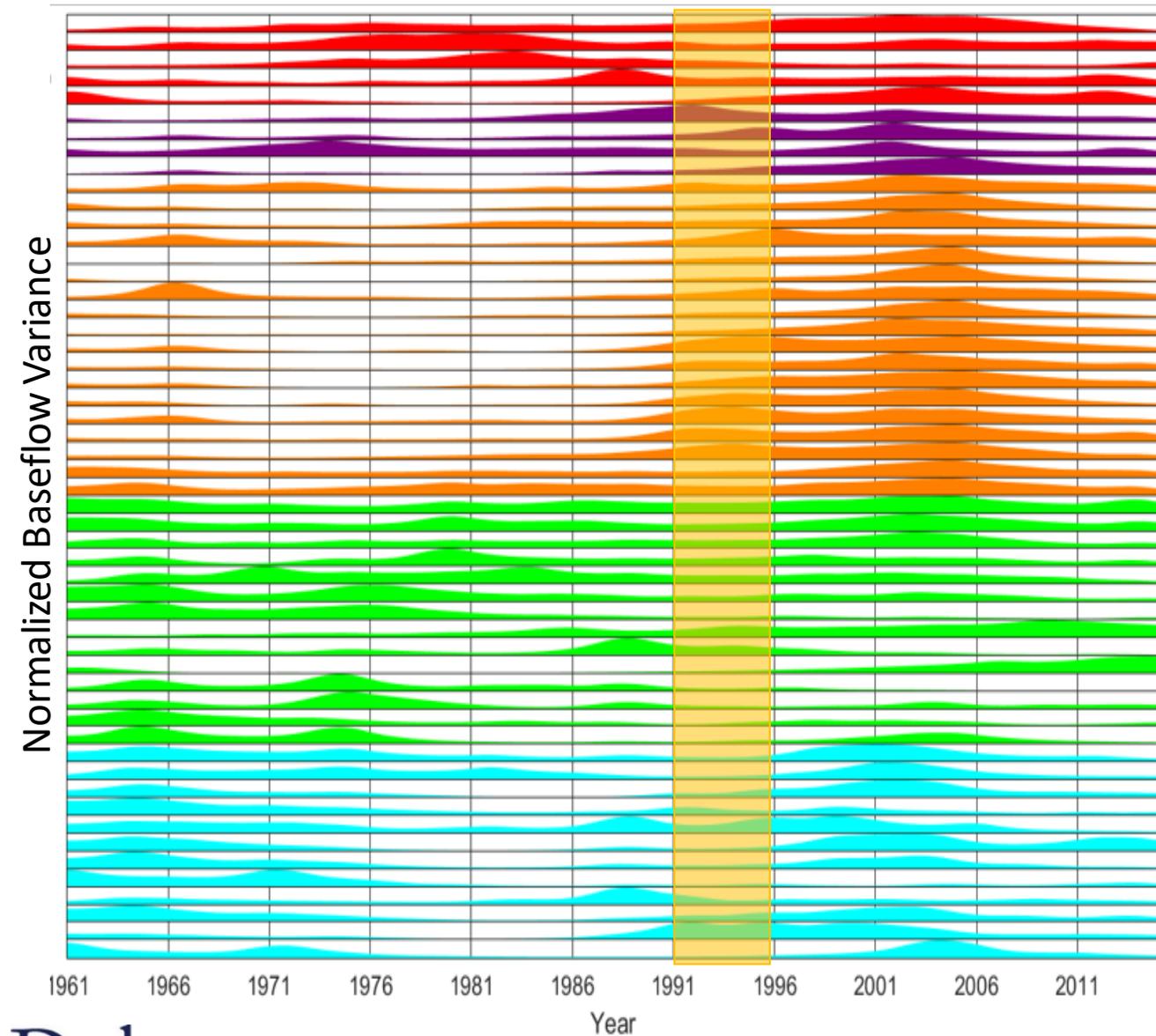
- Outliers**
- 1980-2000 (10 Year)
 - Stream Gauge: 1980-2010

Positioning Risk in Space and Time

Nonstationarity
Multidecadal Variability

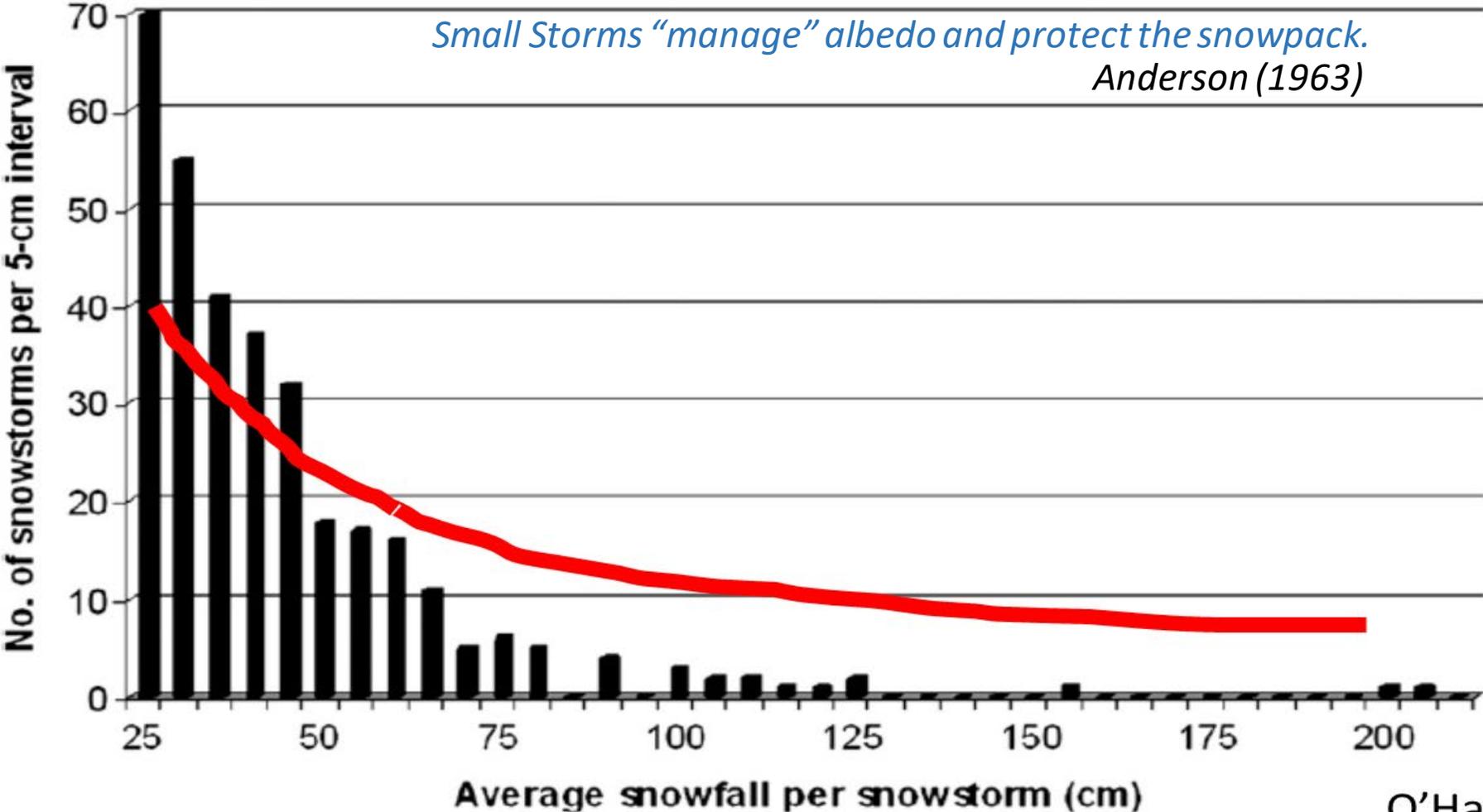


Positioning Risk in Space and Time

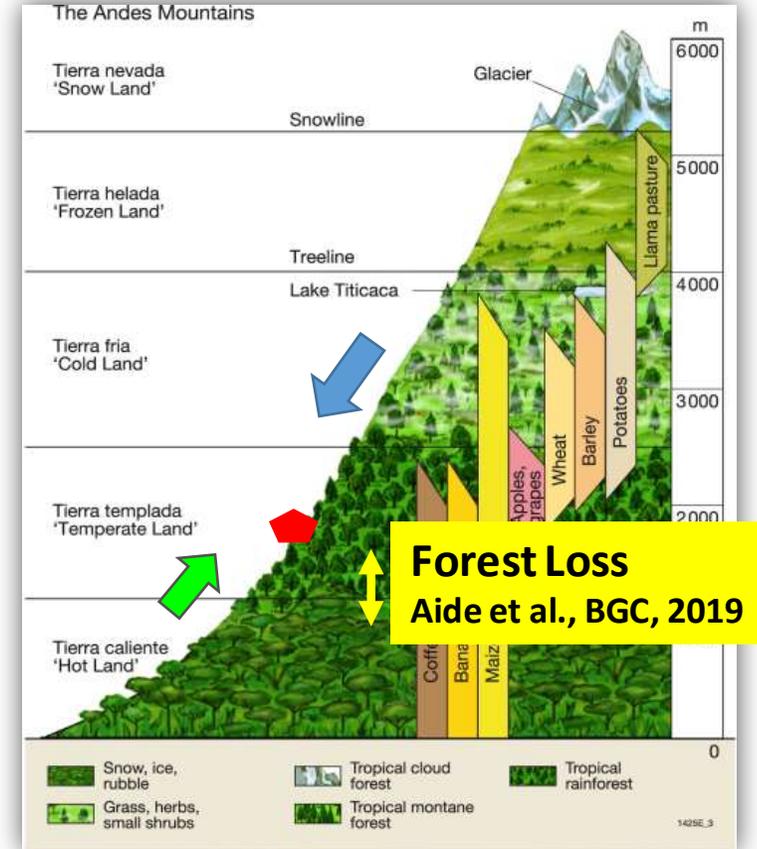
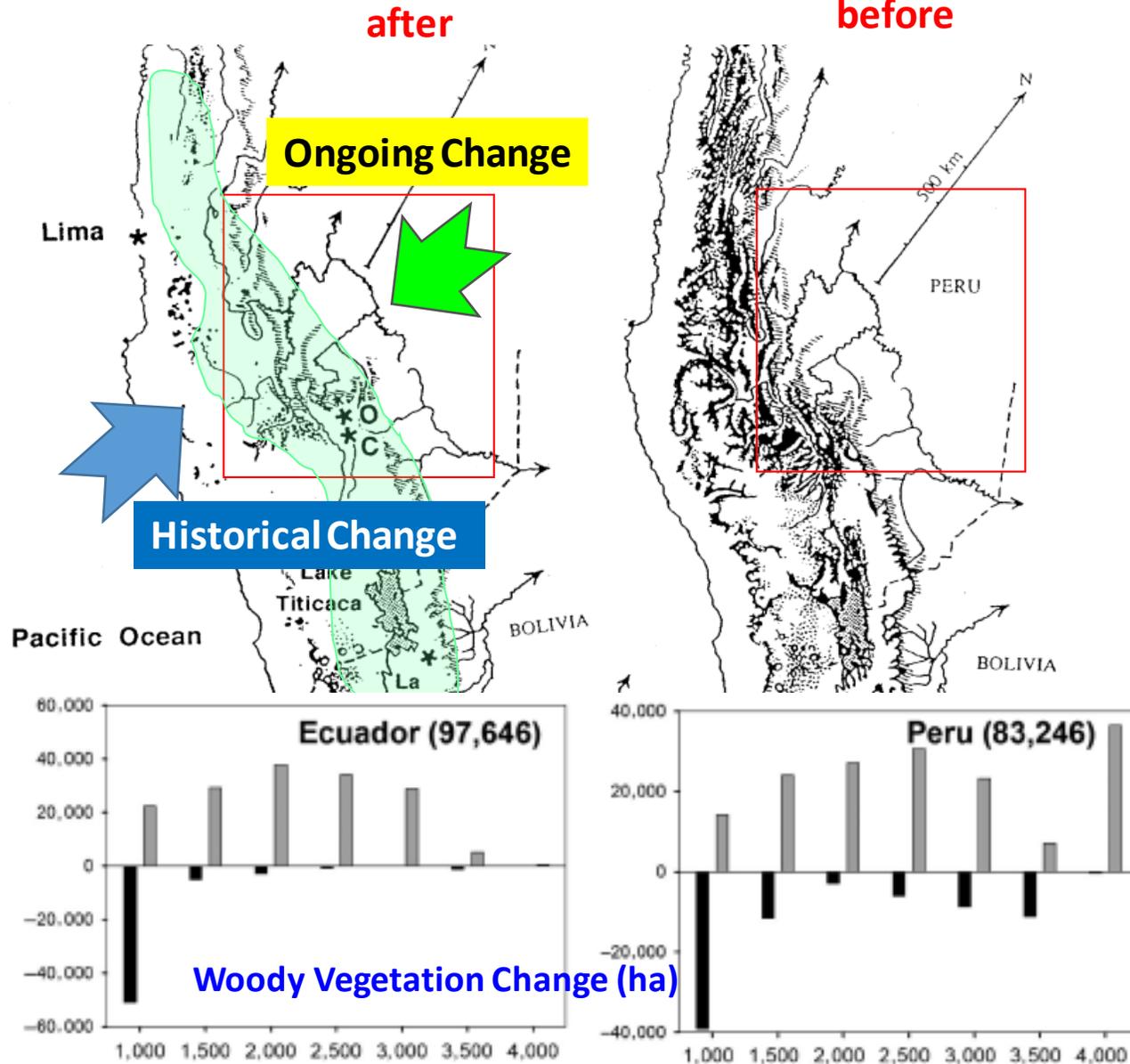


Extremes vs “Nuisance”

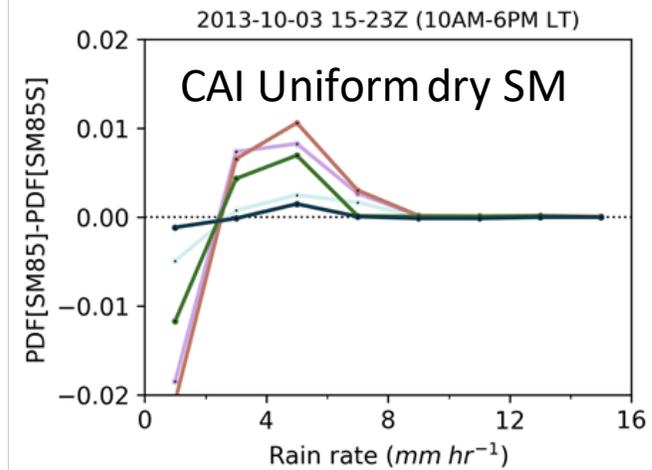
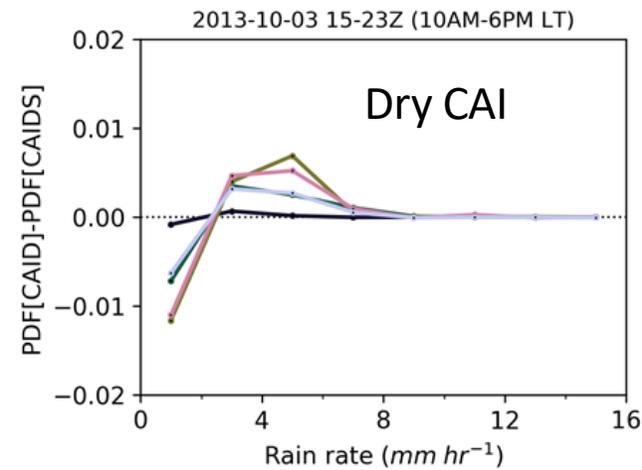
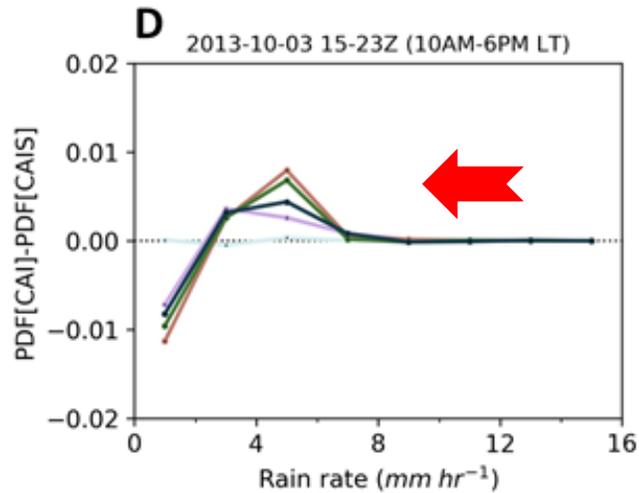
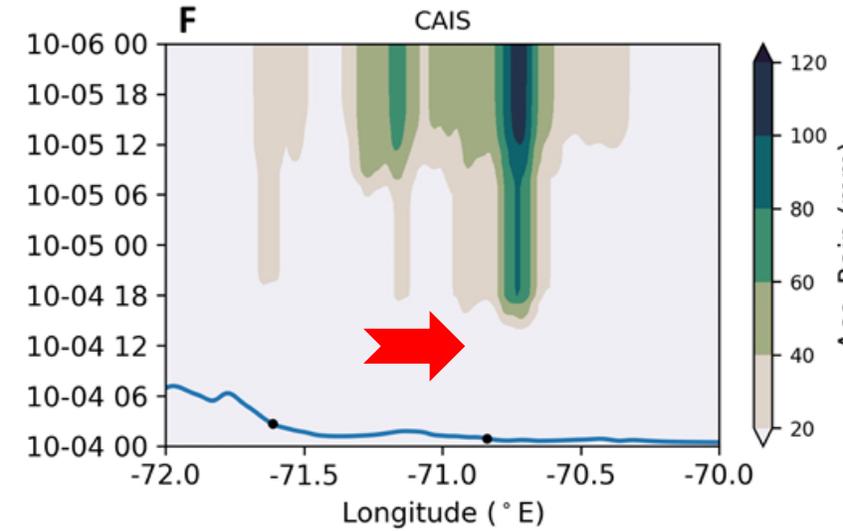
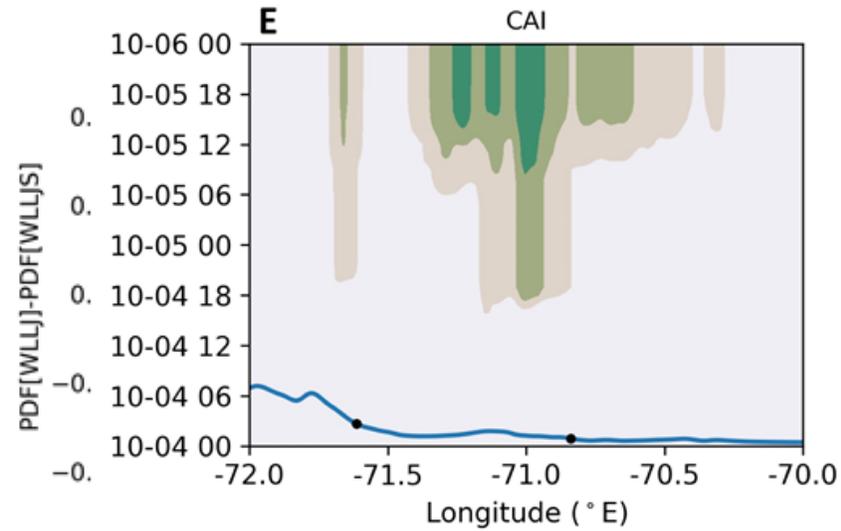
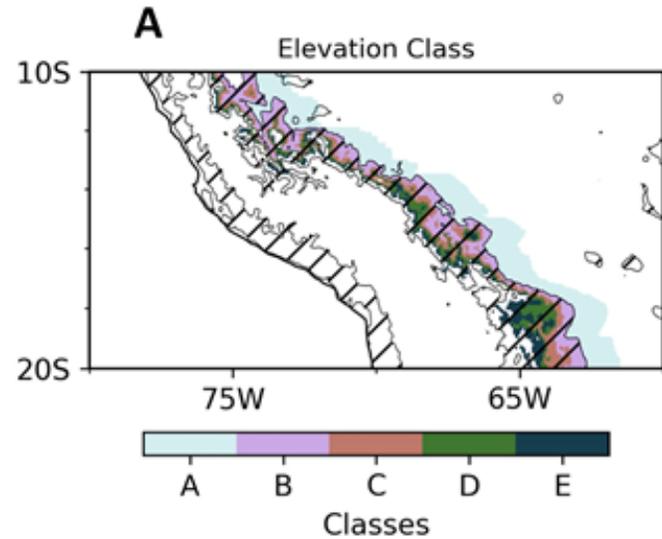
Sierra Nevada Snowstorms
(1949-50 through 2004-05)

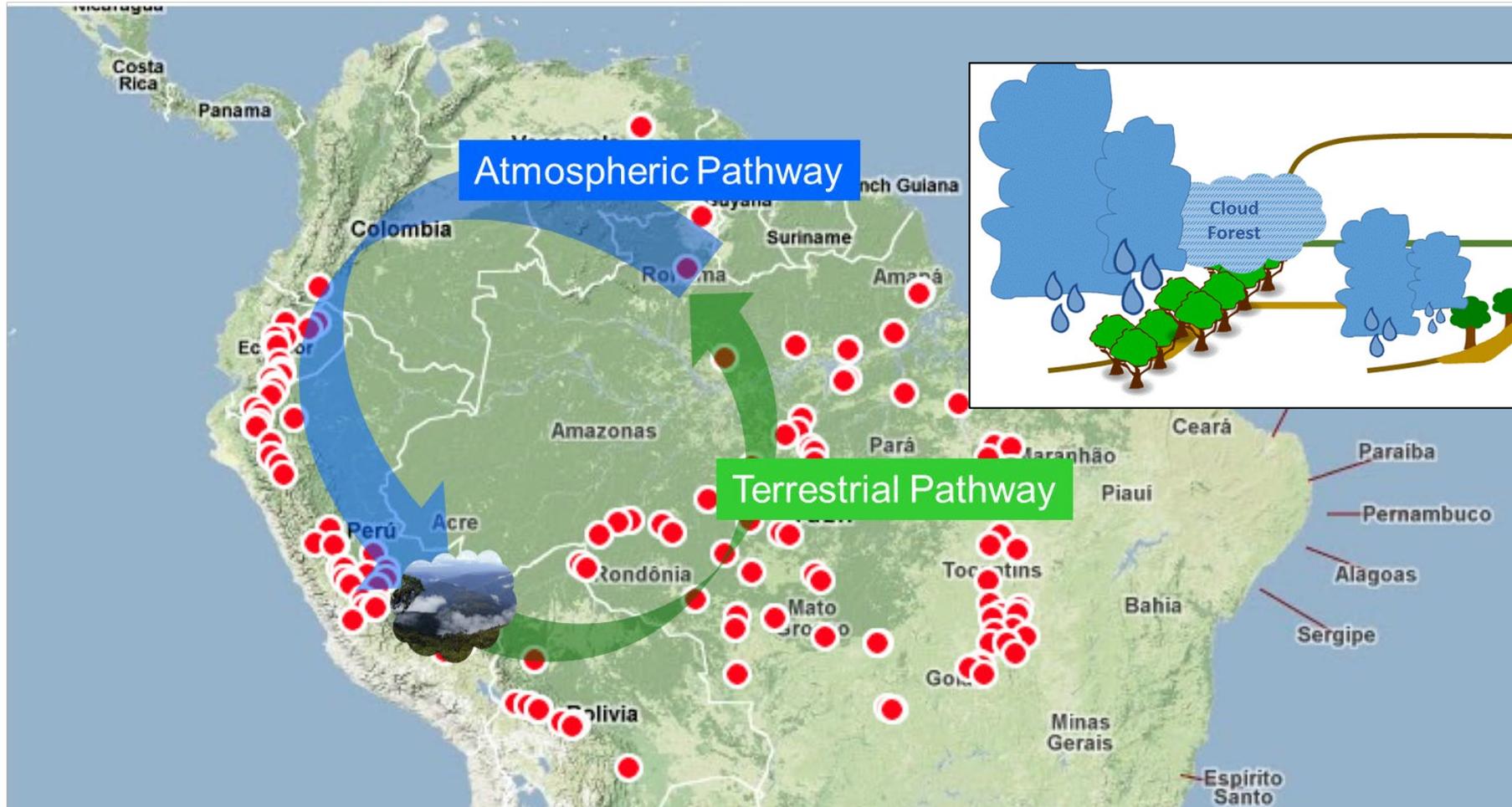


Anthropogenic Land-Use Land-Cover Change



Δ = Tropical Montane Forest - Savannah





www.dams-info.org

50 years !



Due Diligence and Earth System Intelligence

Integrated Earth System Thinking
Teleconnections and Interactions
Multiscale Feedbacks