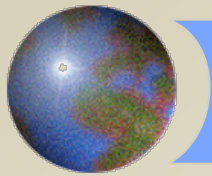


*The Pacific Decadal Precession:  
Our current understanding of its dynamics,  
regional climate effects, and predictability*

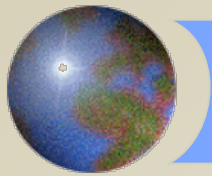
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*Prof. Bruce Anderson  
Dep't of Earth and Environment  
Boston University*



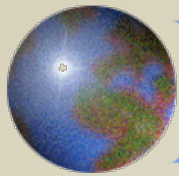
## *Introduction*

- ✧ The impacts of human-induced climate change upon nature and society, both historically and over the next century, have been researched extensively in the climate literature
- ✧ However, climate variations of equal or greater magnitude can occur over just 5-15 years in response to persistent, multi-year shifts in atmospheric pressure patterns and concomitant changes to regional-scale circulations
- ✧ Climate manifestations of such shifts in turn impose significant stresses on physical, biological and socio-economic systems
  - ✧ Extended droughts across California
  - ✧ Exceptional warmth in the Northeast Pacific Ocean
  - ✧ Extreme Fire Weather Conditions from California to Alaska



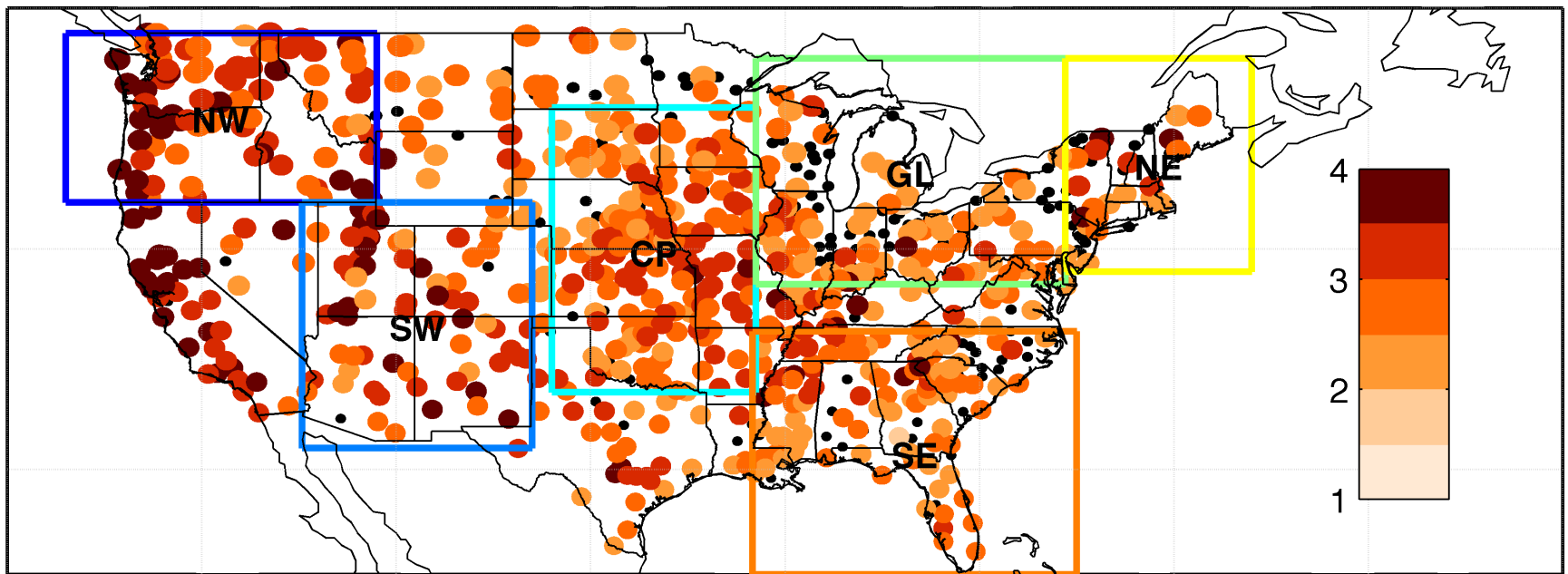
## *Introduction con't.*

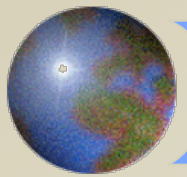
- ✿ Typically, research to understand, anticipate, and prepare for these regional effects invoked well-known modes of decadal climate variability —e.g., the Atlantic Multidecadal Oscillation (AMO), the Pacific Decadal Oscillation (PDO), and the North Pacific Gyre Oscillation (NPGO).
- ✿ In this talk, we will discuss the sources and physical processes giving rise to a recently revealed mode of decadal climate variability termed the *Pacific Decadal Precession* (PDP)
  - ✦ We will show that the PDP and its time evolution represents a robust mode of low-frequency atmospheric variability
  - ✦ We will characterize the PDP's local and teleconnected interactions with, and impacts on, multiple earth system components, including atmosphere, ocean, terrestrial, and cryospheric systems
  - ✦ We will also discuss how to generate long-lead, multi-annual forecasts of these regional climate impacts by leveraging the systematic evolution of the PDP's teleconnection phases



# *Predictability of Observed Precipitation*

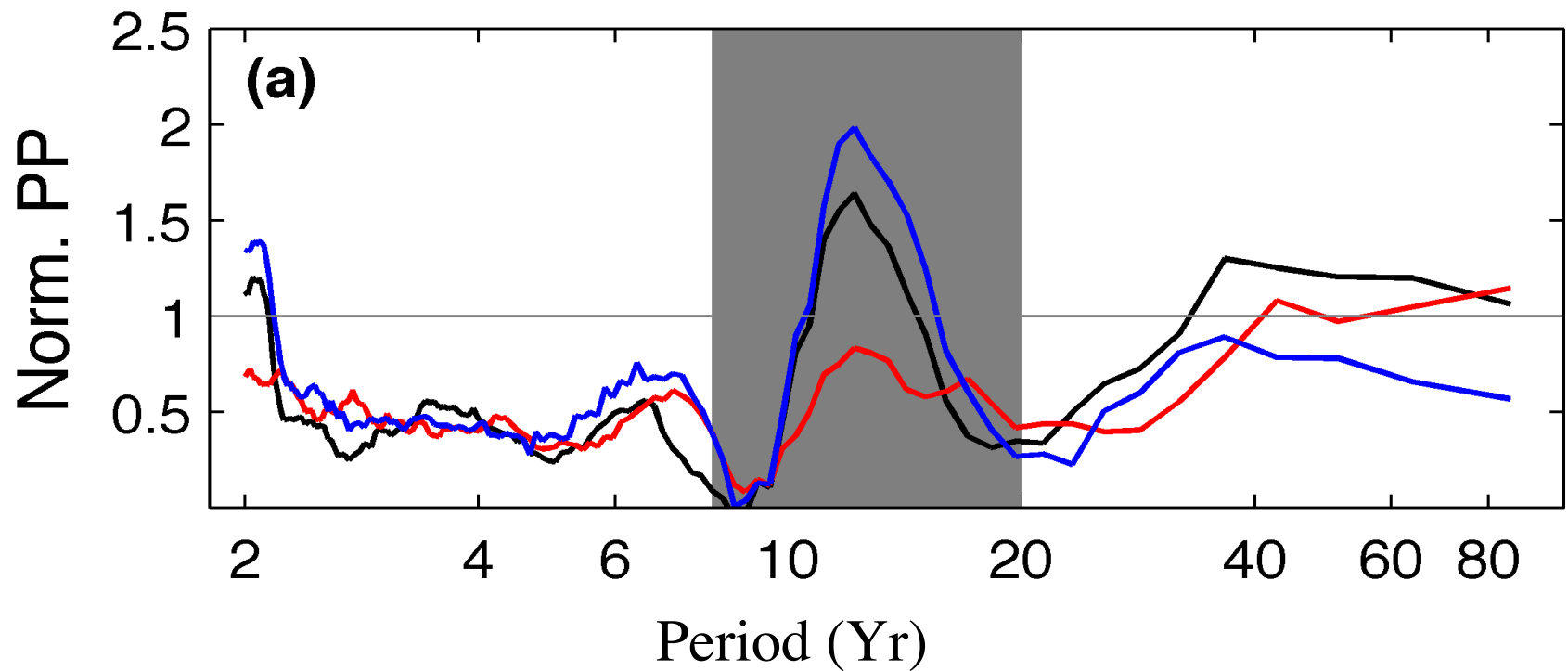
## Potential Predictability for Annual Precip.





# *Timescales of Precipitation Predictability Con't*

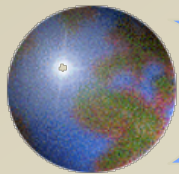
## Northwest



*Intensity*

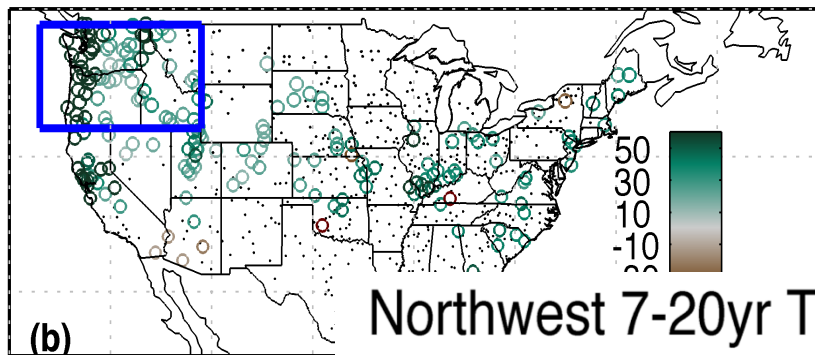
*Total*

*Frequency*

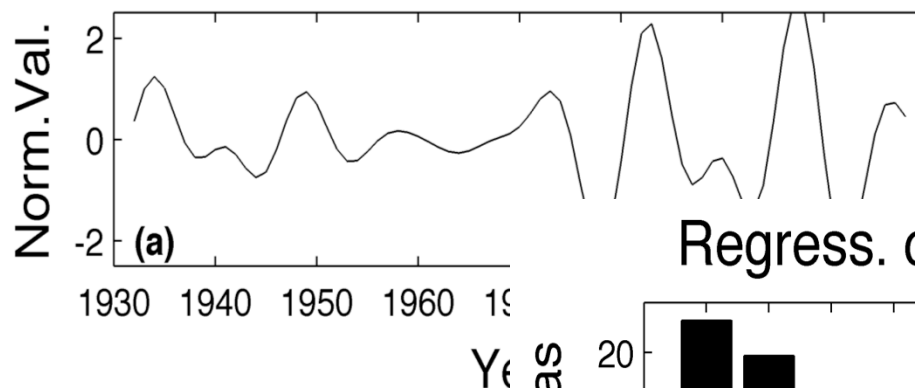


# Leading Mode of 8-20yr Precipitation

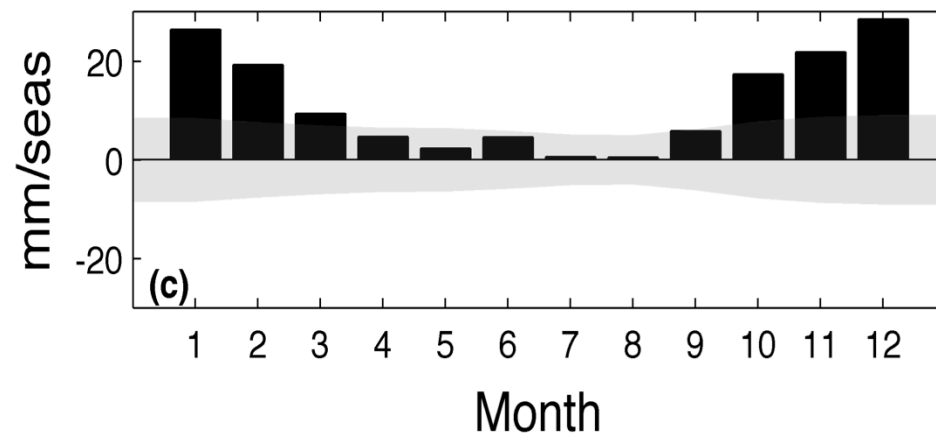
Regress. of TOT(ann) w/PC(1)

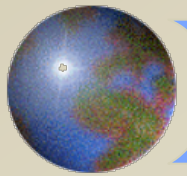


Northwest 7-20yr TOT: PC(1) Time-series



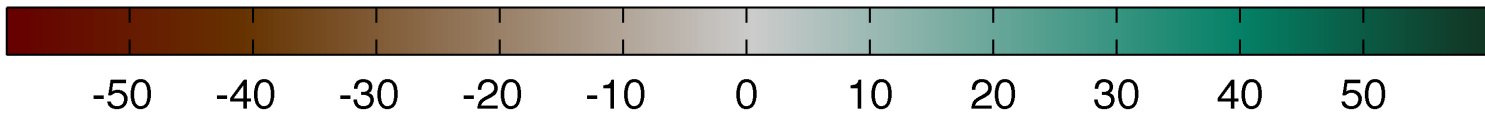
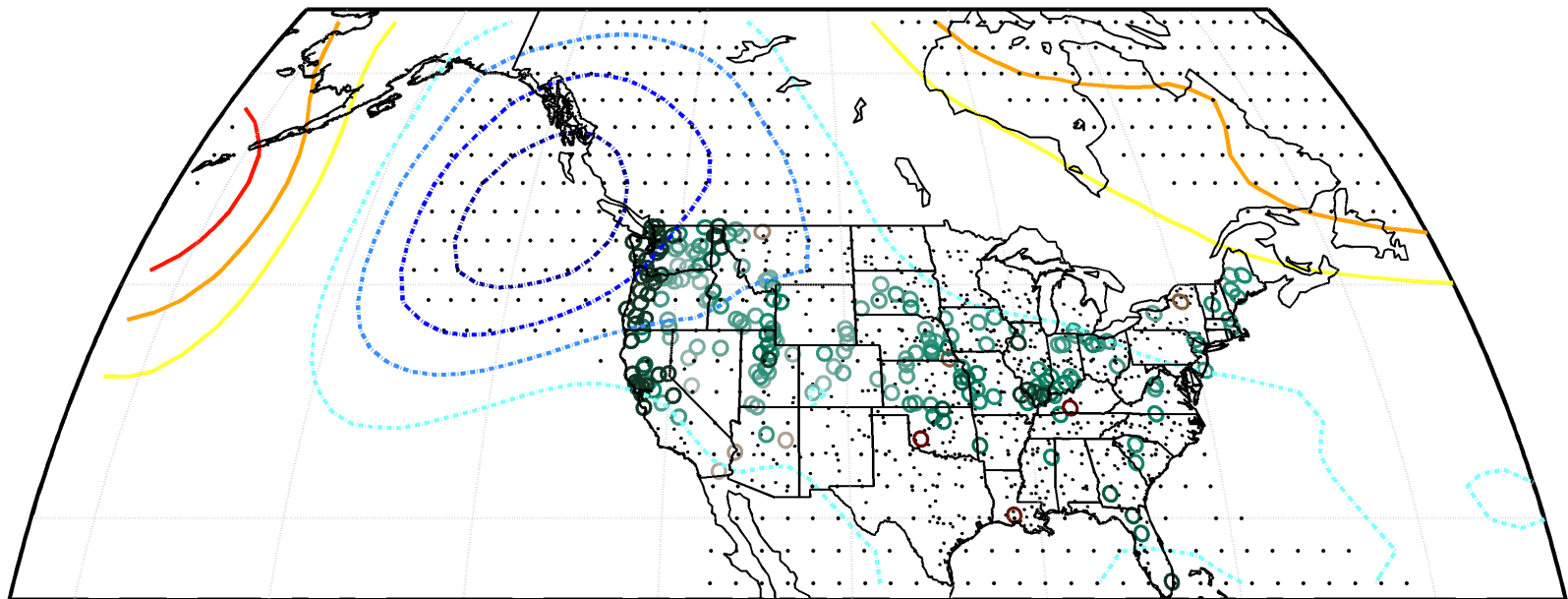
Regress. of TOT(seas) w/PC(1)



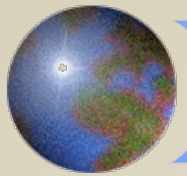


# *Associated Teleconnection Pattern*

Year 0







# *Lead and Lag Teleconnection Patterns*

Year -6

Year -5

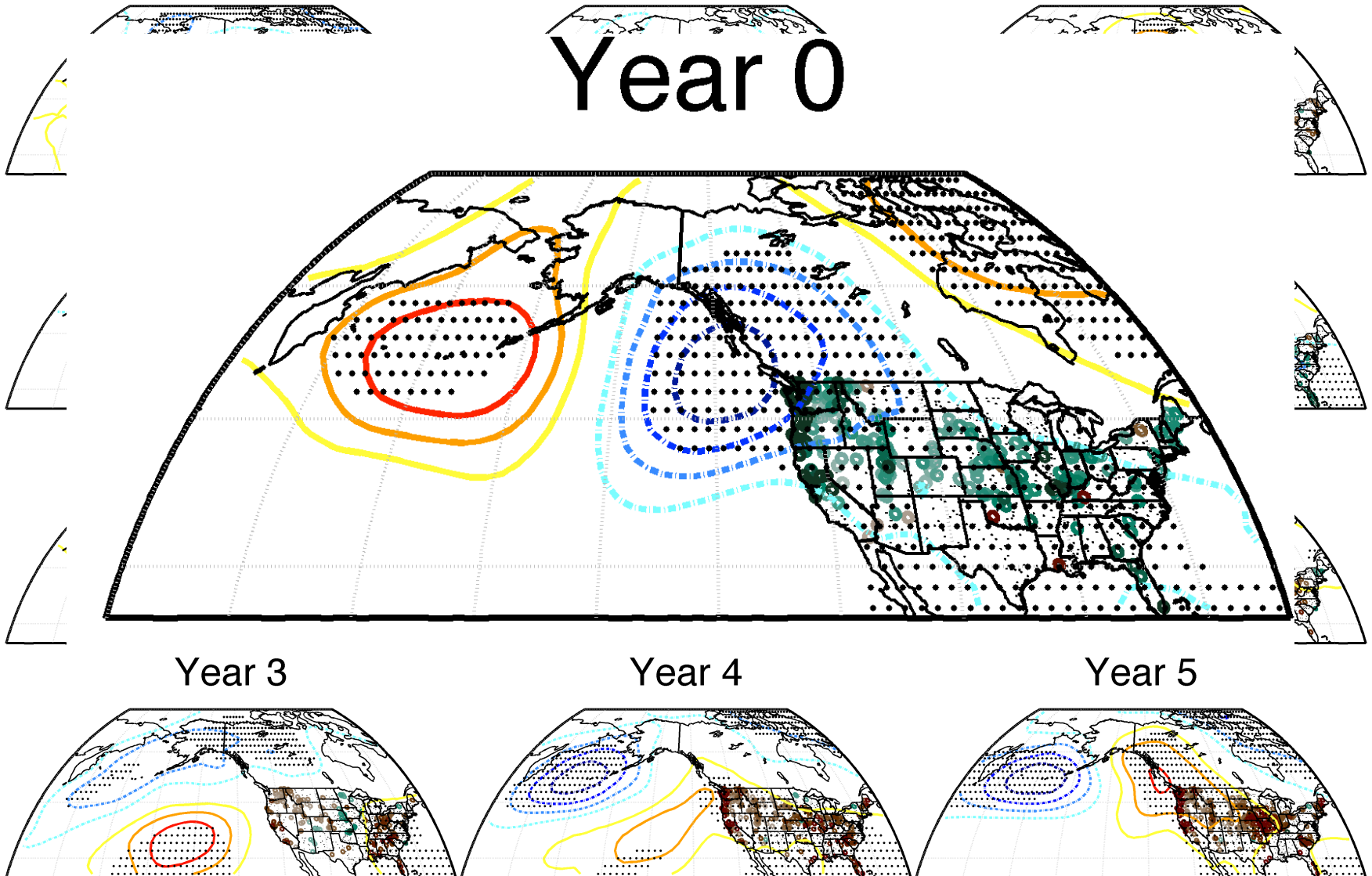
Year -4

## Year 0

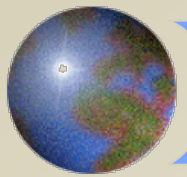
Year 3

Year 4

Year 5

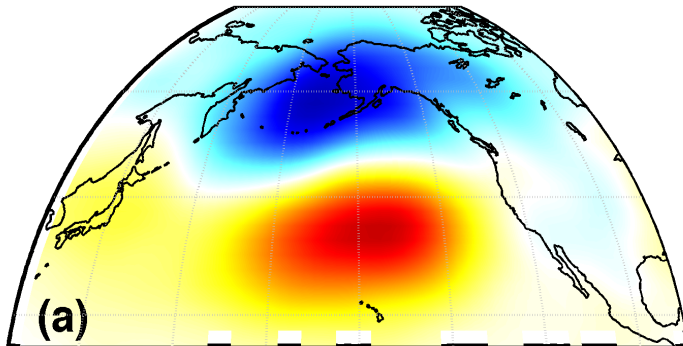




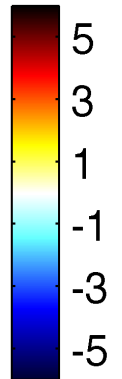
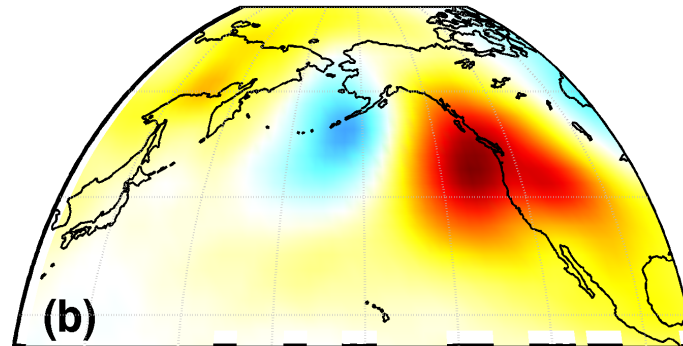


# *PDP Captured by Leading Modes of Variability*

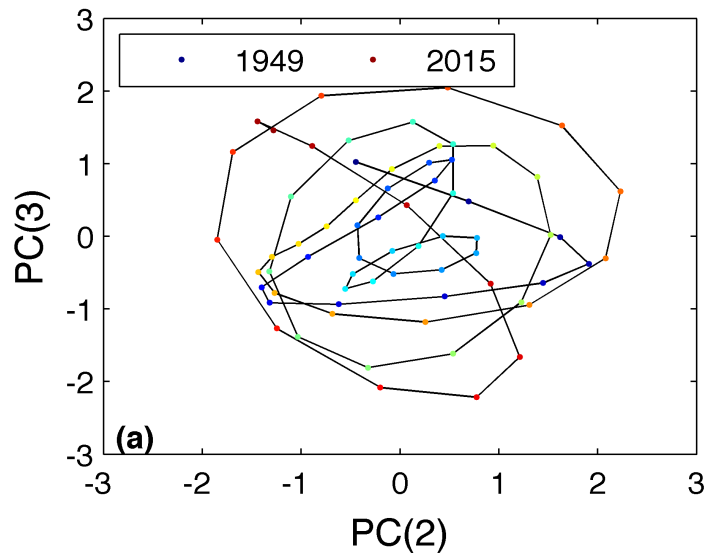
EOF(2): Z(850hPa)



EOF(3): Z(850hPa)



N.Pac. Phase Space: PC2,3



Lead/Lag Correlation of N.Pac. Decadal PC(2,3)

