



Southern California Flood Climatology

Department of Water Resources Workshop
Climate Change, Extreme Weather, and Southern California
Floods

January 31, 2012

Talk Overview

- Ingredients for a Southern CA Flood
- Historical Floods of Note
- Inter-annual Variability and California
- Bulletin 17B
- Climate Change Considerations

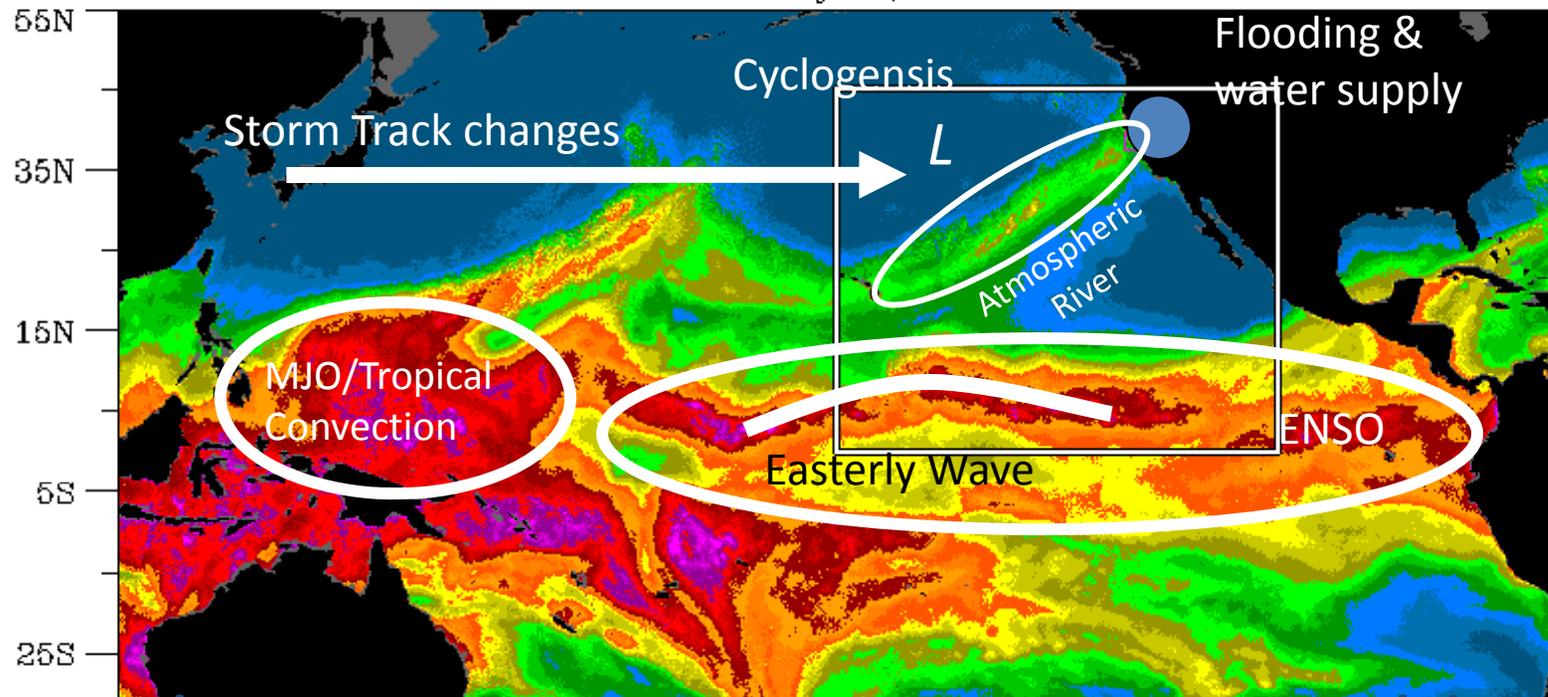
Ingredients for a Flood

- CA flood regime relies on both atmosphere and the interaction of the atmosphere with the land surface
- Time of Year Matters
- Location Matters

Winter Floods

- October through March “wet season”
- ENSO State Matters
- Atmospheric River Events

Key Phenomena Affecting California Water Supply/Flooding:

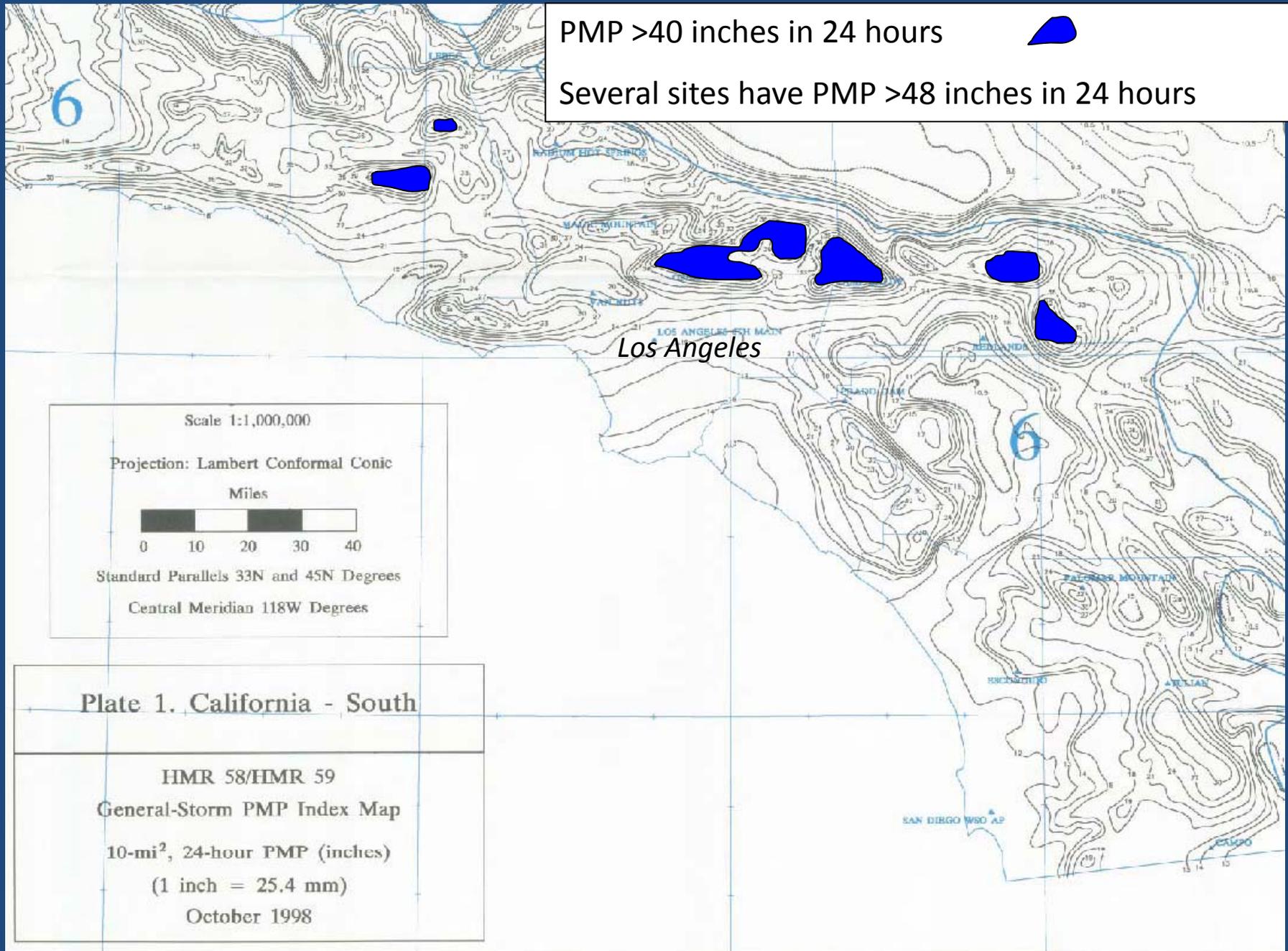


The most extreme CA storm would result from a rare alignment of key processes

PMP >40 inches in 24 hours



Several sites have PMP >48 inches in 24 hours



Scale 1:1,000,000

Projection: Lambert Conformal Conic

Miles



Standard Parallels 33N and 45N Degrees

Central Meridian 118W Degrees

Plate 1. California - South

HMR 58/HMR 59

General-Storm PMP Index Map

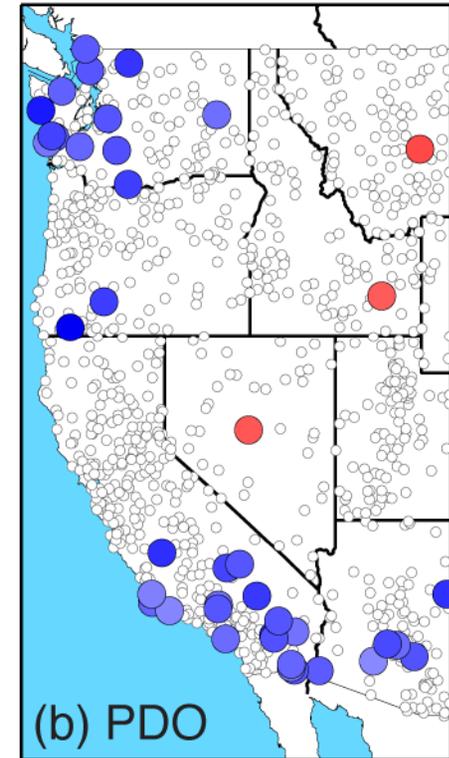
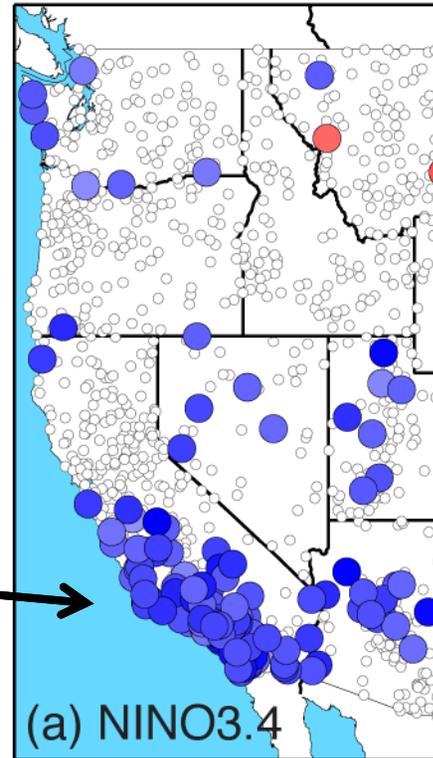
10-mi², 24-hour PMP (inches)

(1 inch = 25.4 mm)

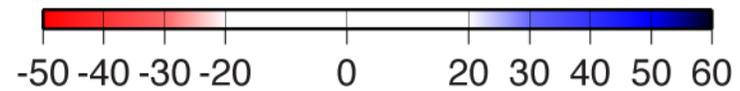
October 1998

CORRELATIONS OF AR PRECIPITATION (days 0 to +1)
CONTRIBUTIONS WITH:

El Ninos, not La Ninas, are historically correlated with larger AR contributions to overall precip



Correlation, as percentage



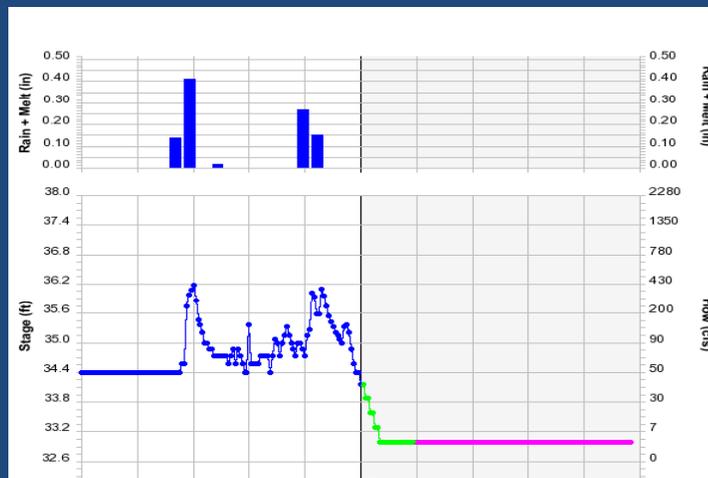
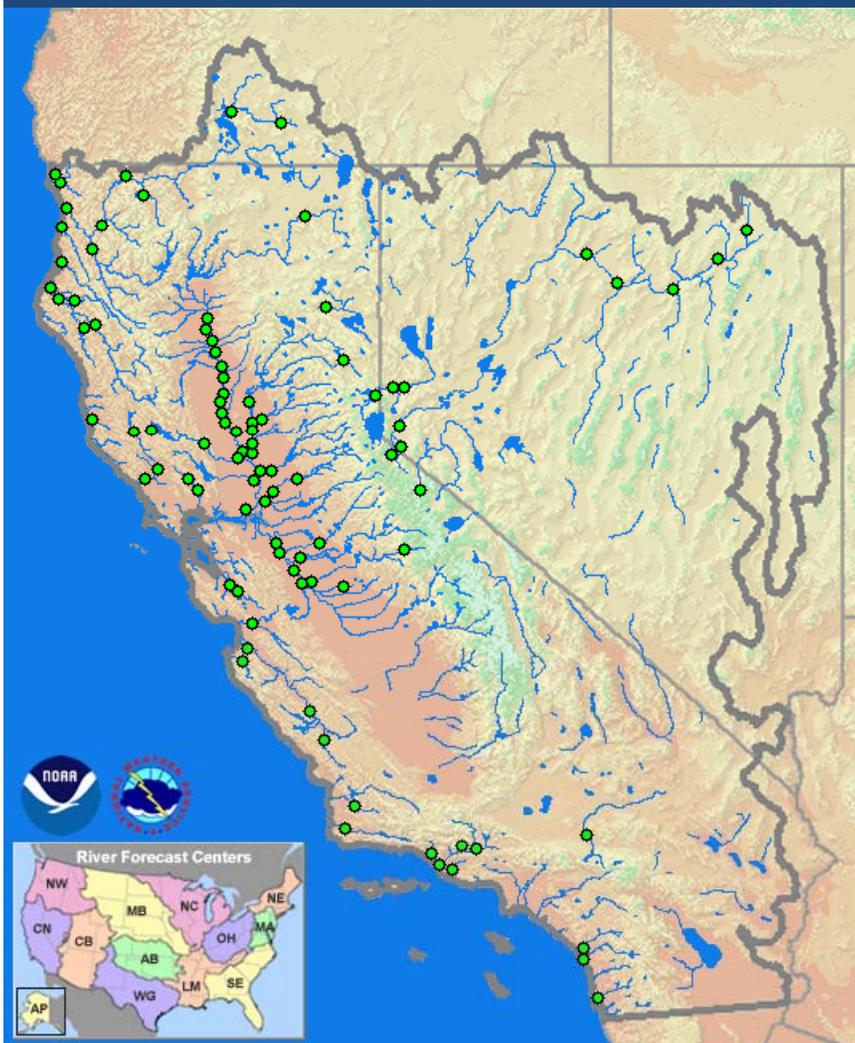
Summer Floods

- Convective Events Related to Monsoon
- Location/Land Surface Condition Matters
- Timing is an Important Issue

Monsoon Moisture Flow



Flood Events and Timing



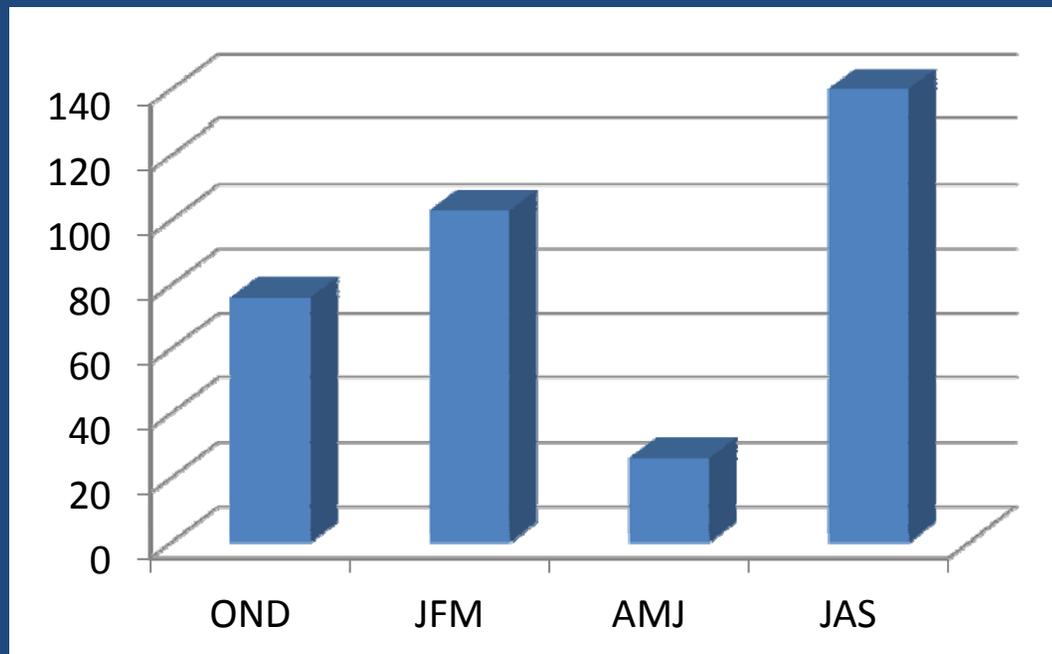
45.7 Feet Ventura Road under the railroad bridge will begin to flood as well as the Wagon Wheel Road shopping center.

46.7 Feet Stores at the Wagon Wheel shopping center will begin to be flooded. McGrath State Beach campground will be flooded.

47.6 Feet Harbor Boulevard Bridge will be overtopped by flood waters. The Montalvo waste water treatment plant will be flooded. The River Ridge area, Olivas Park Golf Course, Ventura Harbor area, and the Ventura Wastewater treatment plant will be flooded.

Flood History

- 345 Events from 1850-2009 taken from “A History of Significant Weather Events in Southern California”

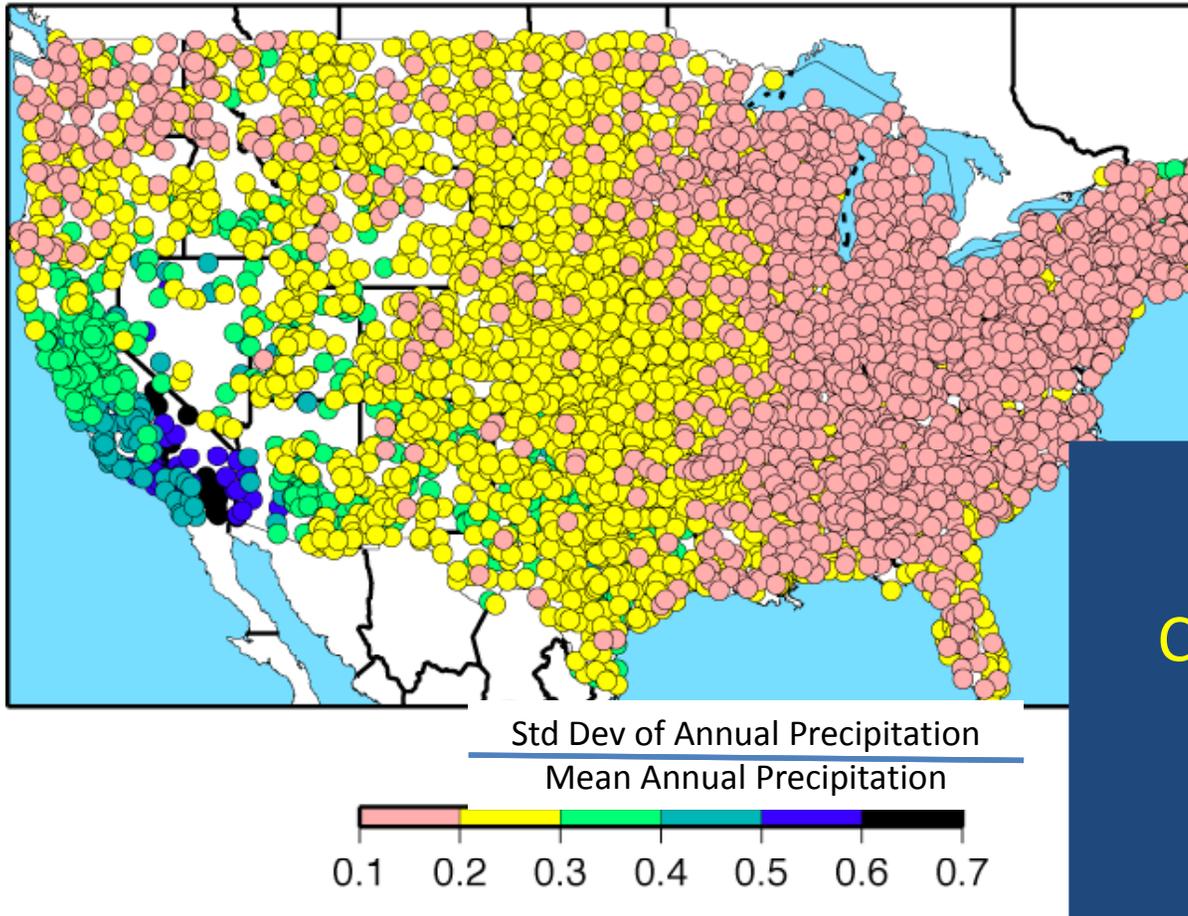


Flood Years of Note

- Dec 1861/Jan 1862
- Jan 1916
- Dec 1921
- Feb 1927
- Feb/Mar 1938
- Jan 1969
- Jan 2005
- Jul/Aug 1955
- Aug 1961
- Jul-Sep 1967
- Aug 1972
- 1982/1983
- 1986
- 1998

Year to Year Precipitation Variability

a) COEFFICIENTS OF VARIATION OF
TOTAL PRECIPITATION, WY 1951-2008



California precipitation
is uniquely variable

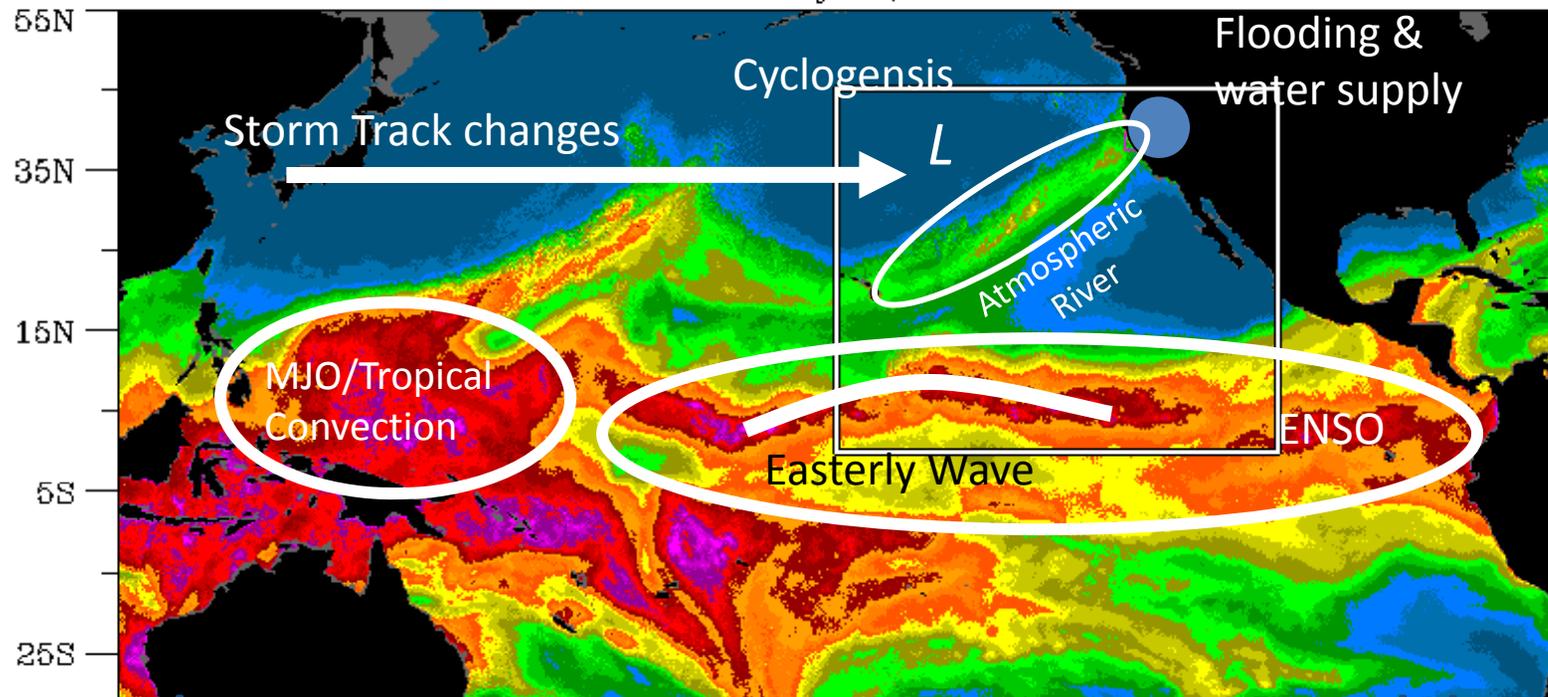
Bulletin 17B Considerations

- Infrastructure design for floods relies on the methods for estimating flood size found in the Bulletin 17B
- Key assumptions in the Bulletin 17B are independence and identically distributed needed to generate statistically relevant sample size
- Flood size estimates are based on historical observation – as new, larger floods are observed flood estimate size changes

Climate Change Considerations

- How will temperature impact the land surface?
- How will atmospheric river characteristics change in a warmer atmosphere?
- How will ocean temperature and circulation patterns impact storm track formation?
- Will event variability increase?

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Monsoon Moisture Flow



Take Home Points

- Atmospheric Rivers are a fundamental element of California winter floods while monsoon processes influence summer floods
- Location important
- Climate signals important for inter-annual variability – all years are not the same
- Climate change has possible impacts to magnitude, timing, and frequency of events



Questions?

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