



BOISE STATE UNIVERSITY



Lab for Ecohydrology and Alternative Futuring

# MODELING CASE STUDY of an INLAND PENETRATING ATMOSPHERIC RIVER EVENT JUNE 2nd-4th, 2010

Matt Masarik<sup>1</sup>, Korri Anderson<sup>2</sup>, Spencer Tangen<sup>3</sup>

Will Rudisll<sup>1</sup>, Lejo Flores<sup>1</sup>, Eric Rothwell<sup>4</sup>

<sup>1</sup>Boise State University, Department of Geosciences

<sup>2</sup>NWS WFO, Boise ID

<sup>3</sup>University of Utah, Department of Atmospheric Sciences

<sup>4</sup>USBR Pacific NW Region

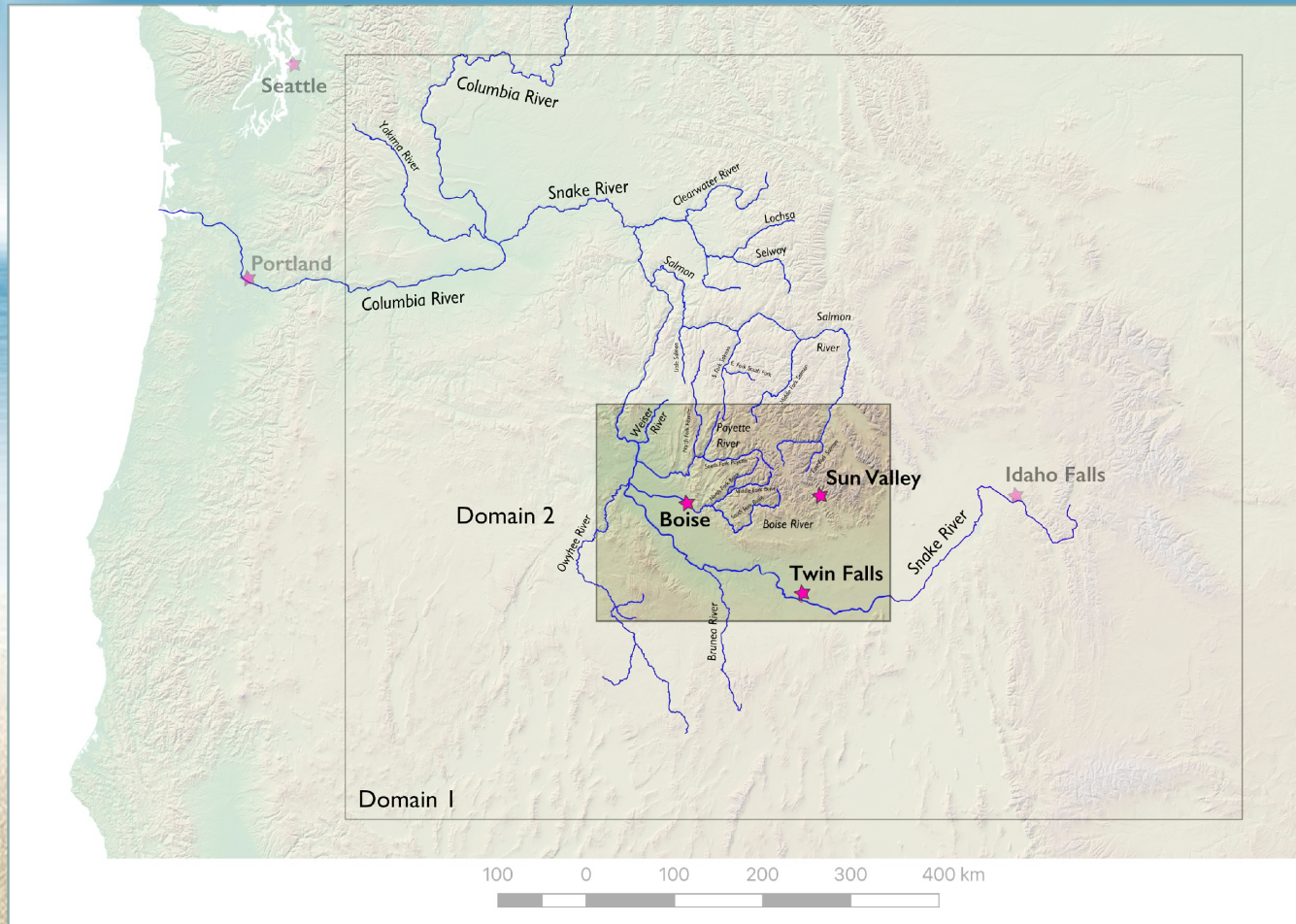
# Motivation

The need for high-resolution weather forecast guidance in the intermediate-range (10-30 days) for water resource management.

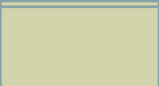


Floodwaters along the Payette River in Emmett

# WRF Domains

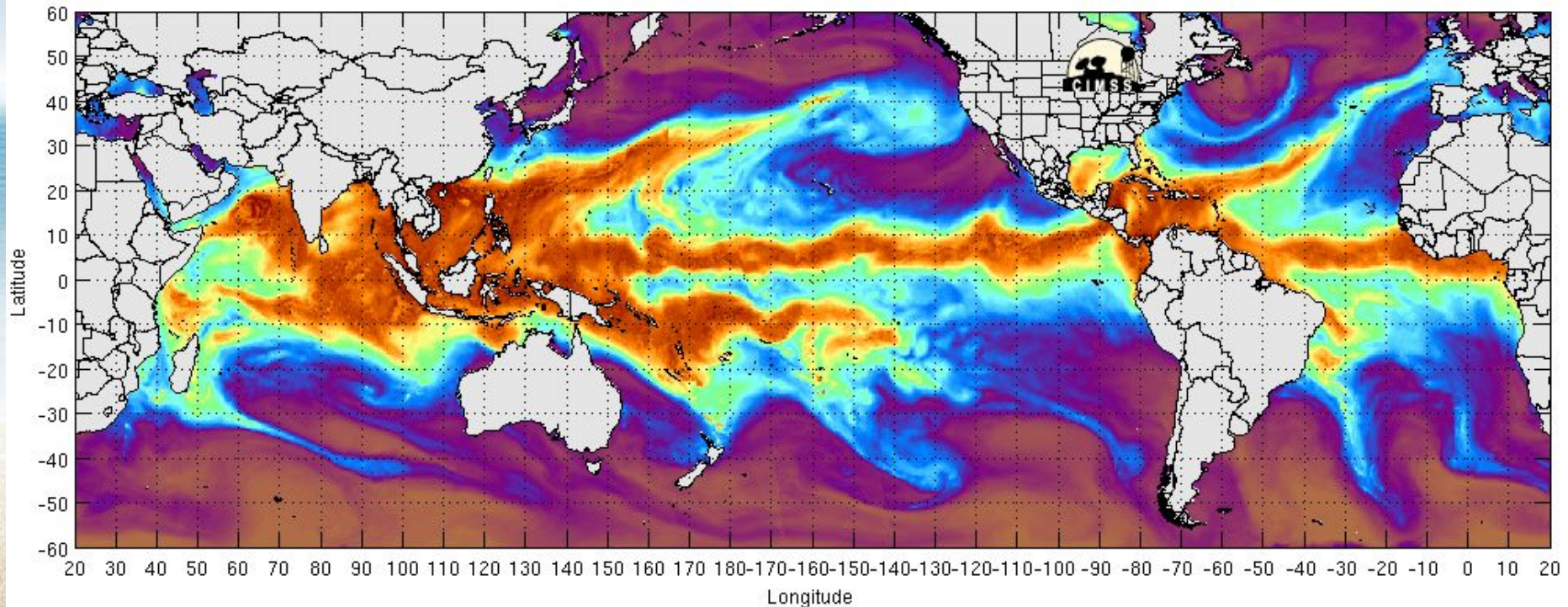


# Boise + Payette Reservoir Levels

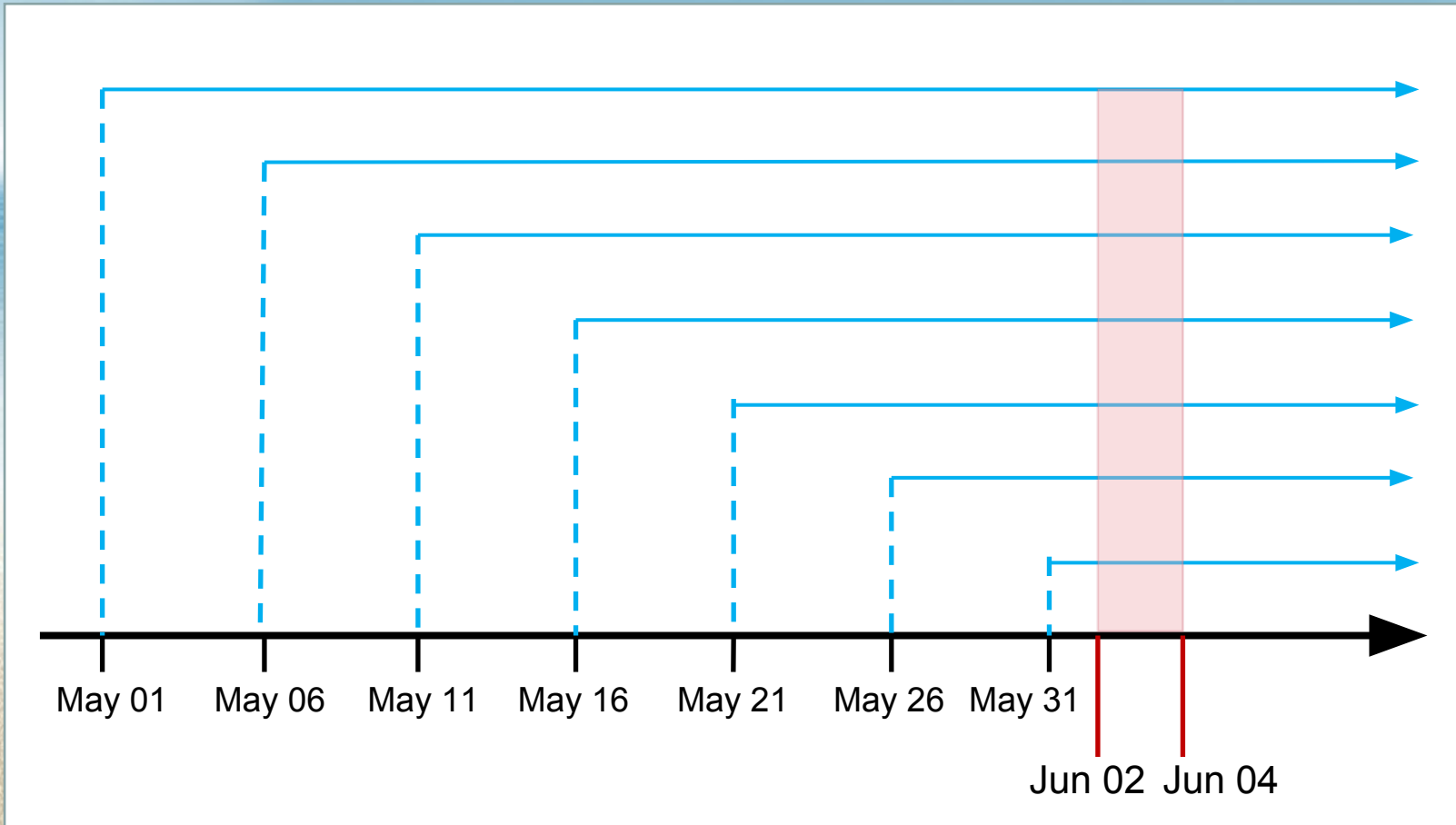
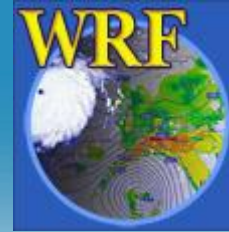
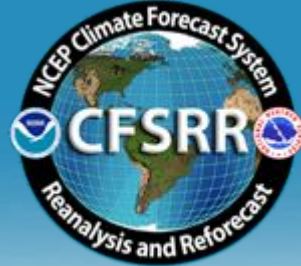


# SSMI/AMSRE TPW: Jun 1-4

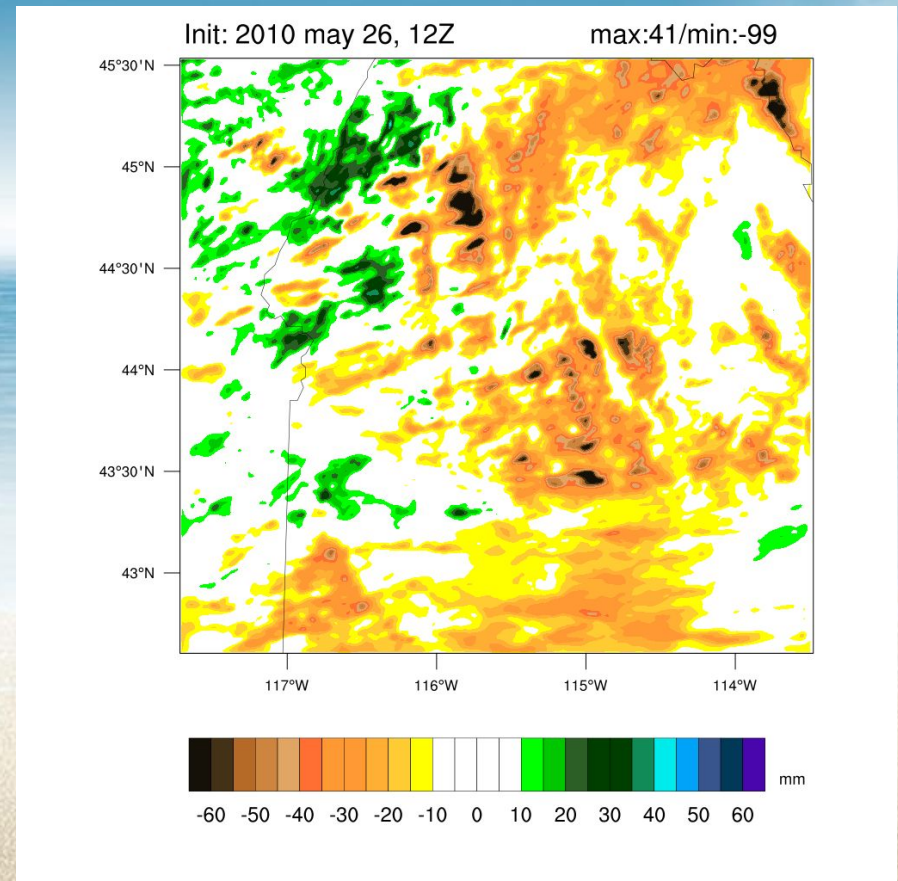
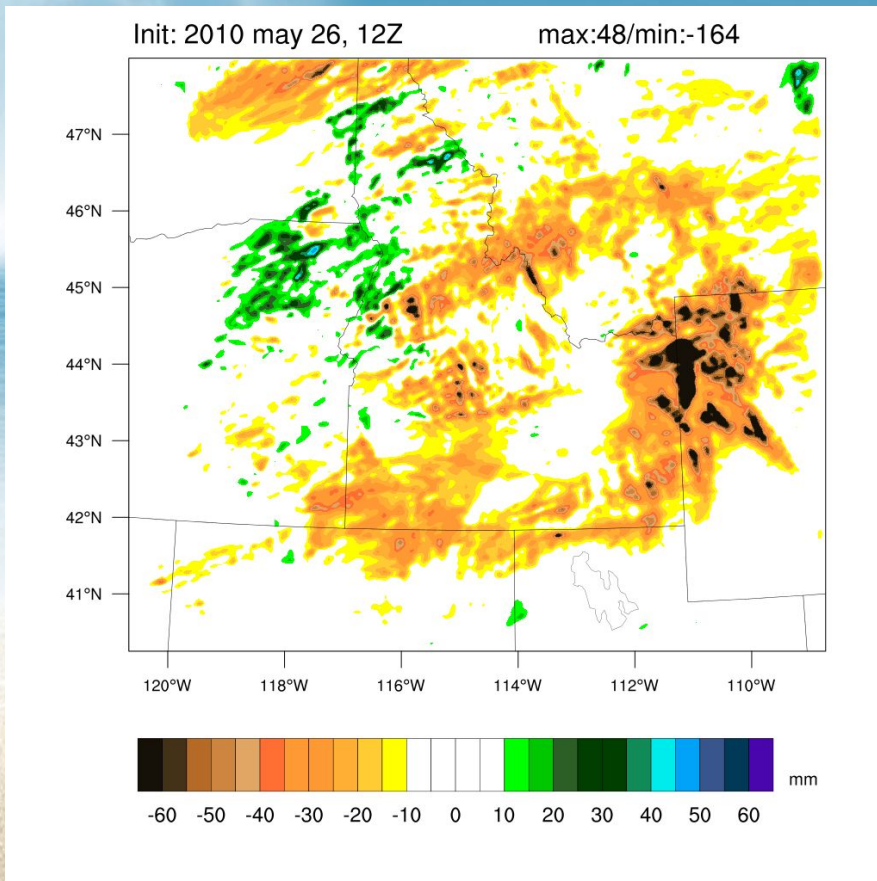
Morphed composite: 2010-06-01 00:00:00 UTC



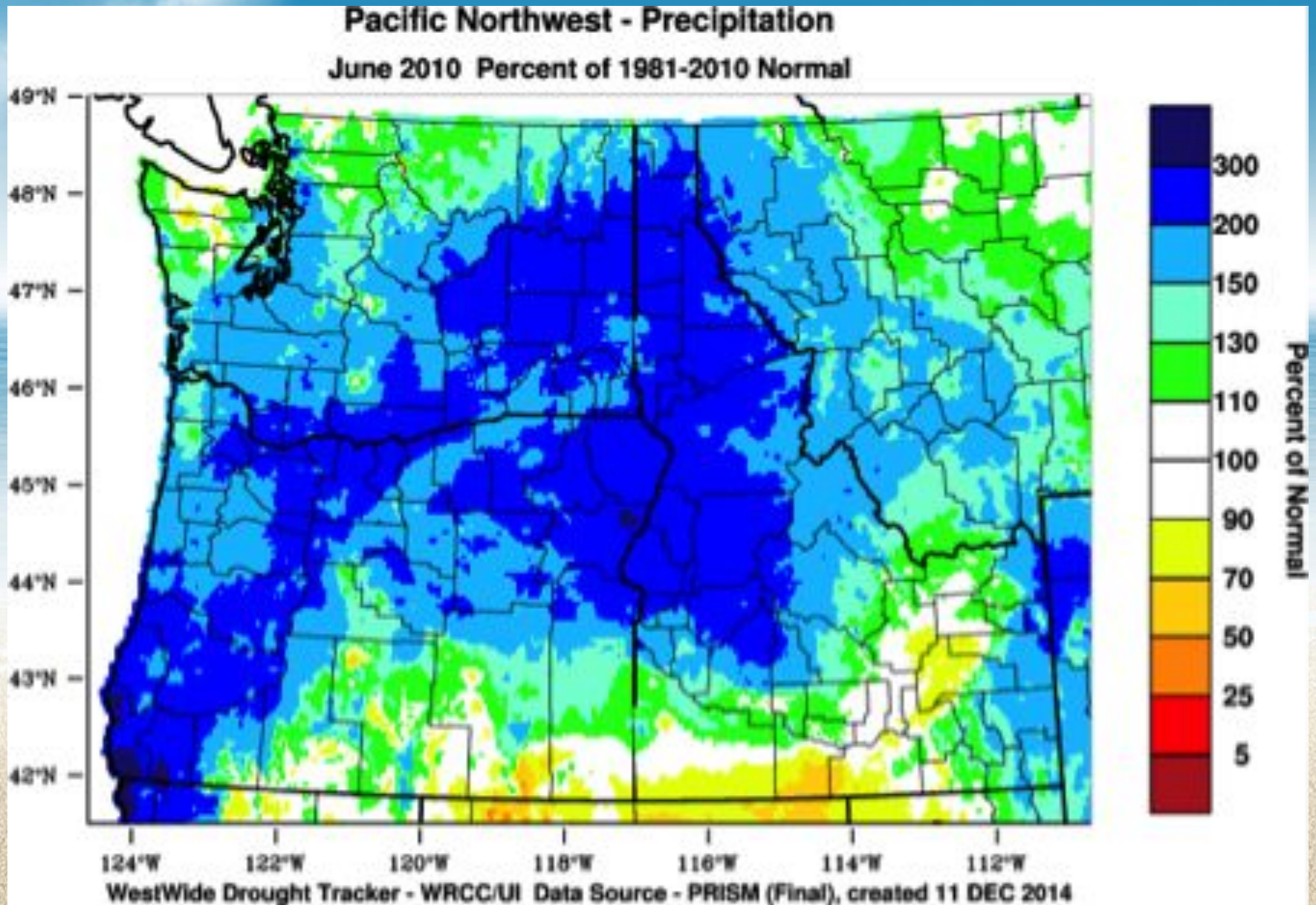
# Experiment design



# WRF RAINNC Spatial Differences

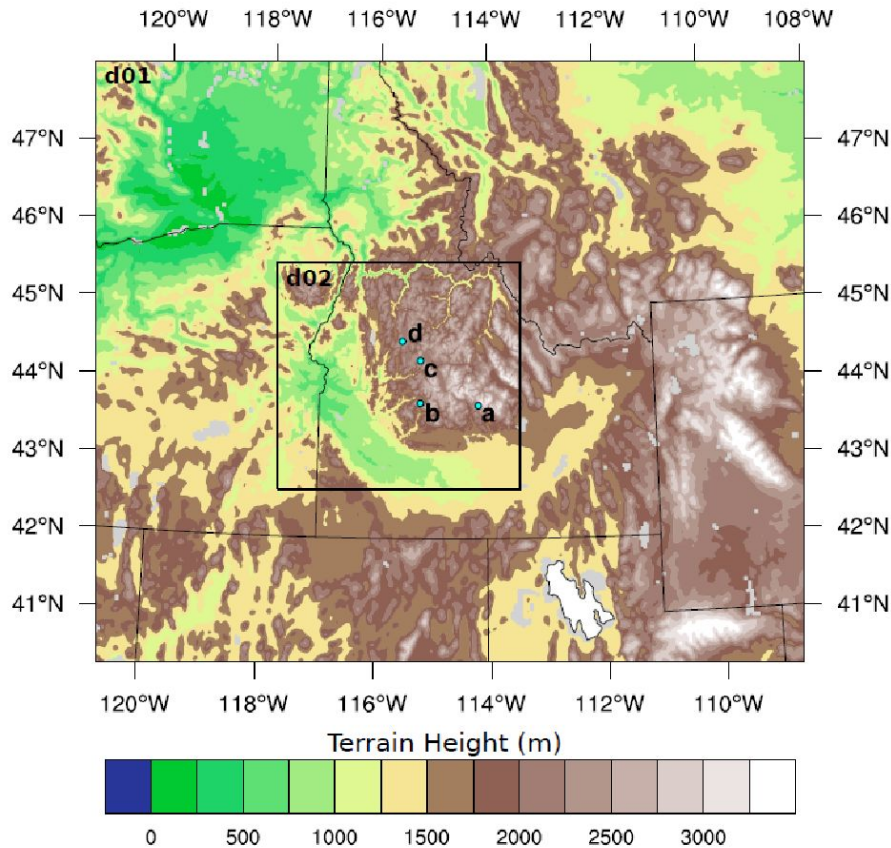


# PRISM

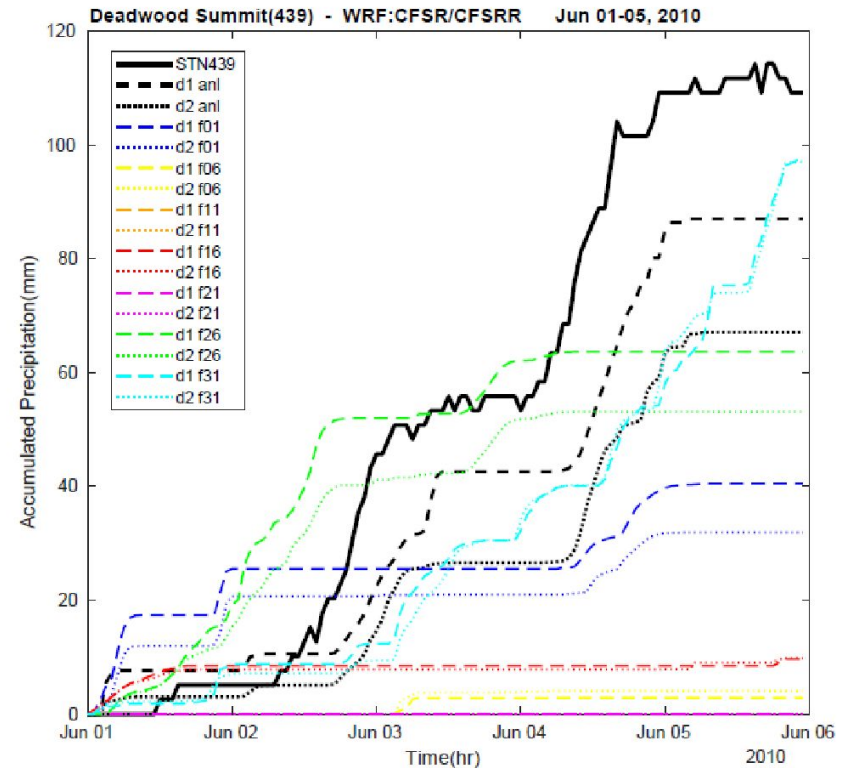




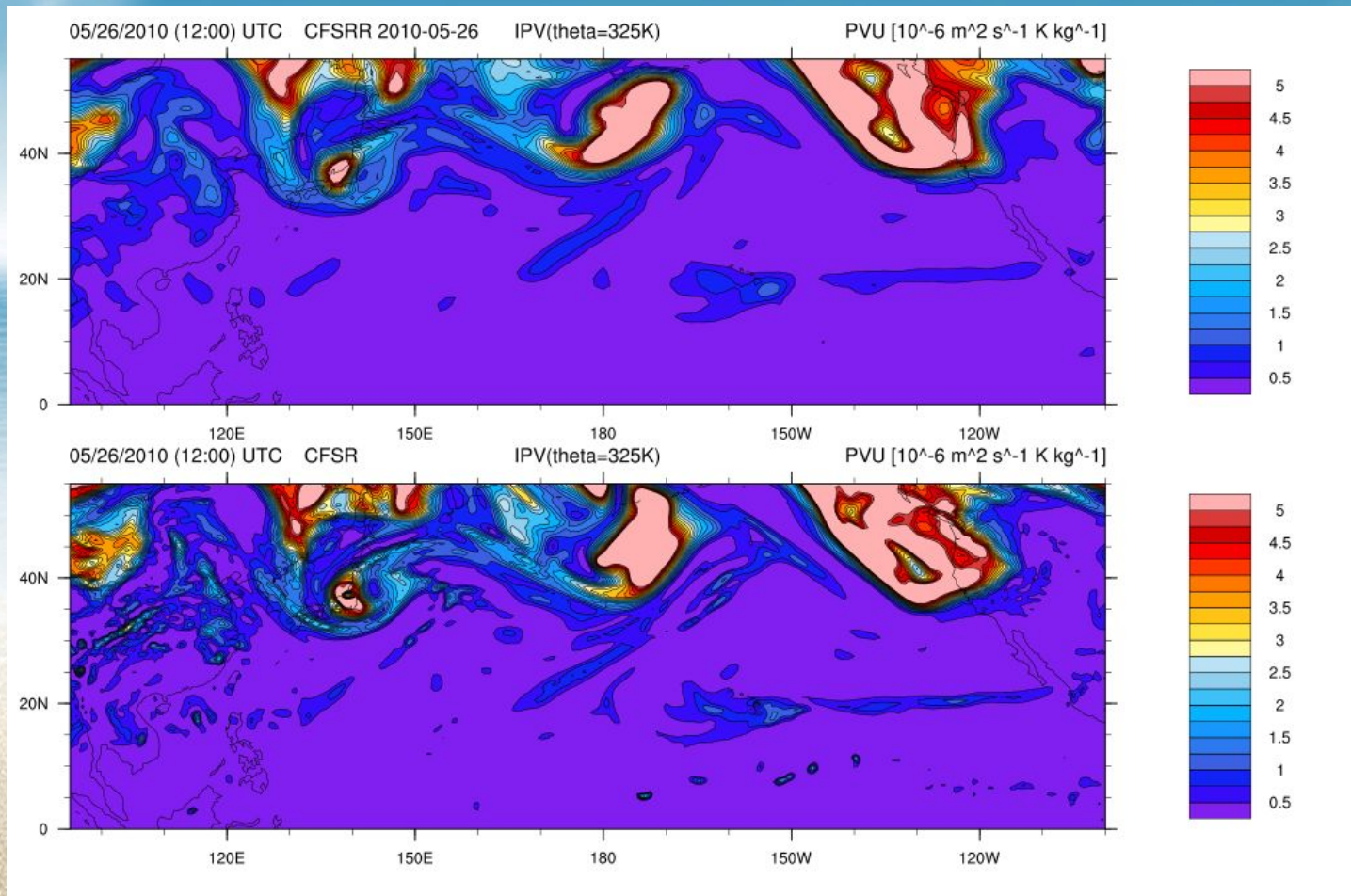
# SNOTEL Station time series



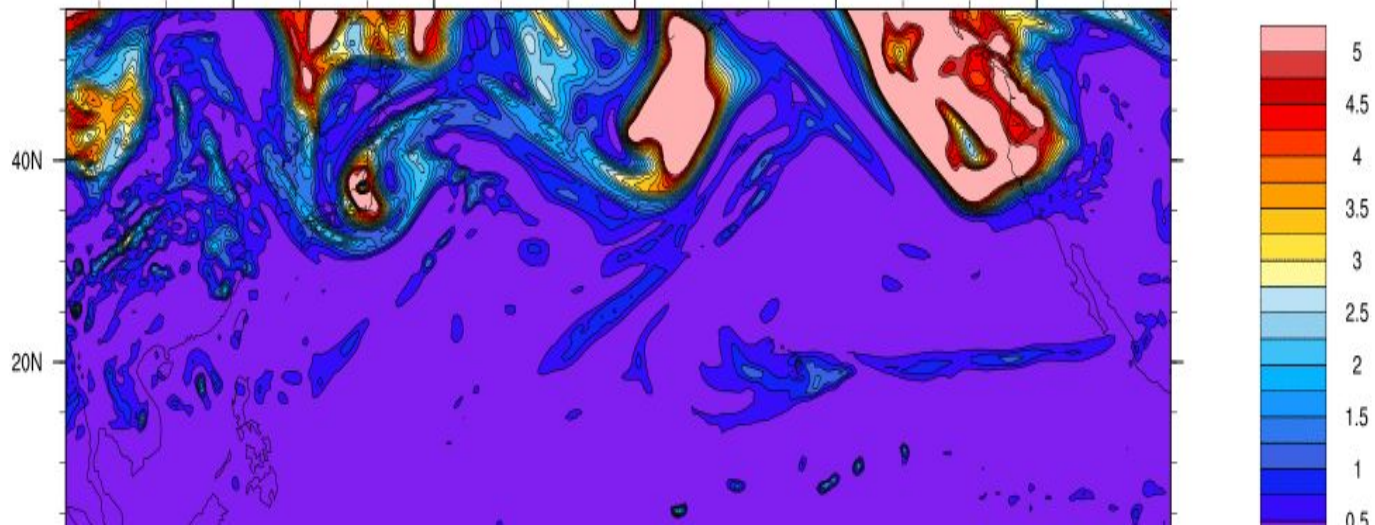
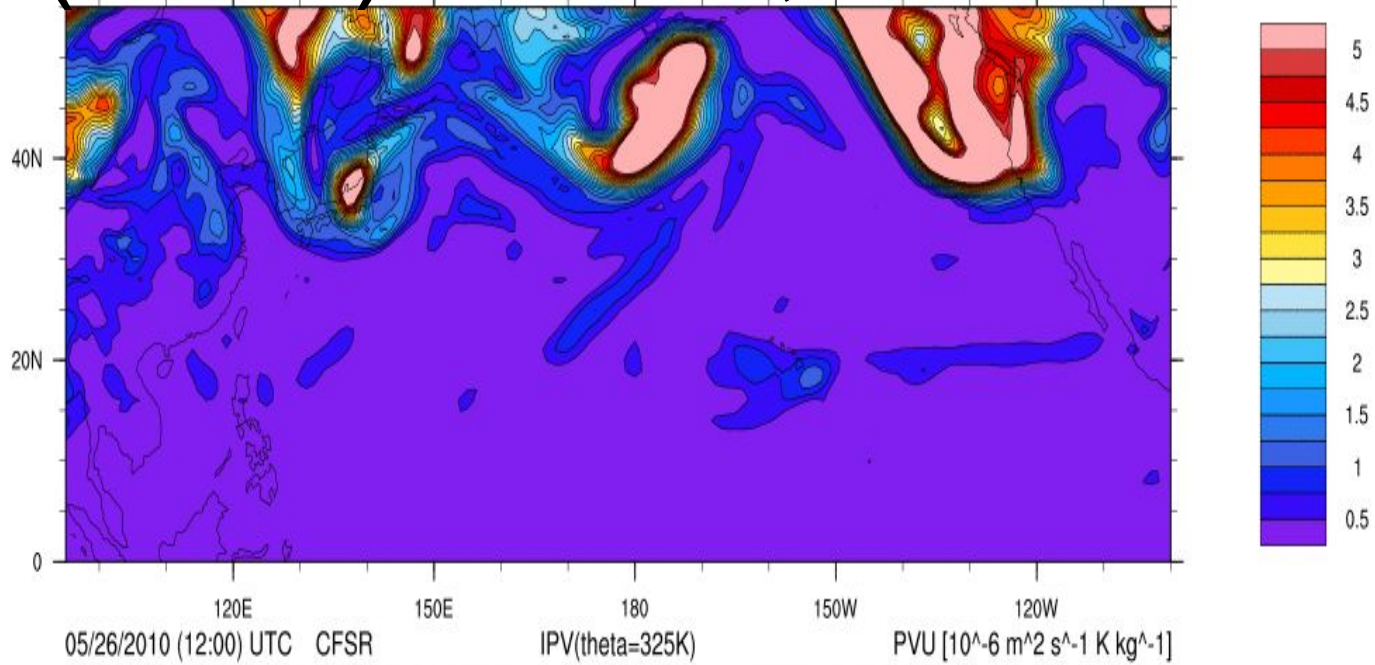
- a - Hyndman (537)**
- b - Atlanta Summit (306)**
- c - Banner Summit (312)**
- d - Deadwood Summit (439)**

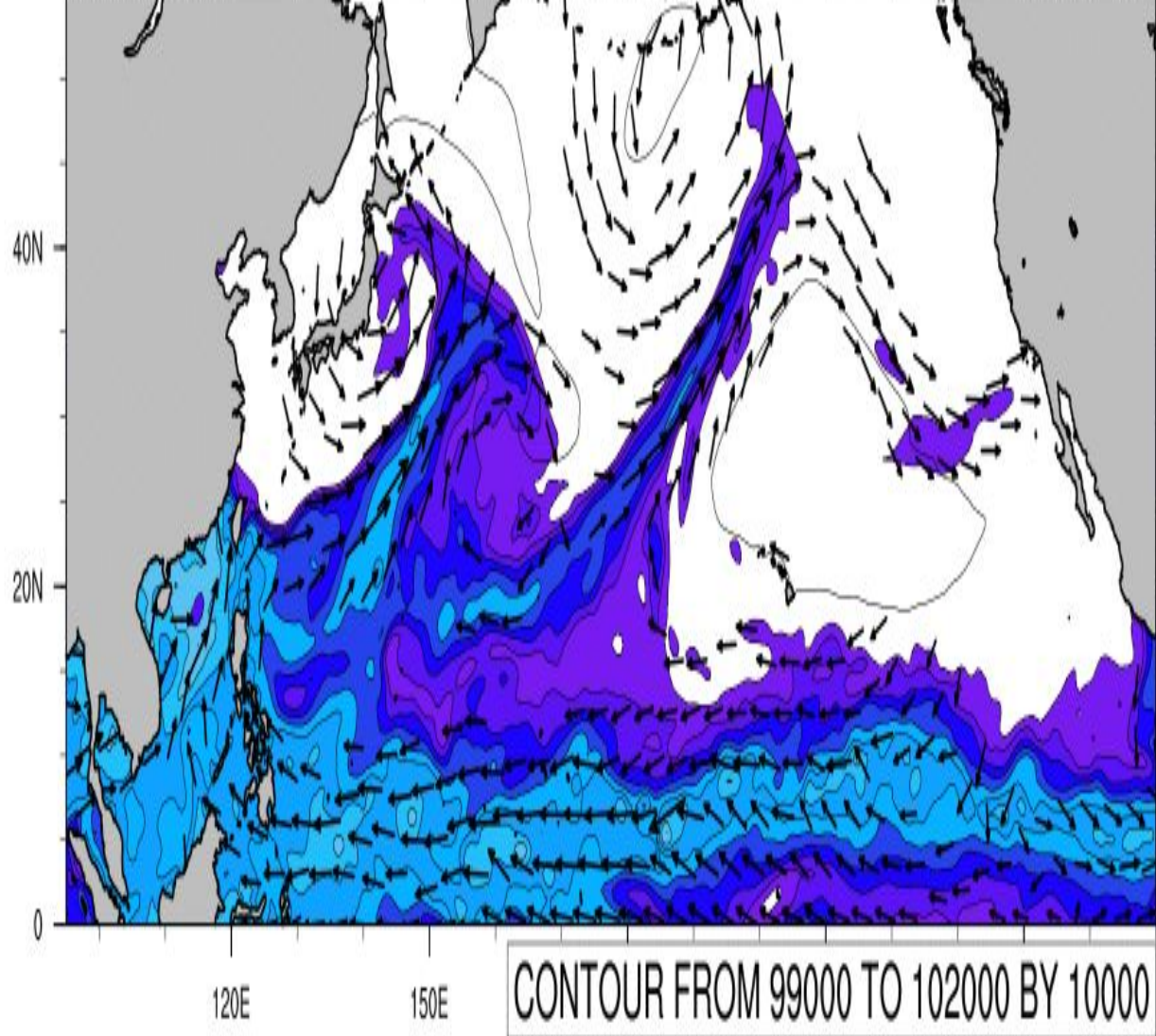


# IPV(325K): CFSR, CFSRR 05 26

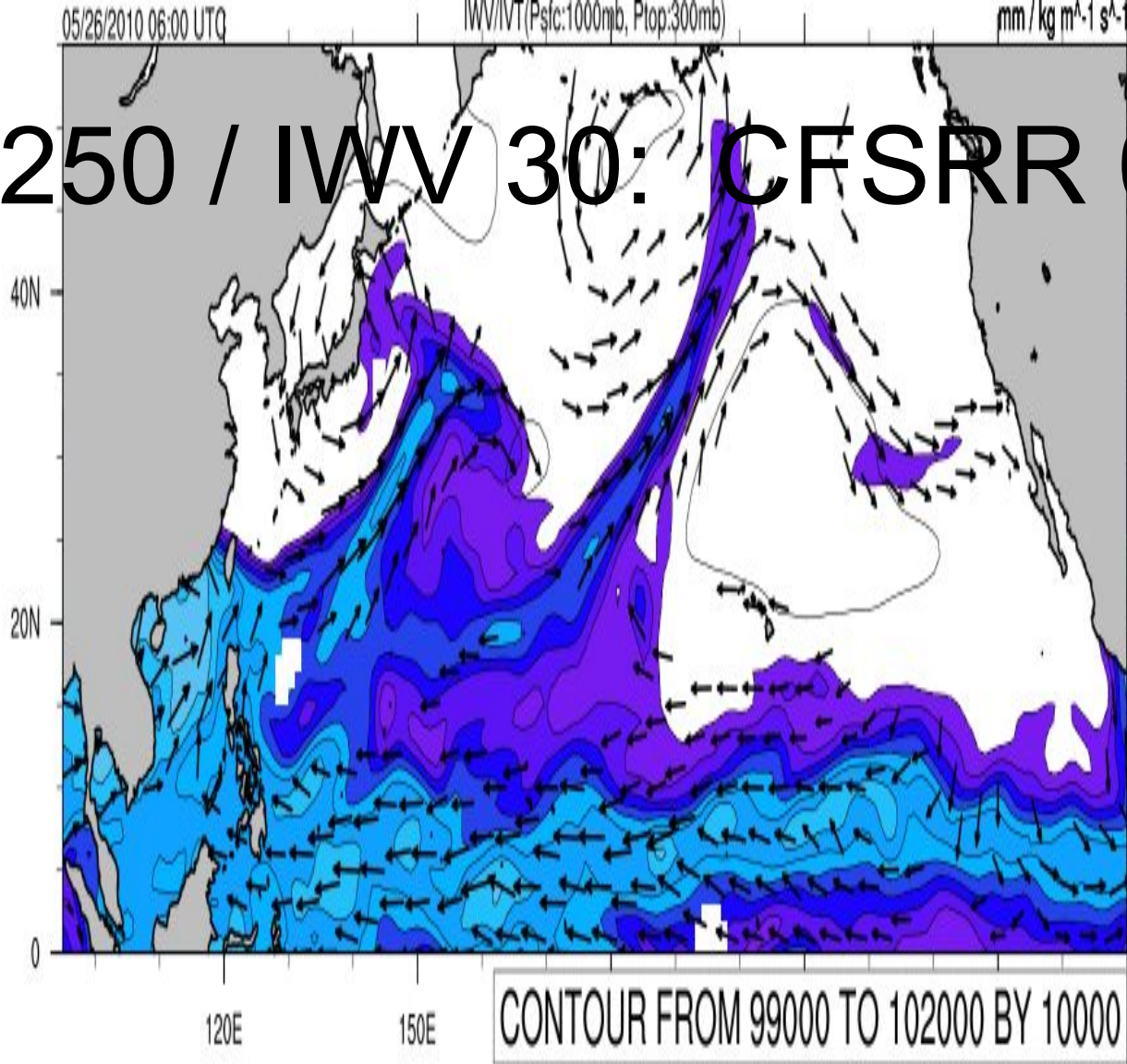


# IPV(325K): CFSR, CFSRR 05 26





# IVT 250 / IWV 30: CFSRR 05 26



# Current Conclusions

- The Reanalysis data confirms a strong sustained AR spanning the Pacific basin, with a source region in Philippines making landfall in the PNW. The 325K IPV shows Rossby wave breaking, PV mixing, and results in a sharp 'edge' in the PV that would suggest a strong upper level jet to the south.
- With respect to the reanalysis, all the Reforecasts lack: (1) the strength of the PV mixed southward, (2) the straight edge structure.
- The IVT/IWV show an AR that meanders more, and makes more of a glancing landfall in the region of the inward penetration.
- The WRF precip for all Reforecast runs are too dry, and the skill is constrained by LBC's.

# Future Directions

- Vertical Structure (LLJ, Upper level jet)
- Large scale evolution
- Spatial comparison of WRF precip distribution with available datasets (NLDAS2, PRISM, ..)
- Time series comparison of WRF output with SNOTEL stations. Particular interest in how the WRF Reanalysis runs compare to obs (useful for other current and future work).

# Acknowledgements



**USBR Project ID: 9682**



- Weekly forecasts with 30-day lead time
- Need: reliability! Analyze an extreme precipitation event with WRF, to see how it is captured.
- Flood event in June 2010
- Turned out to be an AR event
- Predictability constrained by LBC input quality + skill of regional wx model (WRF)
- Tea cup diagram. Also, drawdown time...