Developing Seasonal Prediction for Western USA Water Resources

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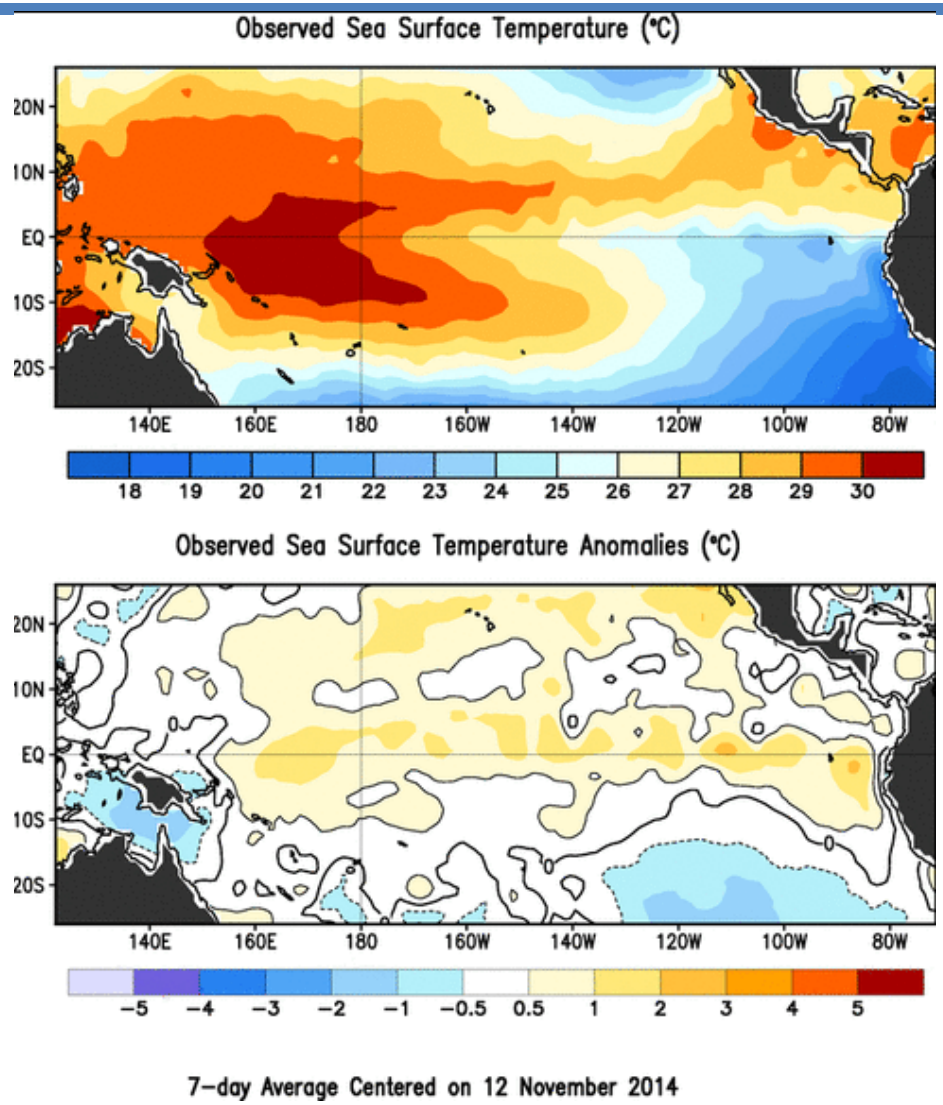
Outline

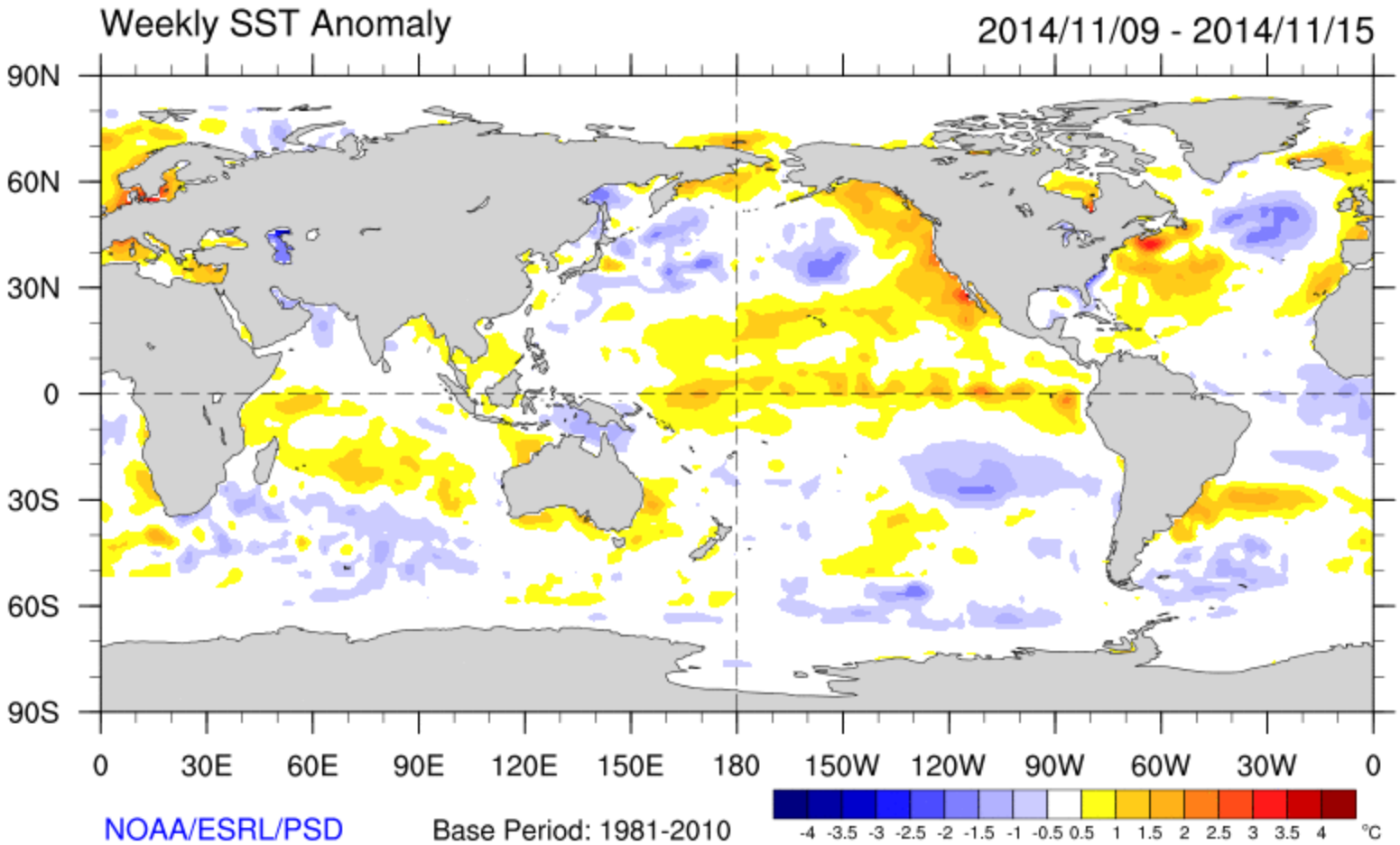
- Current forecasts
- What’s needed
- How could we get there

Current Tropical Sea Surface Temperatures

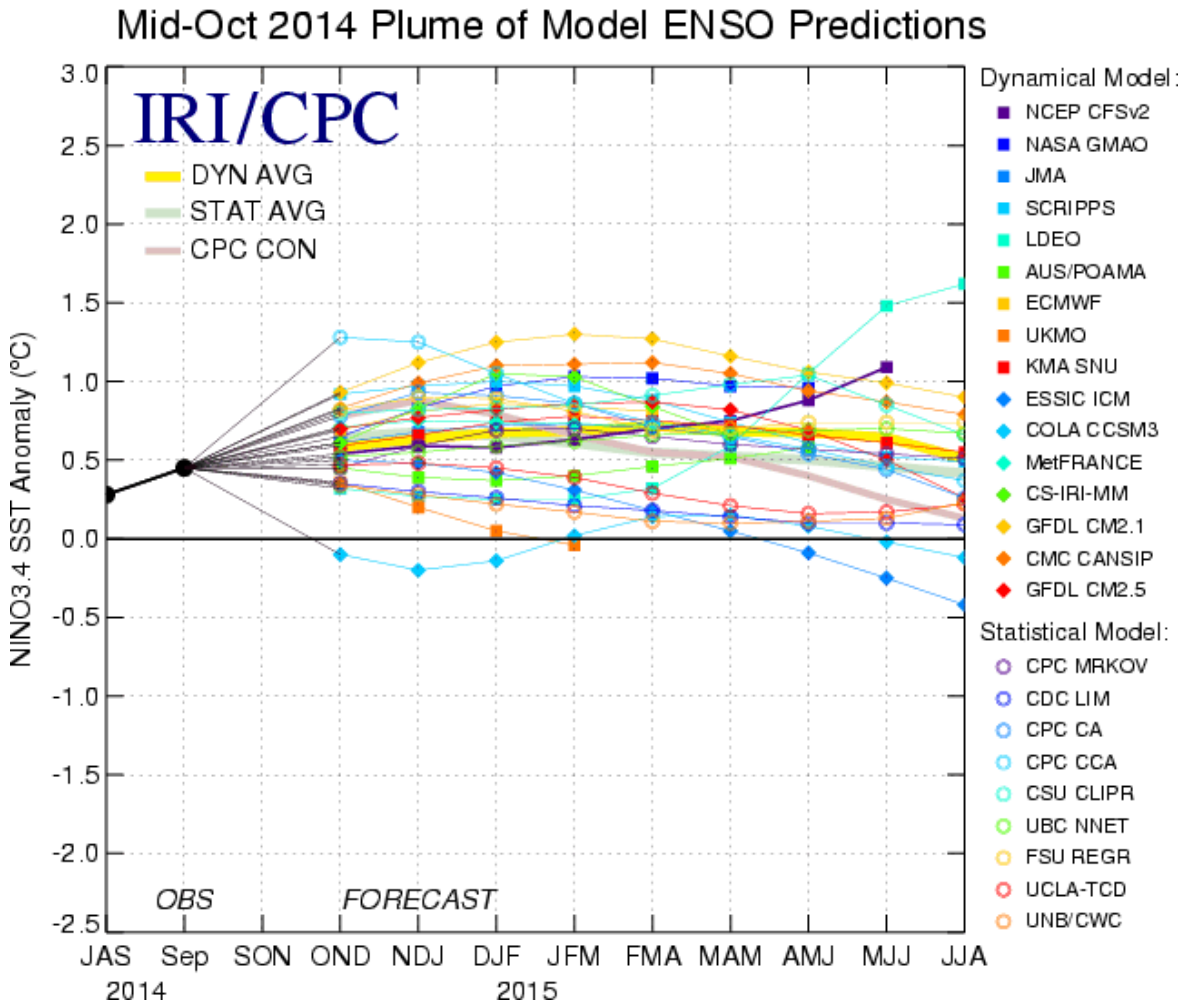


Source: NOAA/CPC

Current Global Sea Surface Temperatures

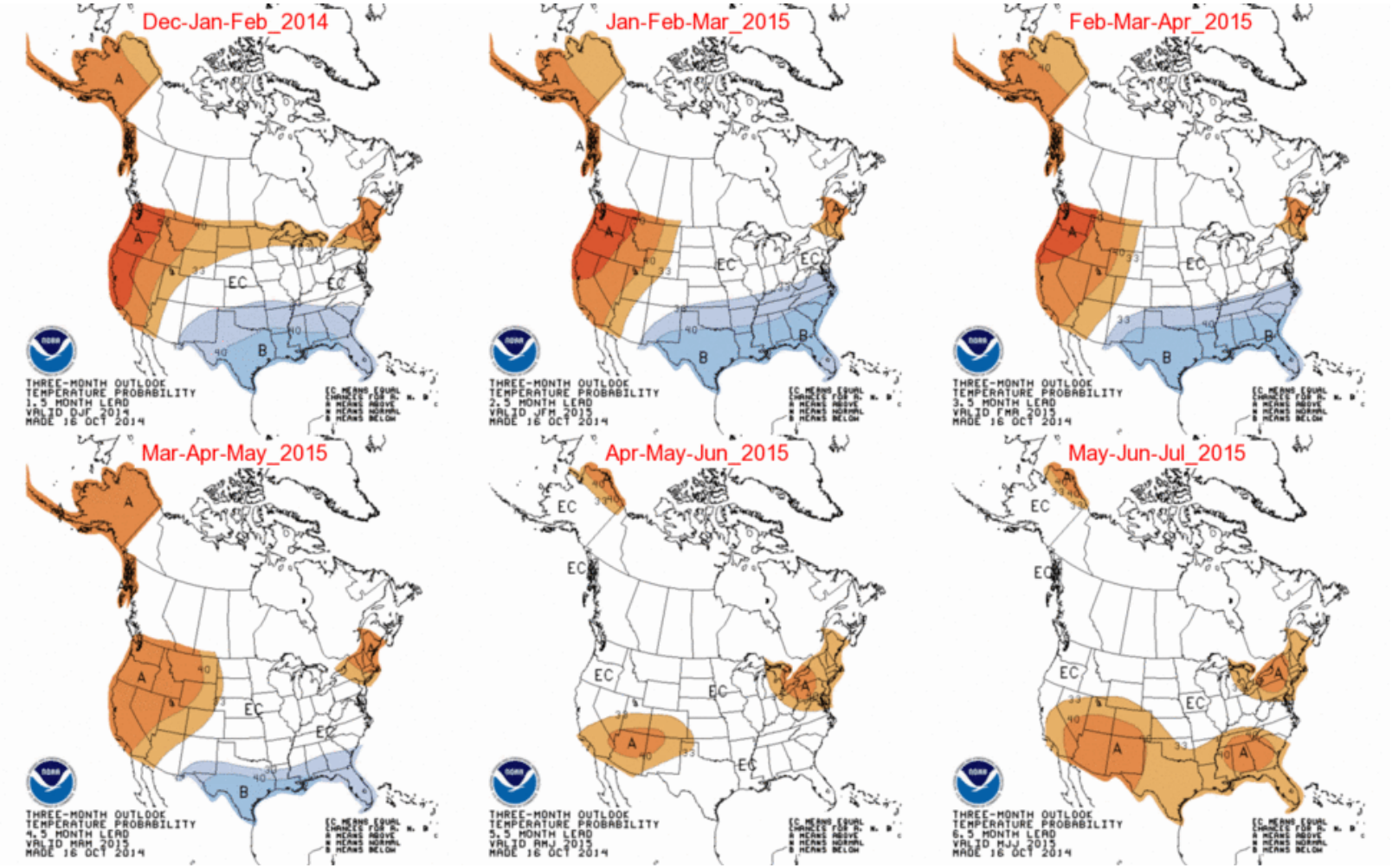


Forecast Sea Surface Temperatures



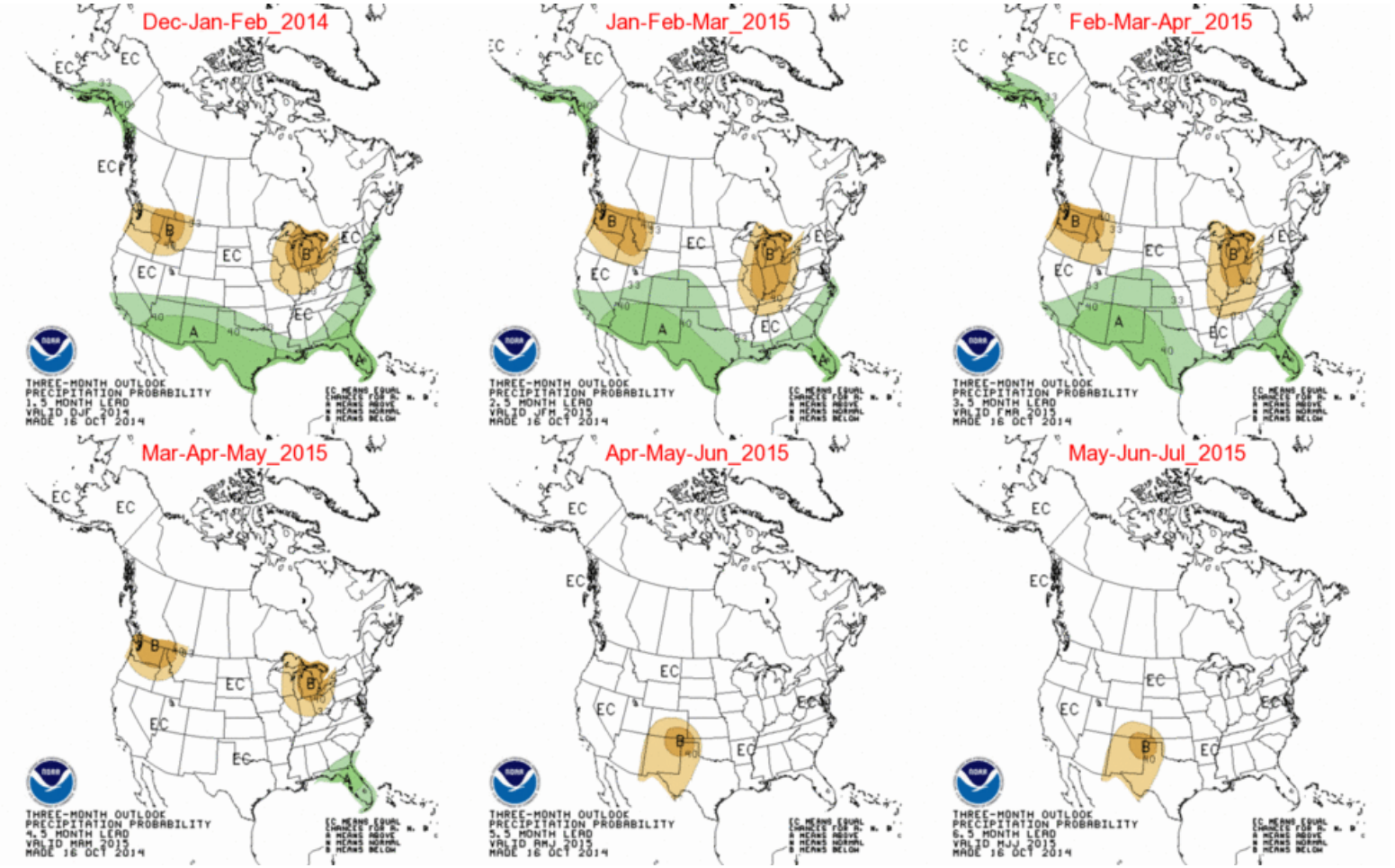
Source: IRI

Temperature Forecast



Source: NOAA/CPC

Precipitation Forecast



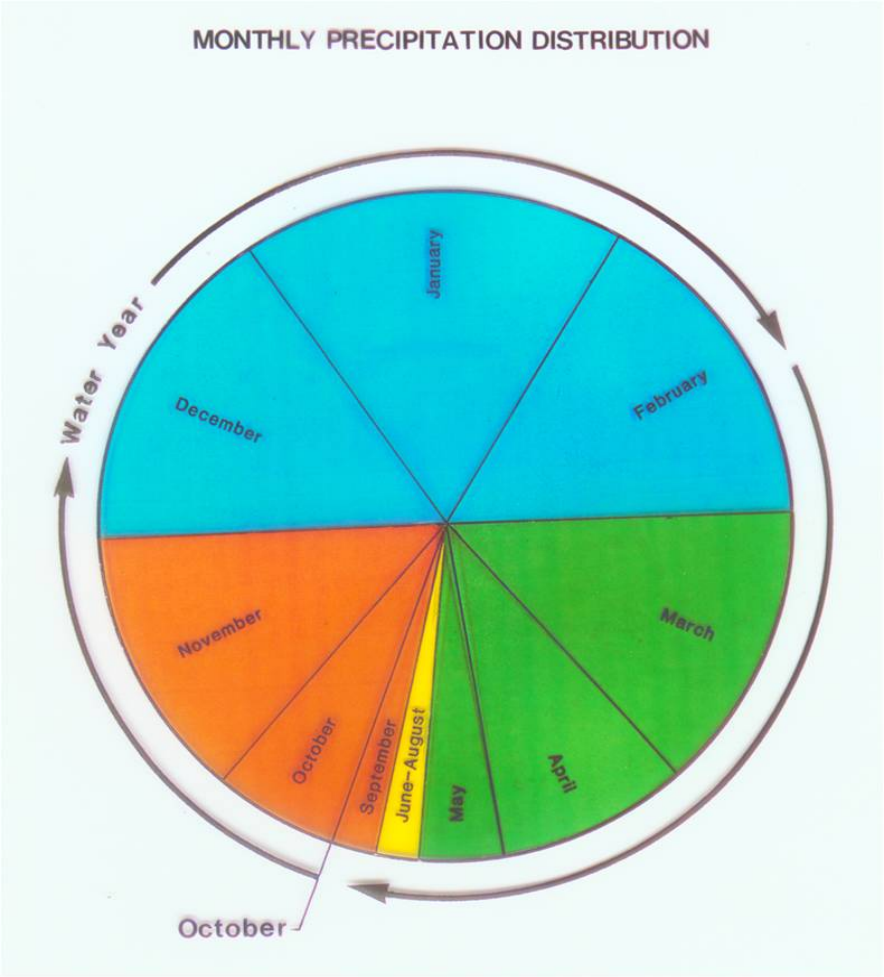
Source: NOAA/CPC

What's needed

(my thoughts)

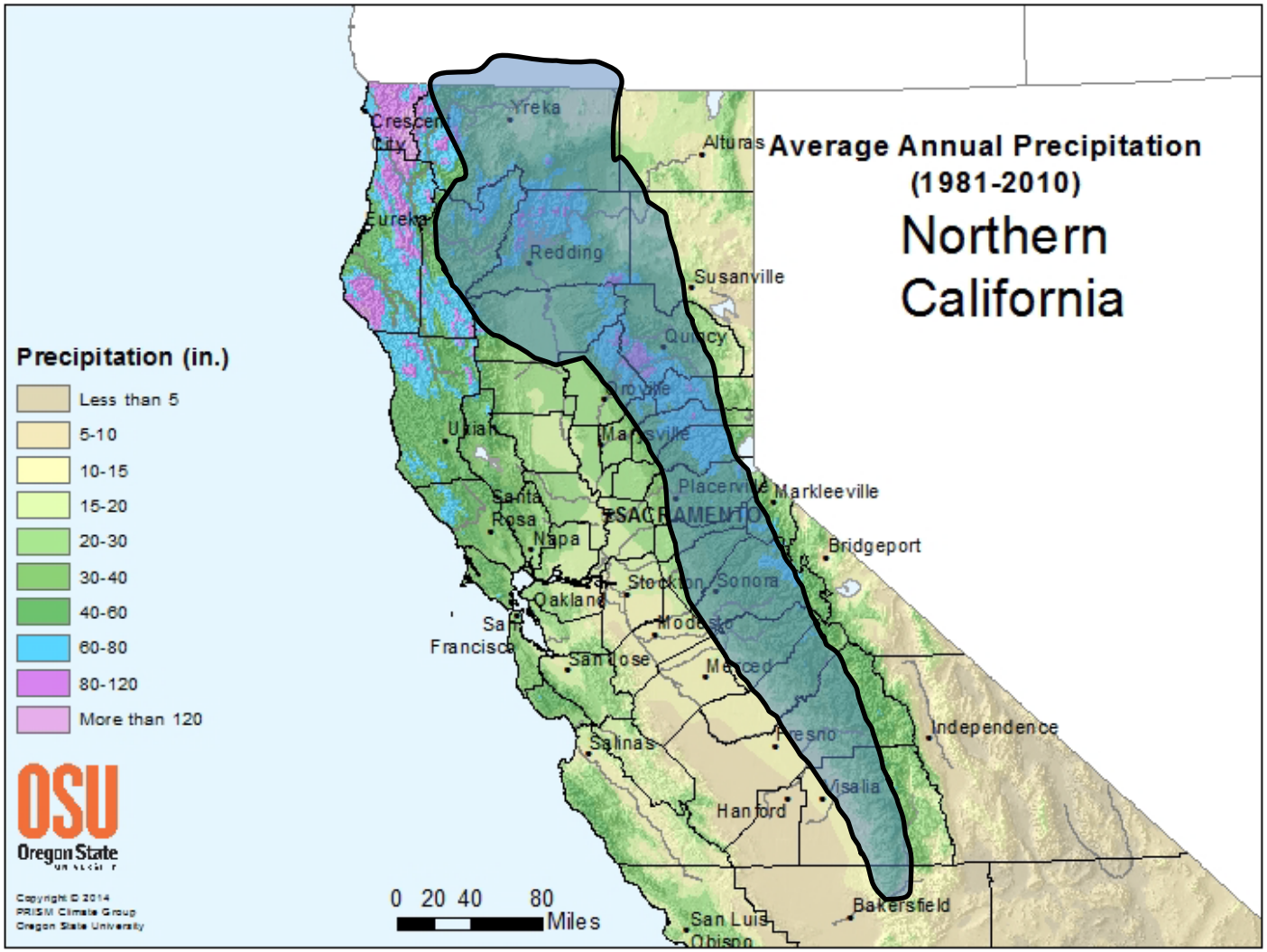
- Forecast target focused on **accumulated cool season precipitation** in mountains
- Utilize **verified** and **vetted** forecast methodologies
  - Reforecast and real time verification
  - Peer review publication of techniques
- Frequent forecast updates
- Application to **streamflow** and **reservoir** modeling and forecasting

Forecast Target: Time

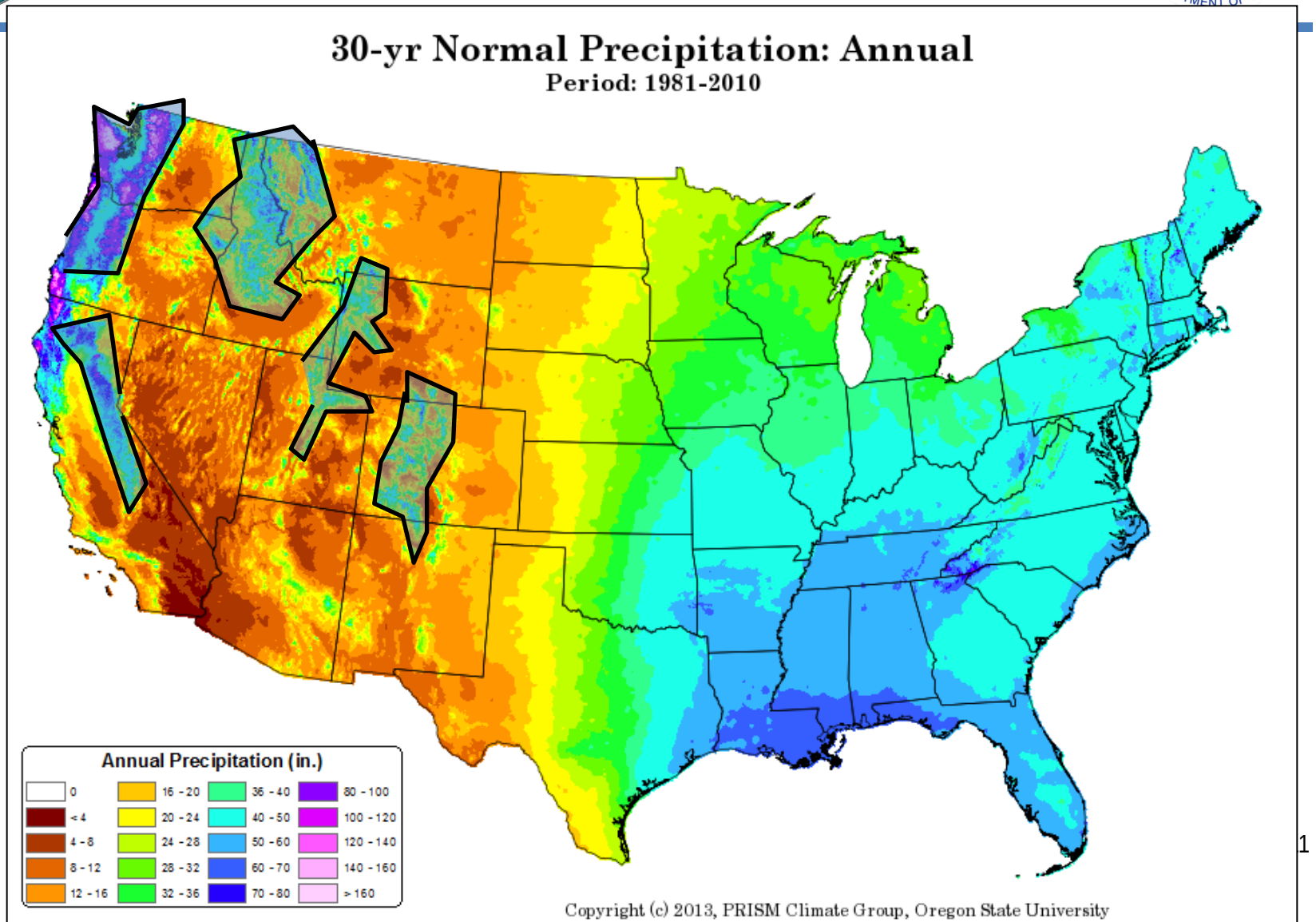


Credit: Maurice Roos

Forecast Target: Space



Forecast Target: Space



How could we build it?

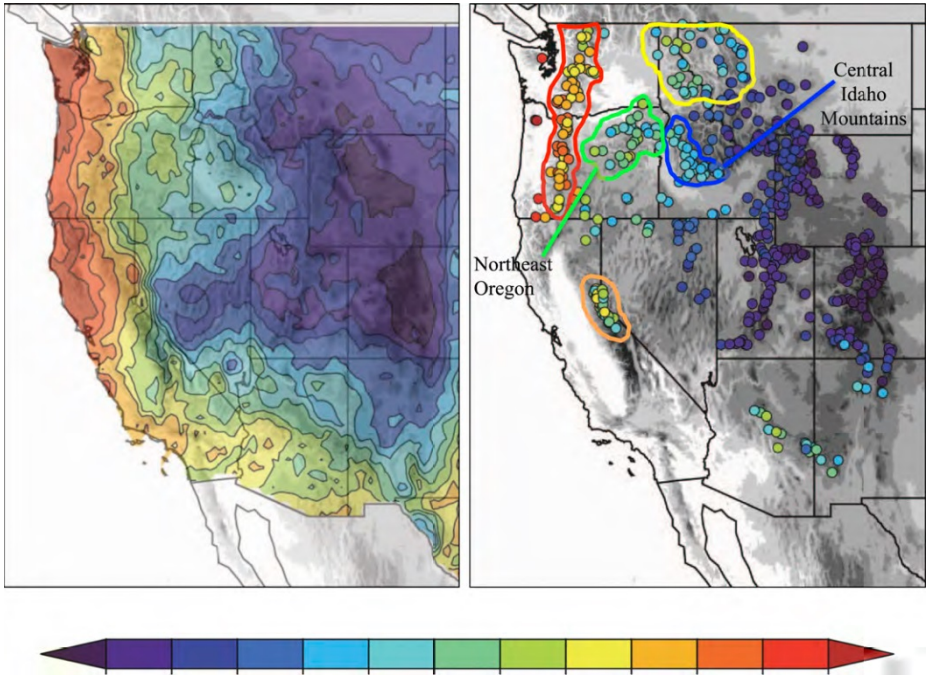
- Synthesize literature for proven forecast methods and ideas
- Develop, vet, and verify proposed forecast method
- Pilot experimental operational forecast system

NOAA Pieces

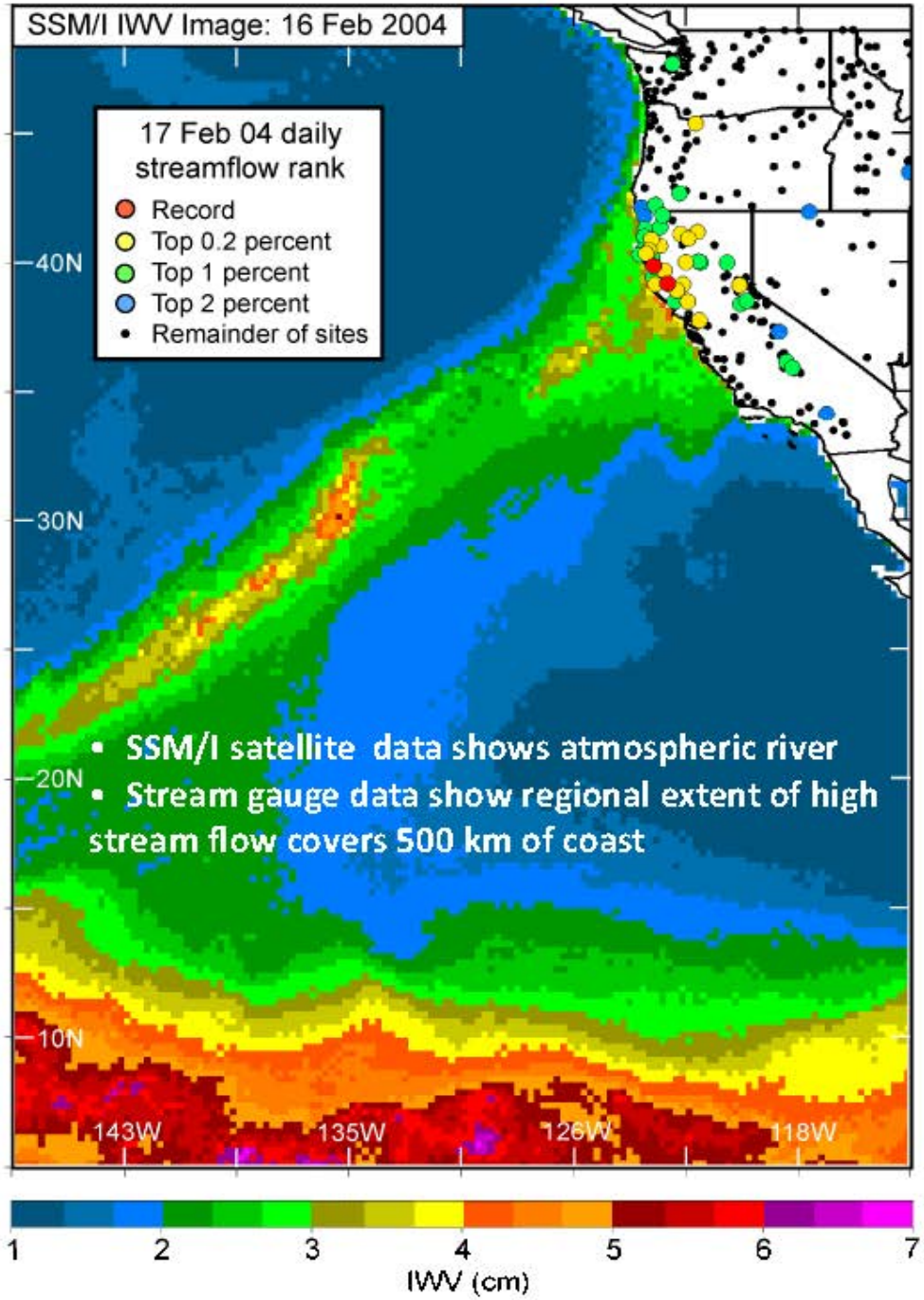
- National Weather Service
  - NCEP – Climate and weather forecast models and centers
  - RFCs (and soon-to-be NWC) – River modeling and prediction
- NOAA Research
  - Labs (e.g. ESRL) – Intramural research
  - CPO – Extramural research
  - NIDIS key role
- NOAA Satellite Service (NESDIS)
  - NCDC – Climate Data Record
- Gap

Promising Directions: Atmospheric Rivers

- Atmospheric Rivers and seasonal prediction



Credit: Rutz et al, 2014



Flooding on California's Russian River: Role of atmospheric rivers

Ralph, F.M., P. J. Neiman, G. A. Wick, S. I. Gutman, M. D. Dettinger, D. R. Cayan, A. White

Geophys. Res. Lett., 2006

Russian River floods are associated with atmospheric rivers - all 7 floods over 8 years.

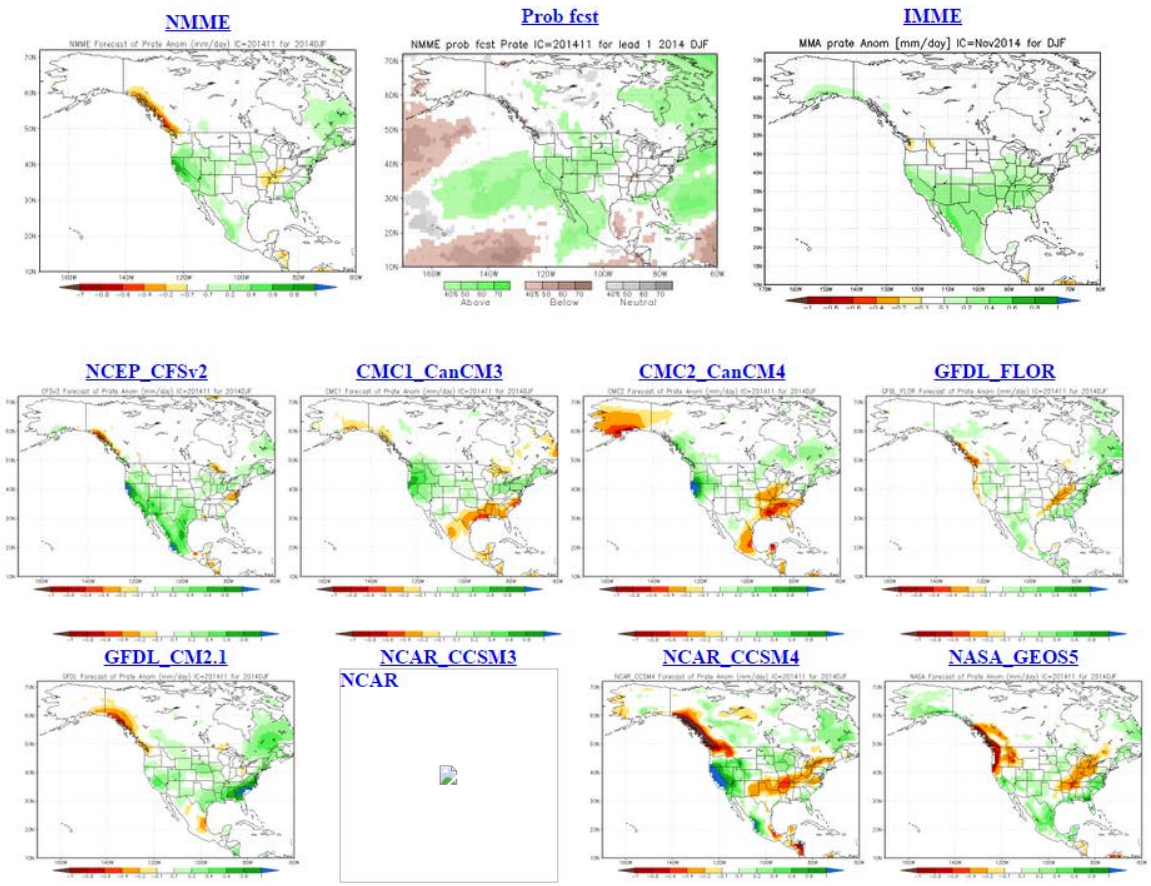
Flooding in Western Washington: The Connection to Atmospheric Rivers

Paul J. Neiman, Lawrence J. Schick, F. Martin Ralph, Mimi Hughes, and Gary A. Wick
J. Hydrometeorology (2011)

Of 48 annual peak daily flows on 4 watersheds, 46 were associated with the land-fall of atmospheric river conditions.

Promising Directions: NMME

- Season 1 prate forecast



Discussion

- Reaction to:
  - forecast target (e.g. cool season accumulated precipitation in mountains, update frequency)?
  - Programmatic approach (e.g. research synthesis leading to experimental pilot forecast system)?
    - Ultimate target operationalization at e.g. NWS, DWR, CW3E, other?
  - Substantive ideas (e.g. atmospheric rivers, NMME, etc)?

Questions/Dicussion