Recap of WY 2018

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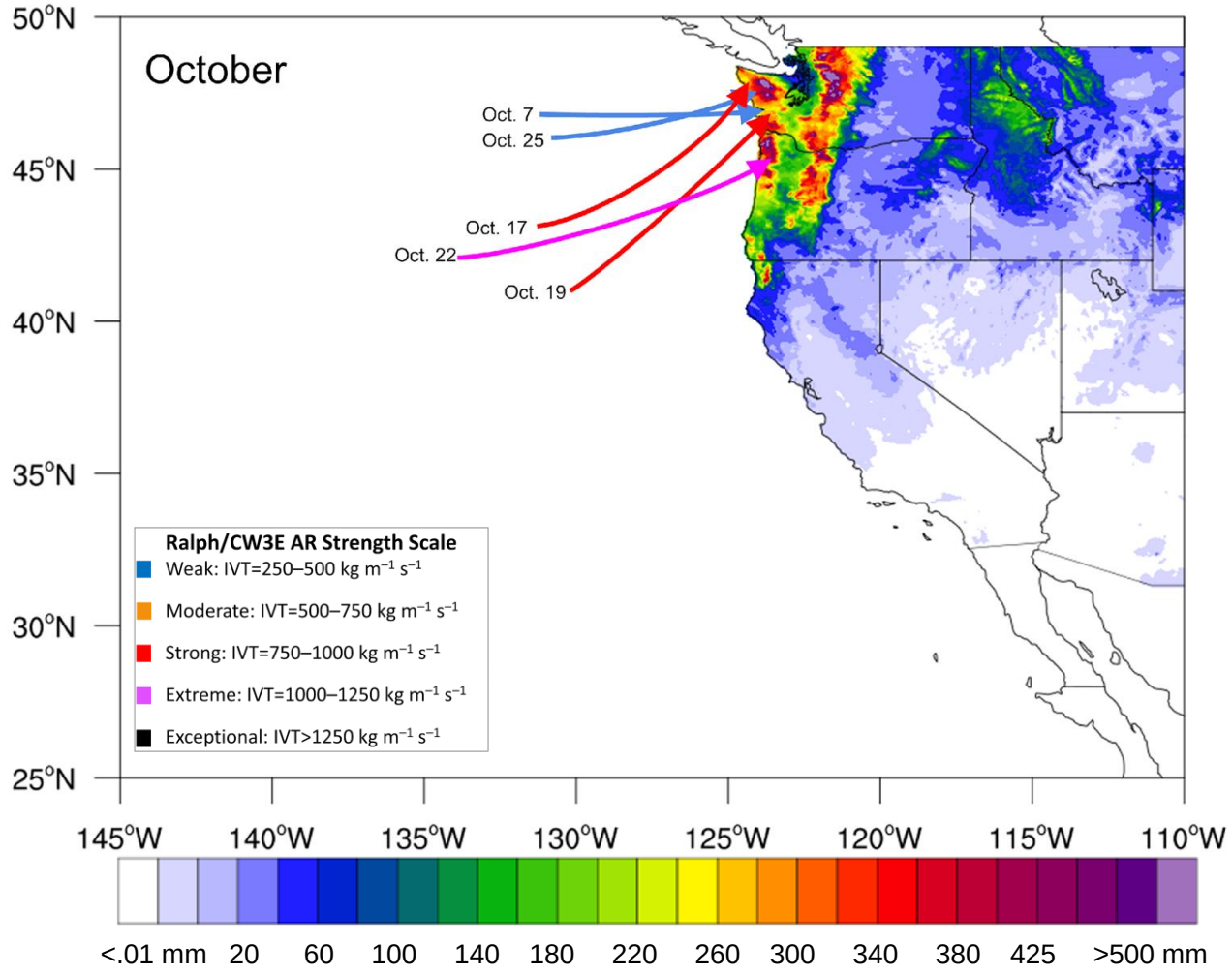
Winter Outlook Workshop
October 31st, 2018

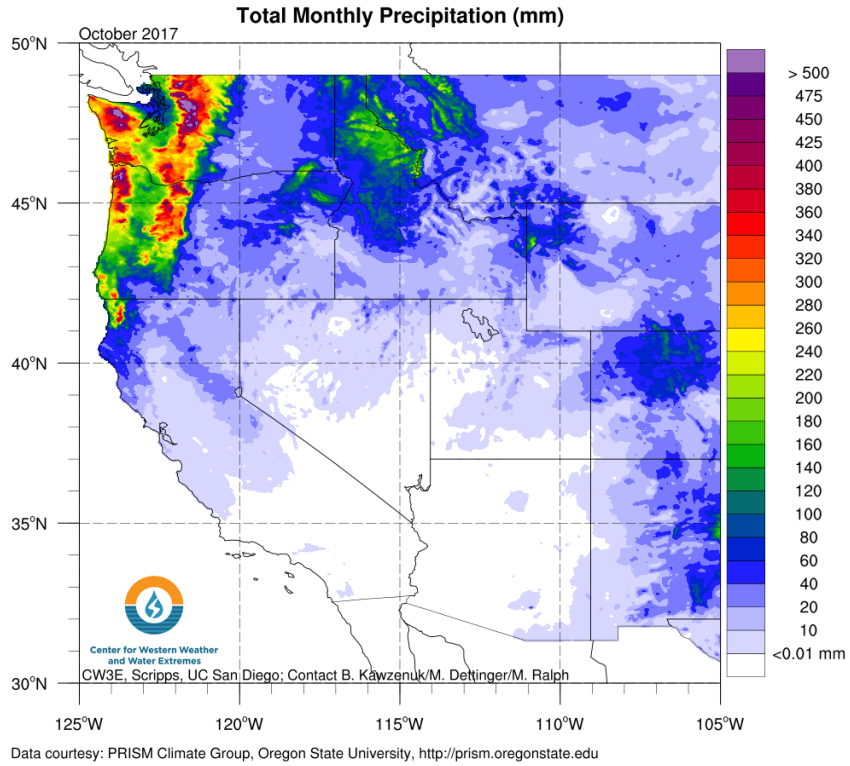
October Atmospheric Rivers (ARs)



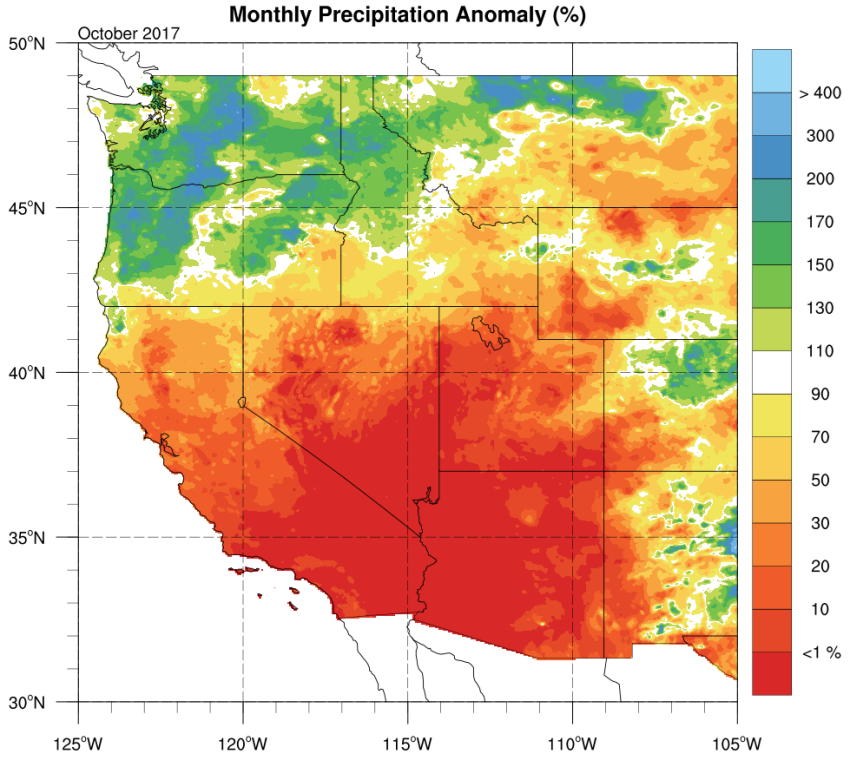
	ARs
October Total	5
Weak	2
Moderate	0
Strong	2
Extreme	1
WY to Date Total	5

Region	ARs
Washington	5
Oregon	5
Northern CA	2
Southern CA	1

October 2017



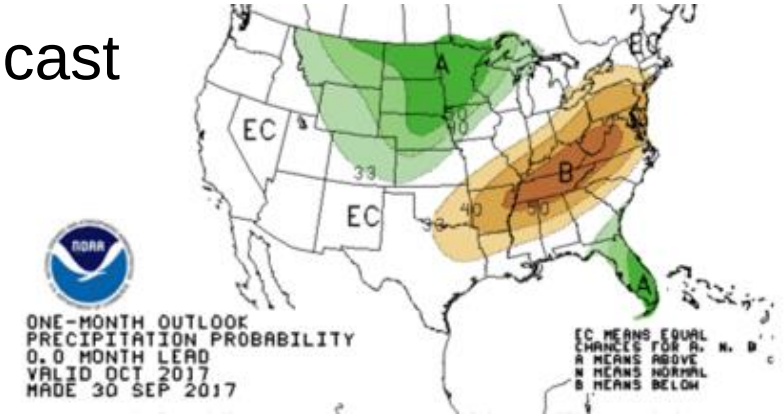
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu



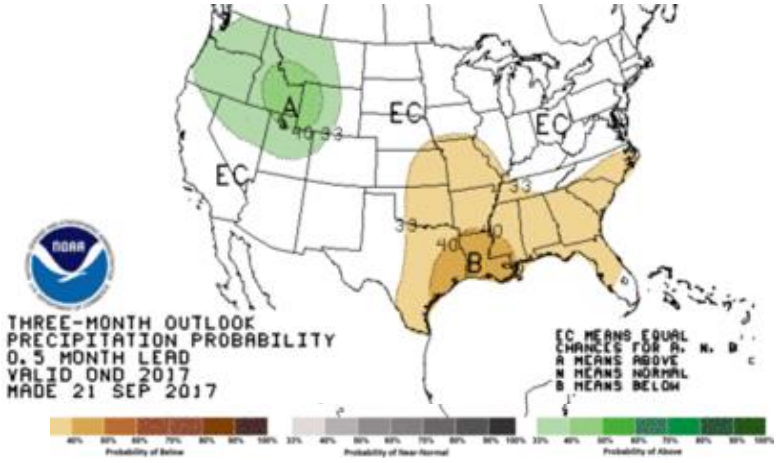
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

CPC Forecast

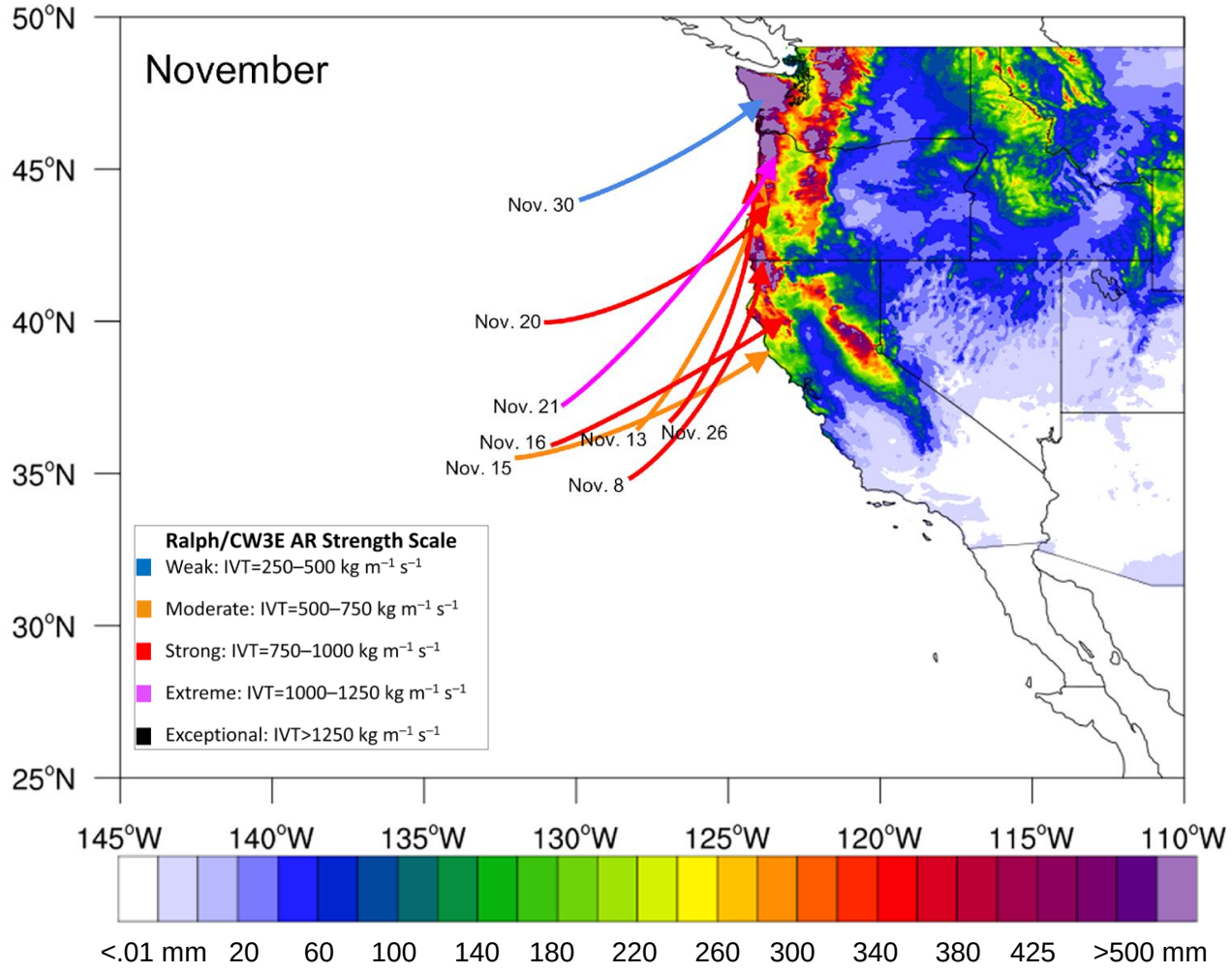
Oct 2017



Oct -Dec 2017



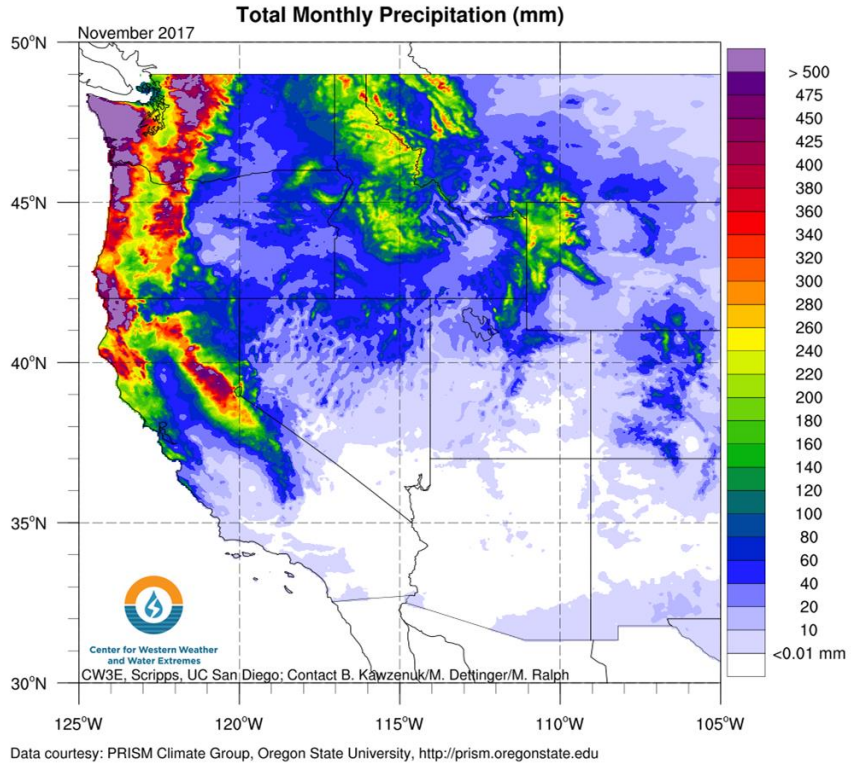
November Atmospheric Rivers

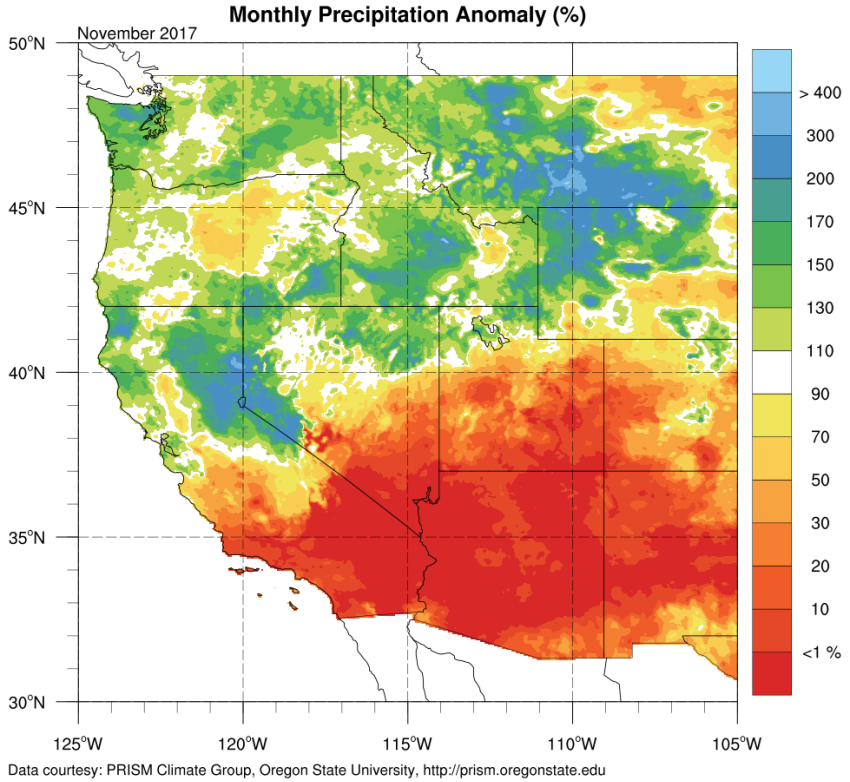


	ARs
November Total	8
Weak	1
Moderate	2
Strong	4
Extreme	1
WY to Date Total	13

Region	ARs
Washington	7
Oregon	8
Northern CA	7
Southern CA	5

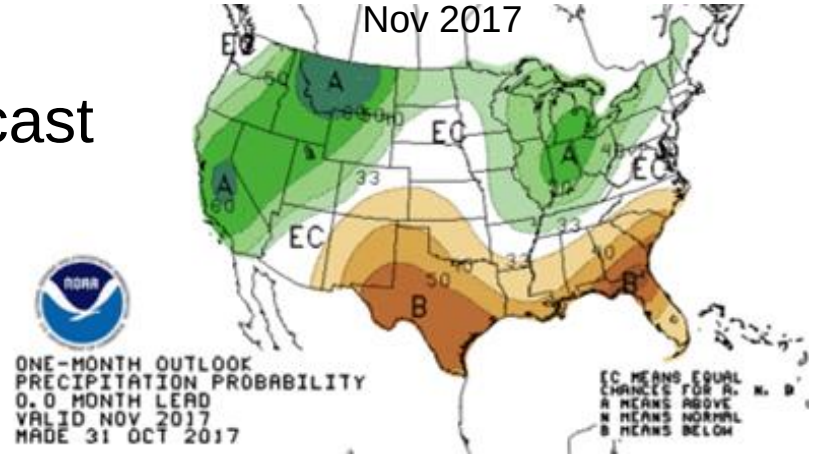
November 2017 Precip



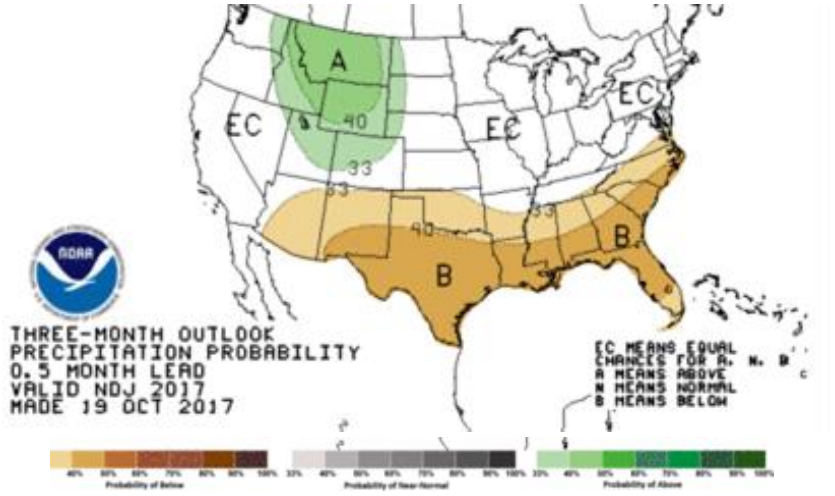


CPC Forecast

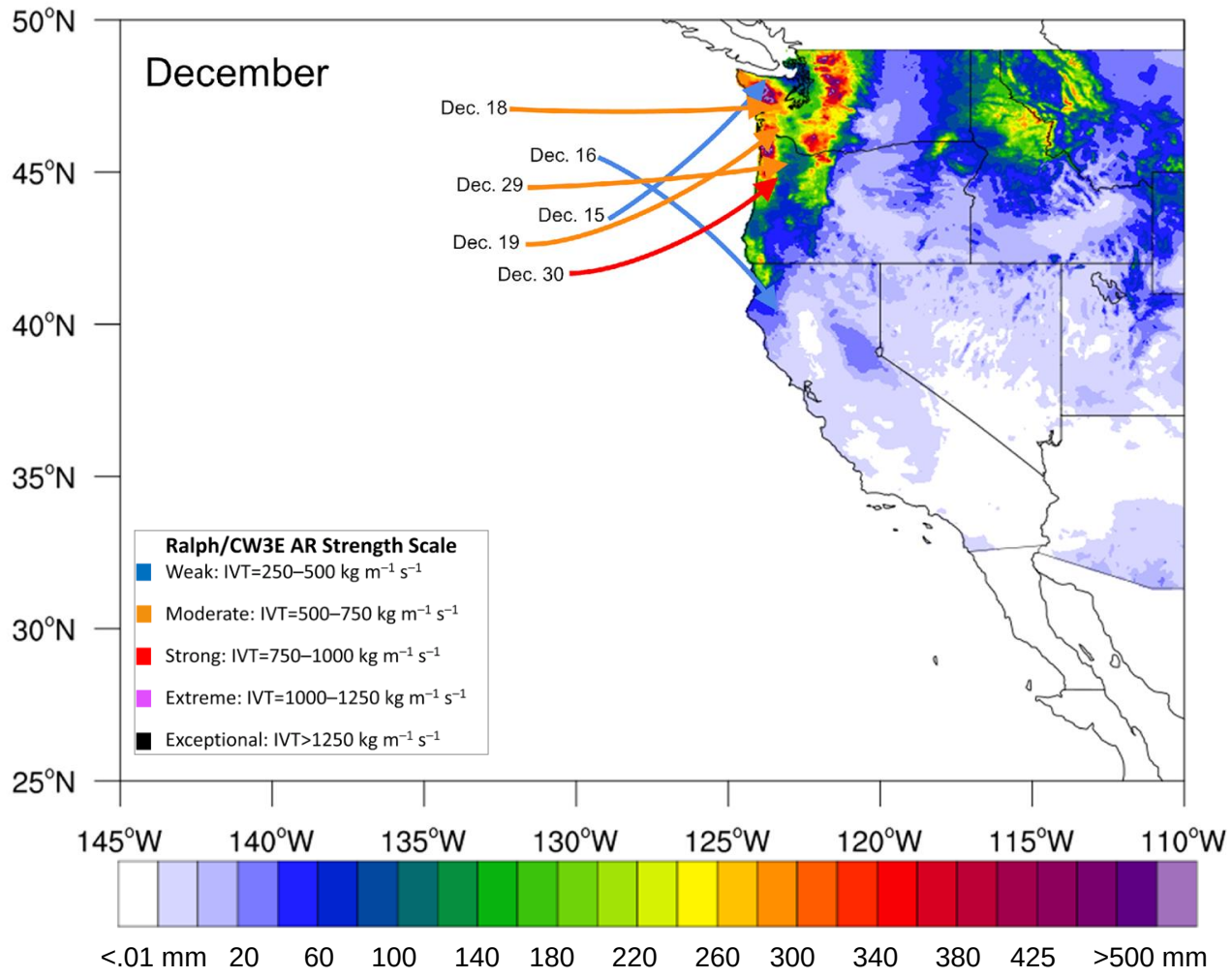
Nov 2017



Nov - Jan 2017



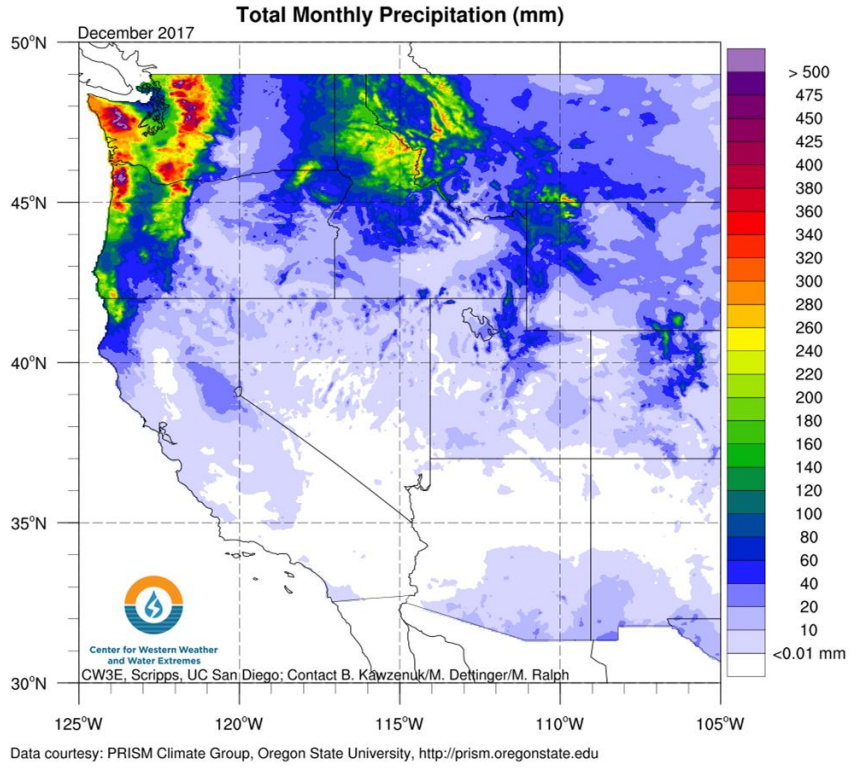
December Atmospheric Rivers

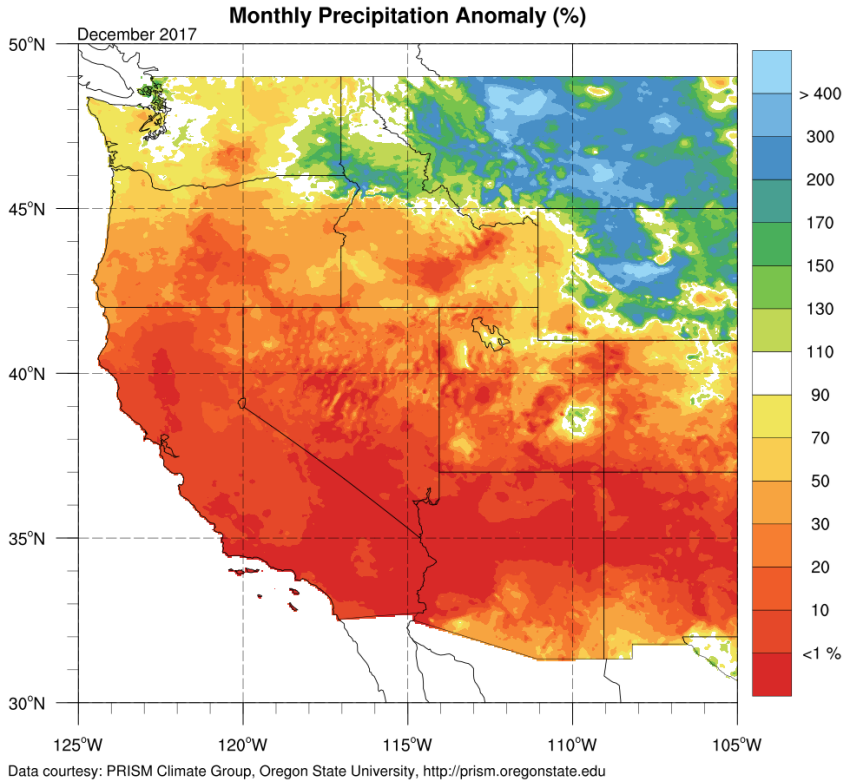


	ARs
December Total	6
Weak	2
Moderate	3
Strong	1
Extreme	0
WY to Date Total	19

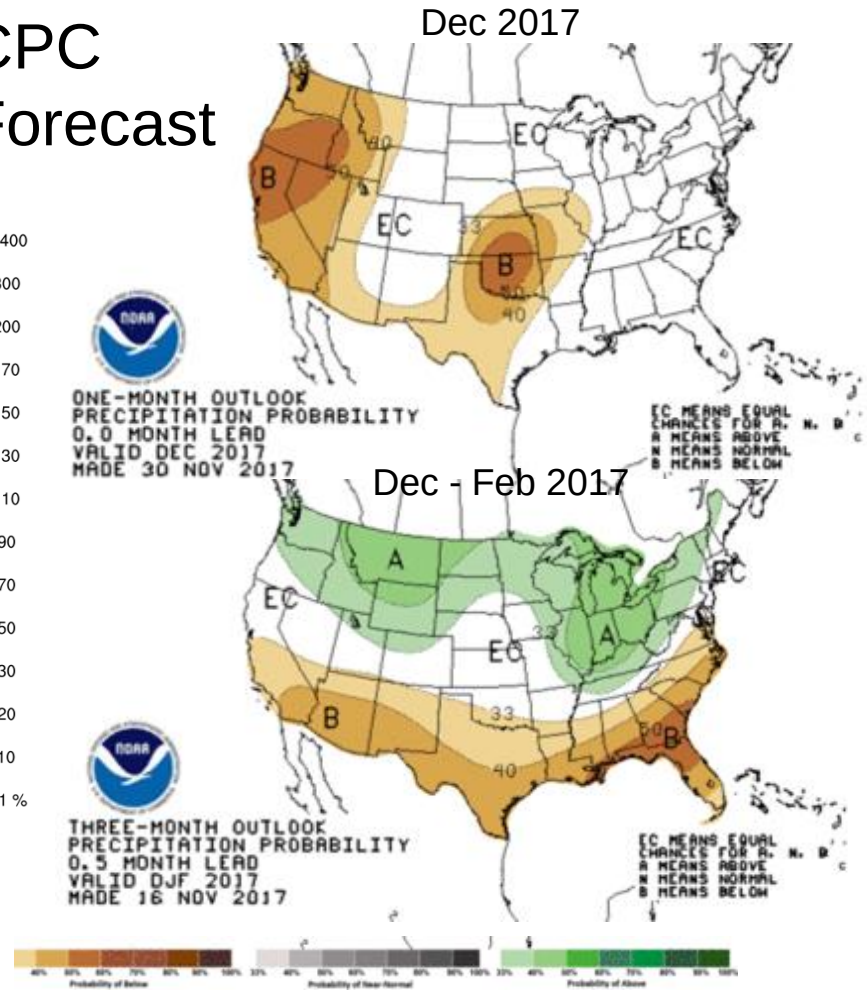
Region	ARs
Washington	6
Oregon	6
Northern CA	3
Southern CA	1

December 2017 Precip

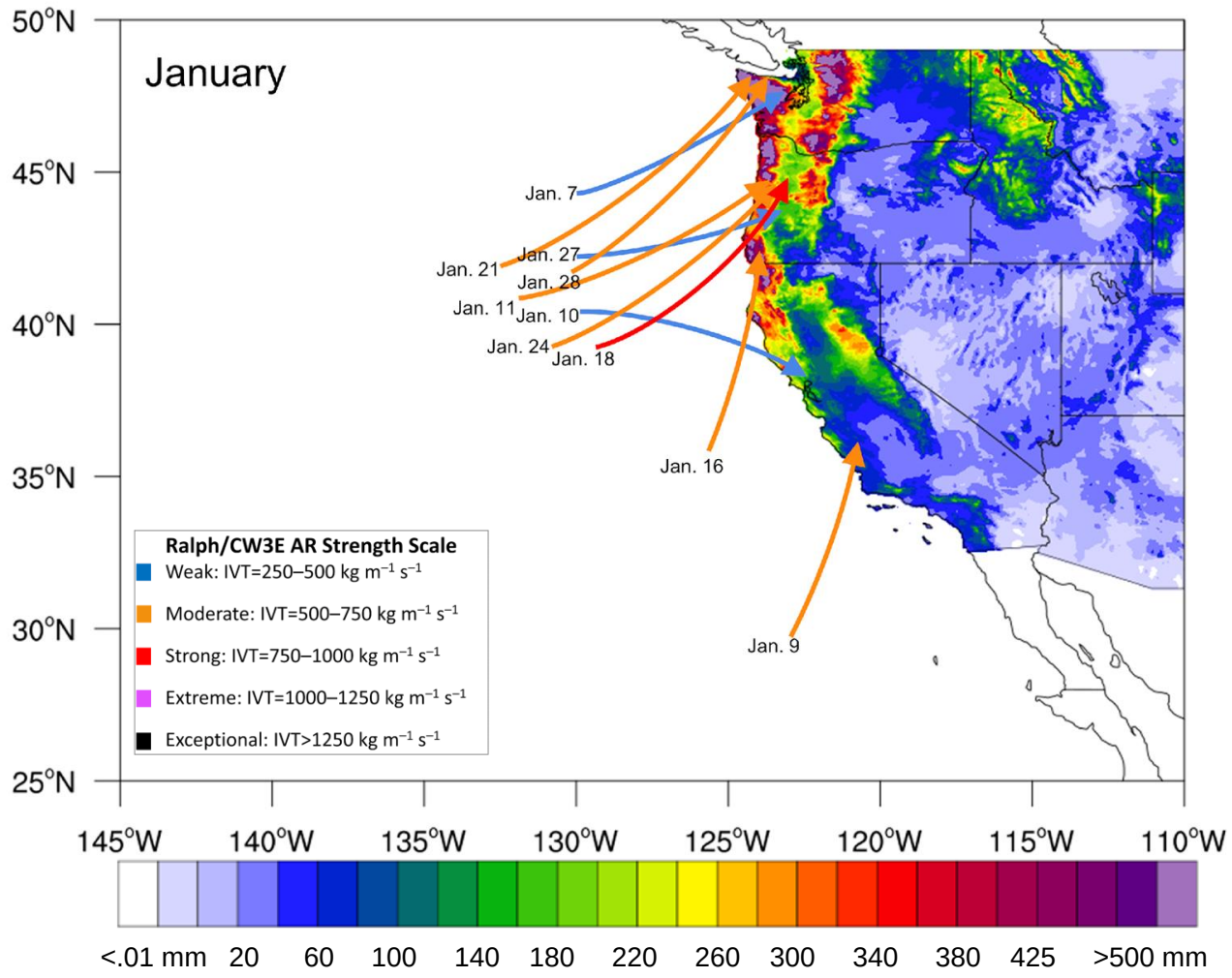




CPC Forecast



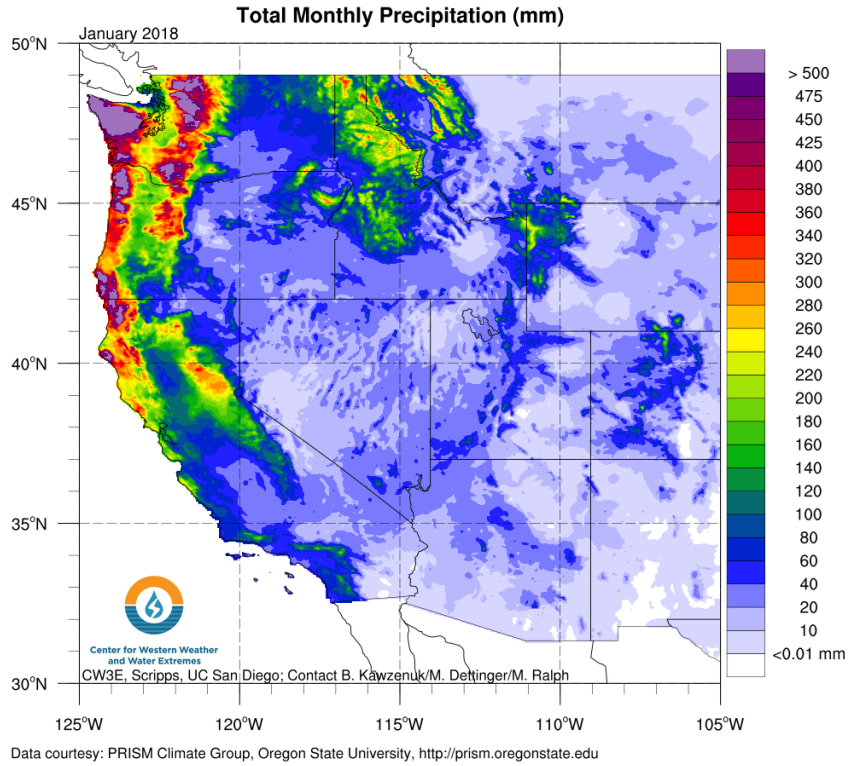
January Atmospheric Rivers



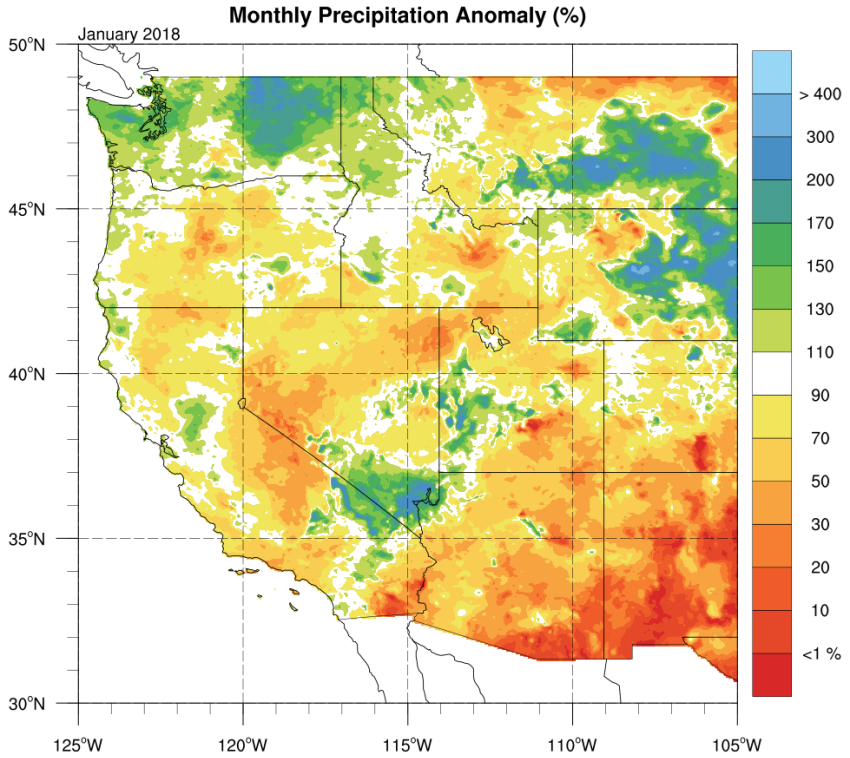
	ARs
January Total	10
Weak	3
Moderate	6
Strong	1
Extreme	0
WY to Date Total	29

Region	ARs
Washington	9
Oregon	10
Northern CA	9
Southern CA	4

January Precip 2018



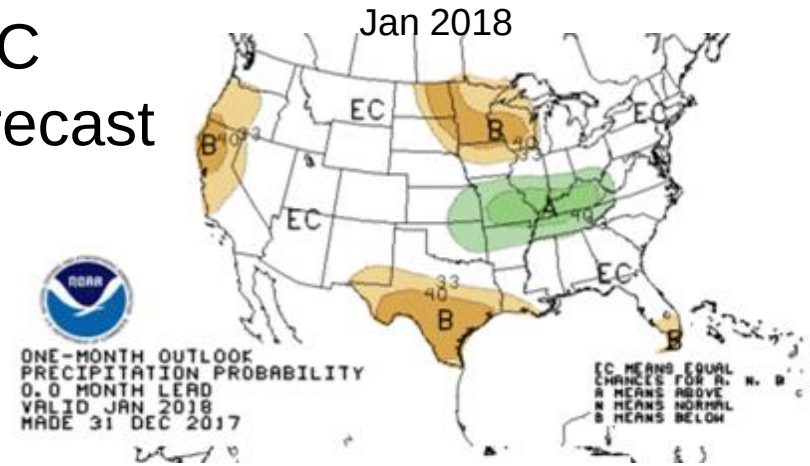
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu



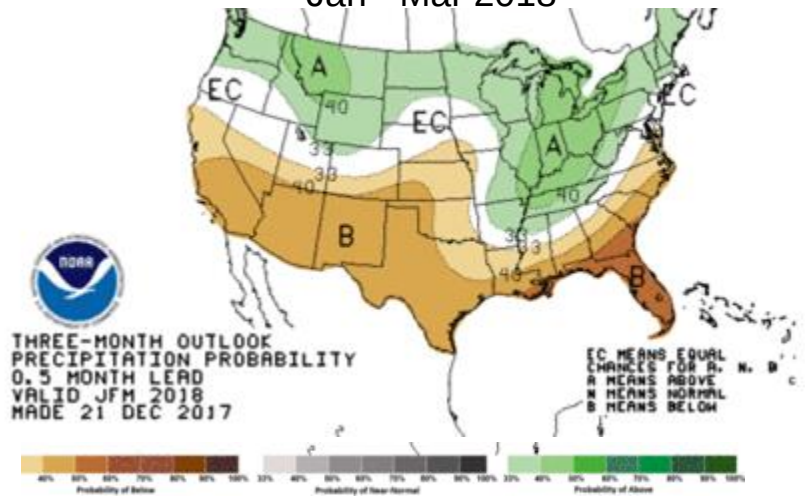
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

CPC Forecast

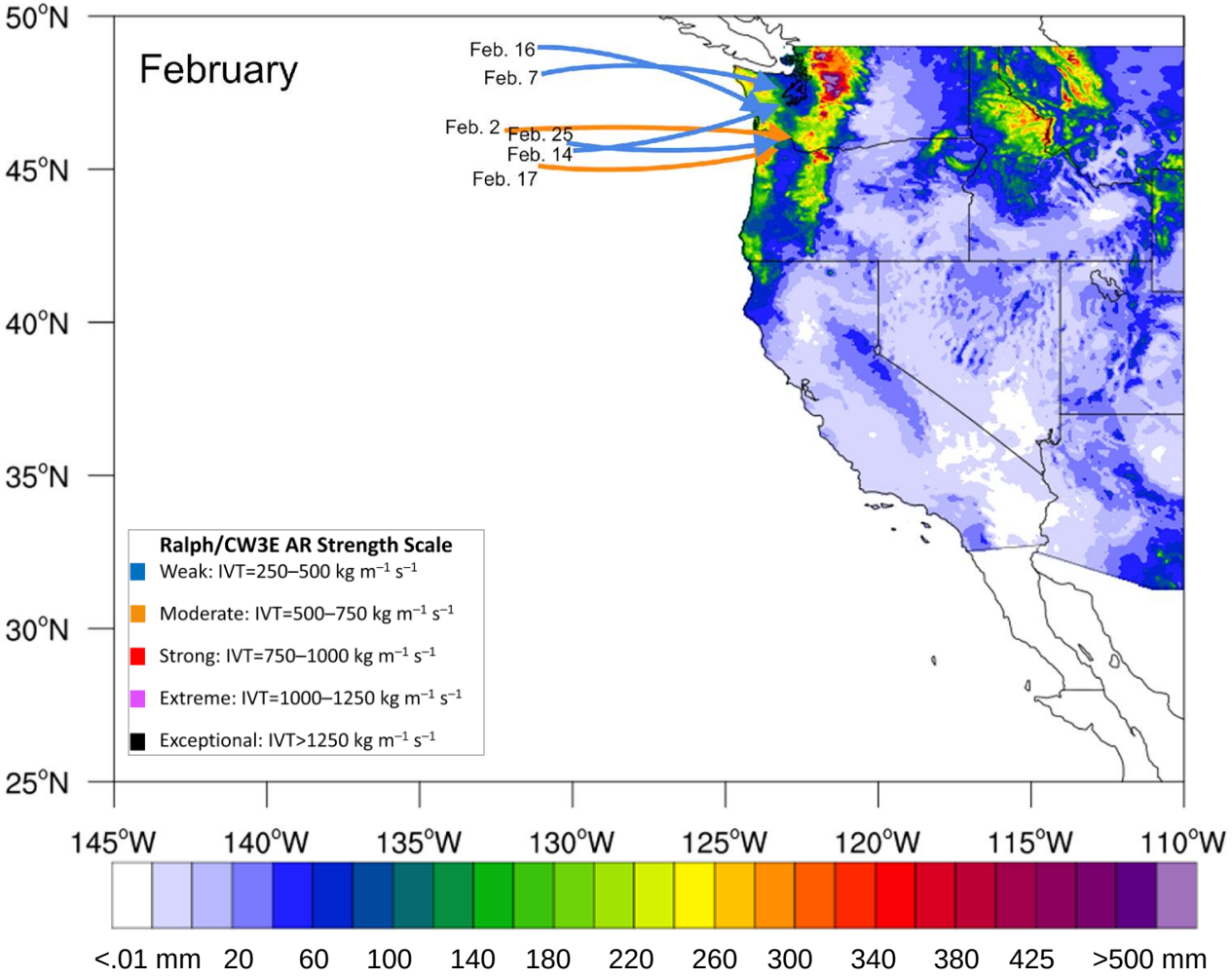
Jan 2018



Jan - Mar 2018



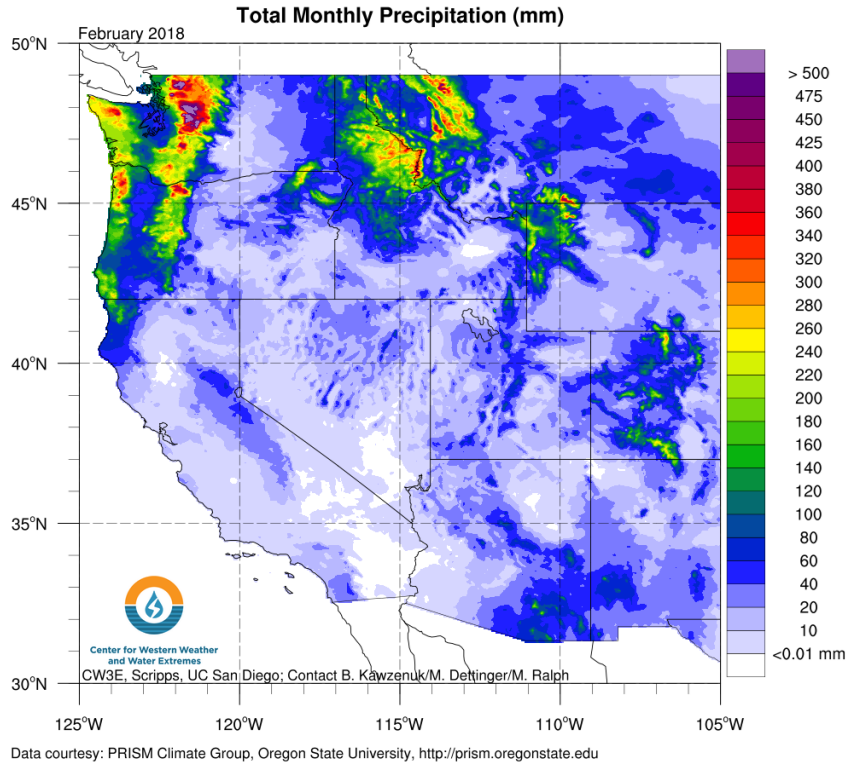
February Atmospheric Rivers



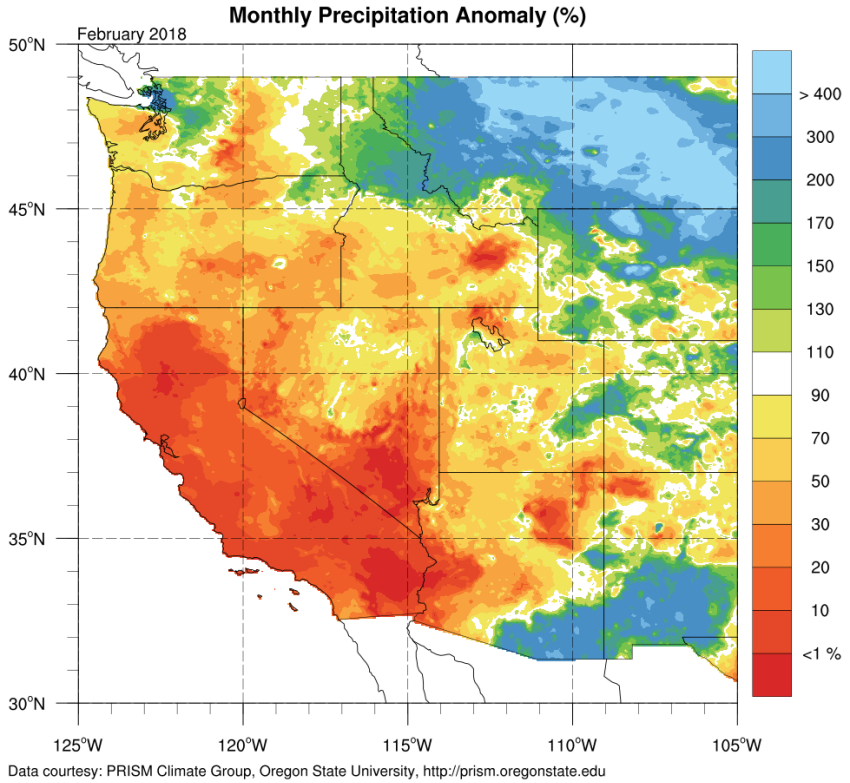
	ARs
February Total	6
Weak	4
Moderate	2
Strong	0
Extreme	0
WY to Date Total	35

Region	ARs
Washington	6
Oregon	6
Northern CA	3
Southern CA	0

February 2018 Precipitation



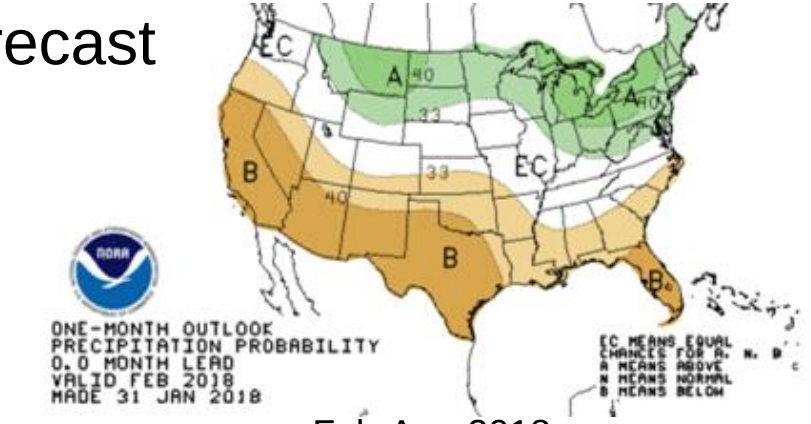
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu



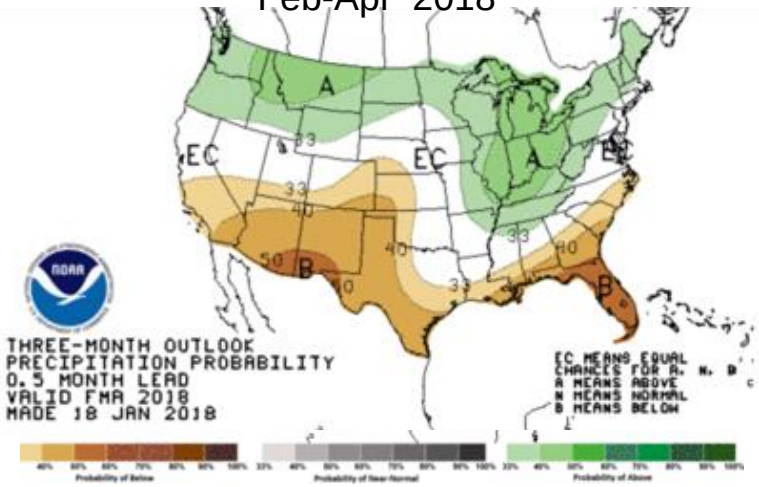
Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

CPC Forecast

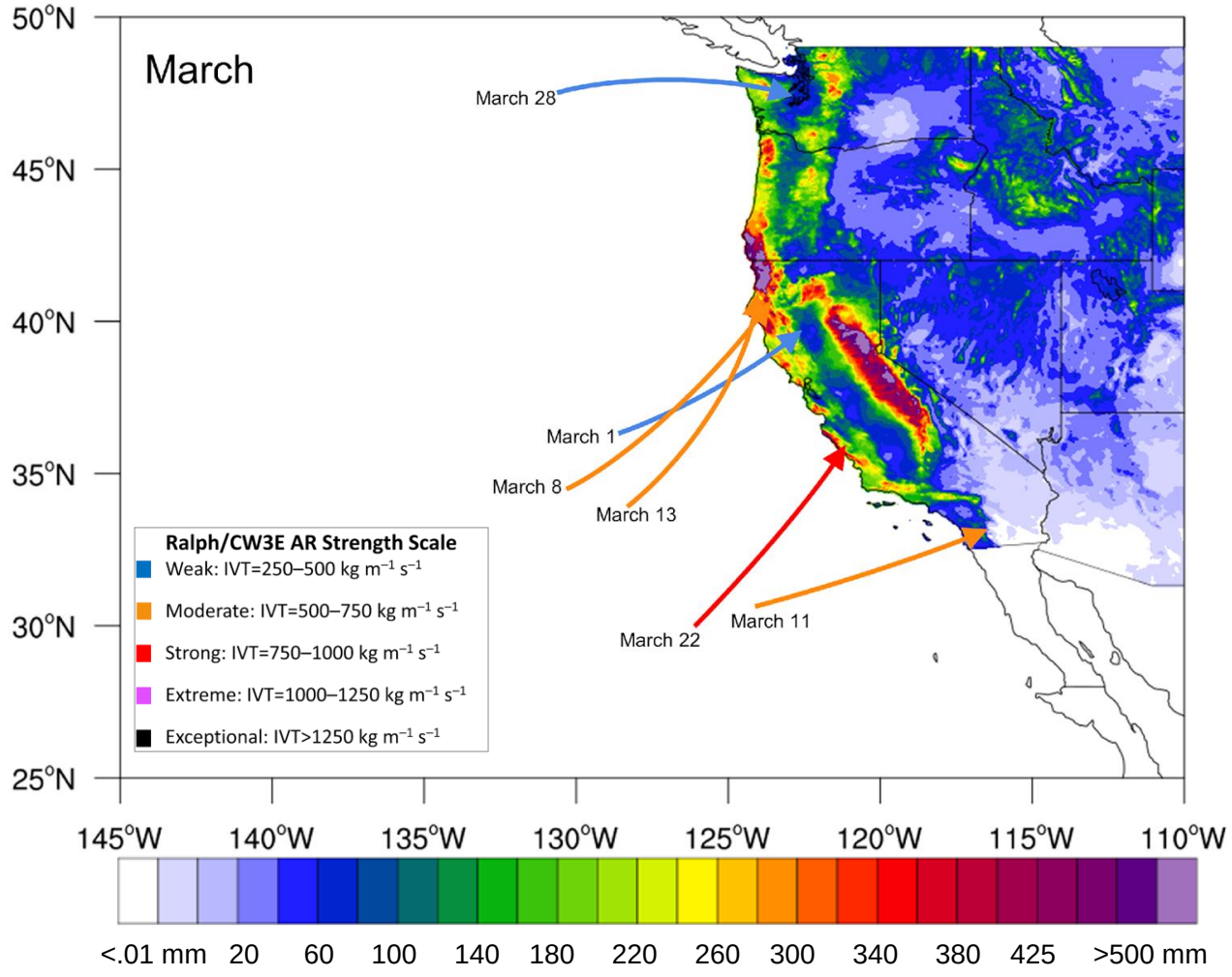
Feb 2018



Feb-Apr 2018



March Atmospheric Rivers

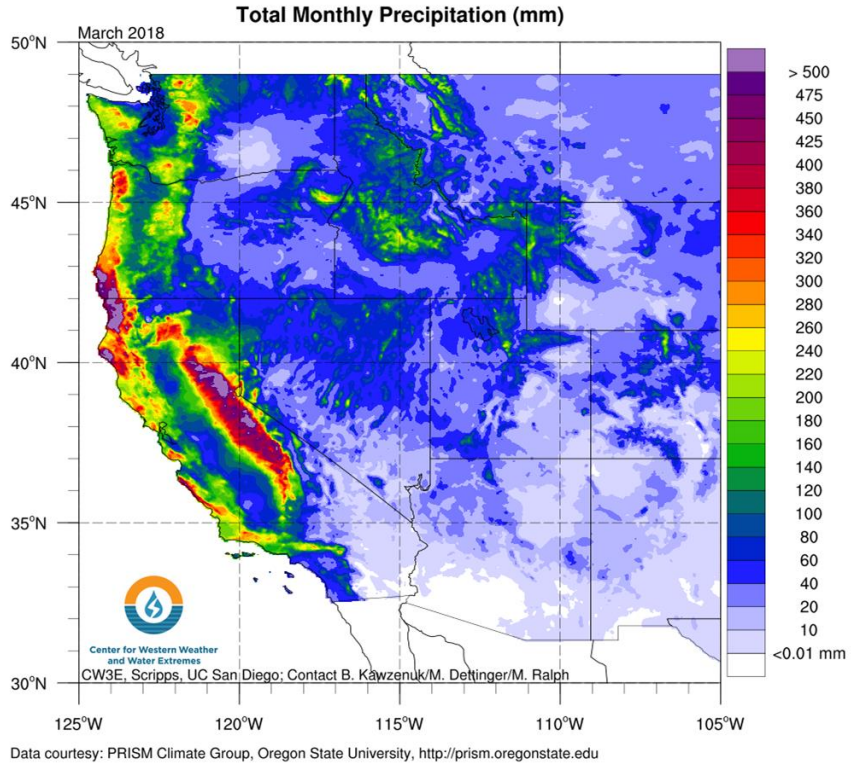


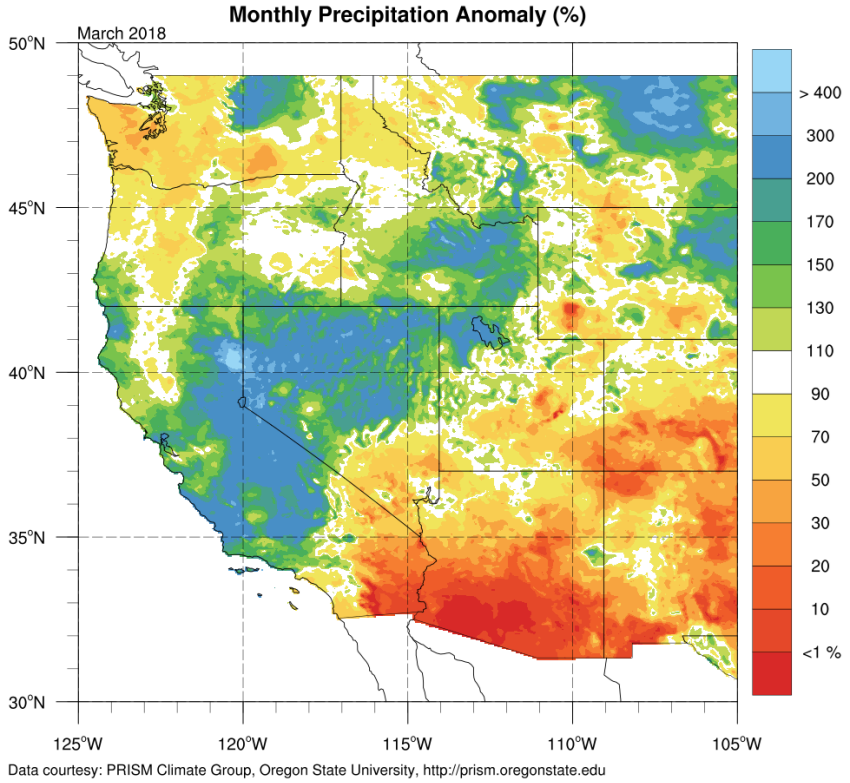
	ARs
March Total	6
Weak	2
Moderate	3
Strong	1
Extreme	0
WY to Date Total	41

Region	ARs
Washington	3
Oregon	5
Northern CA	4
Southern CA	3

Provided by Chad Hecht

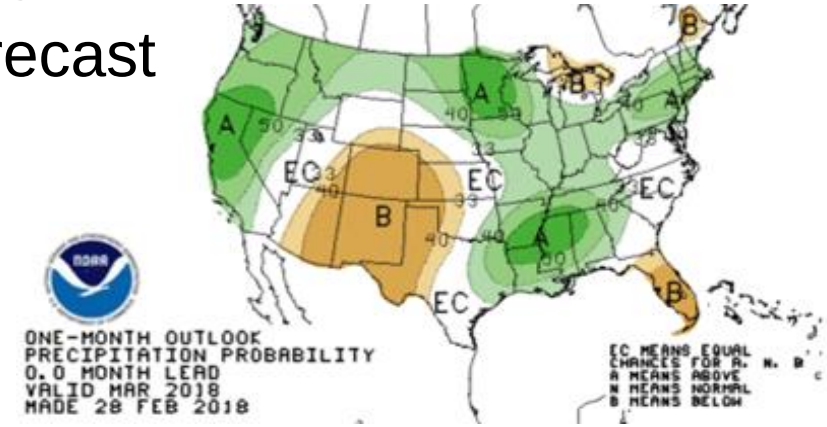
March 2018 Precip



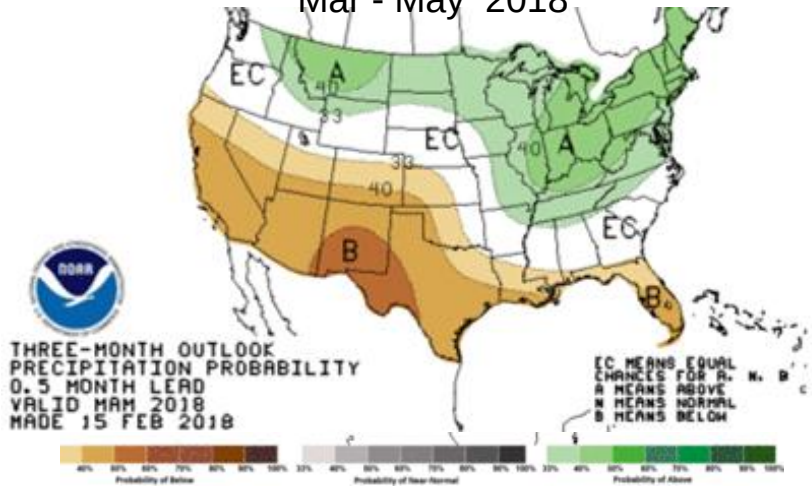


CPC Forecast

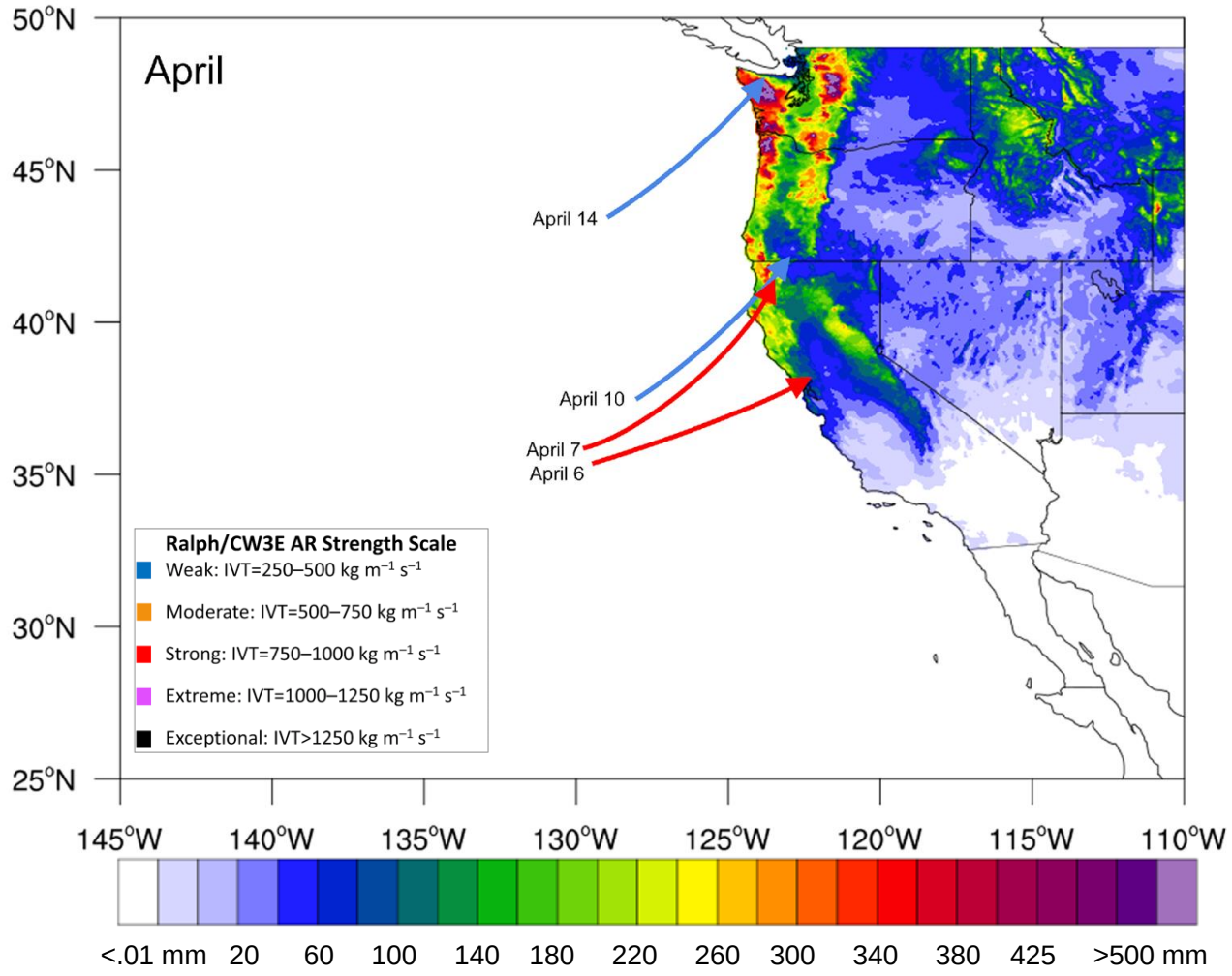
Mar 2018



Mar - May 2018



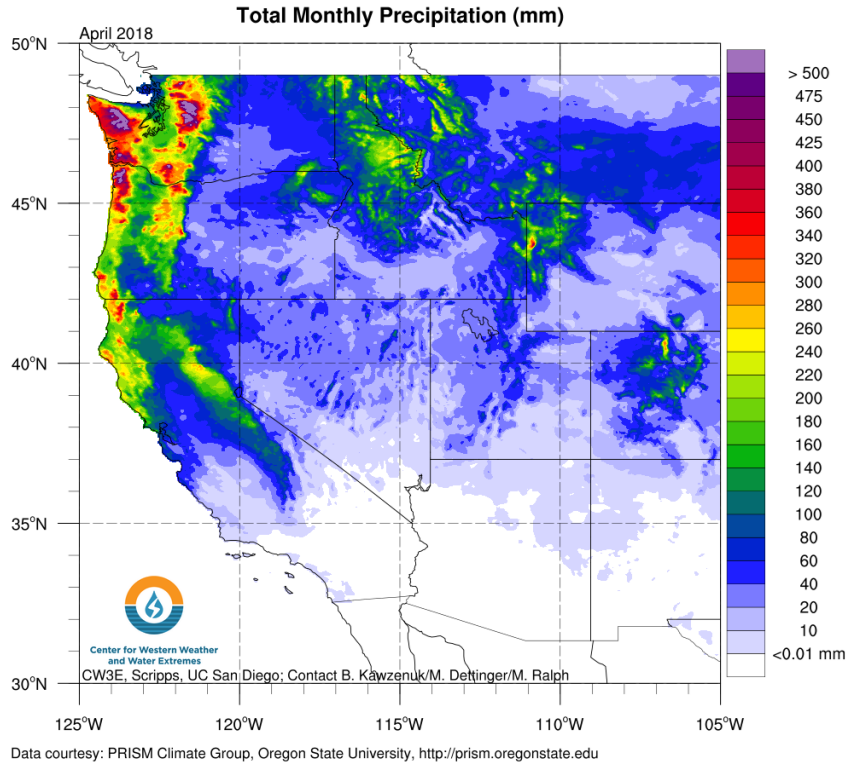
April Atmospheric Rivers

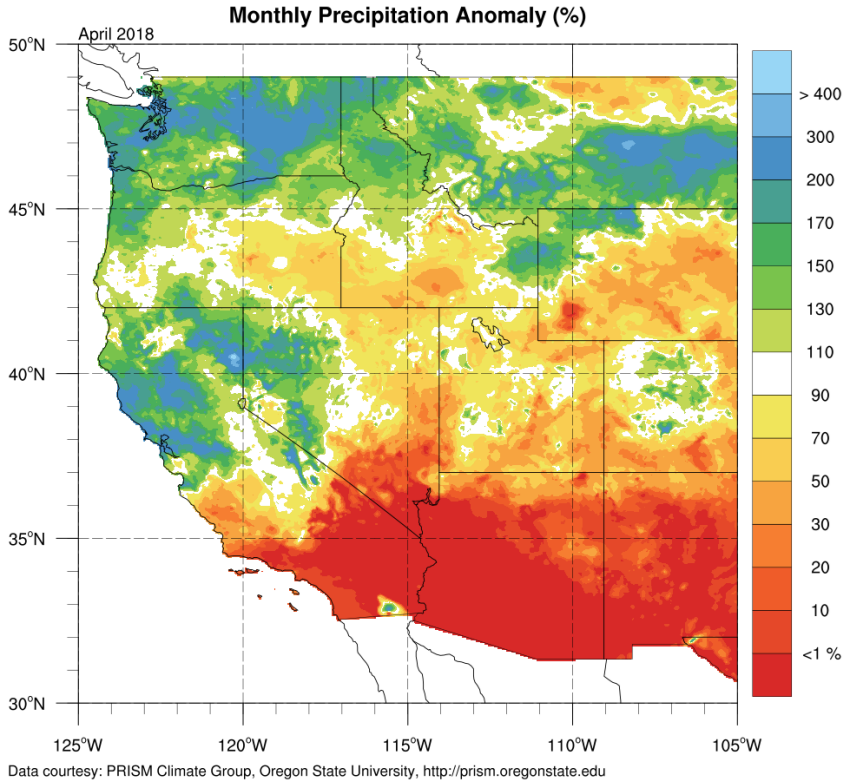


	ARs
April Total	4
Weak	2
Moderate	0
Strong	2
Extreme	0
WY to Date Total	45

Region	ARs
Washington	3
Oregon	4
Northern CA	4
Southern CA	3

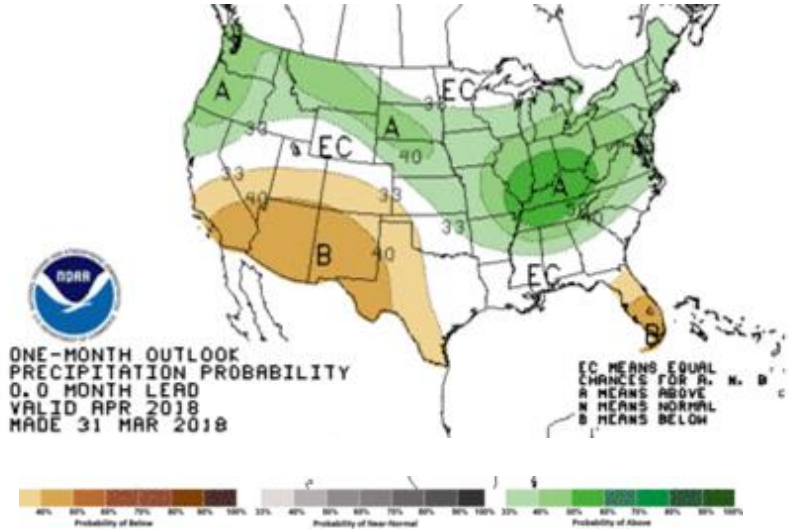
April 2018 Precip



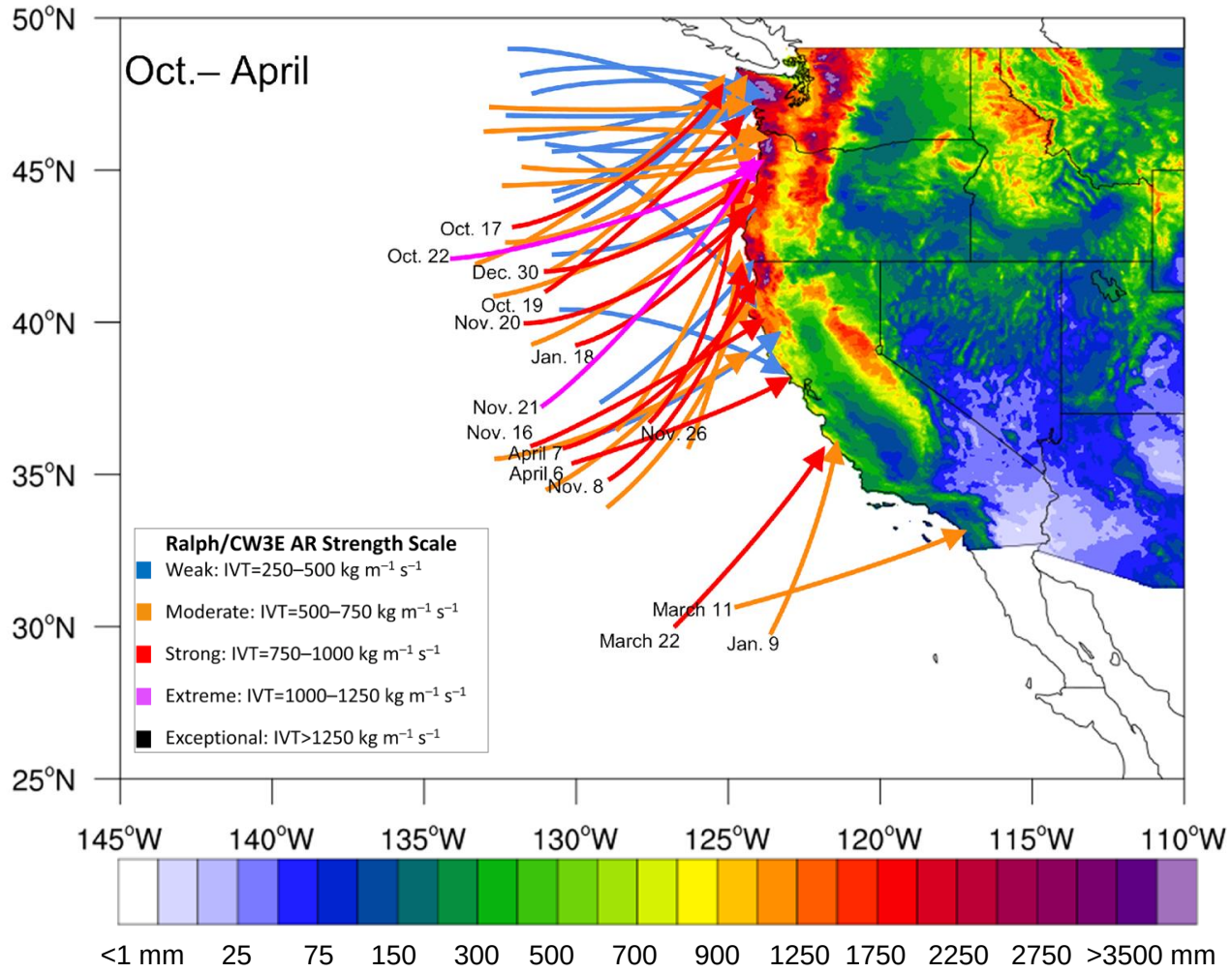


CPC Forecast

Apr 2018



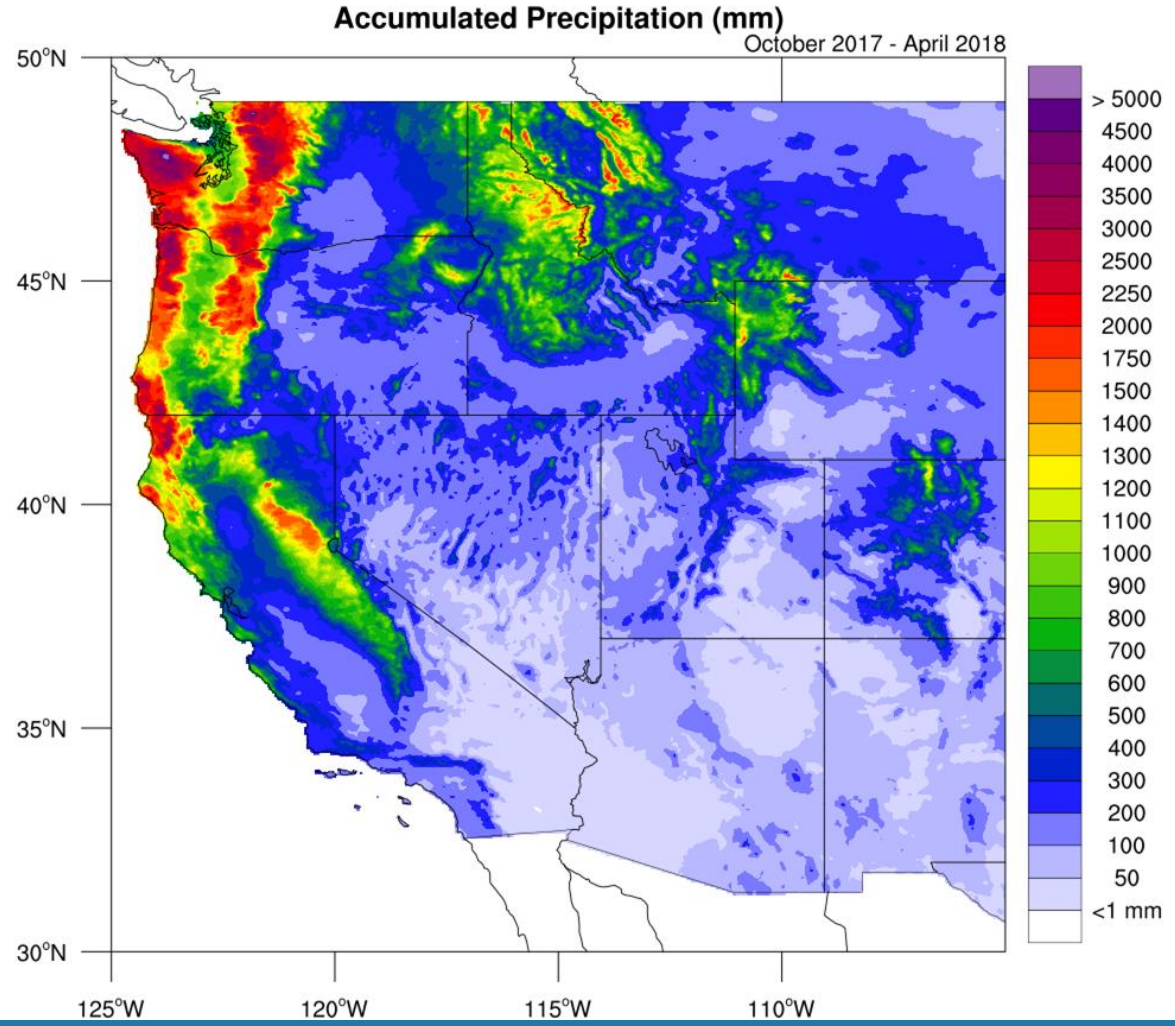
October 2017 - April 2018 Atmospheric Rivers

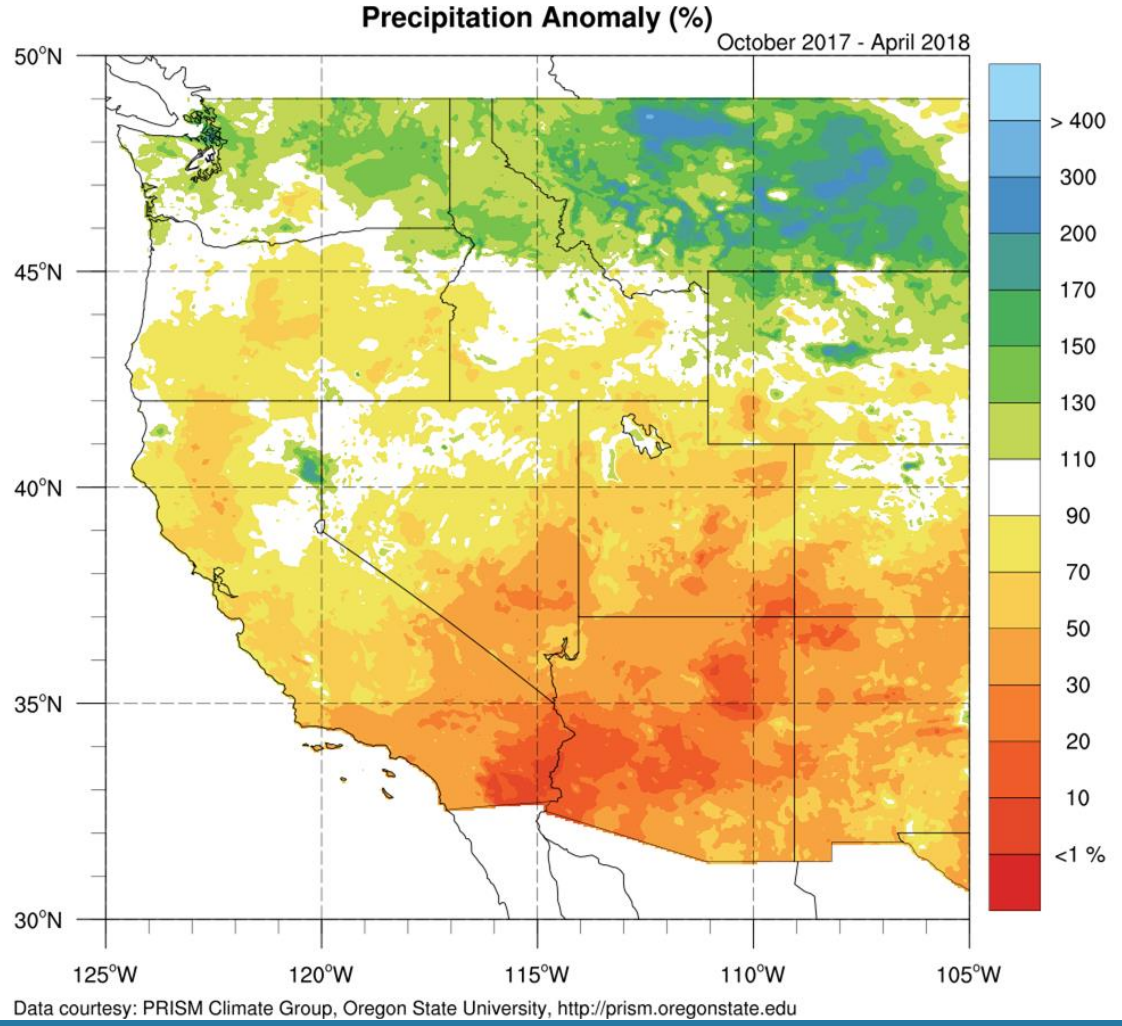


	ARs
Total	45
Weak	16
Moderate	16
Strong	11
Extreme	2

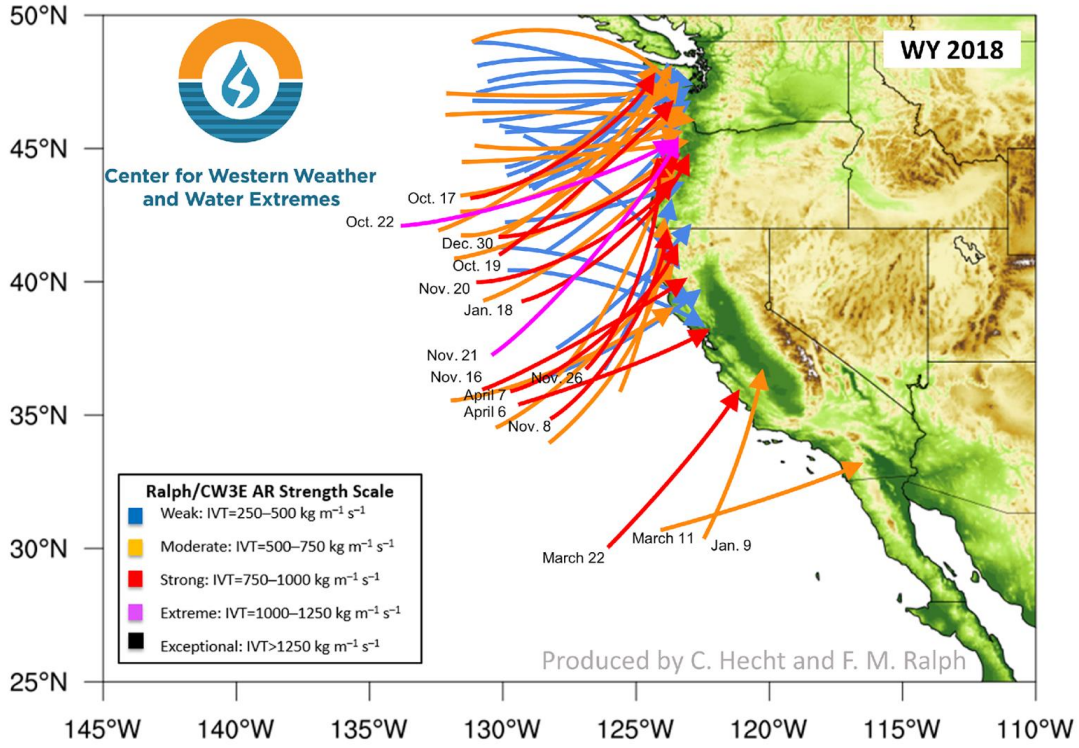
Region	Weak	Mod.	Strong	Extr.	Total
WA	19	14	5	1	39
Oregon	23	12	7	2	44
N. CA	13	12	7	0	32
S. CA	11	6	1	0	18

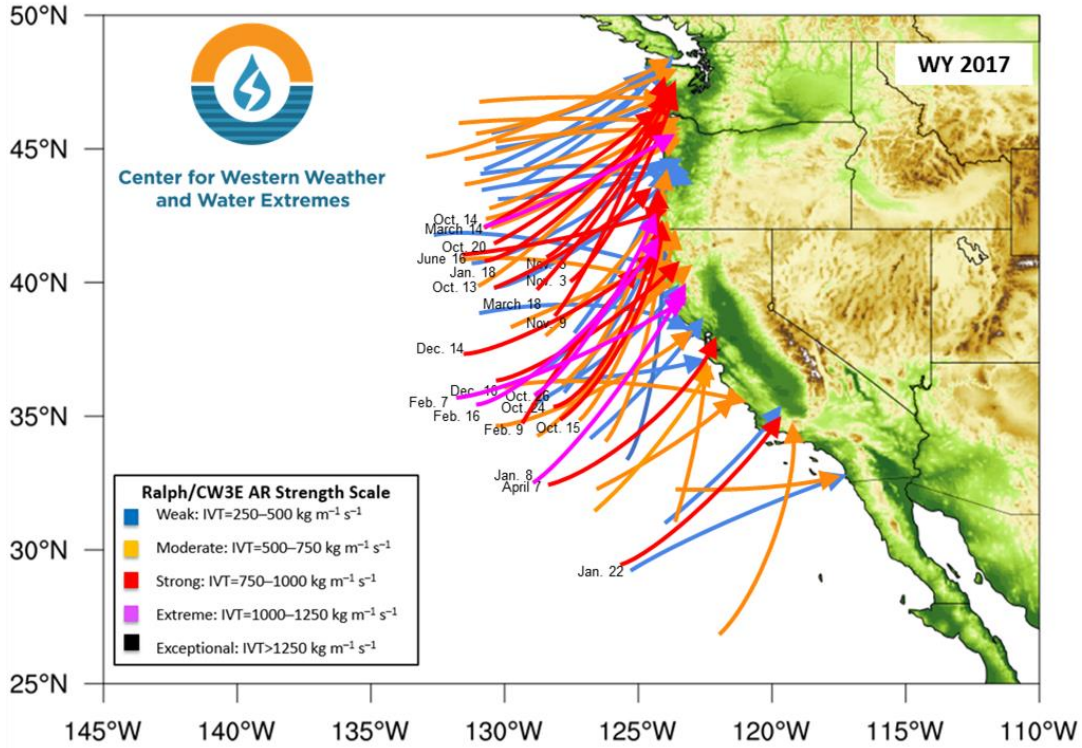
October 2017 - April 2018 Precip





WY 2018 Compared to WY 2017

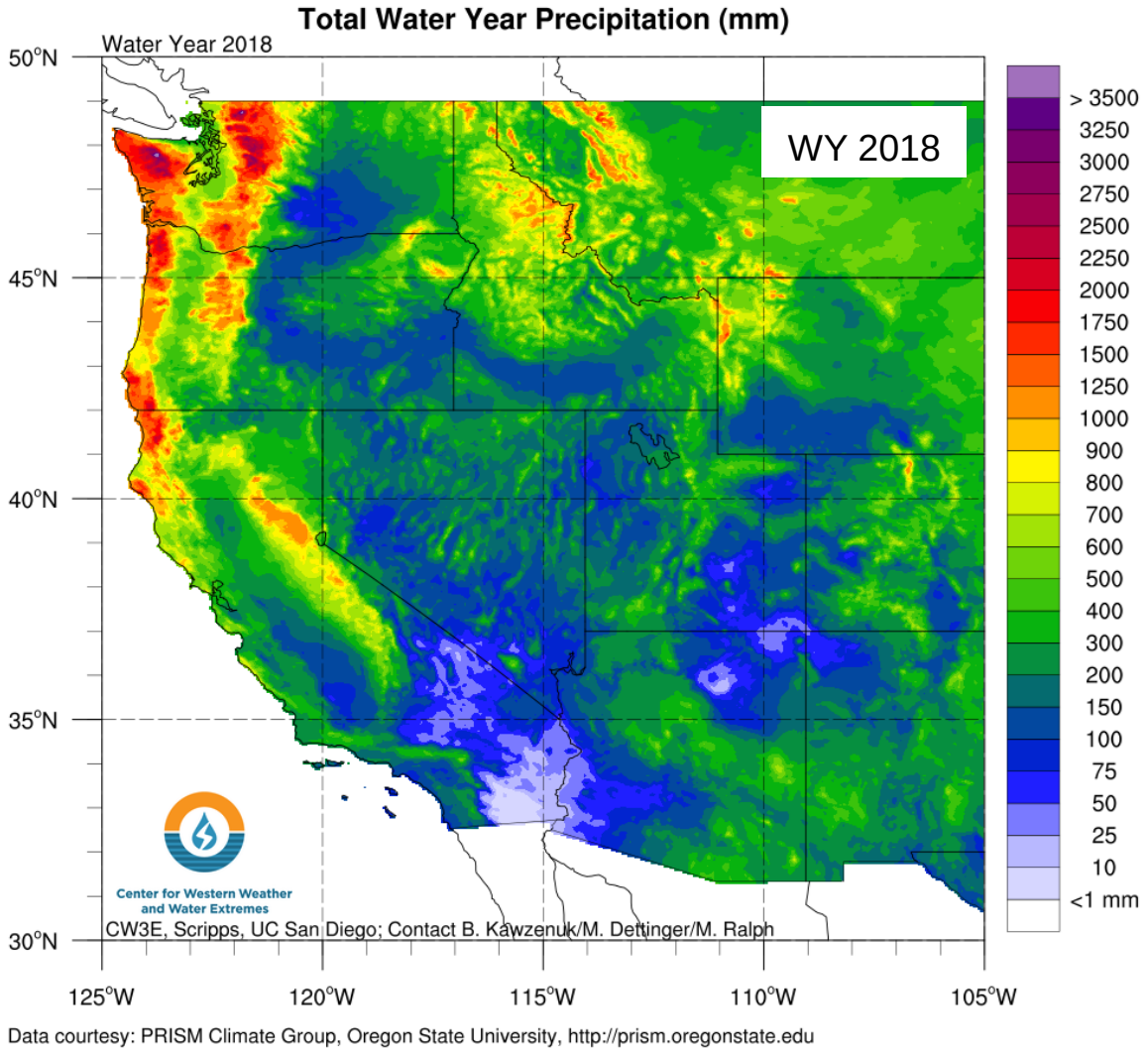




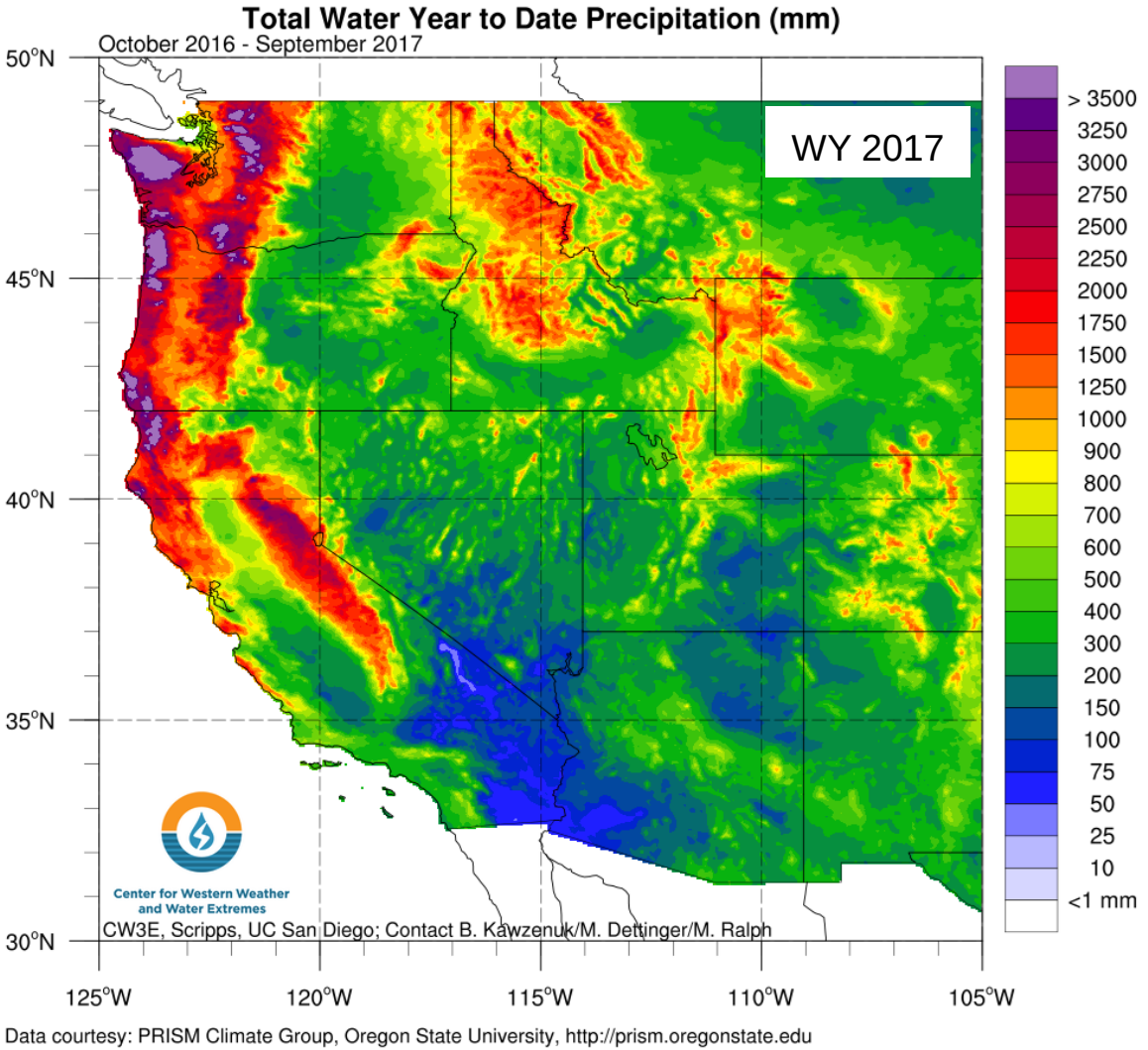
WY 2018	ARs
Total	55
Weak	22
Moderate	20
Strong	11
Extreme	2

WY 2017	ARs
Total	68
Weak	21
Moderate	26
Strong	16
Extreme	5

WY 2018 Compared to WY 2017

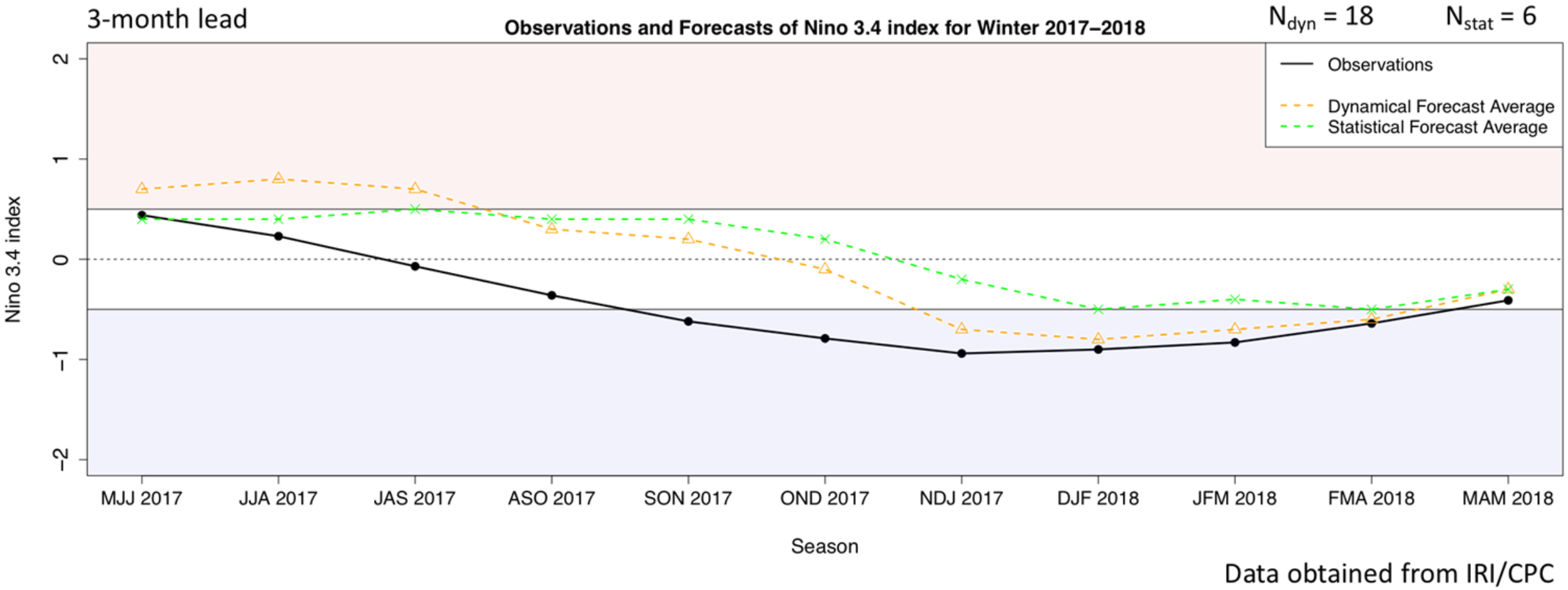


Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu



Data courtesy: PRISM Climate Group, Oregon State University, http://prism.oregonstate.edu

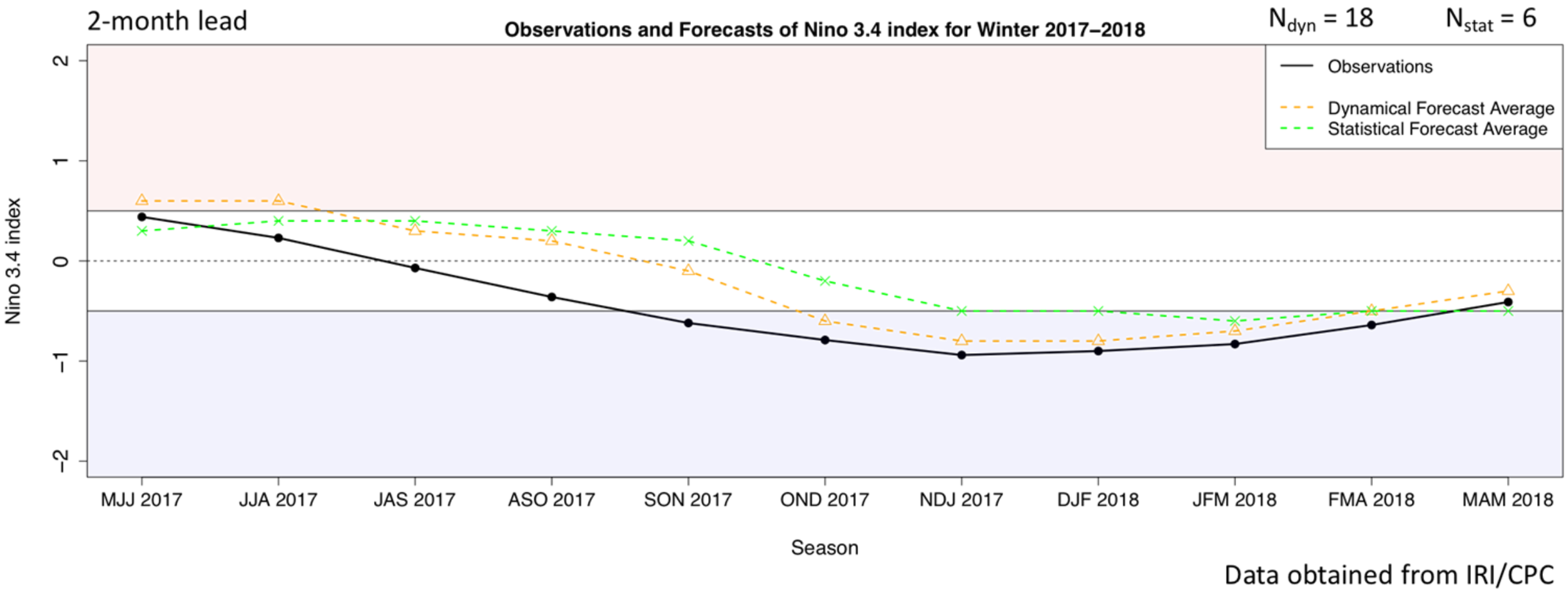
Prediction of Moderate Winter 2017-2018 La Niña



Data obtained from IRI/CPC

Provided by Mike DeFlorio

Prediction of Moderate Winter 2017-2018 La Niña



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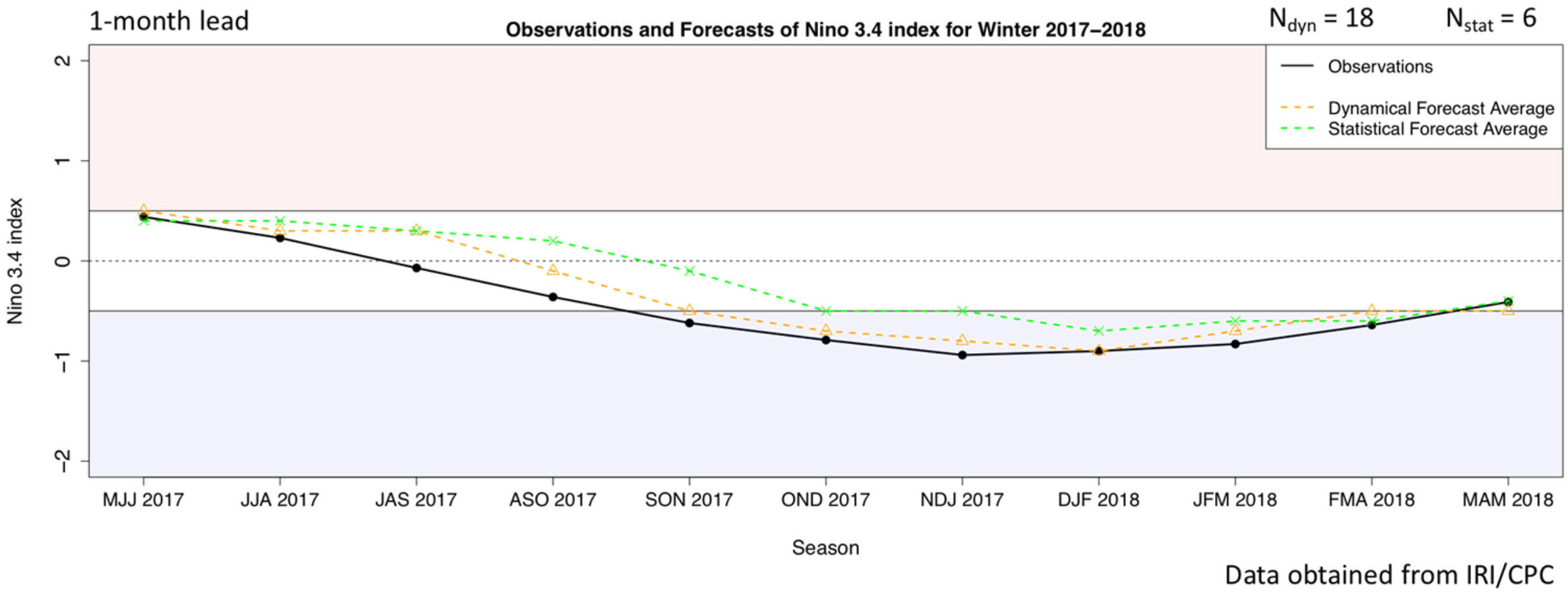
Provided by Mike DeFlorio

Prediction of Moderate Winter 2017-2018 La Niña

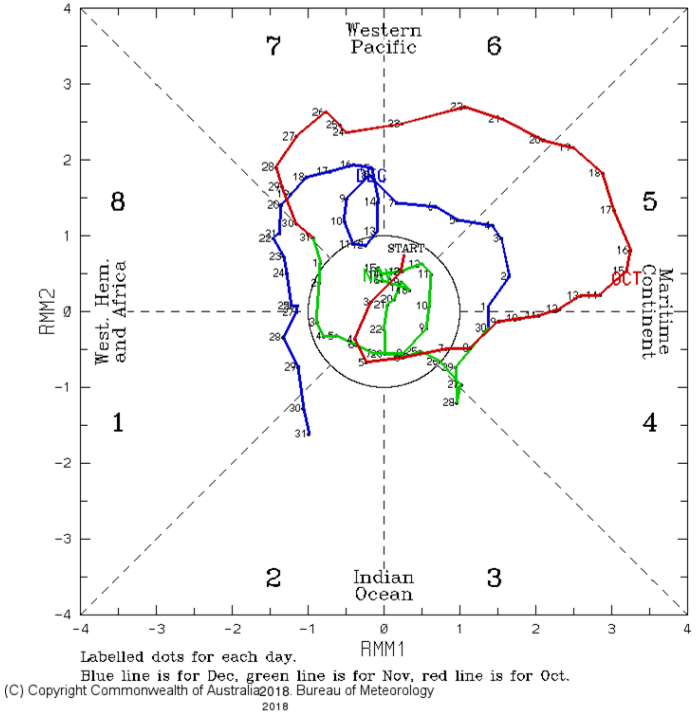


Data obtained from IRI/CPC

MJO/QBO during Fall 2017

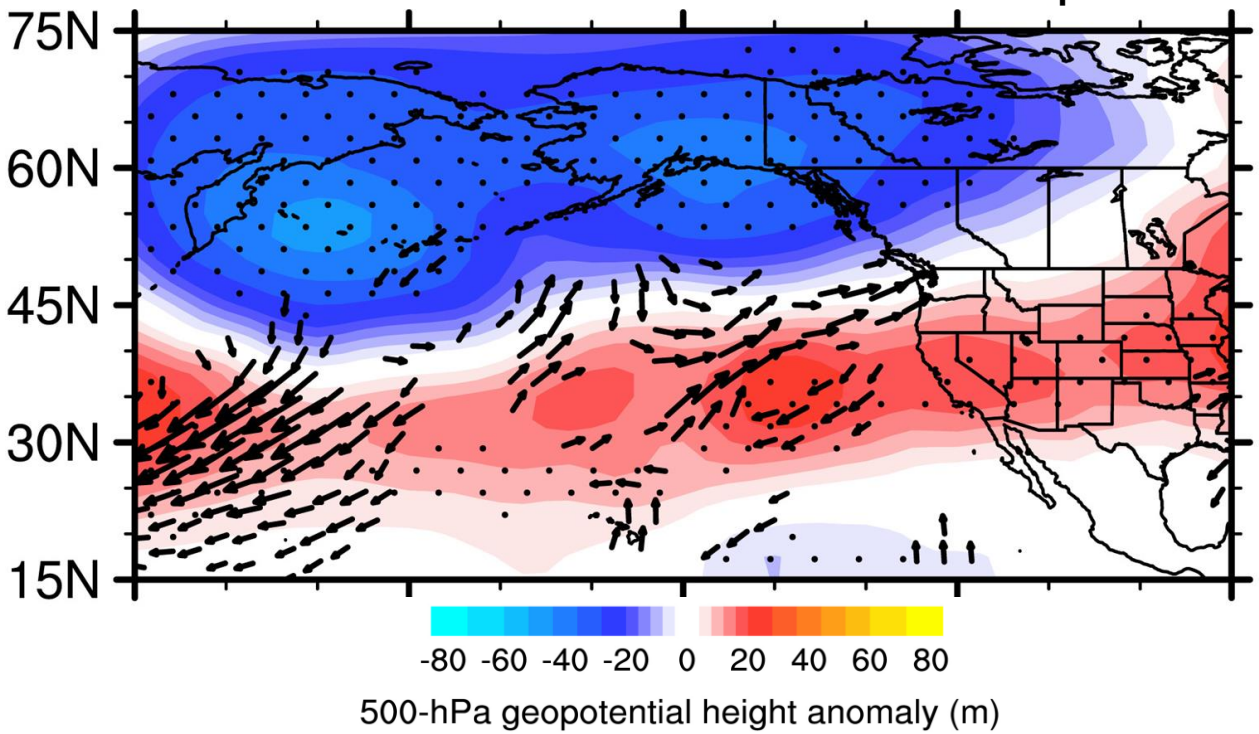
During late summer 2017, the QBO shifted to an easterly (negative) phase, which persisted into fall and winter. During October 2017, strong MJO phase 5 and 6 conditions emerged.

MJO Phase Space for Sep 2017 - Dec 2017

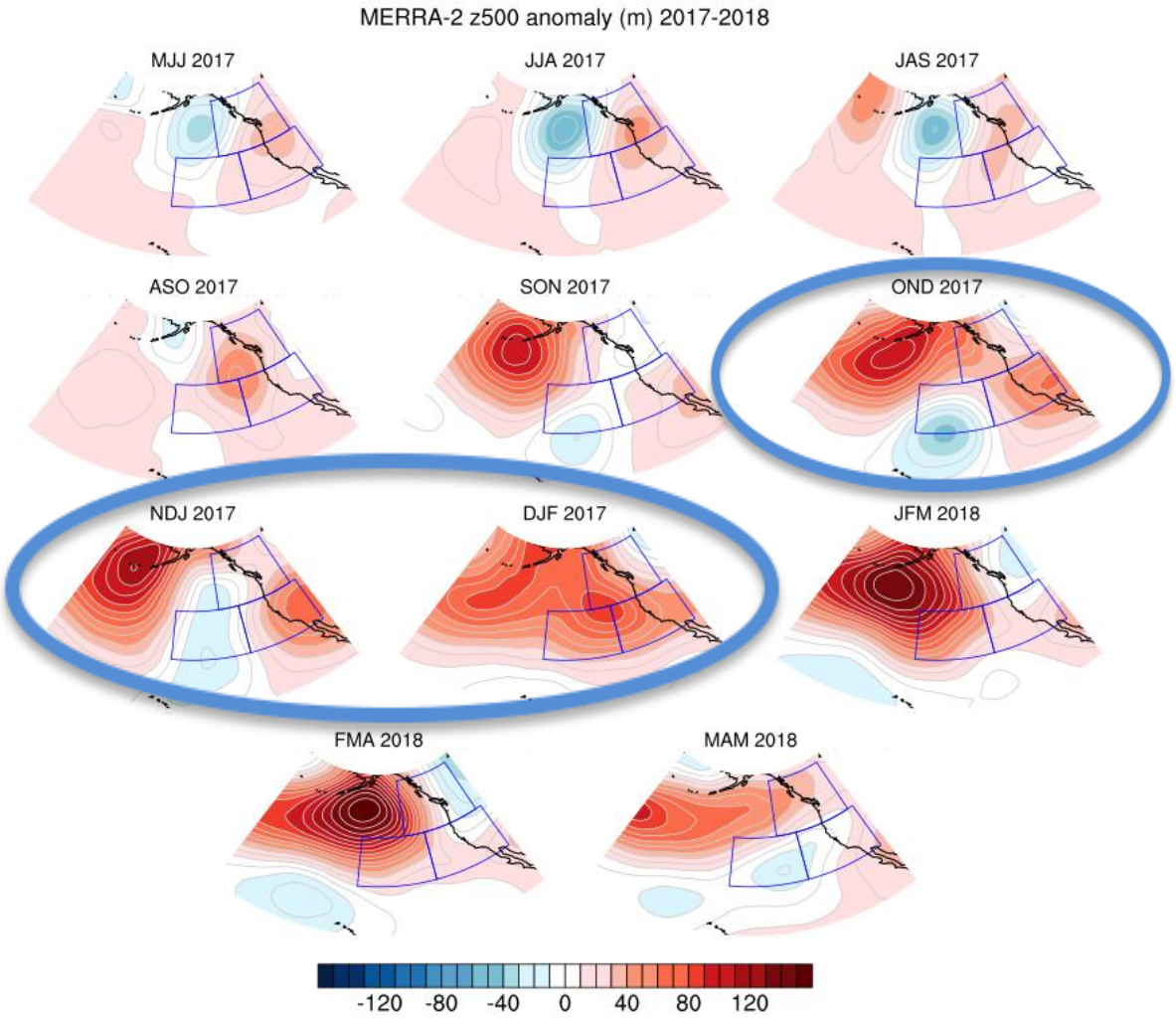


Baggett et al. 2017 showed that QBO easterly + MJO phase 5 and phase 6 conditions are favorable for ridging 2-3 weeks later over California.

Composite of Z500 anomalies on QBO negative conditions, 2-3 weeks after MJO Phase 5 conditions develop



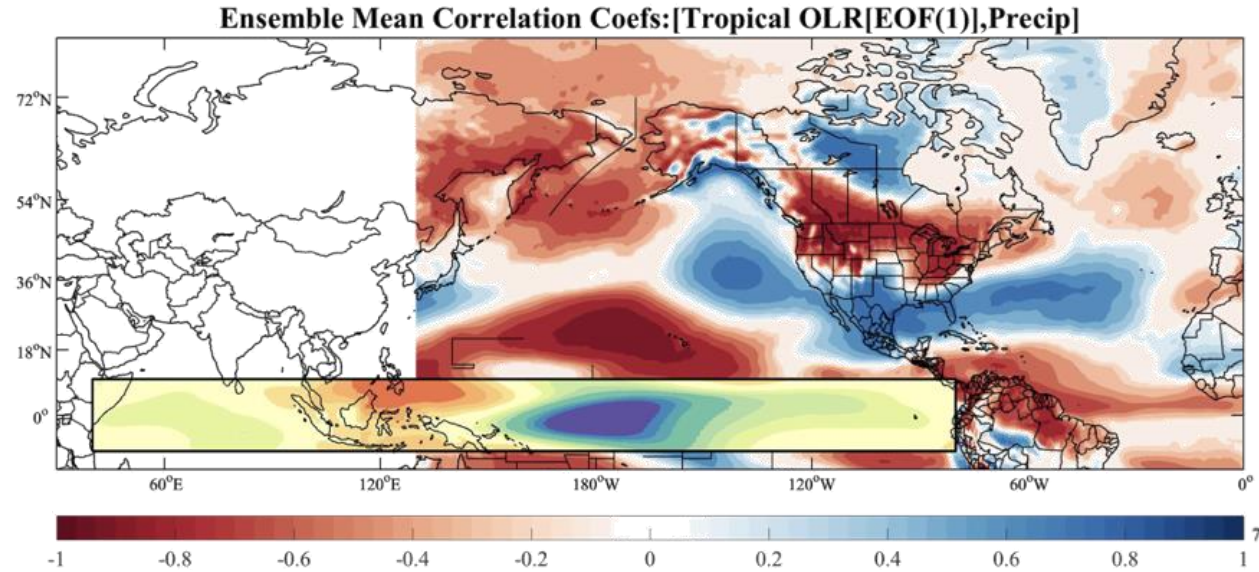
Observations of seasonally-averaged Z500



- Mid-tropospheric ridging developed over California during fall of 2017 and persisted into mid-winter 2017-2018. These circulation anomalies are consistent with both QBO negative + phase 5-6 MJO conditions in early fall, and an emergent moderate La Niña that persisted until spring in the tropical Pacific (more on the statistical relationship between ridging and ENSO in Peter's ridging talk tomorrow).

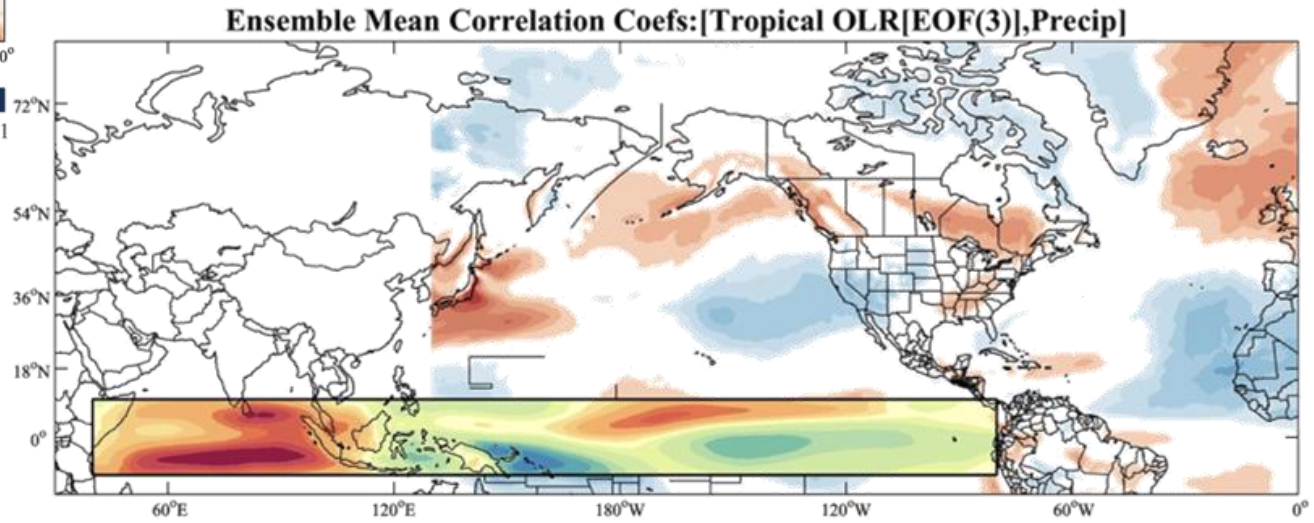
Provided by Peter Gibson (JPL) and Mike DeFlorio

Dominant Modes of Outgoing Long-Wave Radiation



dry
low convection

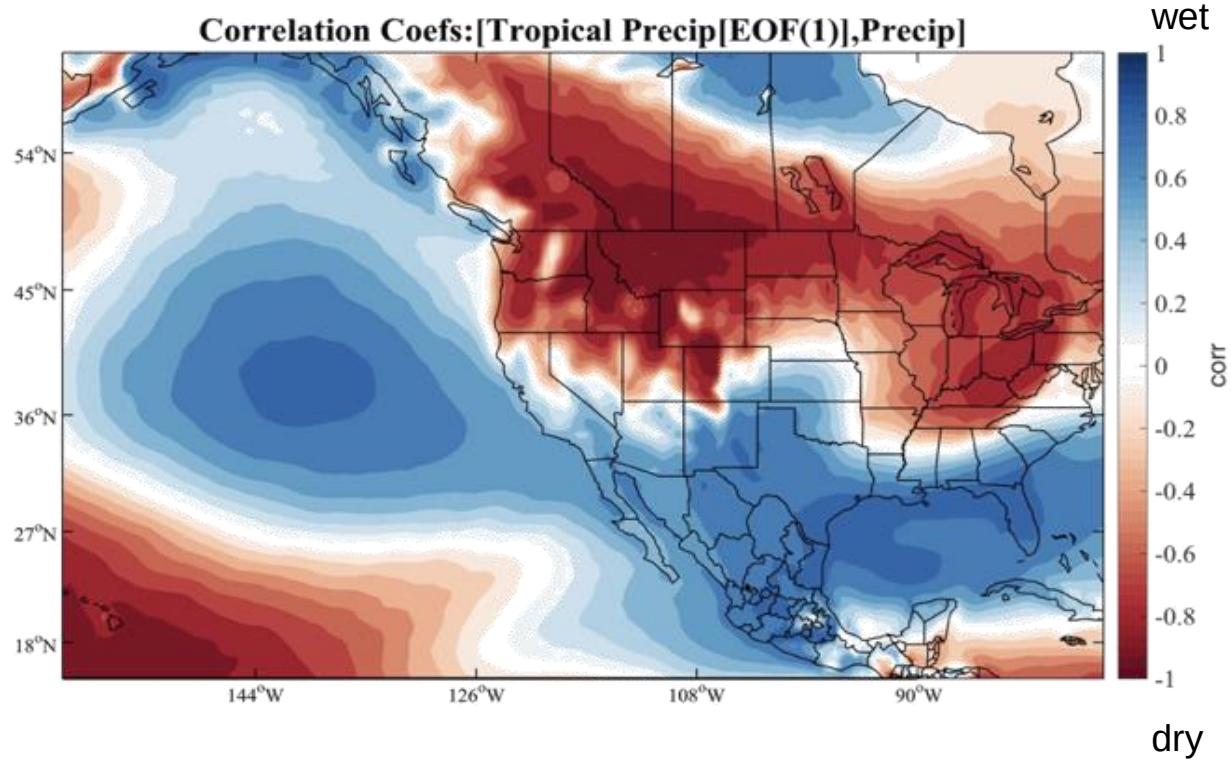
wet
high convection



Provided by Will Chapman

EOF 1 of OLR: Precip Mean and Variability (Spread)

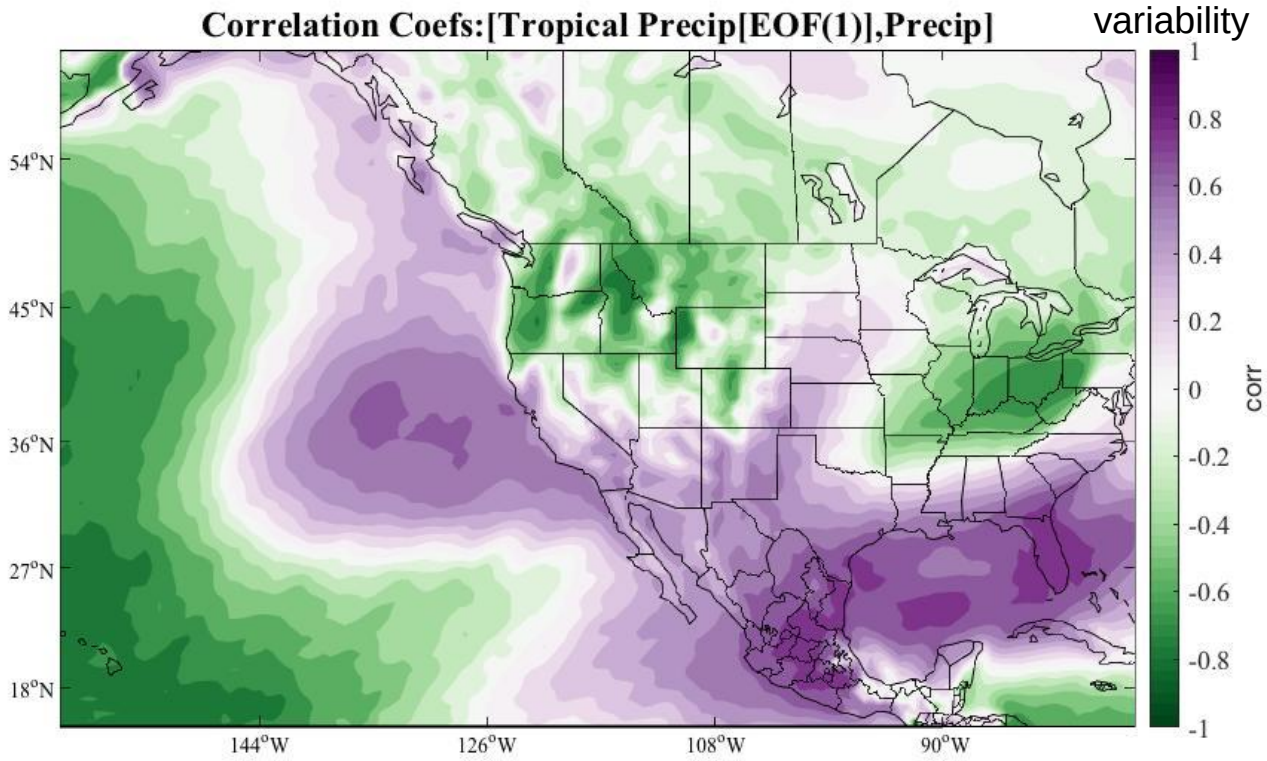
Ensemble Mean



wet

dry

Ensemble Spread



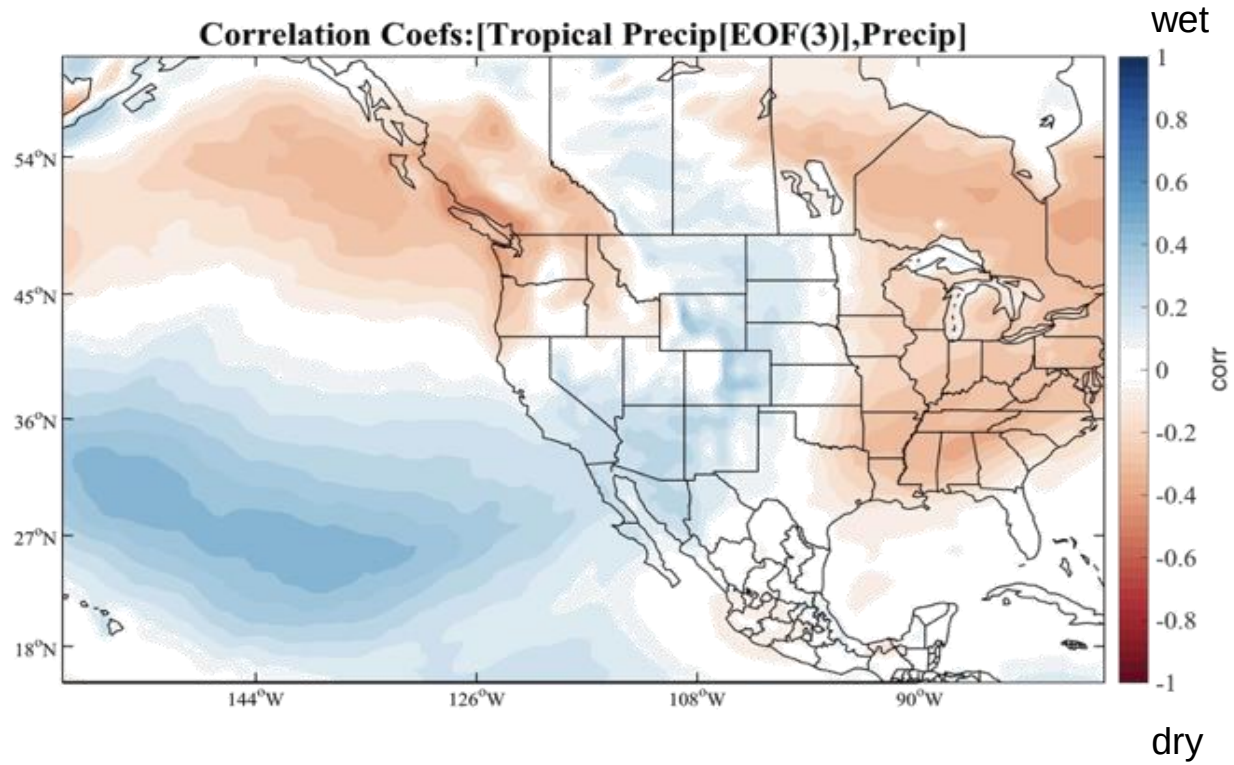
high variability

low variability

Provided by Will Chapman

EOF 3 of OLR: Precip Mean and Variability (Spread)

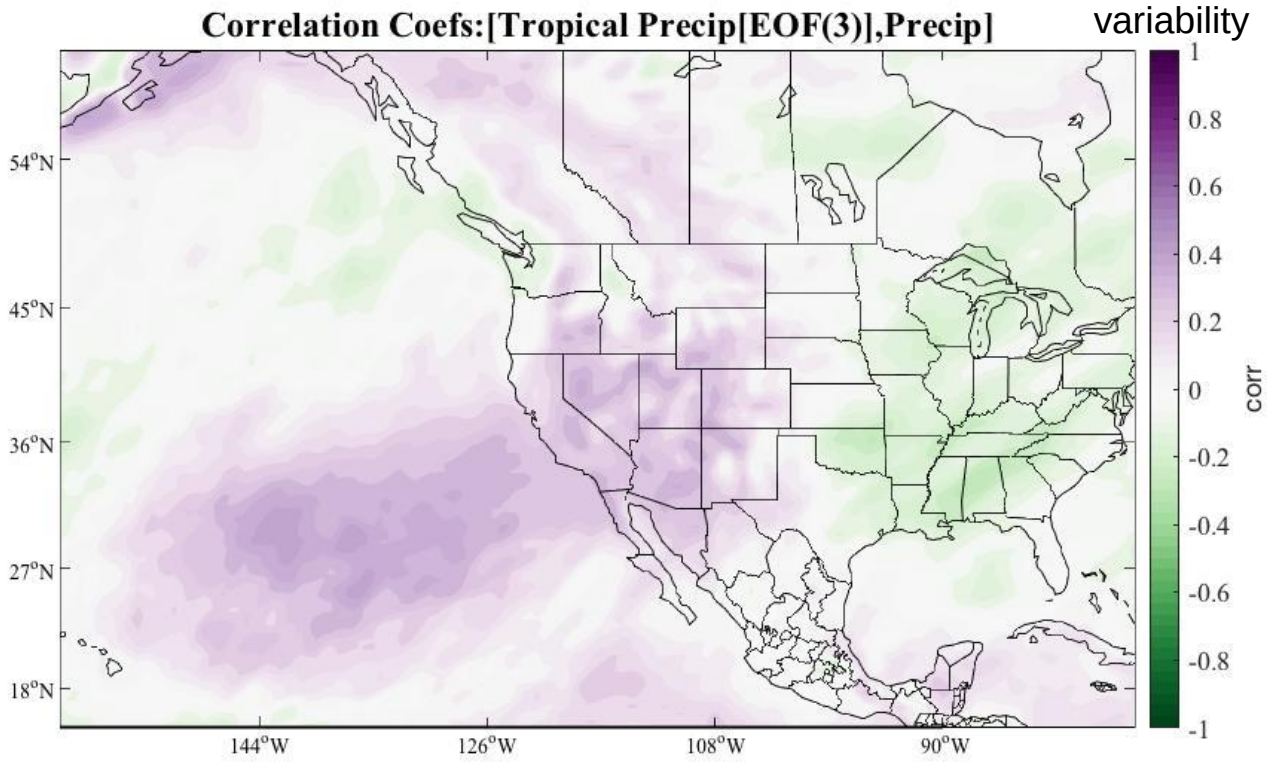
Ensemble Mean



wet

dry

Ensemble Spread

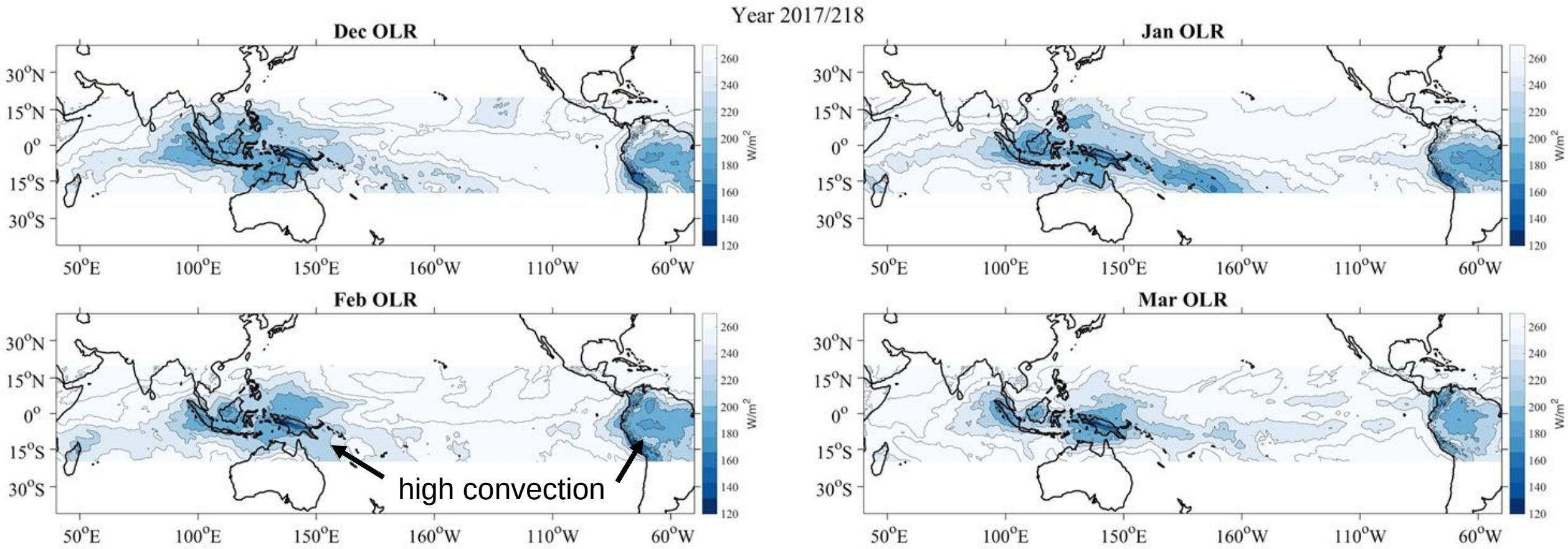


high variability

low variability

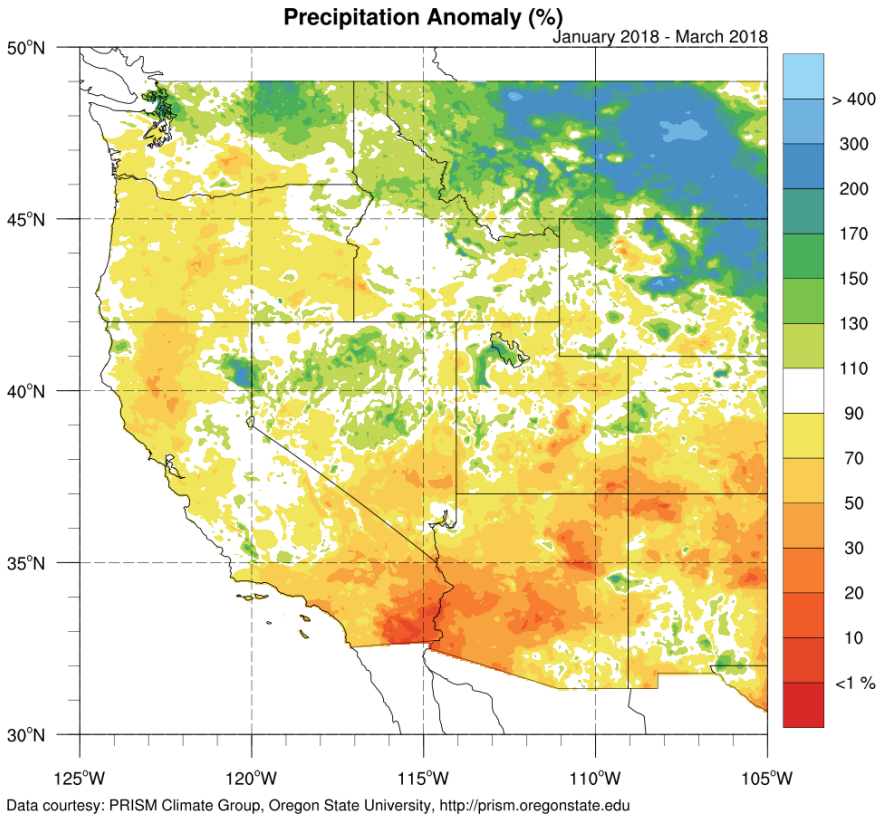
Provided by Will Chapman

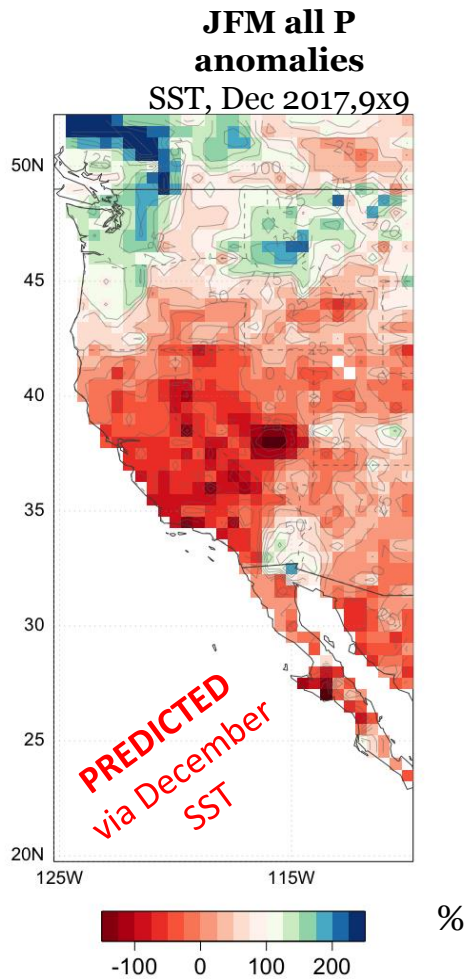
OLR: Outgoing Long Wave Radiation



Provided by Will Chapman

JFM 2018 Precip Prediction from SST Anomaly





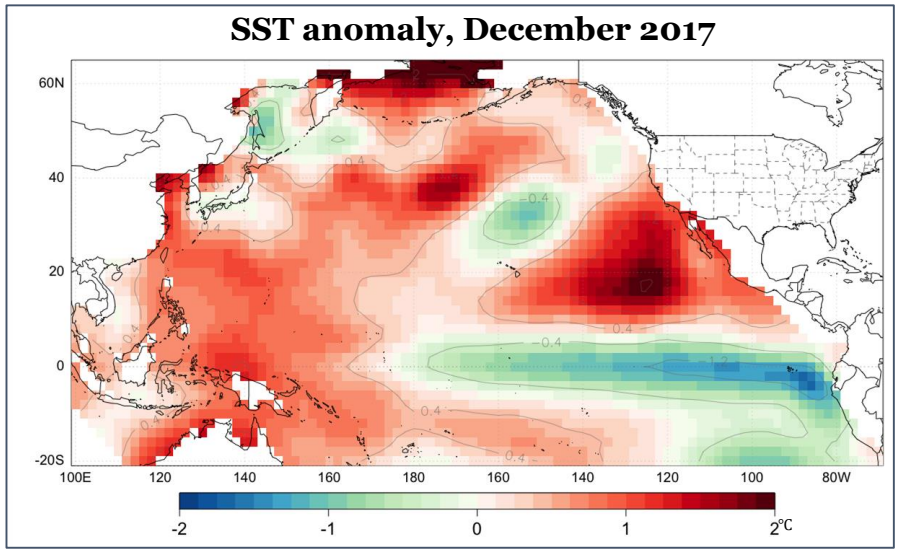
CCA prediction approach:

Predictors: December SST [20S – 65N]

Predictands: JFM all P anomalies (%)

Model training period: 1950 – 2013 (64 years)

Reference period for P climatology: JFM 1950-2013



Provided by Tamara Shulgina & Sasha Gershunov

Summary

- Overall Dry Year
  - S. CA 20-30% of normal and N. CA 50-70% of normal
- In CA no extreme ARs and only 8 strong ARs
  - N. CA had 32 ARs impact (Oct-Apr); S. CA had 18 ARs impact
- Moderate La Niña + MJO/QBO phase locking favorable for dry winter conditions over California
- Winter OLR not a perfect match aligns with drier winter
- Dec SST predicted a dry JFM