Recent NE Pacific Warming or: How I Learned to Stop Worrying and Love the Blob

Nick Bond
UW

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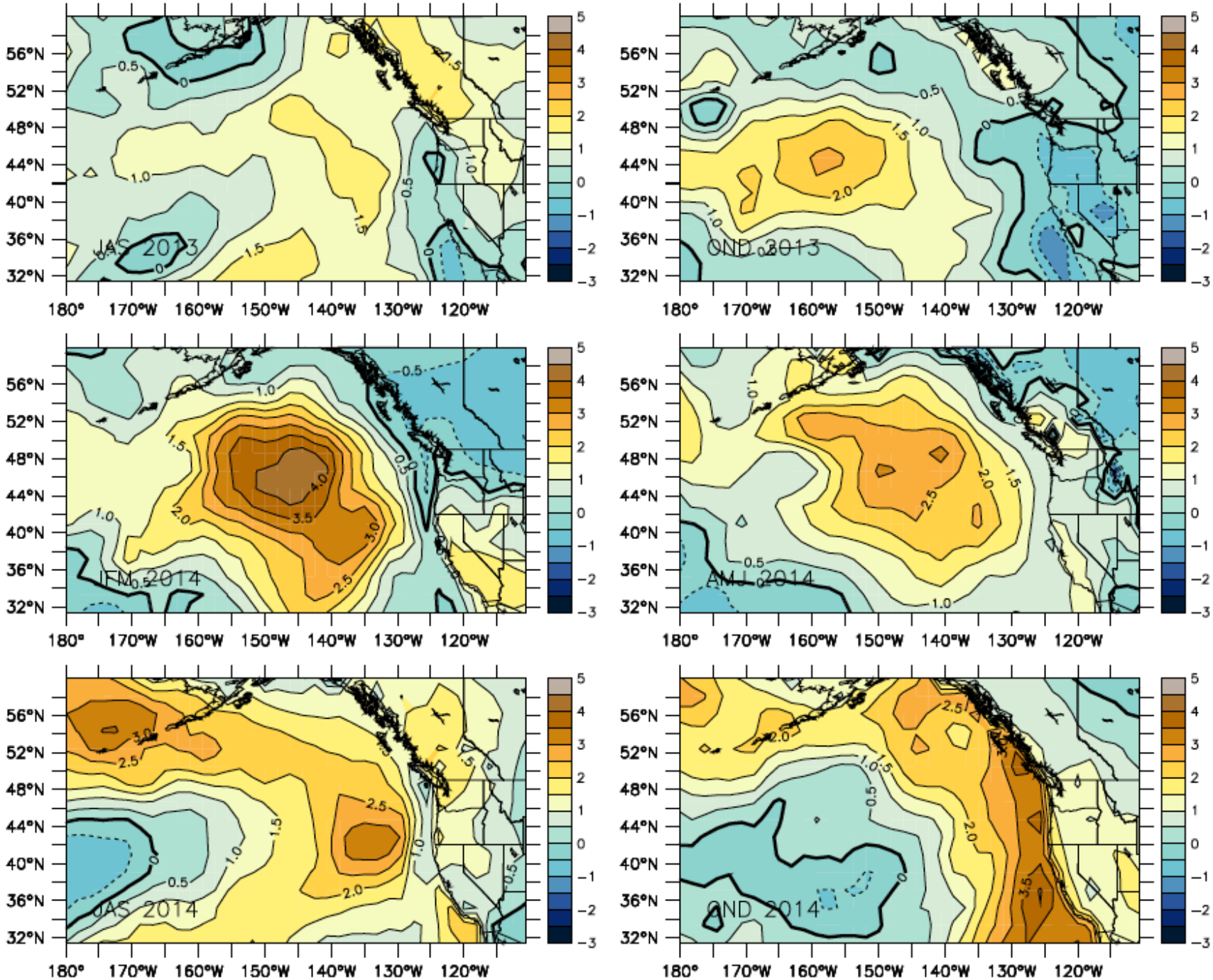
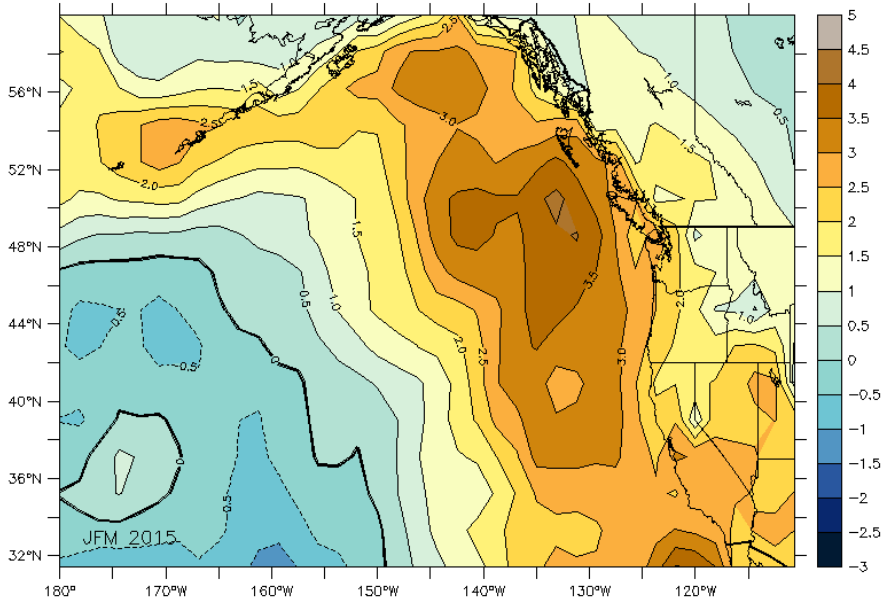
OWSC

Office of the Washington State Climatologist

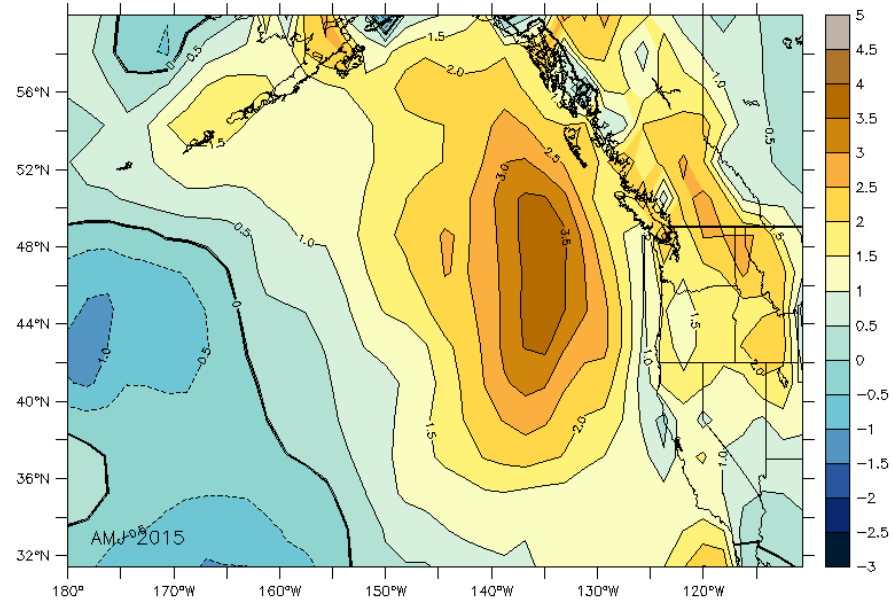

JAS 2013
OND 2013
JFM 2014
AMJ 2014
JAS 2014
OND 2014
56°N
52°N
48°N
44°N
40°N
36°N
32°N
180°
170°W
160°W
150°W
140°W
130°W
120°W

2015

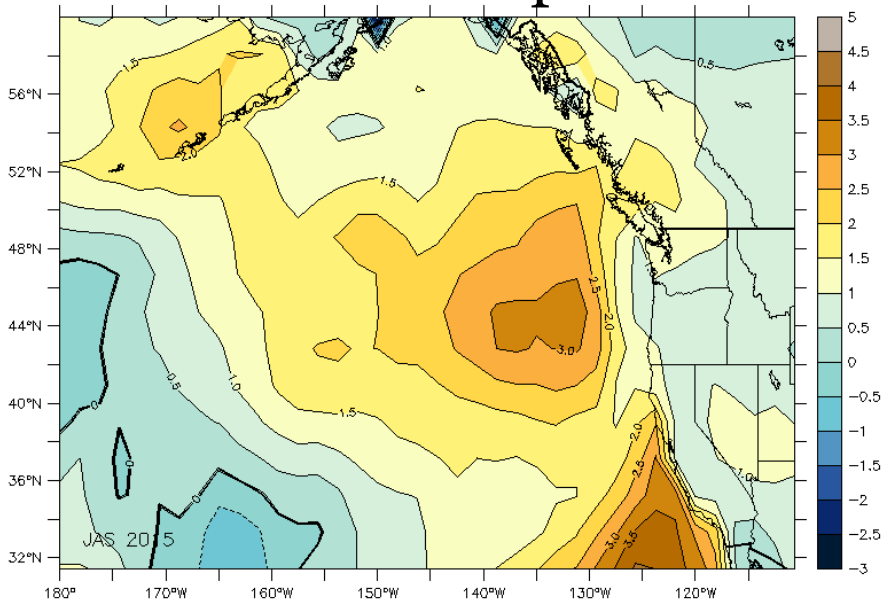
Jan-Mar



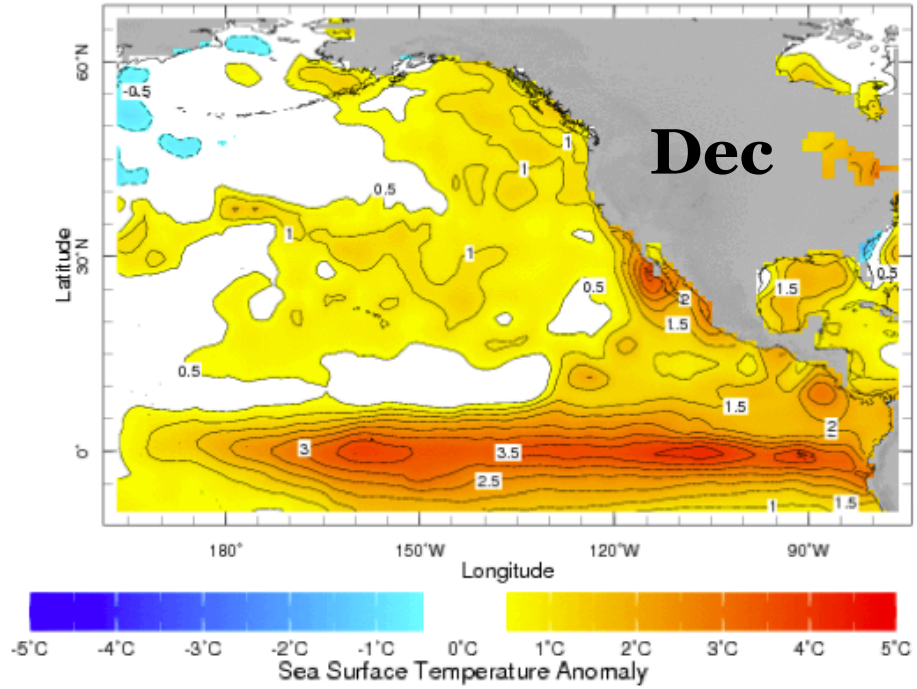
Apr-Jun



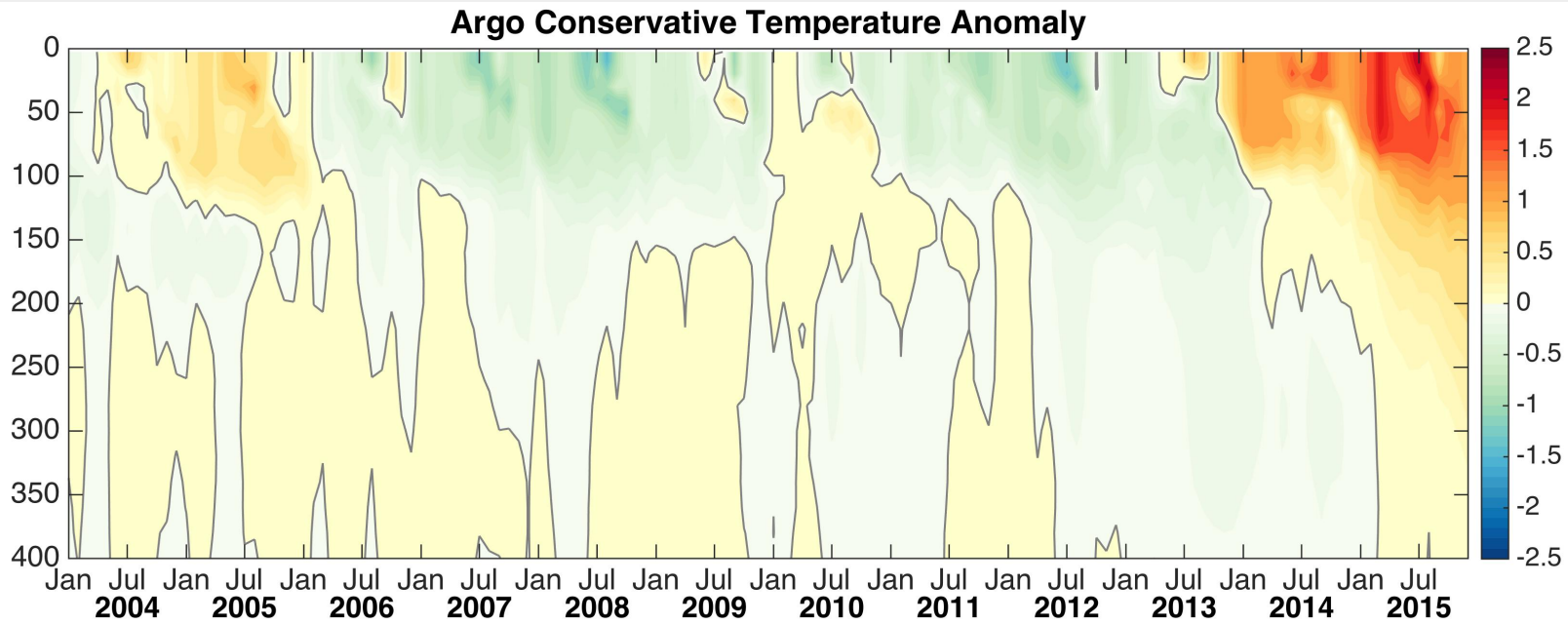
Jun-Sep

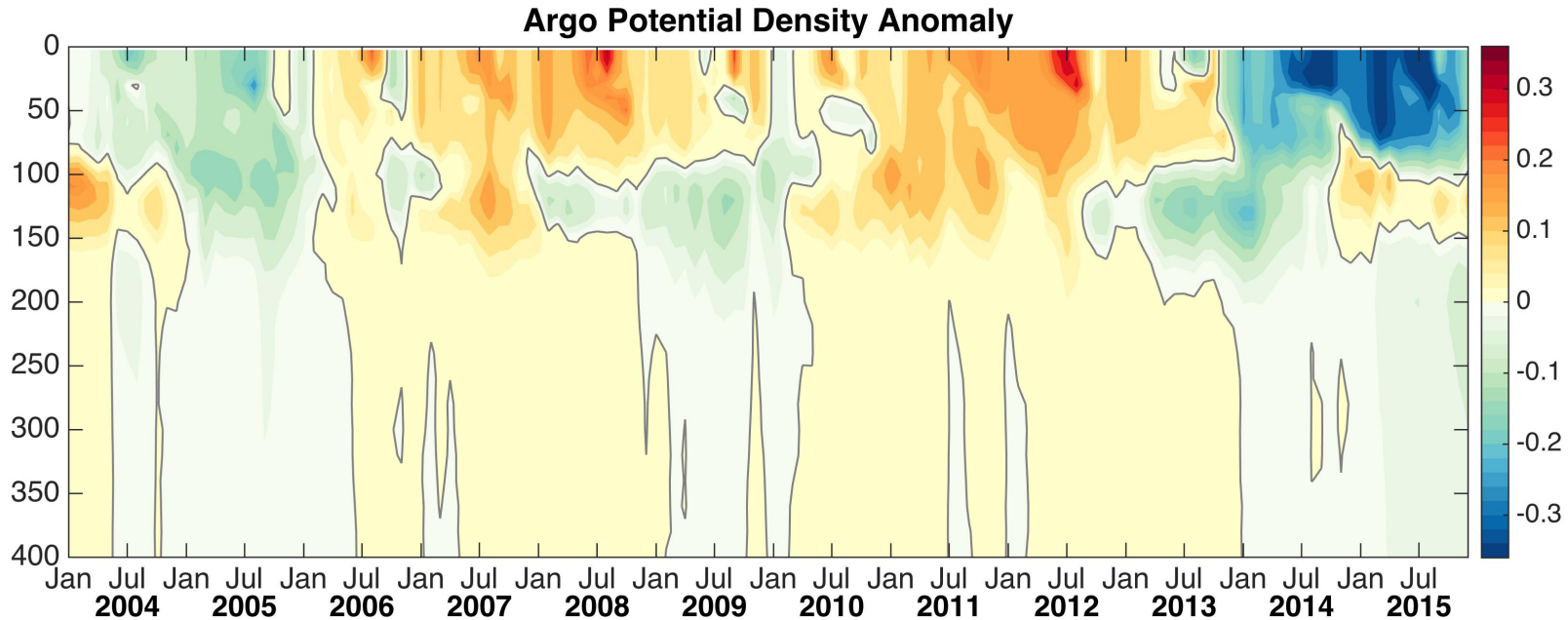


Dec



Time-Depth Averages for 45-55 N, 145-135 W



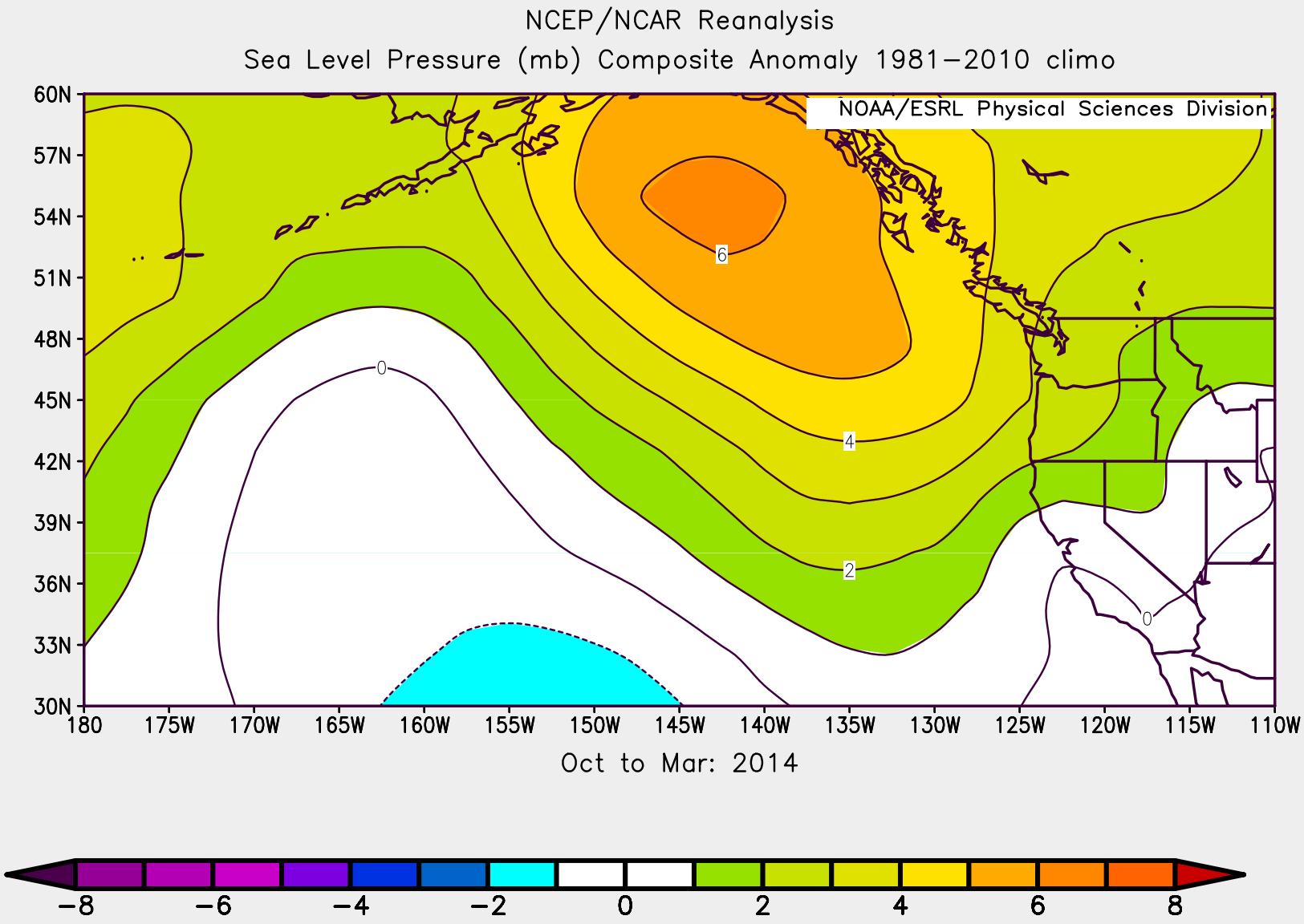


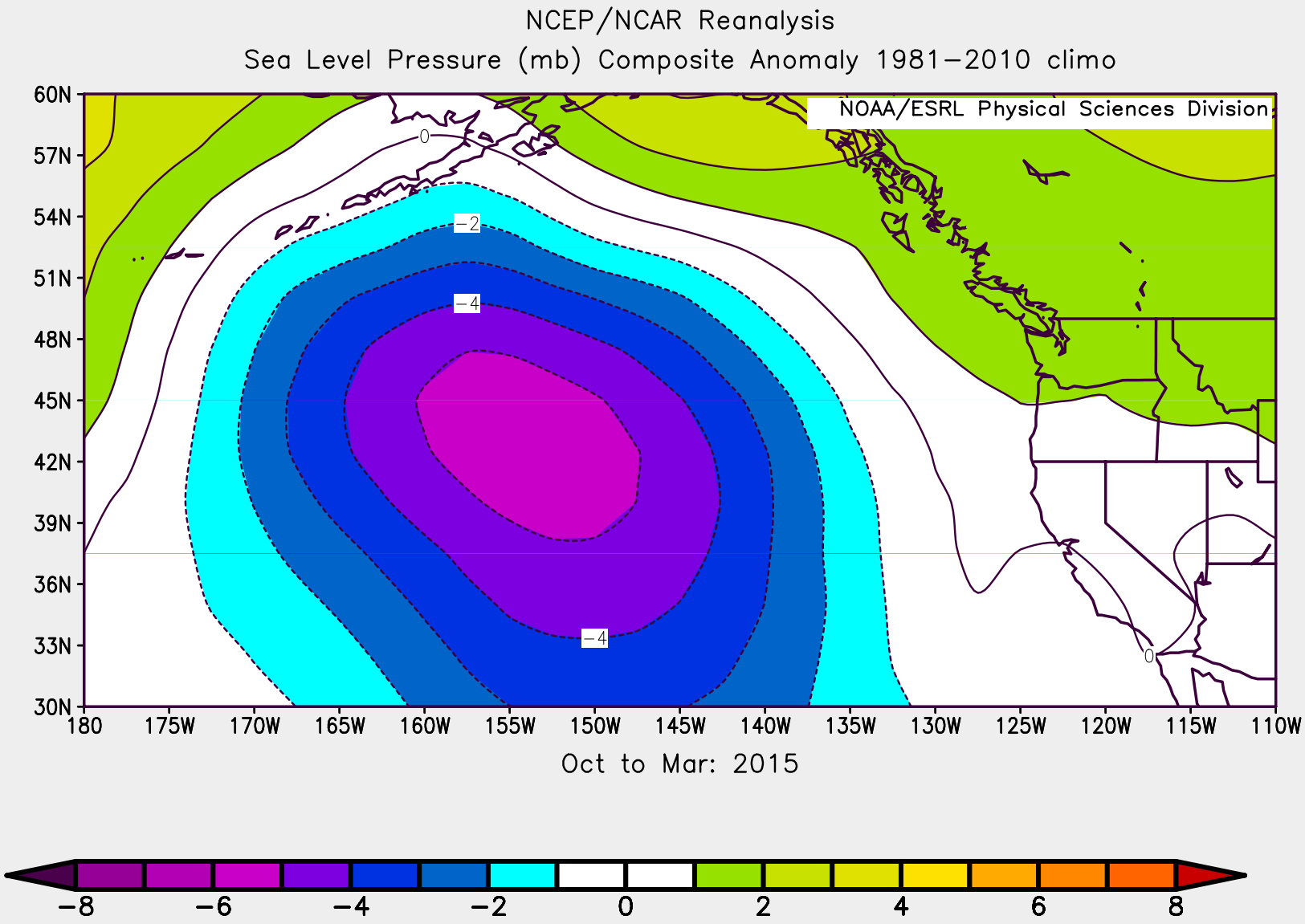
Issues of Interest

- How well do we understand the source(s) of climate variability for the winters of 2013-14, 2014-15, 2015-16? How about the summers?

- How well do we understand the impacts of upper-ocean temperature anomalies, once formed, on atmospheric properties downstream over the Pacific NW?

- Are SST anomalies predictable on seasonal time scales?


NCEP/NCAR Reanalysis
Sea Level Pressure (mb) Composite Anomaly 1981–2010 climo
NOAA/ESRL Physical Sciences Division
60N
57N
54N
51N
48N
45N
42N
39N
36N
33N
30N
180
175W
170W
165W
160W
155W
150W
145W
140W
135W
130W
125W
120W
115W
110W
6
4
2
0
0
Oct to Mar: 2014
−8
−6
−4
−2
0
2
4
6
8


NCEP/NCAR Reanalysis
Sea Level Pressure (mb) Composite Anomaly 1981–2010 climo
NOAA/ESRL Physical Sciences Division
60N
57N
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51N
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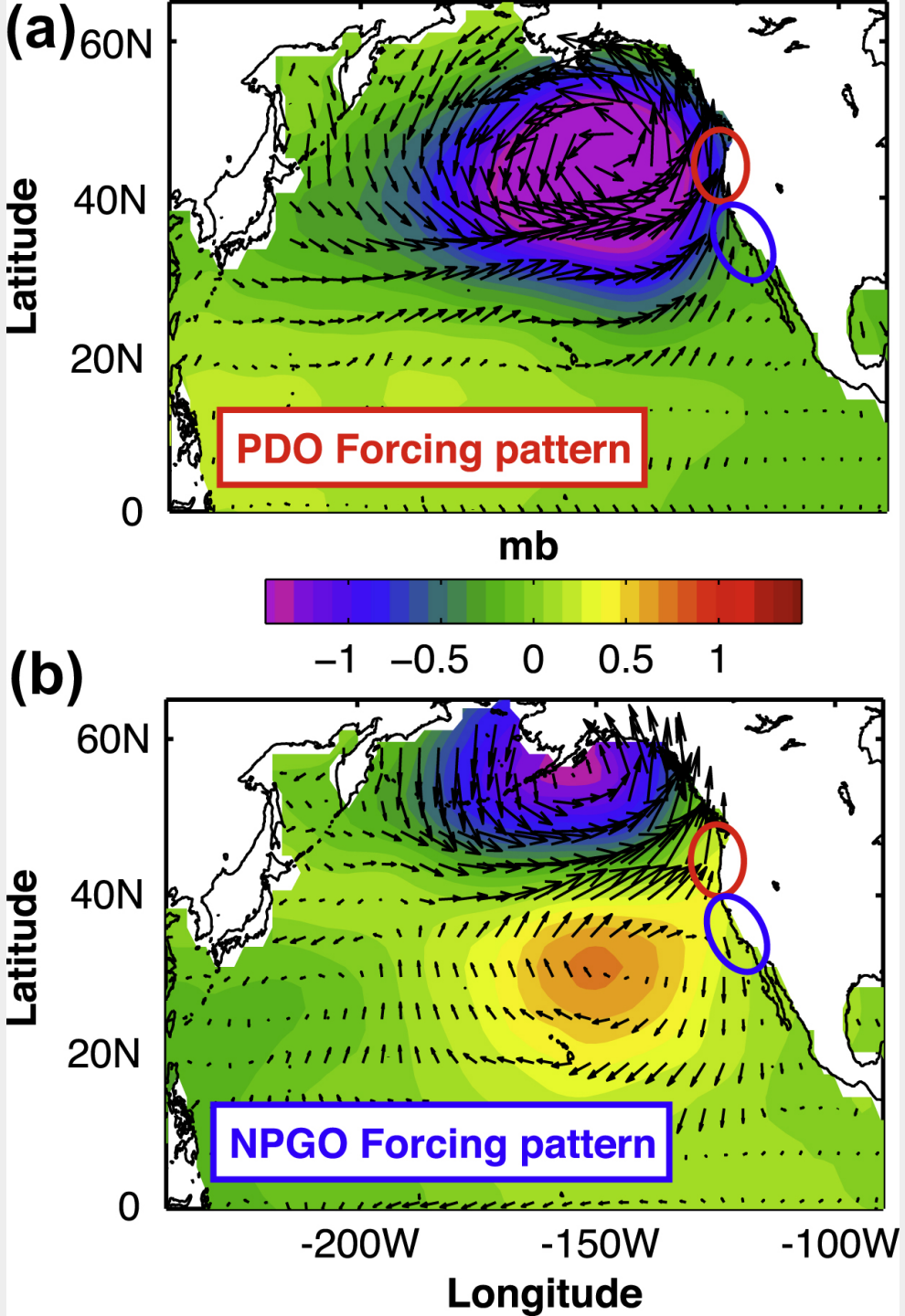
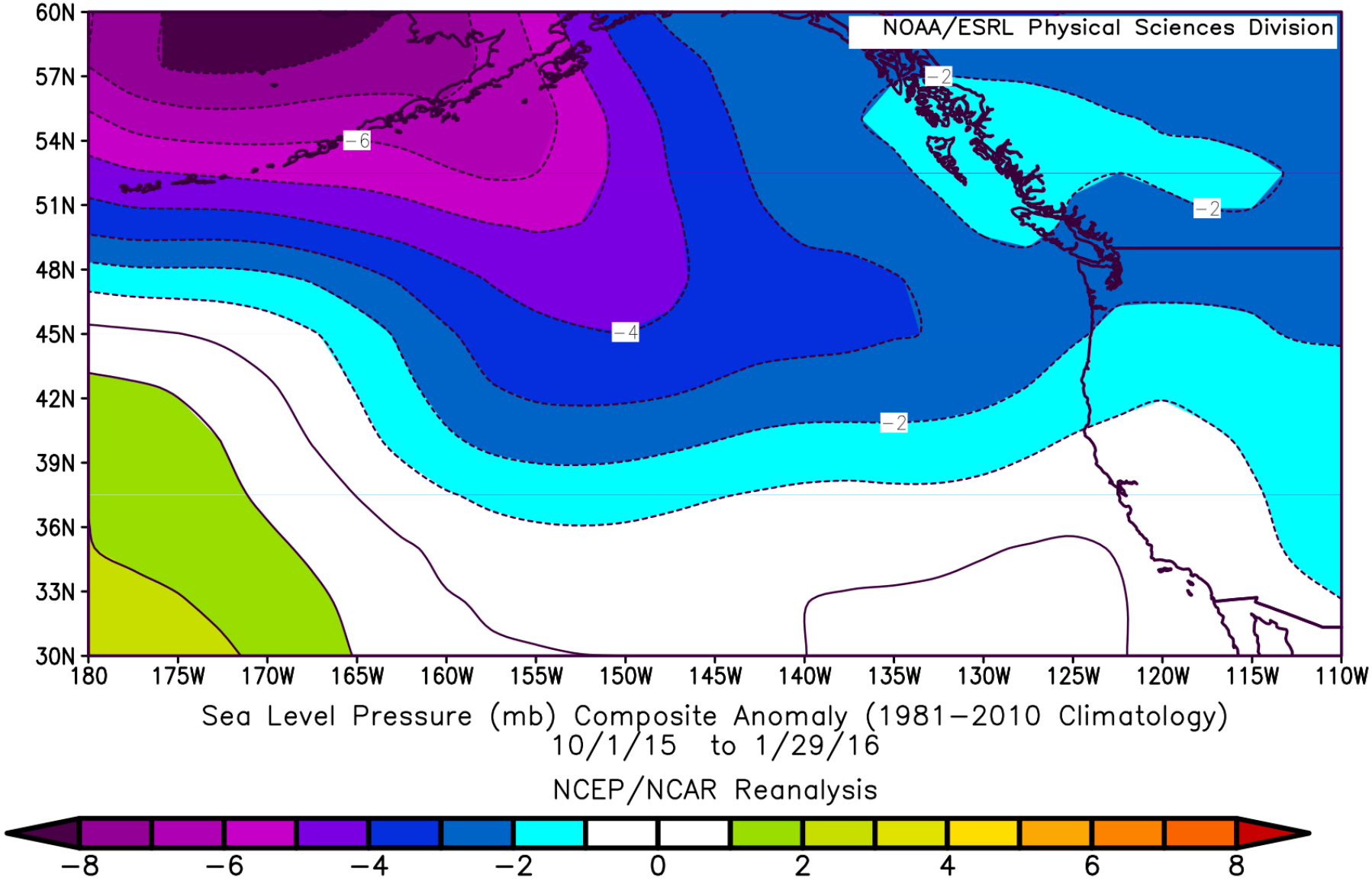
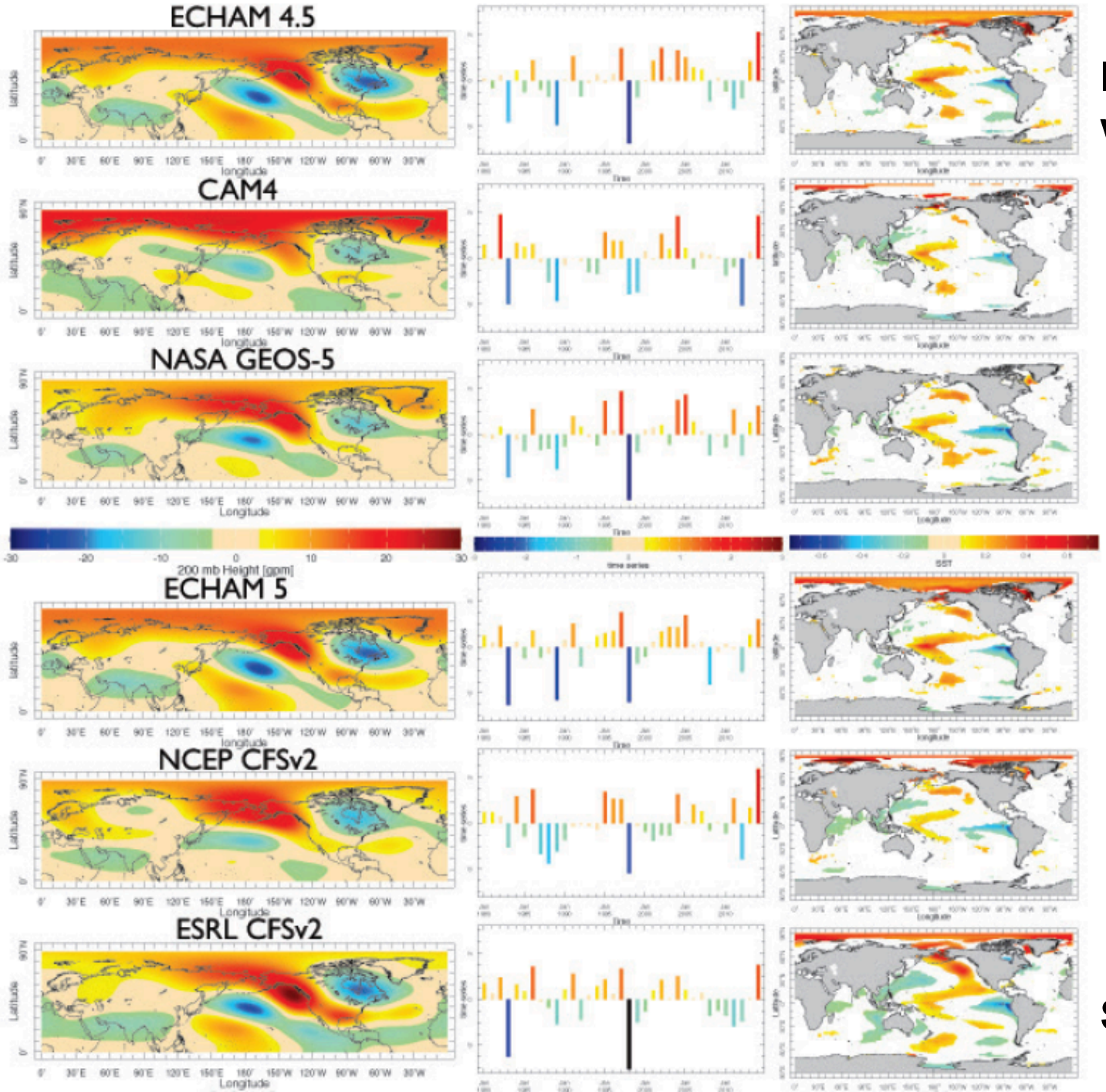
42N
39N
36N
33N
30N
180
175W
170W
165W
160W
155W
150W
145W
140W
135W
130W
125W
120W
115W
110W
0
−2
−4
−4
0
Oct to Mar: 2015
−8
−6
−4
−2
0
2
4
6
8

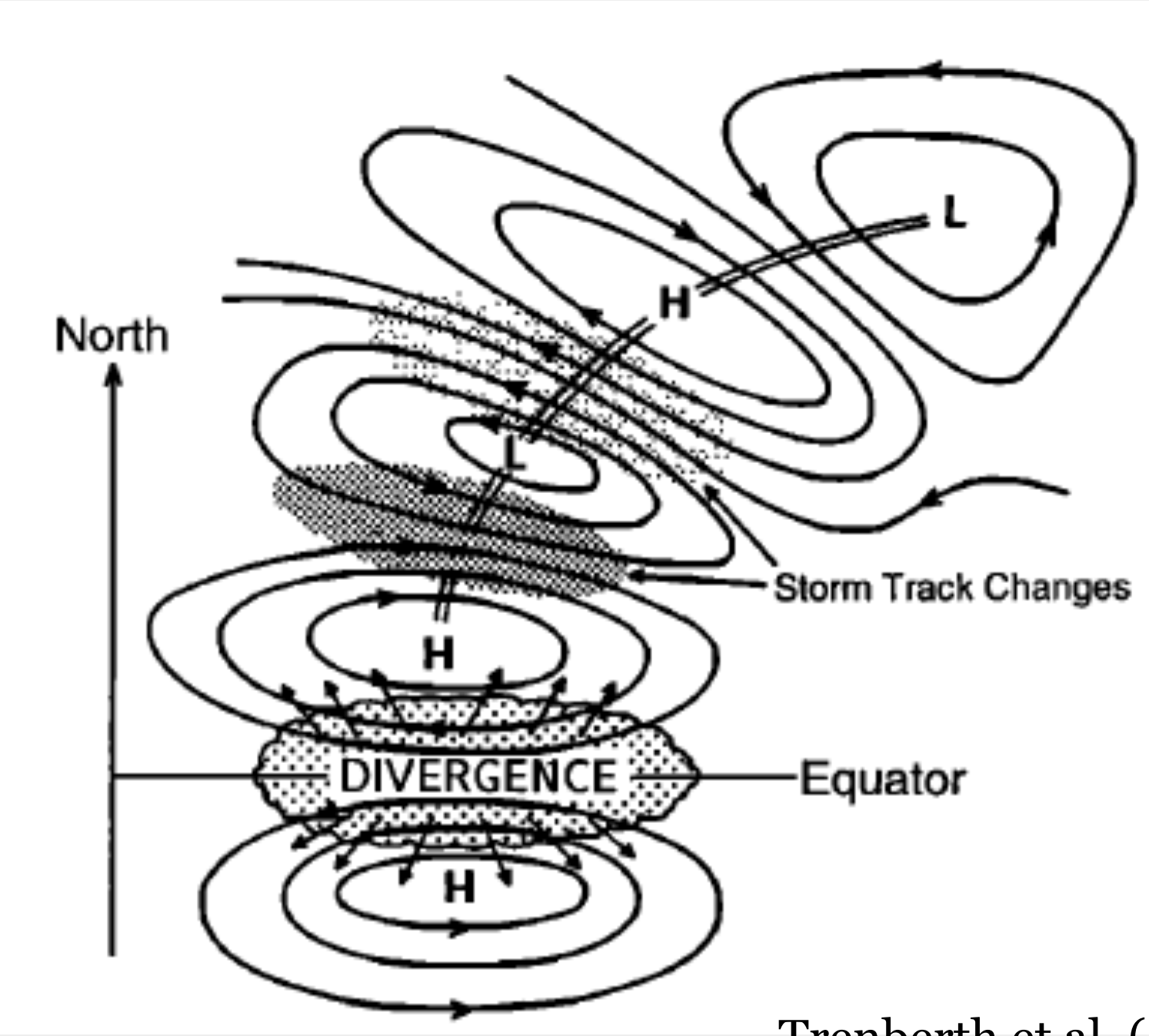

(a)
60N
40N
20N
0
Latitude
PDO Forcing pattern
mb
−1
−0.5
0
0.5
1
(b)
60N
40N
20N
0
Latitude
NPGO Forcing pattern
-200W
-150W
-100W
Longitude


NOAA/ESRL Physical Sciences Division
60N
57N
54N
51N
48N
45N
42N
39N
36N
33N
30N
180
175W
170W
165W
160W
155W
150W
145W
140W
135W
130W
125W
120W
115W
110W
−6
−4
−2
−2
−2
Sea Level Pressure (mb) Composite Anomaly (1981−2010 Climatology)
10/1/15 to 1/29/16
NCEP/NCAR Reanalysis
−8
−6
−4
−2
0
2
4
6
8

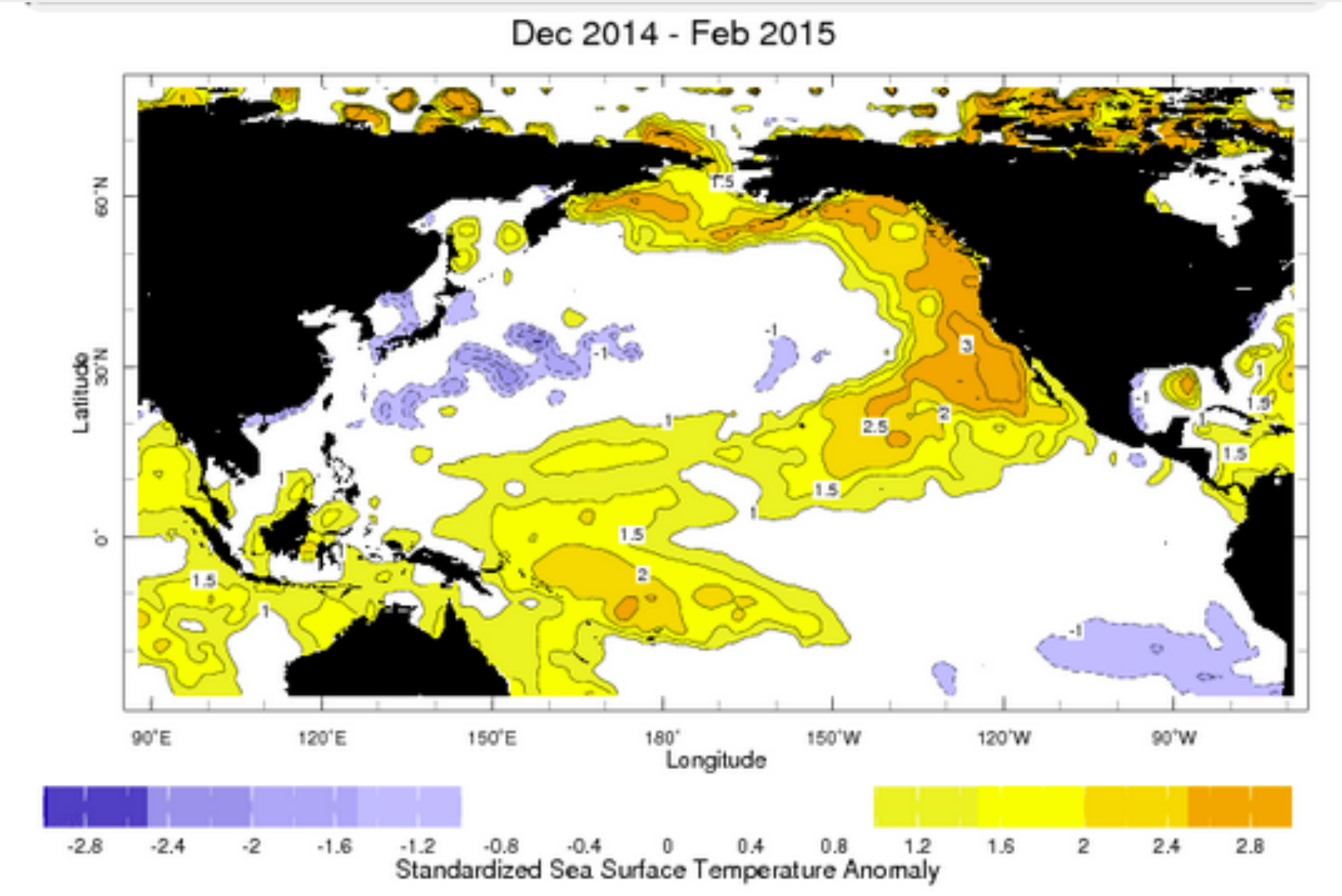


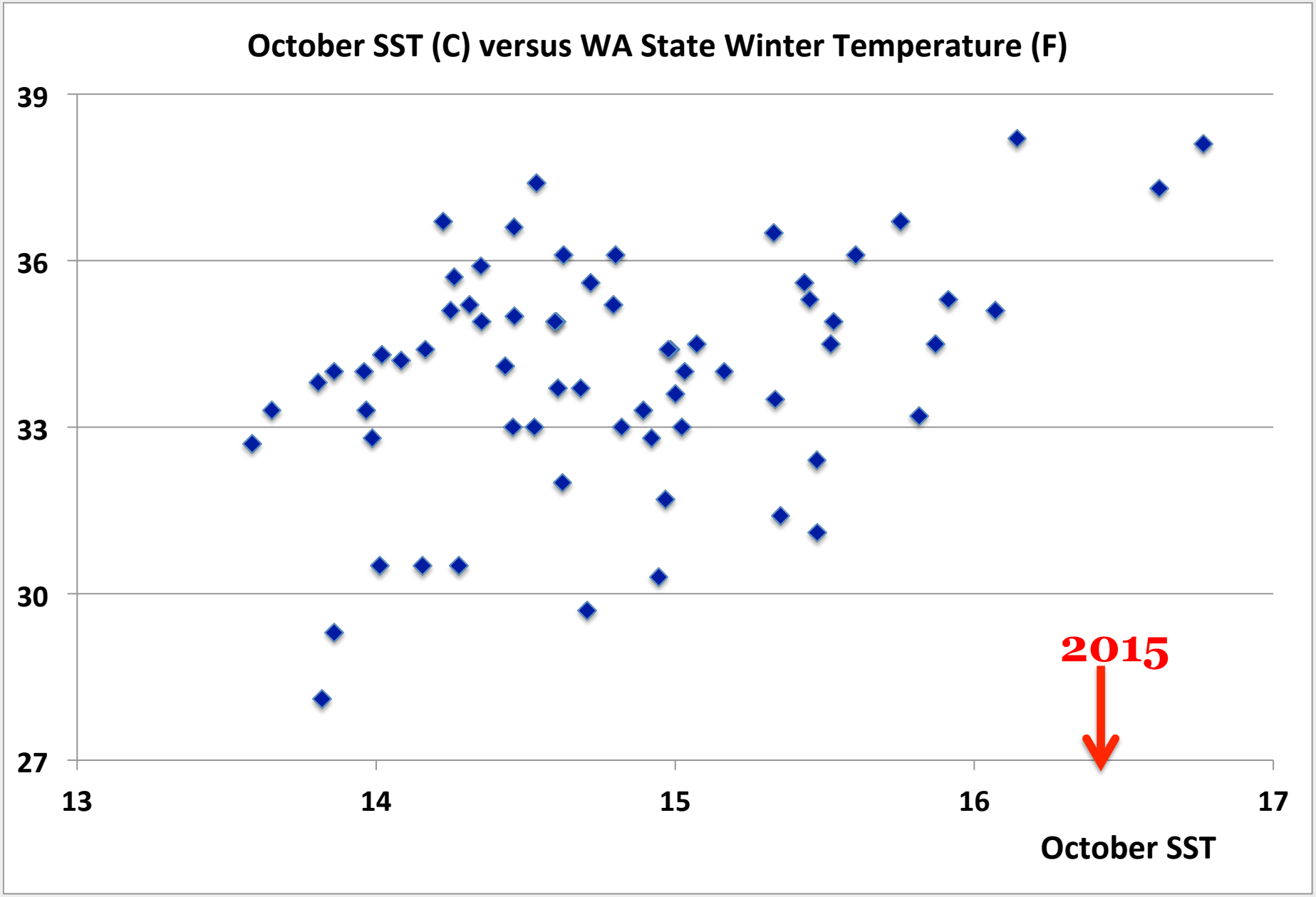
Model Anomalies w/ EOF3 SST

Seager et al. 2015



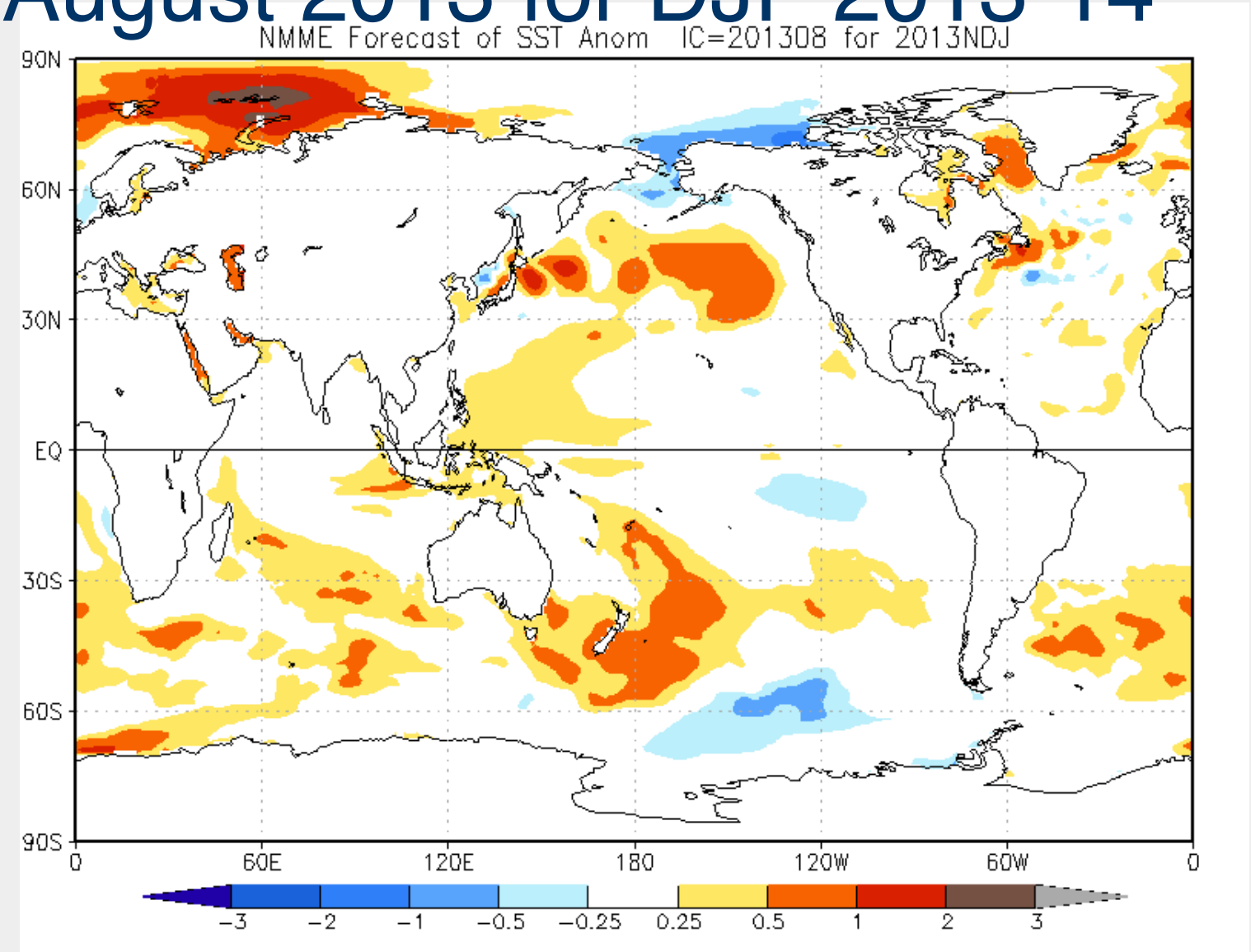
Trenberth et al. (1998)


Dec 2014 - Feb 2015
60°N
30°N
0°
Latitude
90°E
120°E
150°E
180°
150°W
120°W
90°W
Longitude
-2.8
-2.4
-2
-1.6
-1.2
-0.8
-0.4
0
0.4
0.8
1.2
1.6
2
2.4
2.8
Standardized Sea Surface Temperature Anomaly

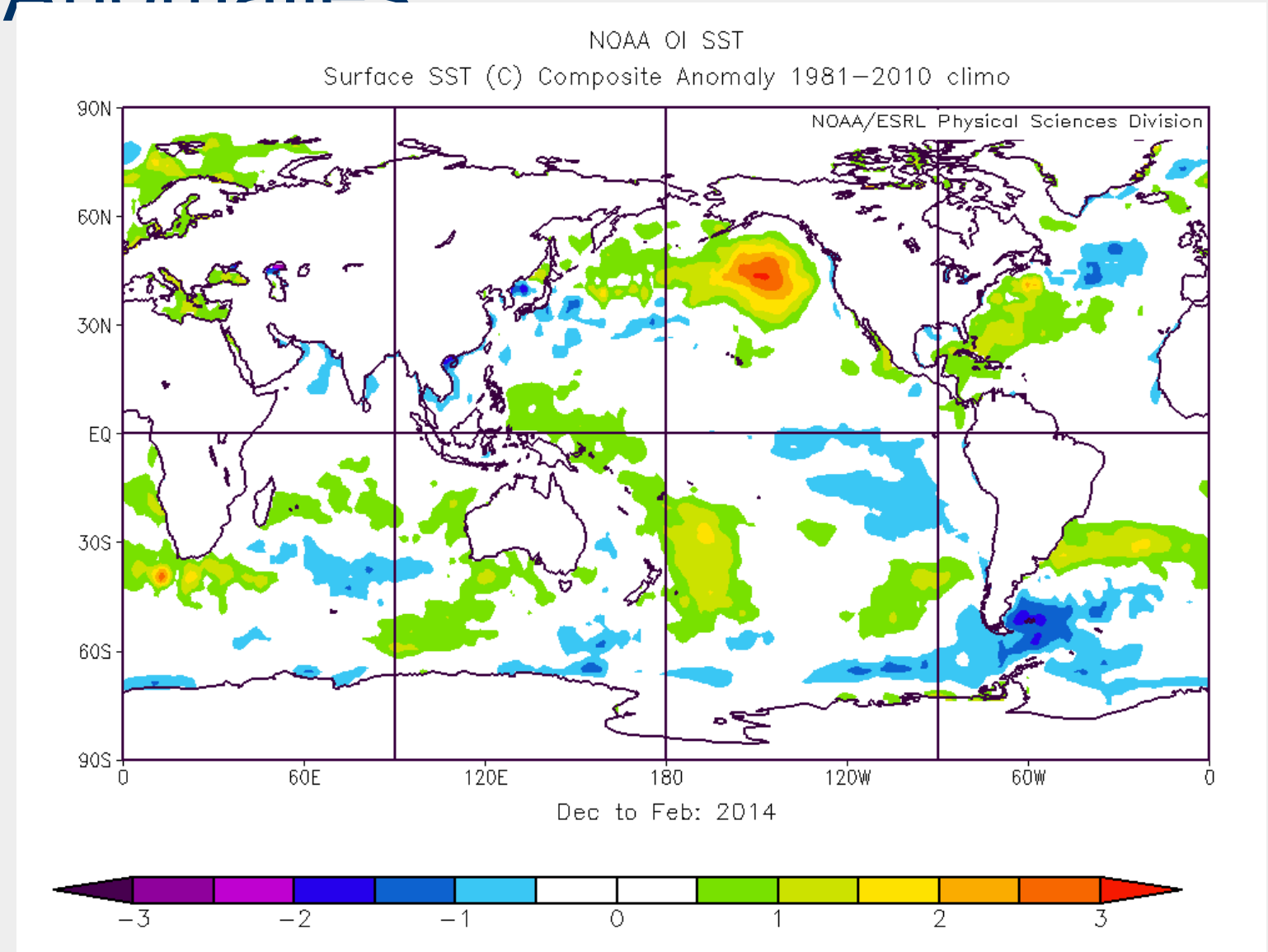

October SST (C) versus WA State Winter Temperature (F)
39
36
33
30
27
13
14
15
16
17
October SST
2015

Could the Blob have been predicted?

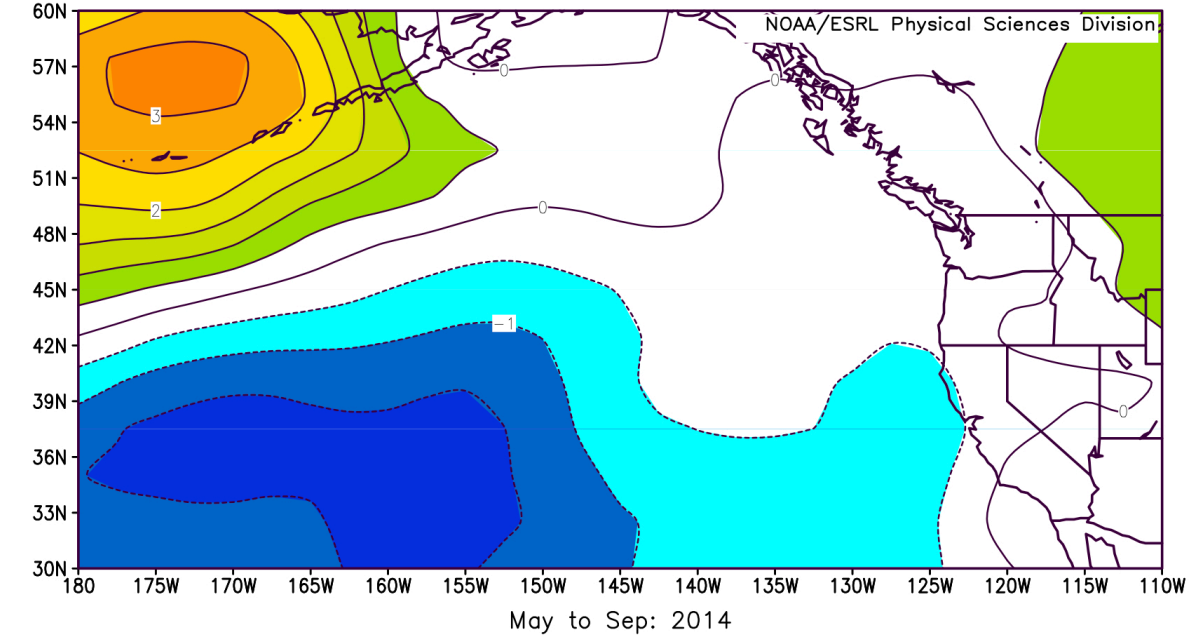
NMME SST Anomalies August 2013 for DJF 2013-14



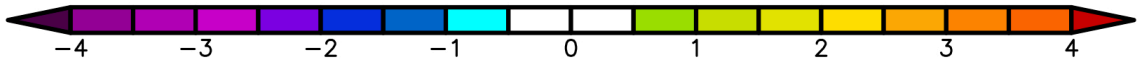
DJF 2013-14 observed SST Anomalies



SLP Anomalies

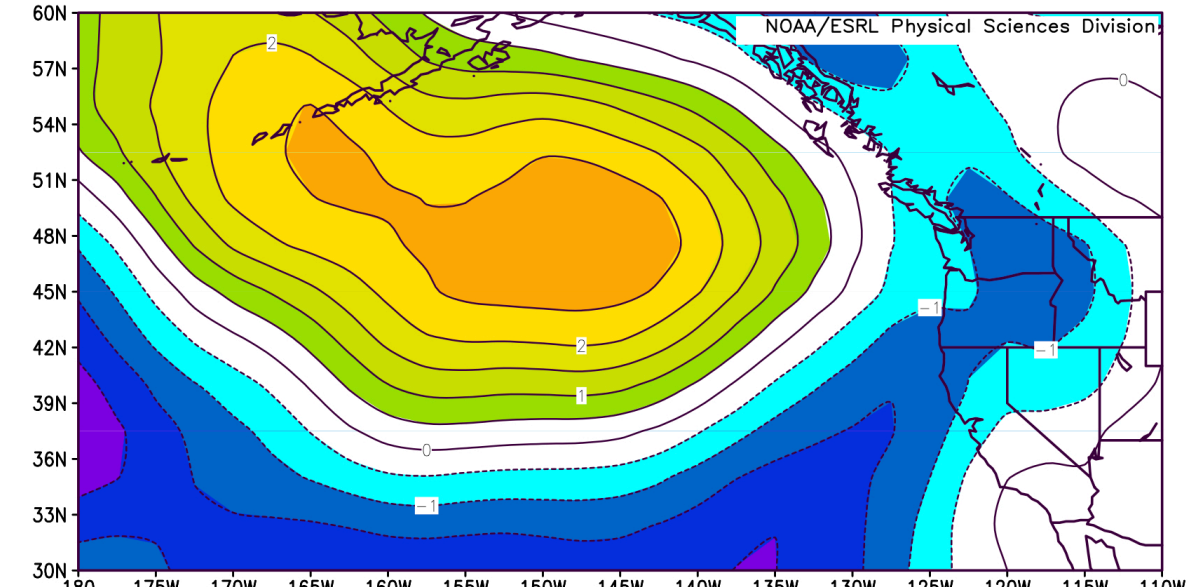


May-Sep 2014

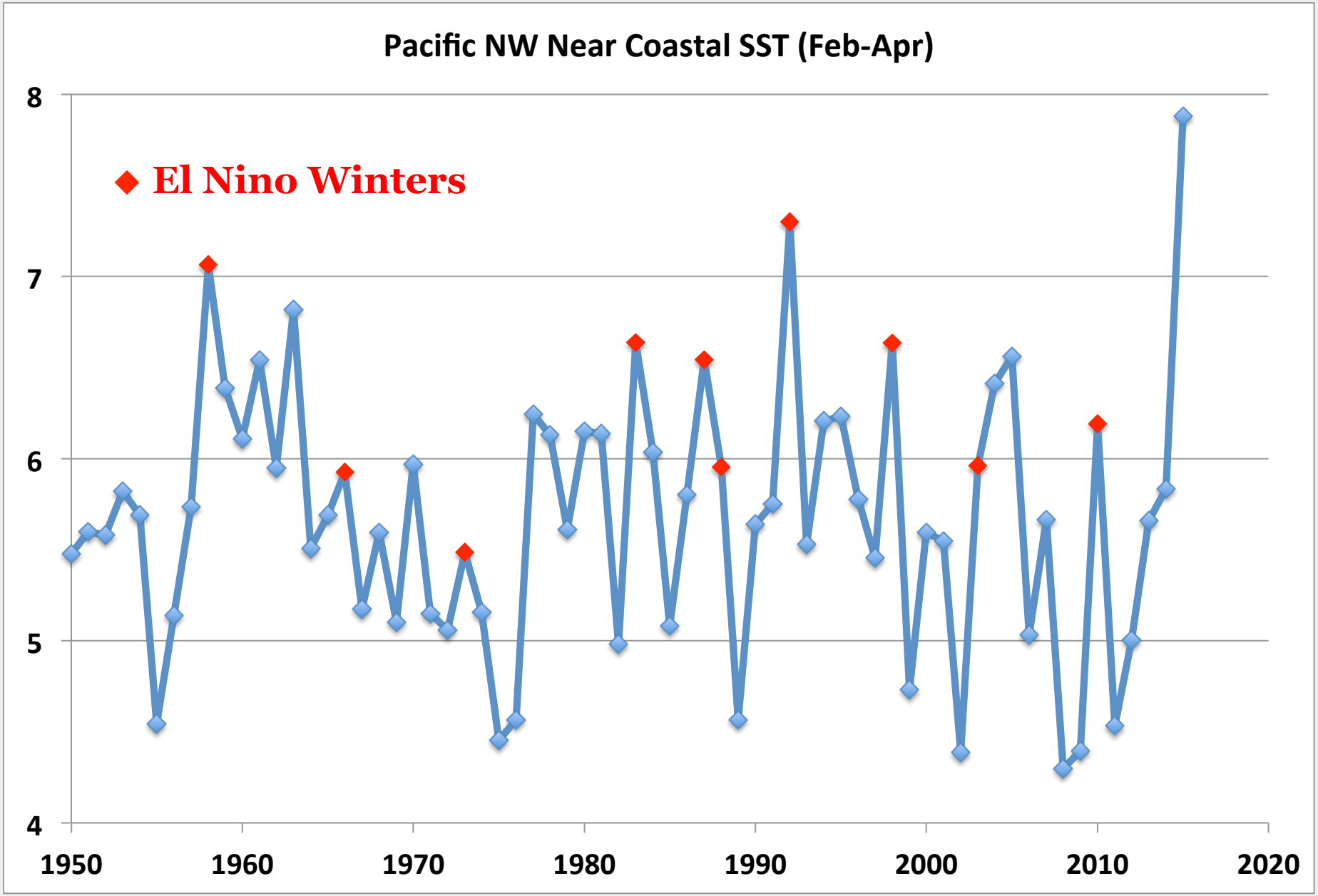


NCEP/NCAR Reanalysis

Sea Level Pressure (mb) Composite Anomaly 1981−2010 climo



May-Sep 2015


Pacific NW Near Coastal SST (Feb-Apr)
El Nino Winters
8
7
6
5
4
1950
1960
1970
1980
1990
2000
2010
2020

Final Remarks

- Recent warm event was of unprecedented amplitude for much of the NE Pacific

- Regional atmospheric forcing produced the upper ocean anomalies, with subsequent effects on low-level atmospheric temperature and humidity downstream

- To the extent that the state of the NE Pacific relates to air temperatures downstream over the Pacific NW, the ocean may provide *some* predictability with respect to the winter snowpack.