The North Pacific Atmosphere-Ocean System in Recent Years
According to the Media
The Recent NE Pacific Marine Heat Wave from a Climate Perspective

El Nino, La Nina and the PDO
The 2014-16 Event (aka the Blob)
Climate Change Context
Predictability of the NE Pacific
El Niño – Southern Oscillation (ENSO)
Pressure Pattern in Upper Atmosphere with SST Anomalies in Tropical Pacific

Trenberth et al. (1998)
Composite Sea Surface Temperature Anomalies

El Nino (last 3)

La Nina (last 3)
SST Anomaly in Nino 3.4 Region (5N-5S, 120-170W)

Year

Anomaly in Degrees C

National Centers for Environmental Information / NESDIS / NOAA
Pacific Decadal Oscillation (PDO)

warm phase

cool phase

PDO index values: January 1900 - January 2017
What the hell is going on?!
- Toby Garfield  SWFSC
Early 2016 SLP (contours) and SST (color fill) Anomalies
Is there precedent for the recent warmth in the NEP?

SST Anomalies (Jun-Sep)
2014-16 SST Anomaly

Jacox et al. (2018)
Modeled Changes in the Frequency Distribution of Mean Annual Thermal Anomalies

Projected Upper Ocean Temperatures along Washington Coast
(RCP 8.5 Scenario)

Mean August Temperature (°C)

- CanESM2
- GFDL_ESM2G
- HadGEM2CC
- MIROC-ESM (RCP 8.5 Scenario)
Could the Blob have been predicted?
NMME SST Anomalies
August 2013 for DJF 2013-14
DJF 2013-14 observed SST Anomalies
Final Remarks

• A marine heat wave (MHW) of unprecedented intensity and duration occurred in the NE Pacific during 2014-16.

• It was especially severe because of the baseline warming that has occurred; comparable events are apt to become increasingly frequent in future decades.

• There appears to be some predictability in the NE Pacific on time horizons of 6-12 months.
Back-Up Slides
Meridional Wind Stress + GOA SST (6-month lead) + EqSOI

SST Anomaly (°C)

-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5


r = 0.88
Observed 200 hPa Z, SST & Precipitation Anomalies

Seager et al. (2015)