

ECOSYSTEM STATUS REPORT

Climate and Oceanography Update

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NPFMC Groundfish and Crab Plan Teams
September 16, 2019



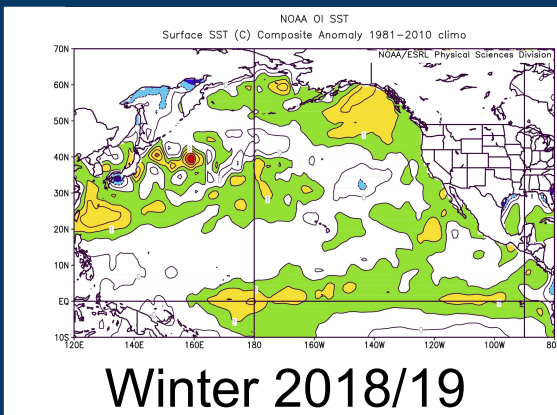
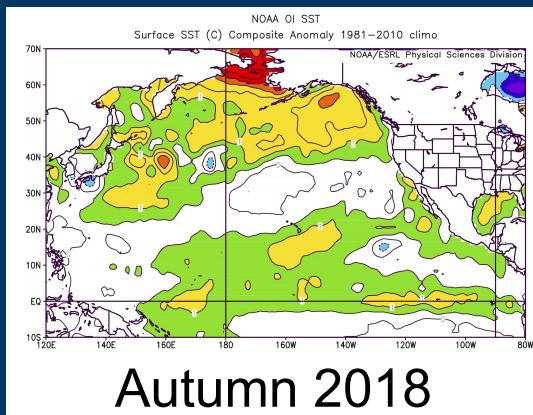


- 🌊 2019 climate and oceanography
- 🌊 2020 sea surface temperature forecasts

Sea Surface Temperature Anomalies

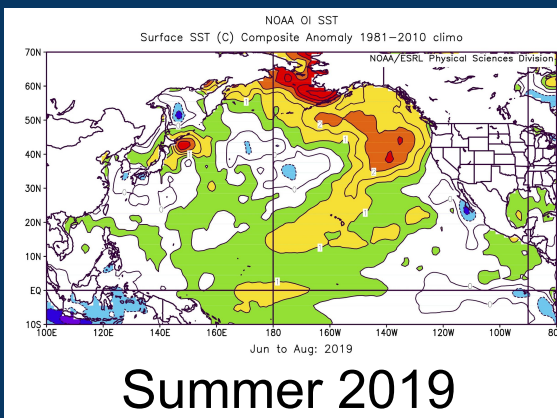
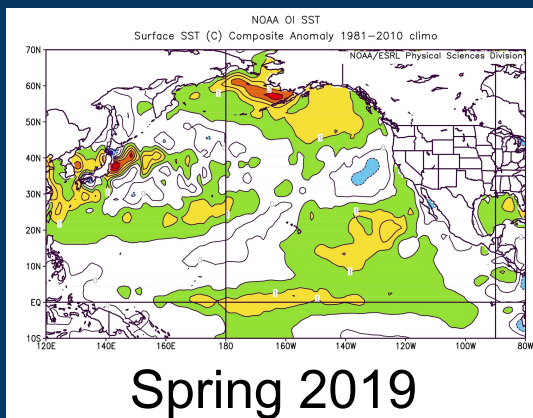
Bond

Warmth in
north
delayed
freezing



Modulation of
temps, weak
El Niño

Warm in EBS



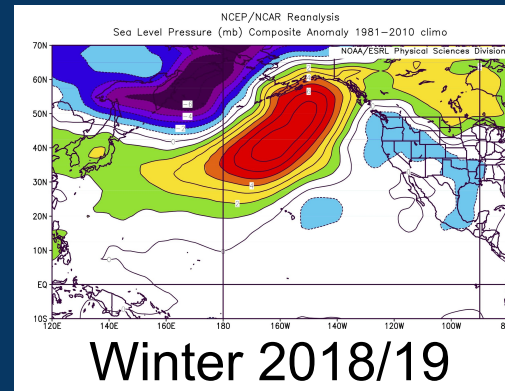
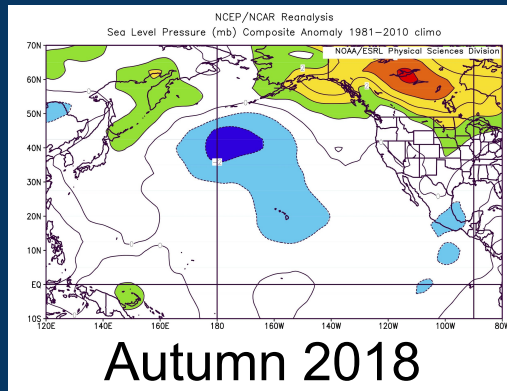
Increase in
warming in
EBS/GOA
and PNW.
Beginning
positive PDO
pattern



Sea Level Pressure Anomalies

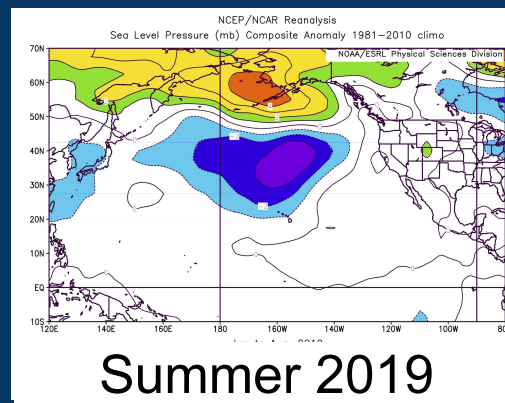
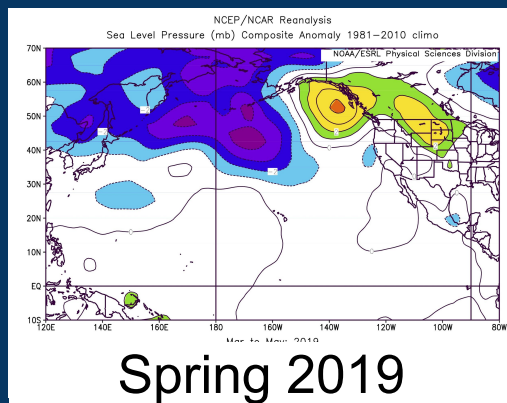
Bond

Suppressed storminess in GOA, related to development of warm SSTs

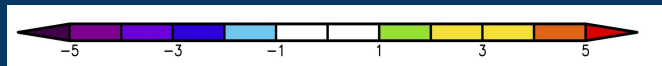


Highly unusual pattern with El Niño.
Strong S wind across Bering (2nd winter)

Promoted continuation of warm flow from S into EBS and WGOA

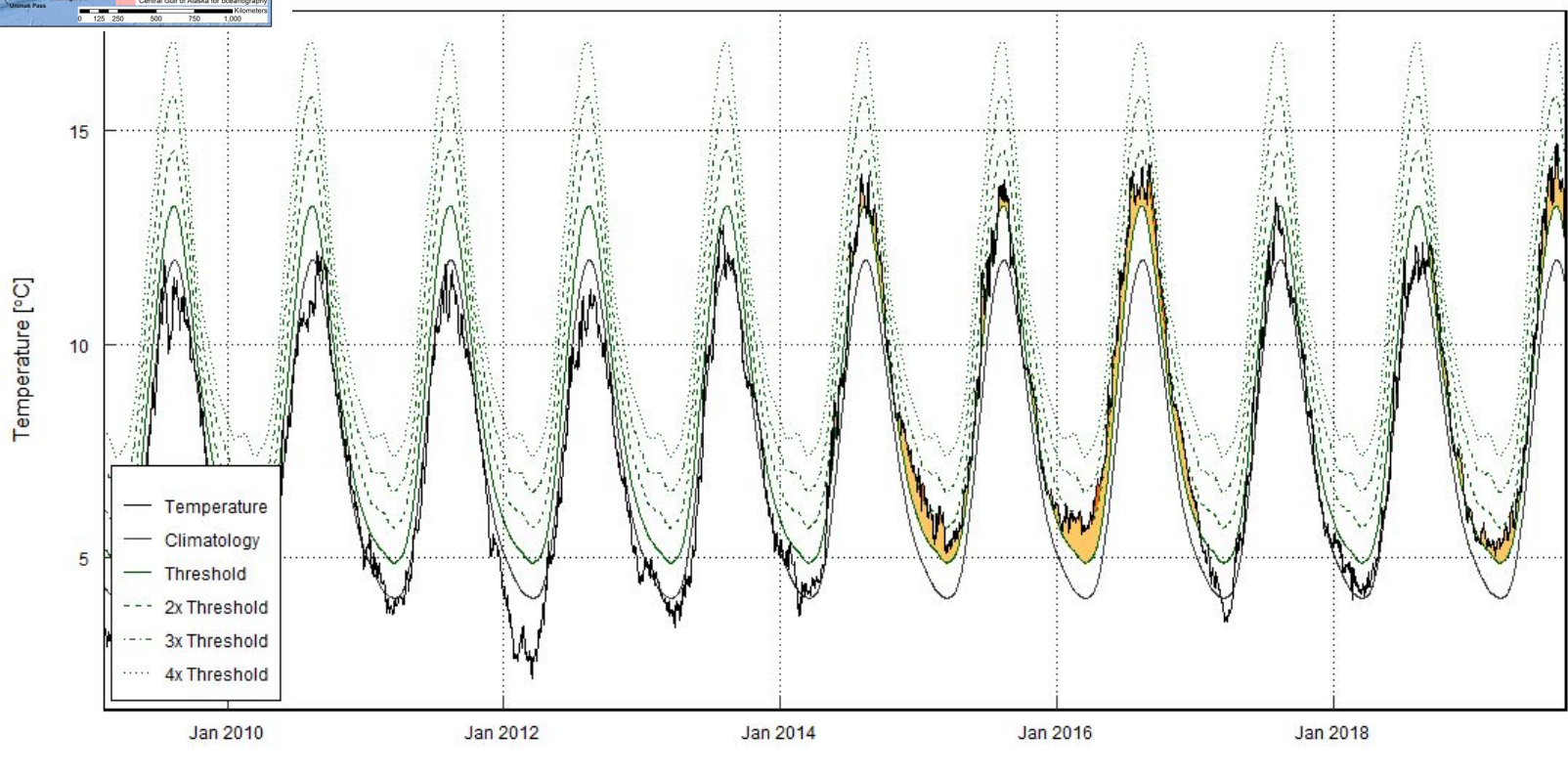
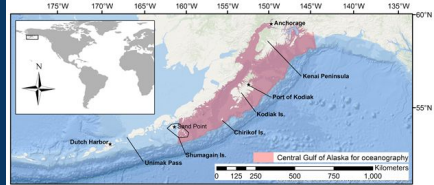


Suppressed storminess in BS/GOA, contributing to warmth



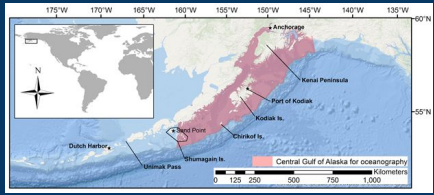
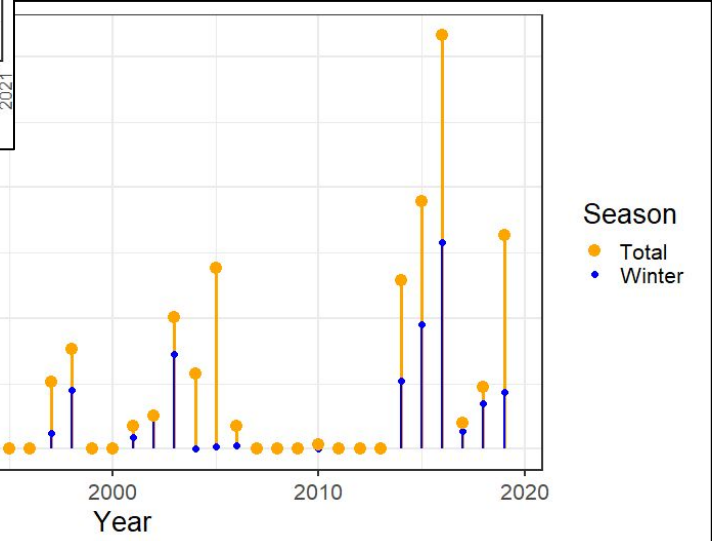
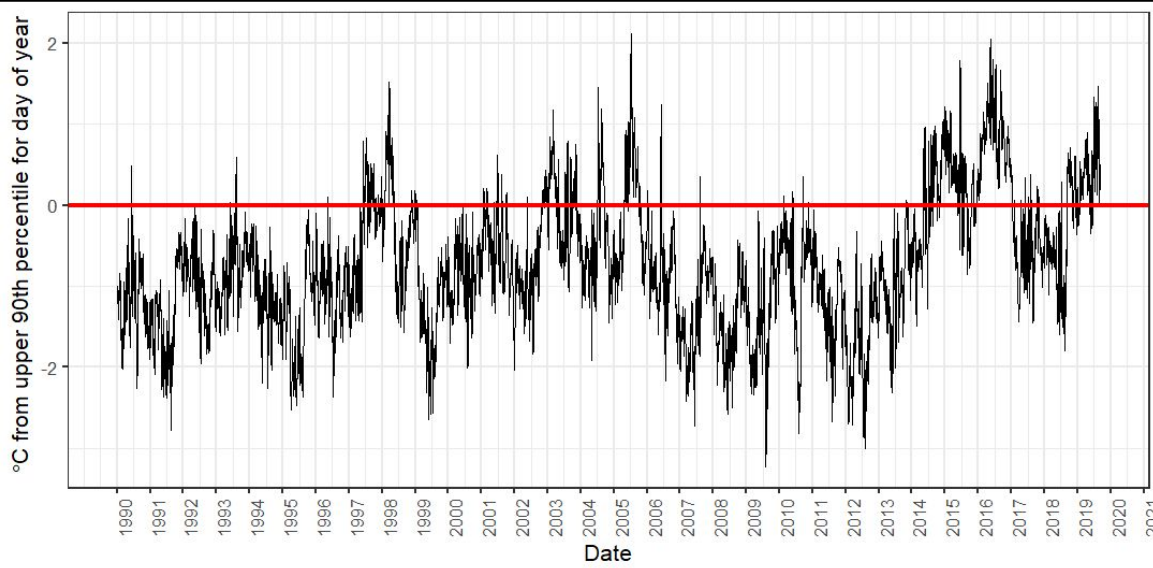
Western Gulf of Alaska heatwave

Barbeaux



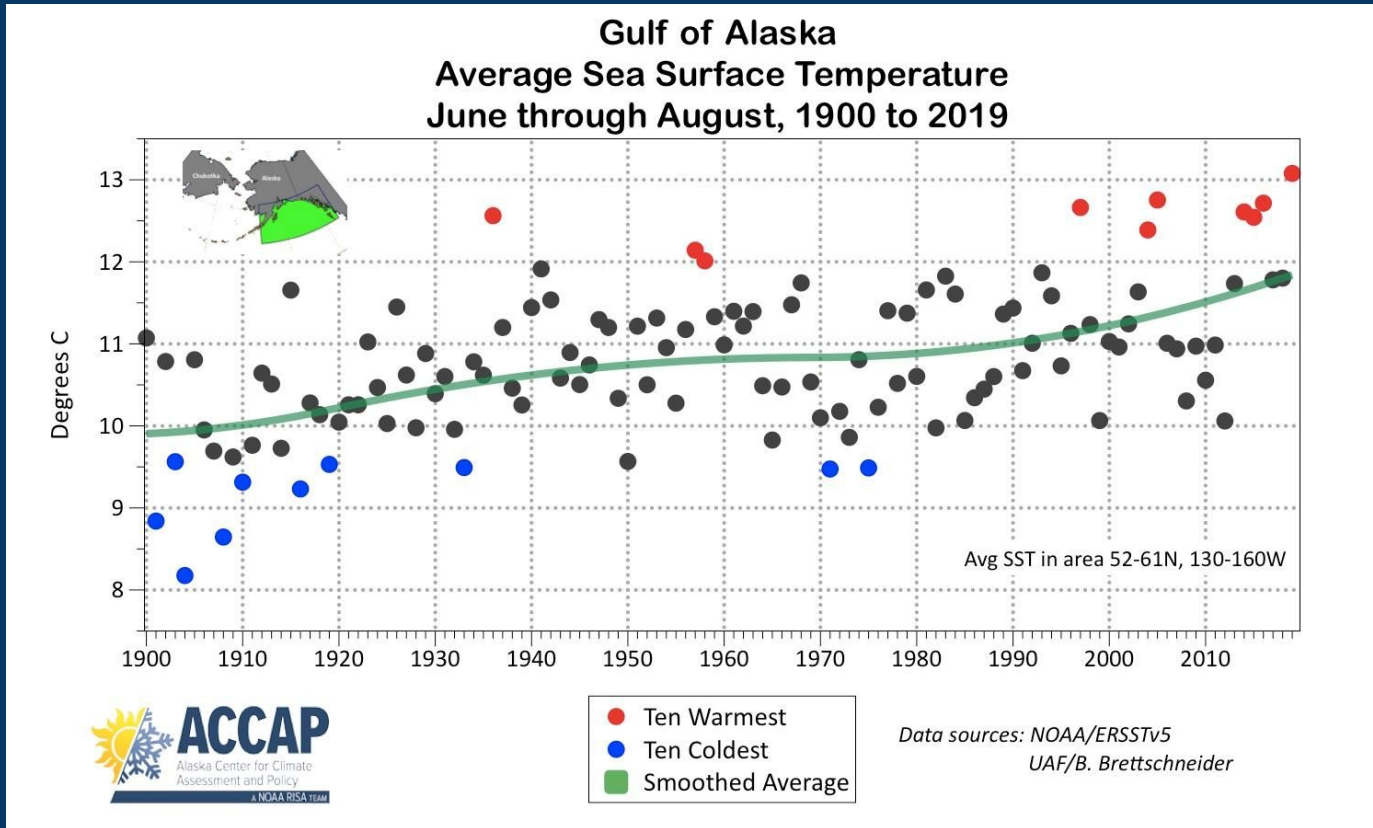
Western Gulf of Alaska heatwave

Barbeaux



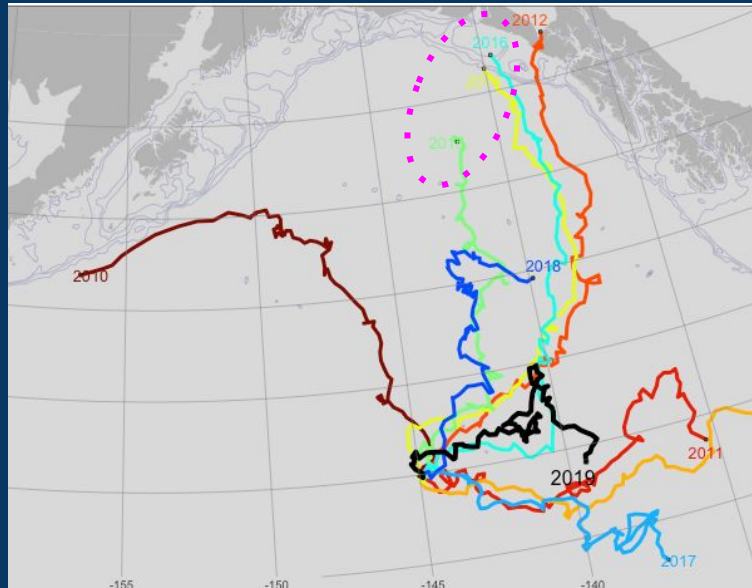
GOA Sea Surface Temperatures

Thoman



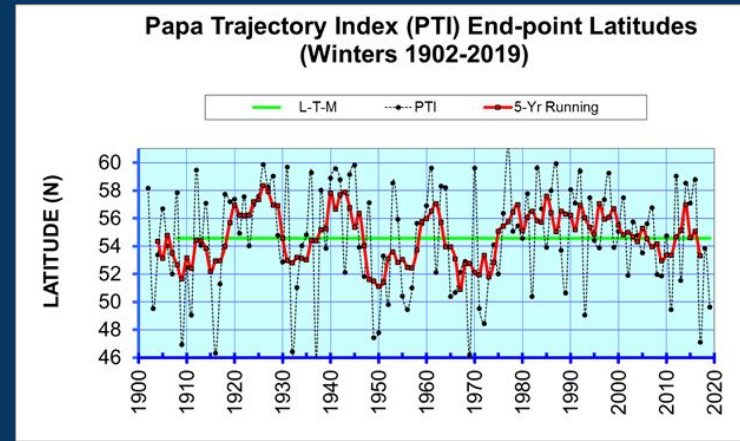
GOA Ocean Surface Currents – PAPA Trajectory Index

Stockhausen



- 2019 PTI reflects wind shift from westerly to southerly
- Since 2005, ~5 yr periodicity

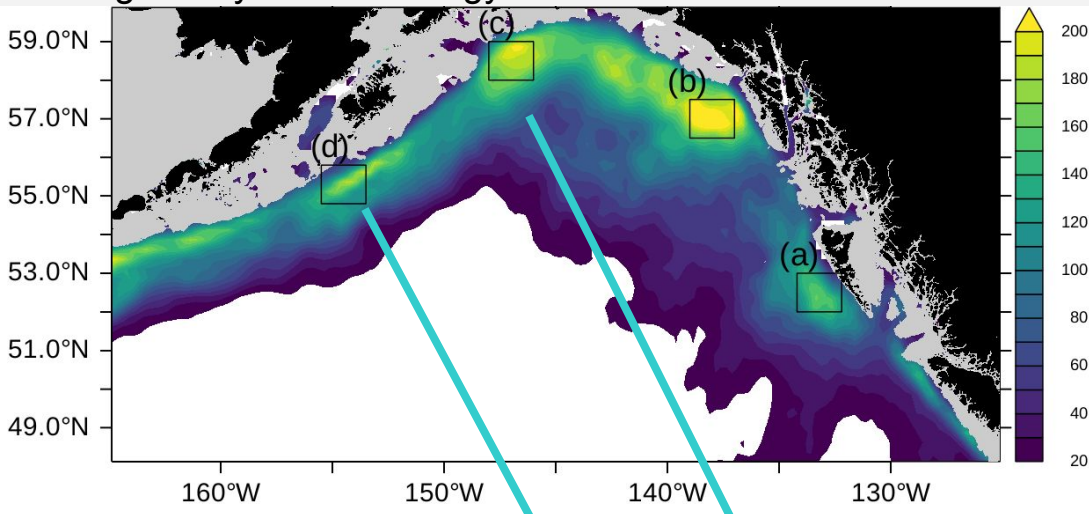
- Simulated surface drifter released from Ocean Station PAPA Dec 1 for 90 days
- 2014-2016 trajectories similar (S wind anomalies, heatwave years)
- Directionality reflects wind patterns



Eddies in the Gulf of Alaska

Ladd

Average Eddy Kinetic Energy Jan 1993 - Dec 2017



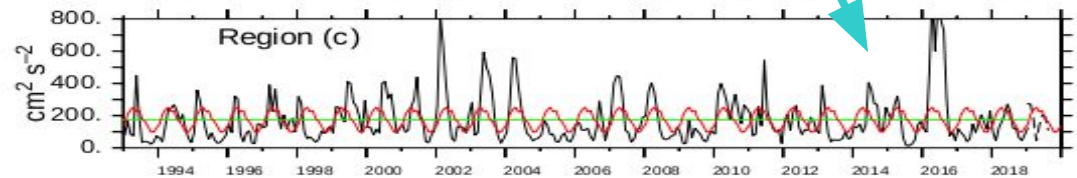
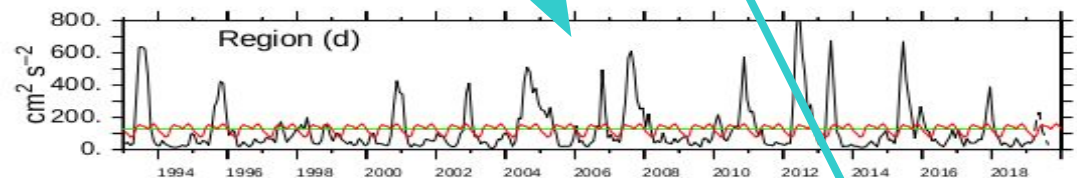
Seasonal cycles:

(c) High EKE in spring

(d) High EKE in fall

(c) Strong persistent eddy in 2016, currently average

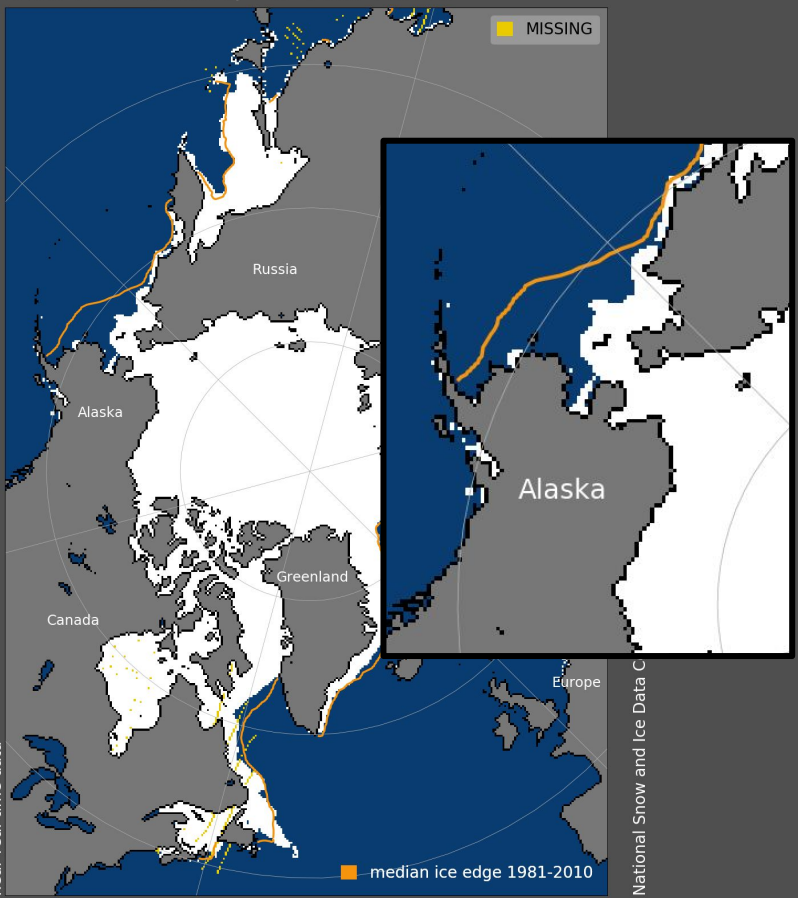
(d) Currently average



E GOA: influenced by winds
(climate and gap scale)

W GOA: influenced by
propagation and intrinsic
variability

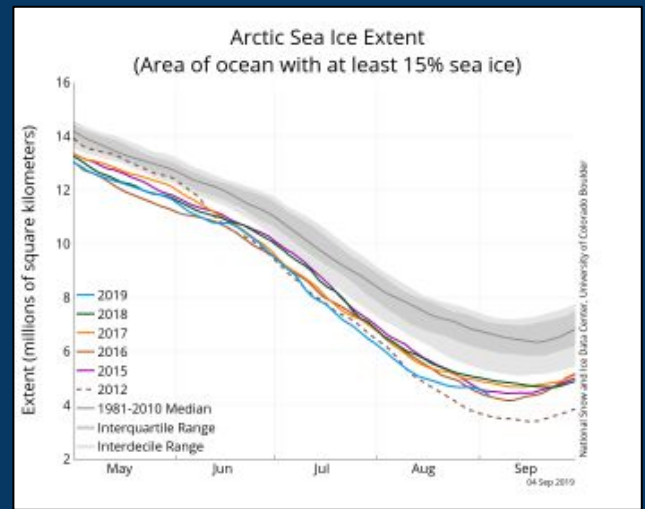
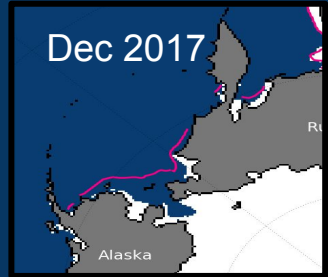
Maximum Sea ice extent, 13 Mar 2019



Arctic sea ice extent

National Snow and Ice Data Center

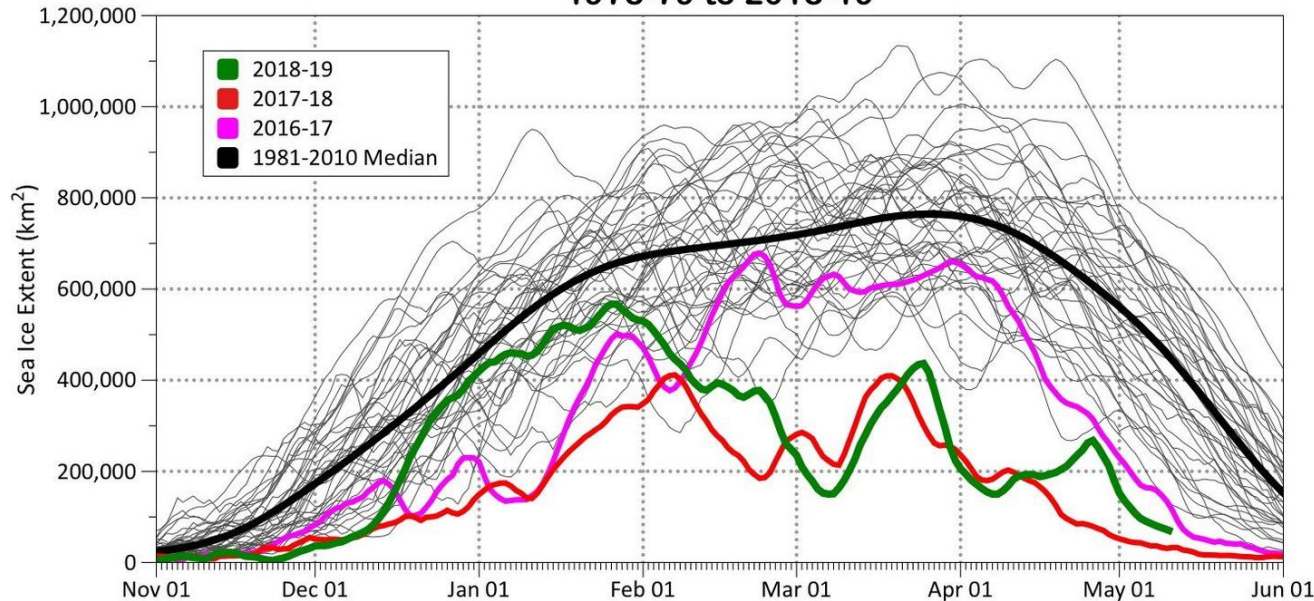
2019 on track with record low year (2012)



Bering Sea sea ice extent

Thoman, Bond

**Bering Sea Daily Ice Extent
1978-79 to 2018-19**

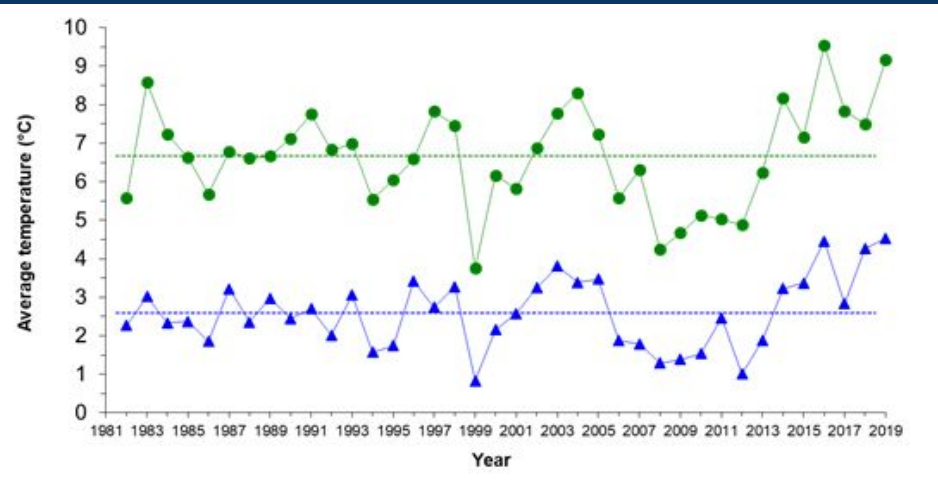
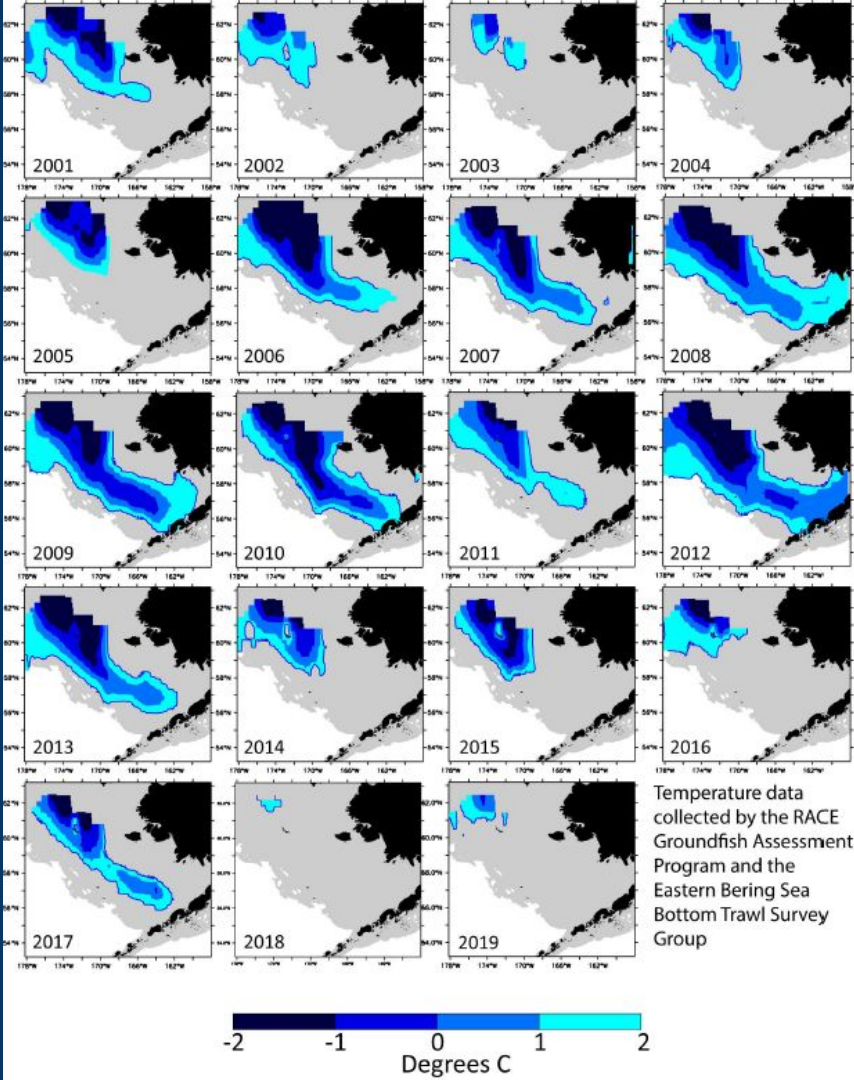


- Delayed freeze-up in Chukchi
- Late Dec cold, northerly winds increased ice
- Southerly winds in Feb during ice retreat, rather than typical advance

EBS cold pool and temperatures

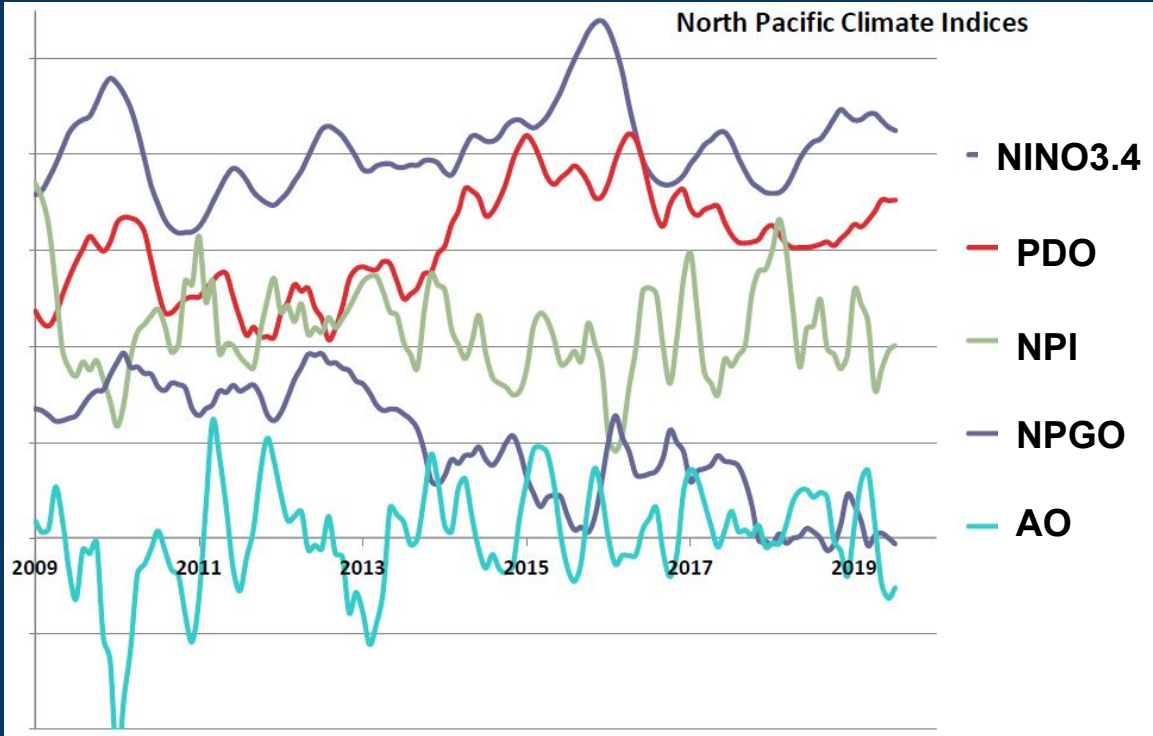
Overland, Ladd, Britt

- Second smallest cold pool in summer 2019
- Surface and bottom temps during the BT survey warm, similar to 2016



Climate Indices

Bond



NINO3.4 - Weak to moderate El Niño event

PDO transition to positive, but not necessarily start of extended period

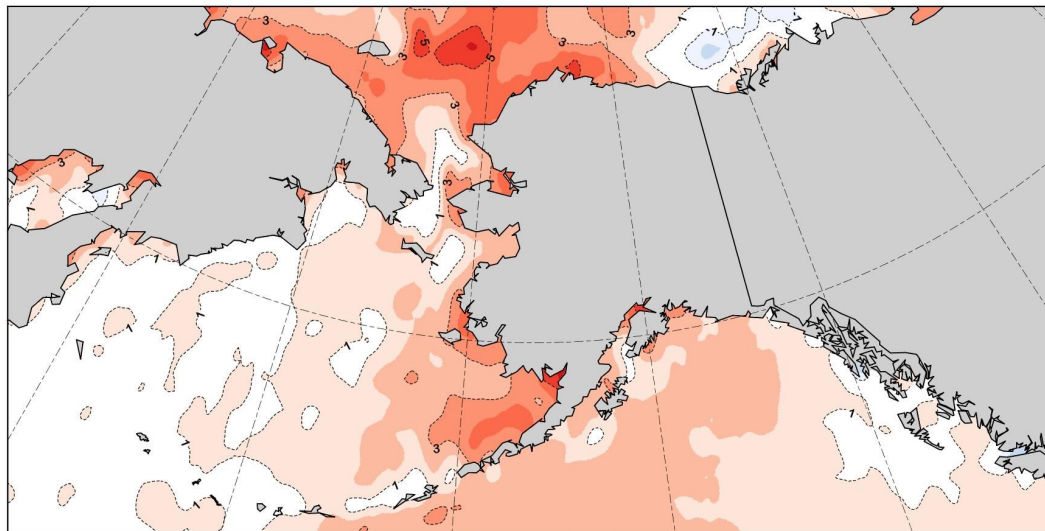
NPI reflects mostly high SLP in Aleutian Low area

NPGO implies weak west-wind drift in ENP and reduced flow into GOA

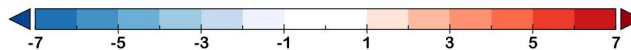
AO reflects high pressure in the Arctic

Sea Surface Temperature Departure from Normal

August 30-September 5, 2019



Graphic by @AlaskaWx



Degrees C

Rick Thoman

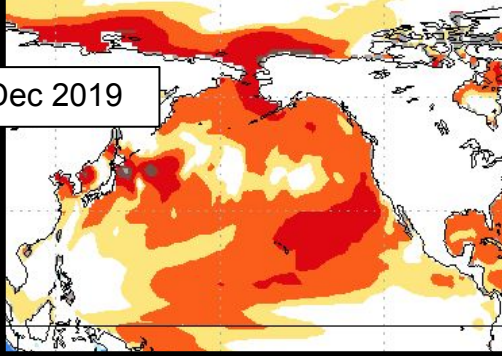
OISSTv2 courtesy of NOAA/PSD/ESRL

2020 Sea Surface Temperature Forecasts

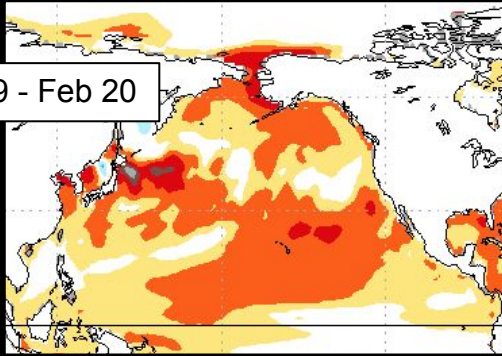
SST Projections from the National Multi-Model Ensemble

Bond

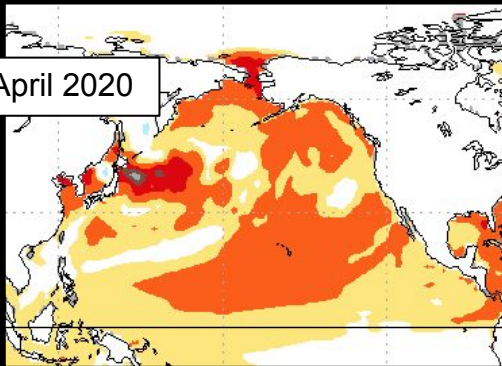
Oct - Dec 2019



Dec 19 - Feb 20



Feb - April 2020



- Previous projections were warm, but not warm enough
- Projected continuation of warmth but reduced magnitude
- Warmest north of Kuroshio Extension
- Neutral ENSO projected

