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# Identifying anomalous climate conditions in the Northeastern Pacific Ocean

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## PROBLEM

Since 2012 we are testing a new climate index (unpublished). By following the sequence of the SLP monthly difference between Anchorage and San Diego, we perceive that something abnormal was happening because the SLP provides dramatic responses in the area of the Northeast Pacific.

Pending newsletters NOAA on the ENSO (2012-2013), in **October 2012**, caught our attention anomalous POSITIVE SLP in Anchorage, AL, was +15,860.

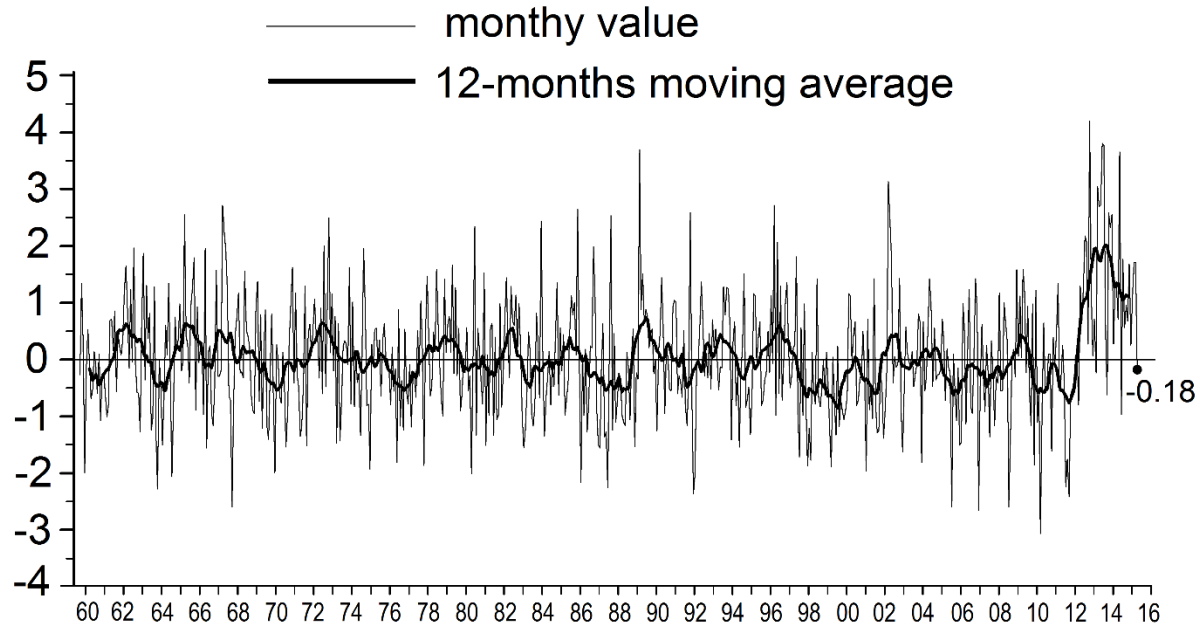
Then in **March** and **April 2013** were also POSITIVE awaiting SLP anomalies with +12.29 and +12.33 respectively.

SLP anomalies between San Diego and Anchorage remained abnormally positive. November 2014 and February 2015 were the highest positive anomalies in recent months in Anchorage, with +10.5 and +12.7 respectively.

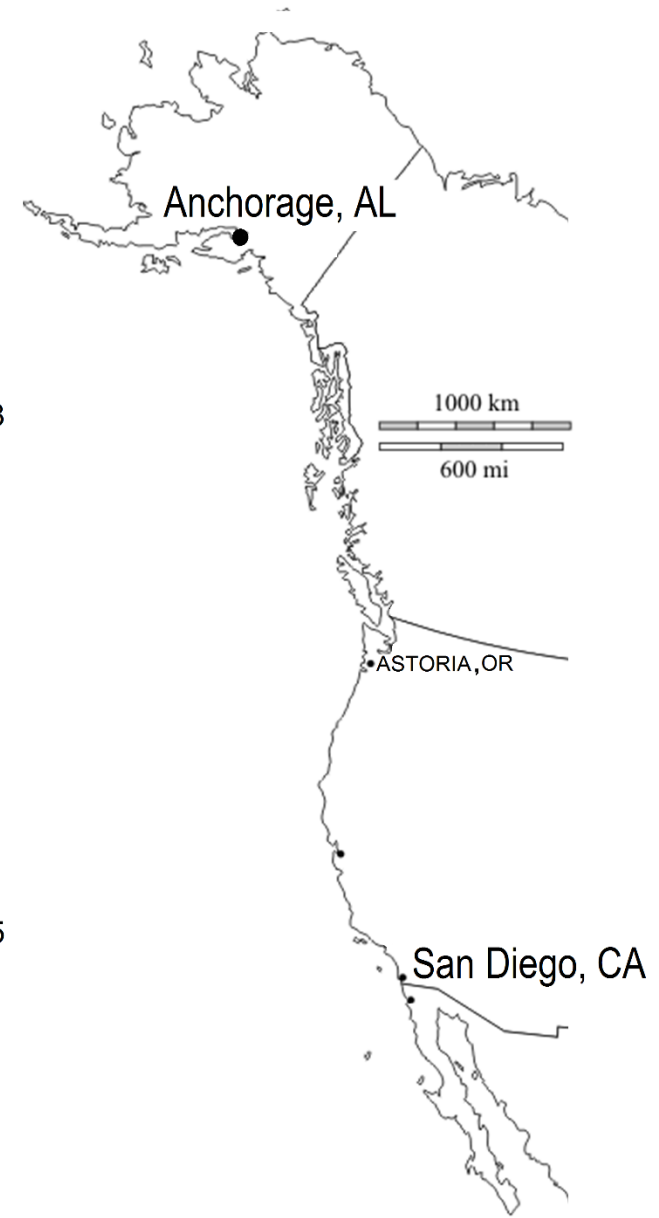
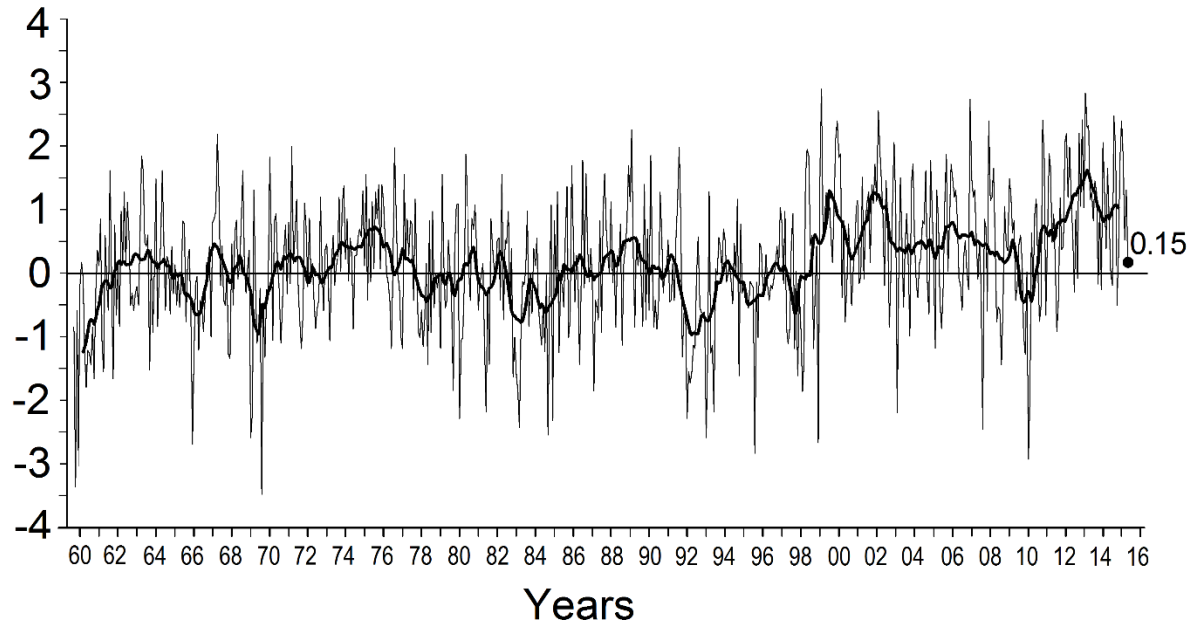
From these anomalous values, we started working modestly and with our own resources, to make this new climate index, that adequately describe the relationship for some regions influenced by the equatorward flow of the California Current.

SLP

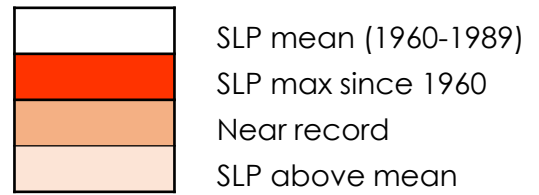
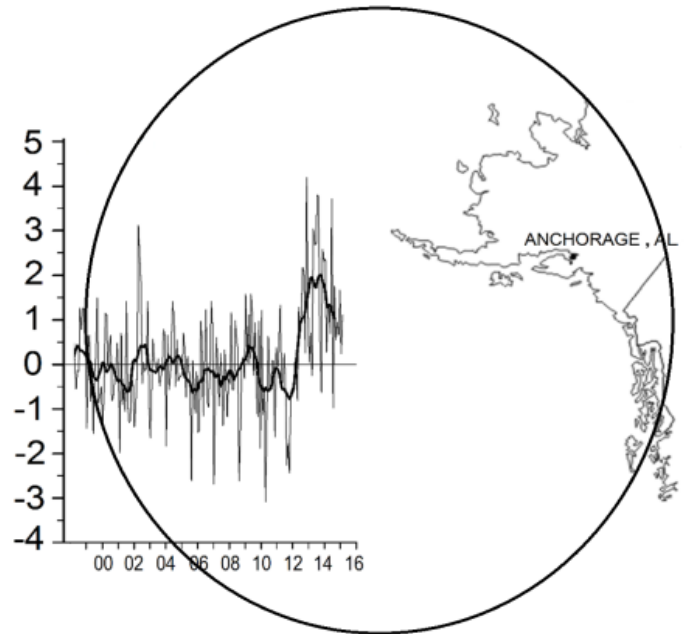
SLP Anom. (Stand. Desv.)  
Anchorage, AL.



SLP Anomalies  
San Diego, CA.



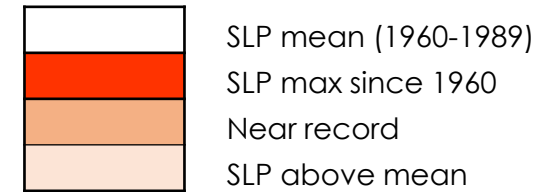
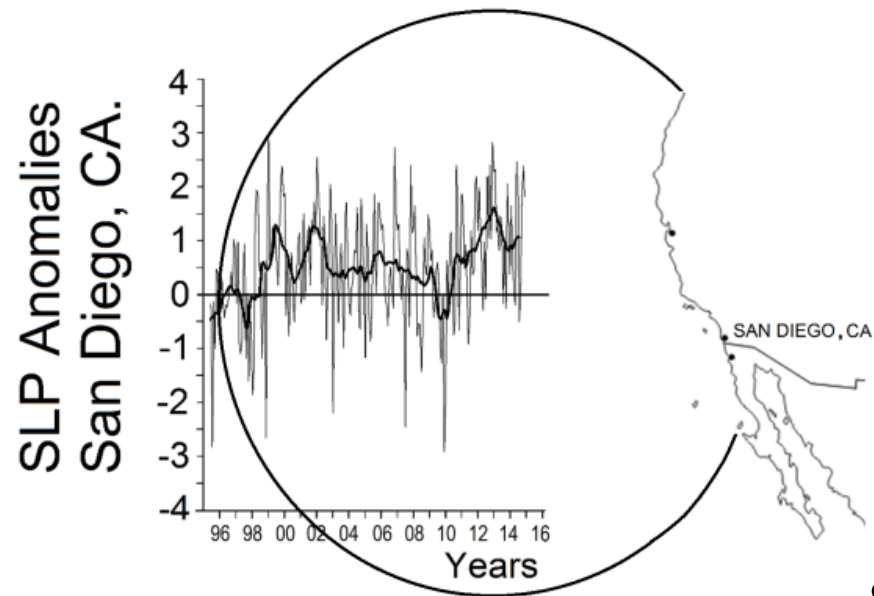
SLP Anomalies  
Anchorage, AL.



### SLP (mb) IN ANCHORAGE

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	1002.71	1001.69	999.32	1009.82	1008.12	1010.14	1014.22	1013.54	1004.74	1013.88	1006.09	1000.67
2013	1007.10	999.31	1014.90	1016.25	1013.54	1014.90	1017.27	1009.14	1001.35	1007.77	1013.54	1014.56
2014	1004.18	1010.55	1007.72	1007.11	1016.00	1006.09	1013.43	1009.14	1007.31	1000.54	1009.48	1001.69
2015	1009.82	1013.88	1009.48	1003.11								
mean	1002.40	1001.19	1002.61	1003.92	1006.47	1007.89	1010.07	1007.53	1003.75	998.02	998.96	1000.36
max	1014.86	1028.80	1015.23	1016.25	1016.00	1014.90	1017.27	1014.90	1011.20	1013.88	1015.60	1014.56

6 records in 3 years..!!  
4 records in 2013 since 1960



## SLP (mb) IN SAN DIEGO

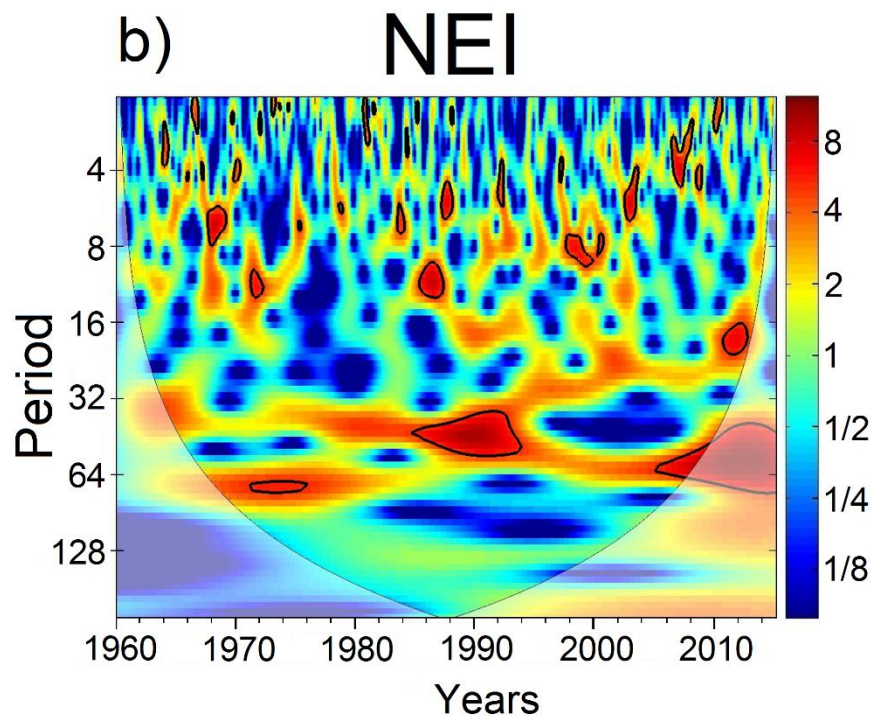
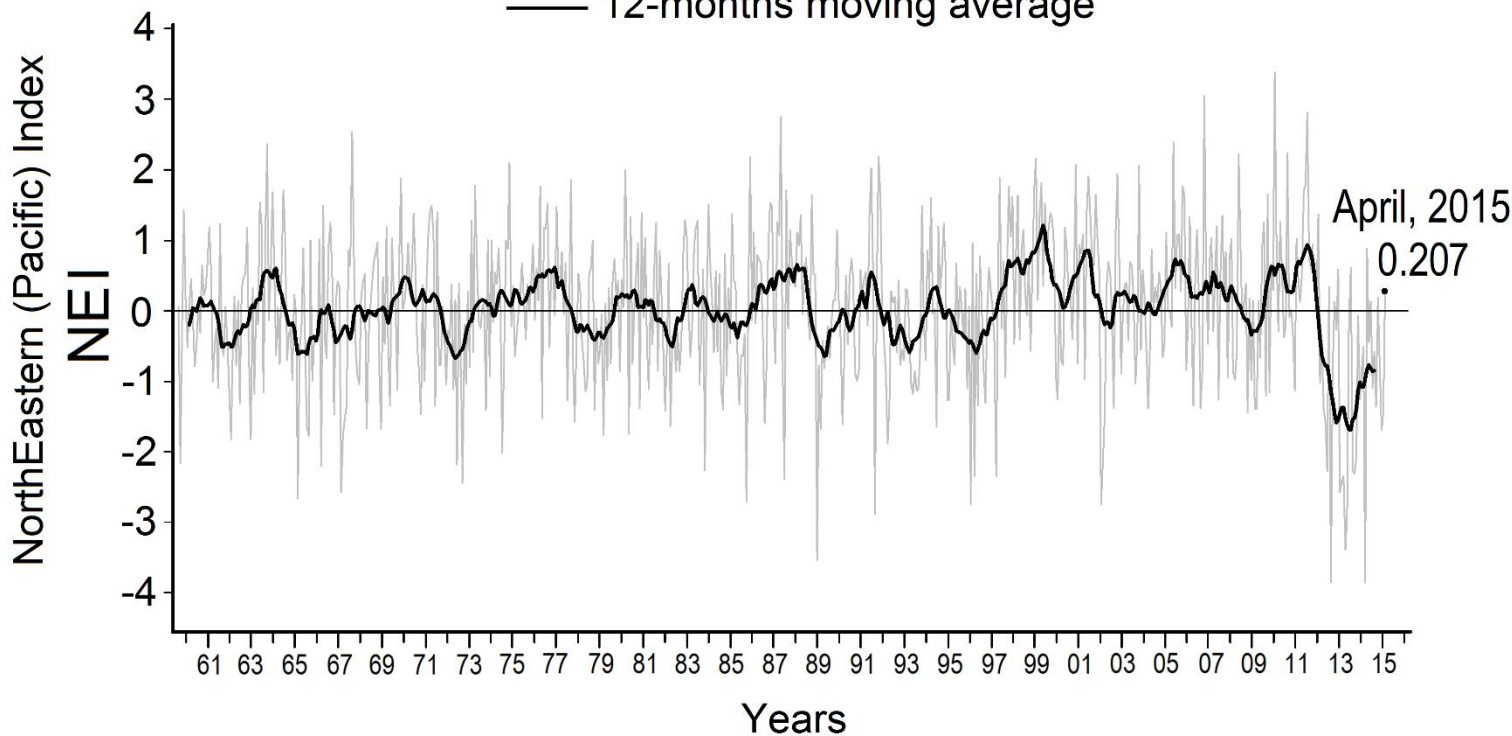
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	1019.67	1017.94	1017.60	1015.91	1014.22	1012.09	1013.40	1011.85	1013.54	1014.56	1018.28	1017.94
2013	1020.31	1019.30	1017.94	1015.91	1014.90	1013.20	1013.88	1013.20	1011.17	1014.56	1015.57	1018.96
2014	1018.73	1017.13	1017.27	1015.57	1014.69	1012.19	1014.90	1013.88	1010.83	1013.78	1017.61	1019.30
2015	1019.30	1017.27	1016.93	1014.90								
mean	1017.48	1016.75	1015.62	1014.75	1013.63	1012.38	1012.43	1011.93	1011.34	1013.51	1015.83	1016.91
max	1020.31	1019.64	1017.94	1016.93	1015.57	1014.22	1014.90	1013.90	1013.54	1015.91	1018.28	1019.64

5 records in 3 years..!!  
2 records in 2012, and 2 in 2013, since 1960

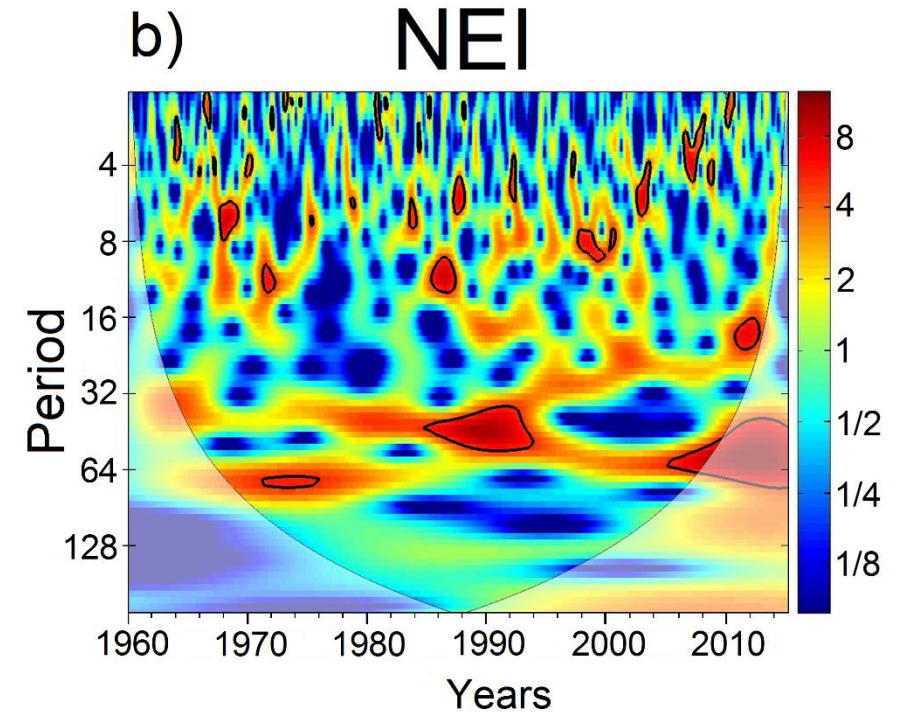
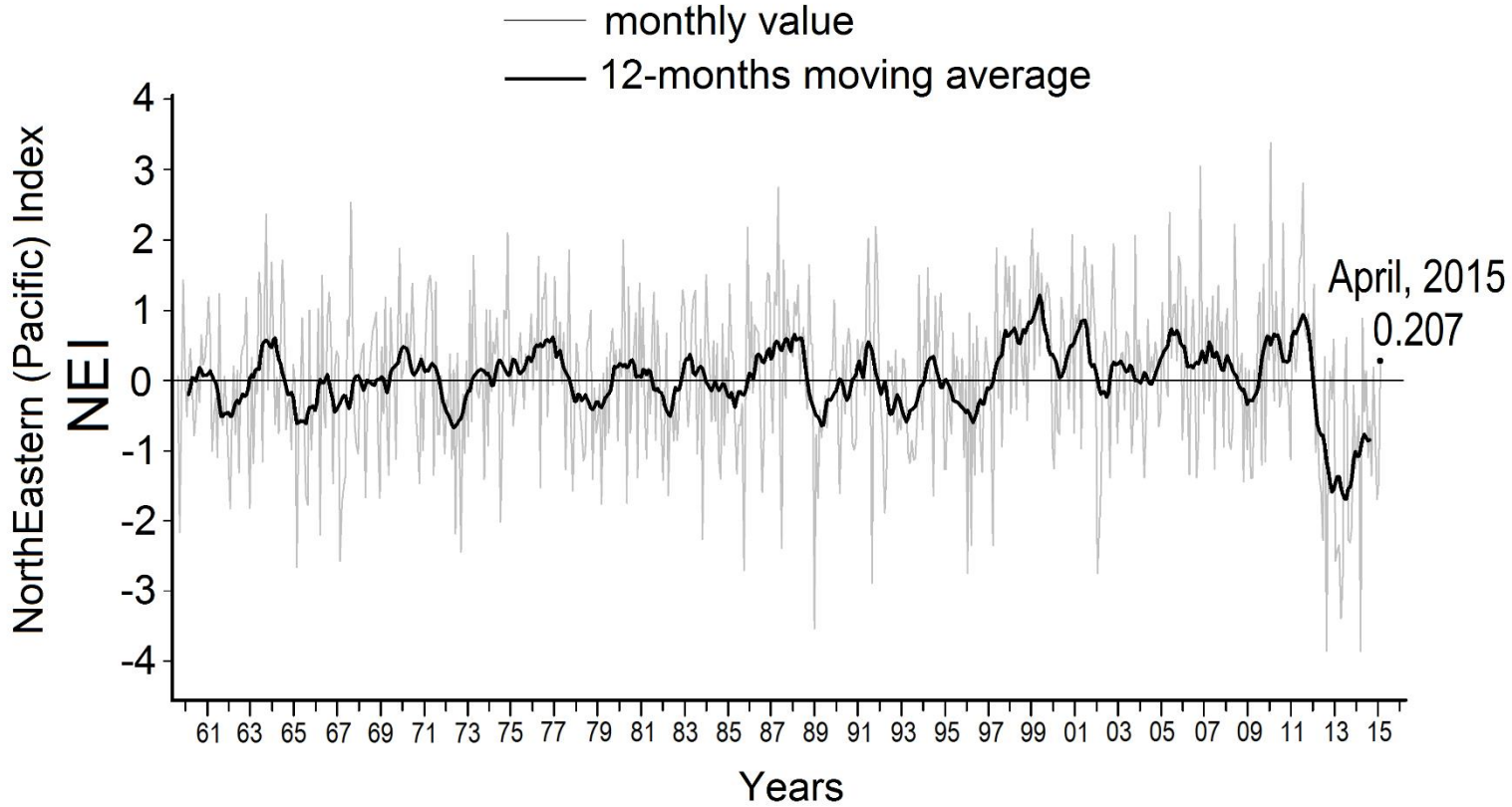
# NEI

NorthEastern Index

— monthly value  
— 12-months moving average





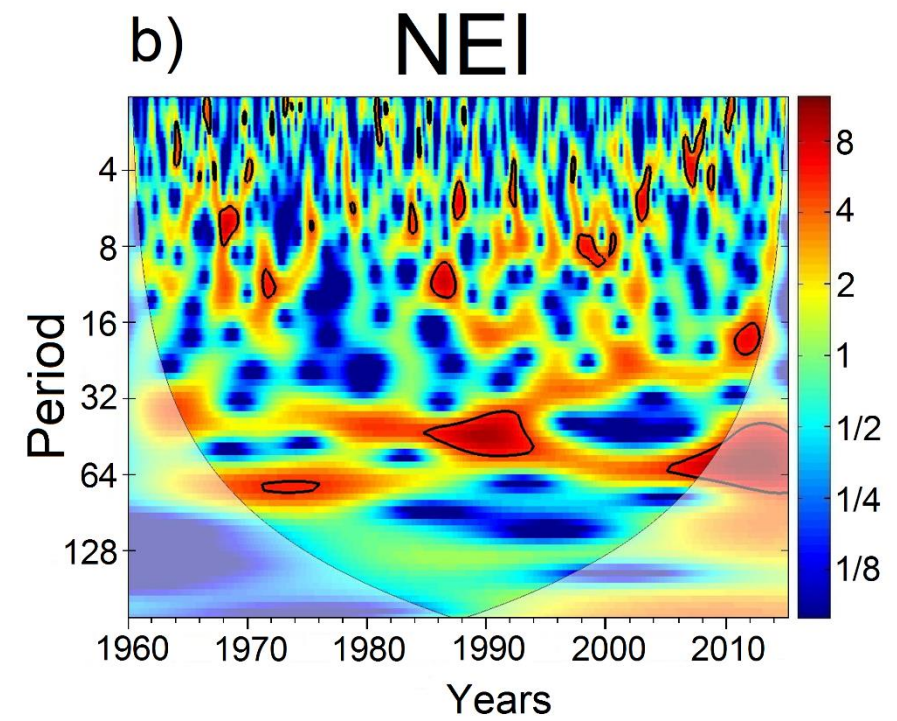
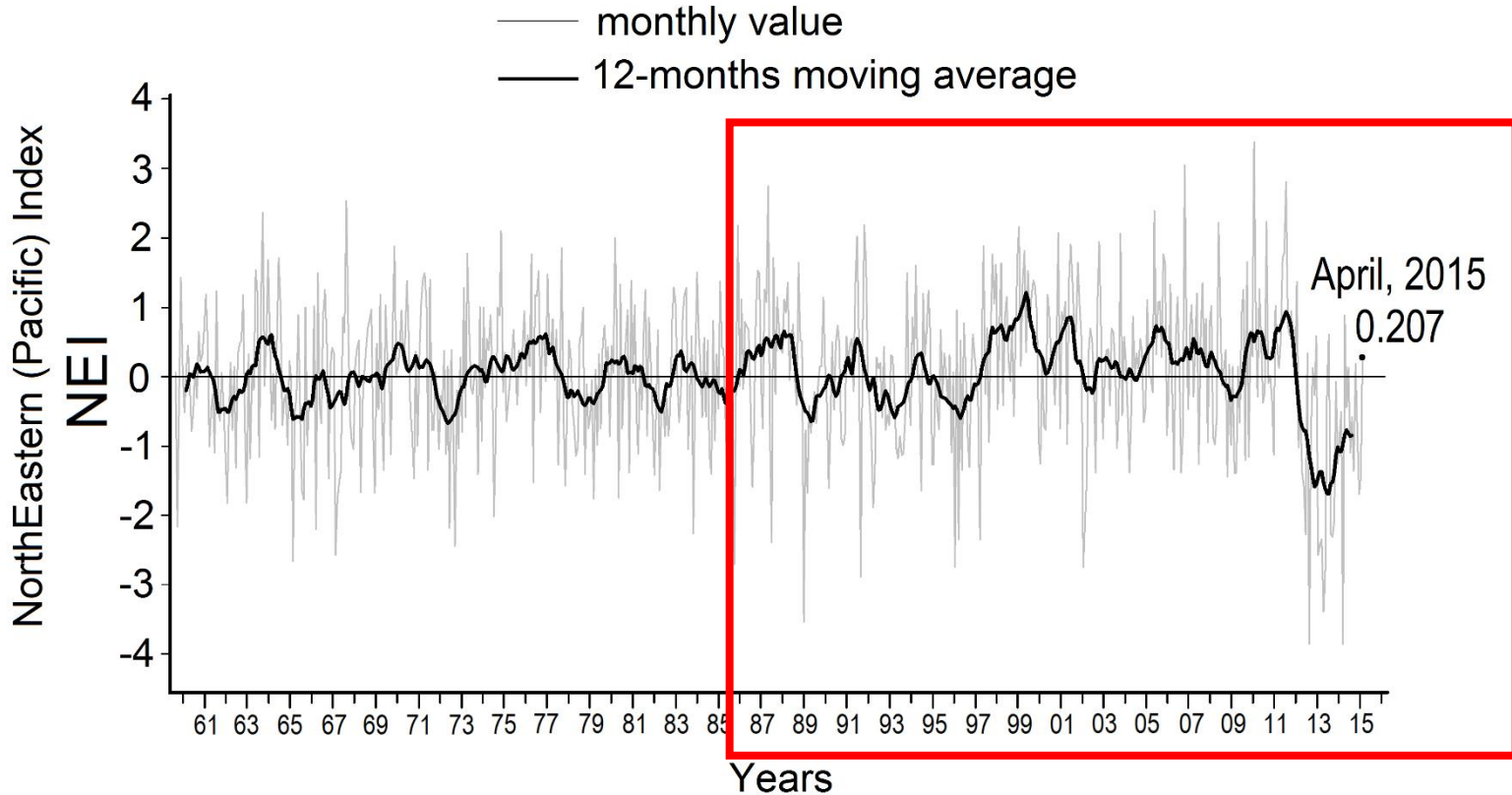


$$NEI = \frac{SLP \text{ anom (E/SD)} - SLP \text{ anom(Ancho)}}{\text{Stand. Desv. of the difference between E/SD and Ancho (*)}}$$

(\*) mean period (1960-1989)

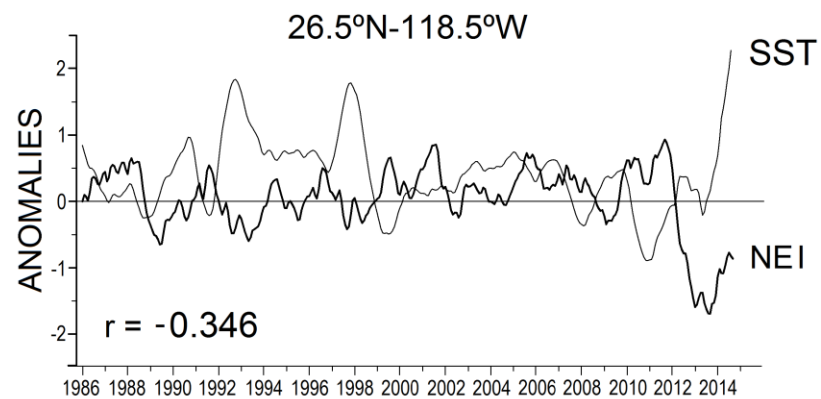
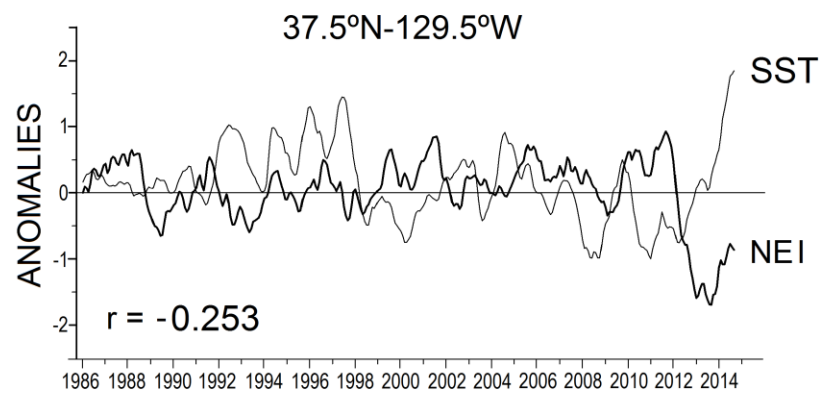
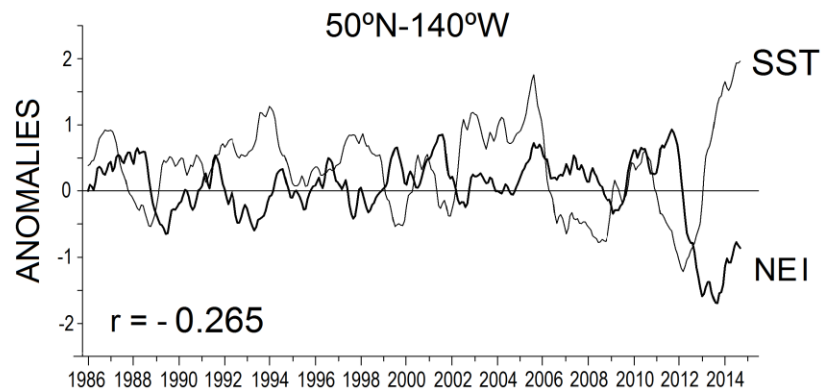
E/SD = ENSENADA/San Diego, CA

Ancho = Anchorage, AL

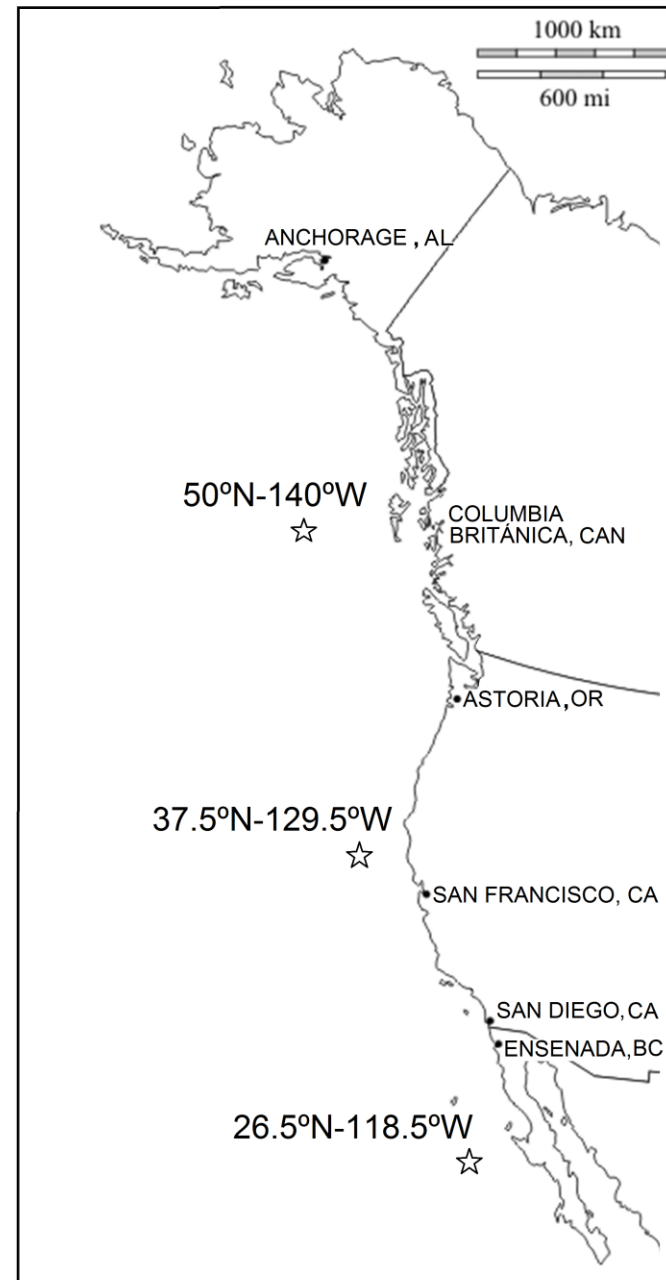


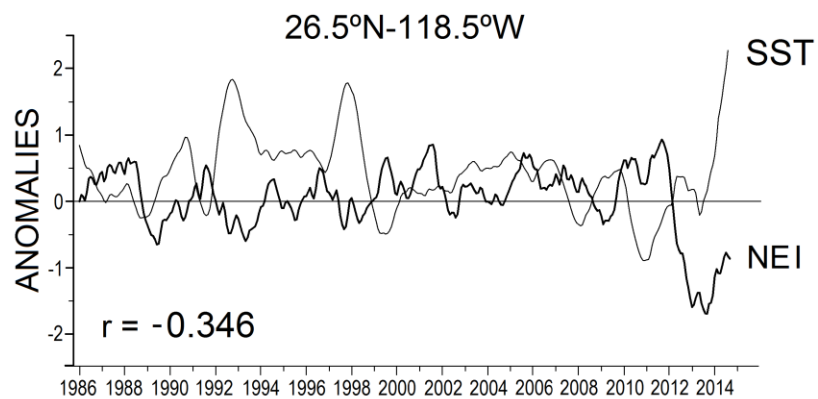
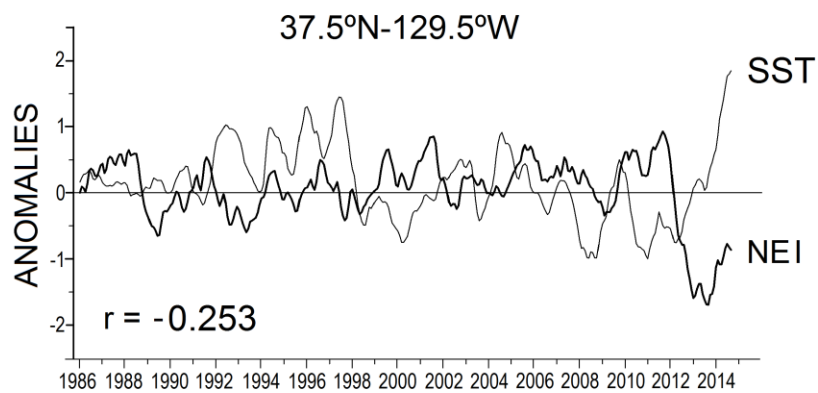
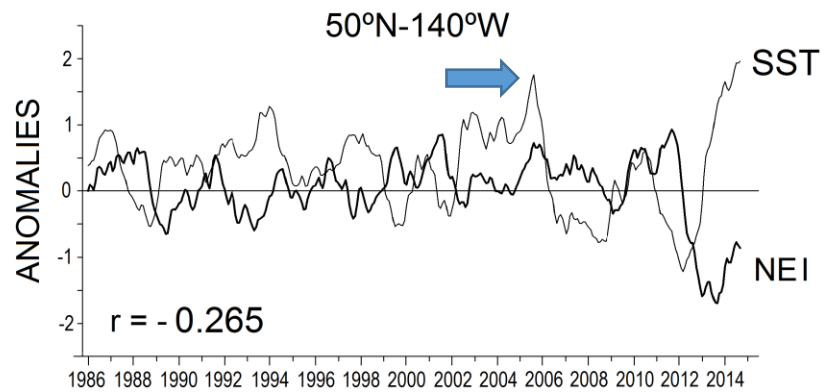
$$NEI = \frac{SLP \text{ anom (E/SD)} - SLP \text{ anom(Ancho)}}{\text{Stand. Desv. of the difference between E/SD and Ancho (*)}}$$

(\*) mean period (1960-1989)  
E/SD = ENSENADA/San Diego, CA  
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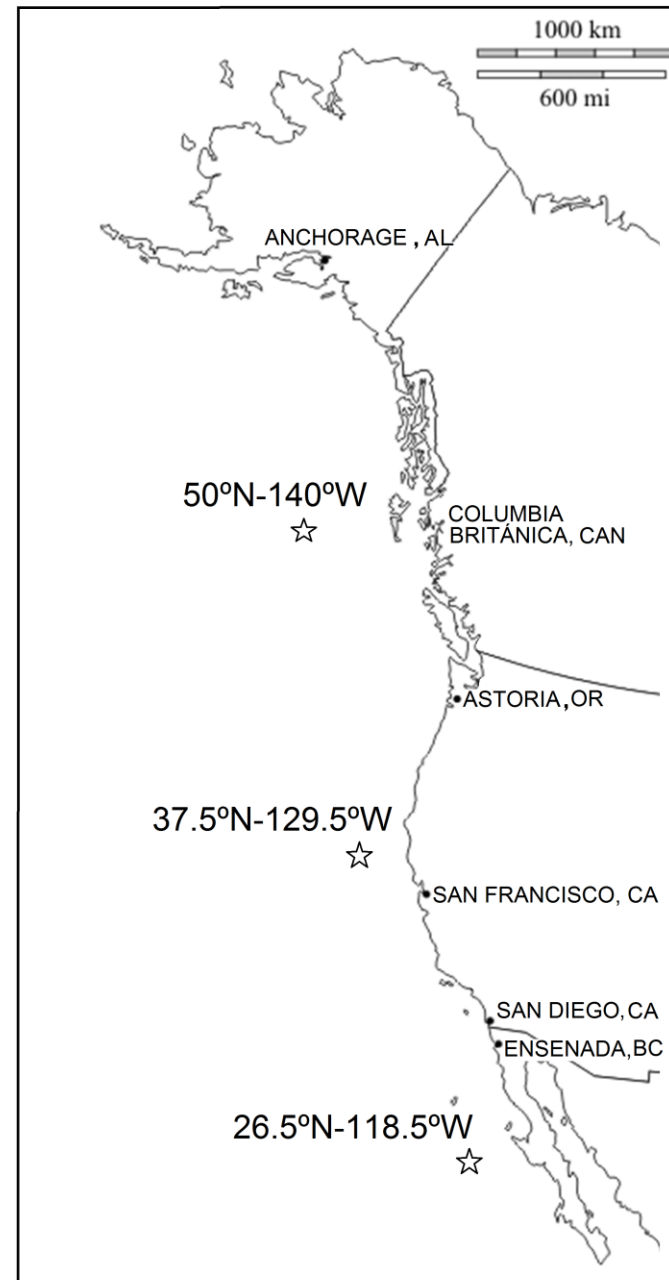


Years

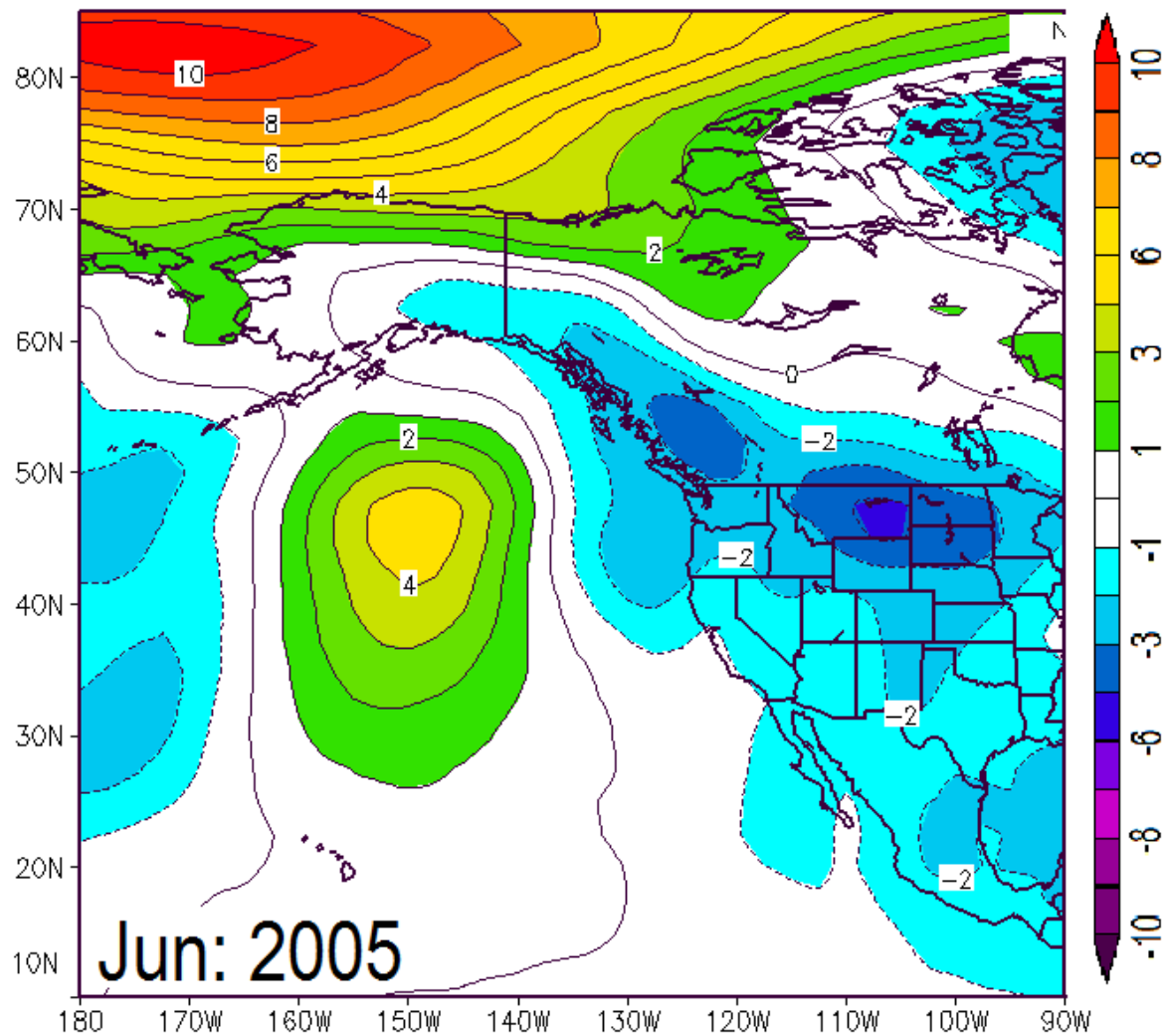




Years

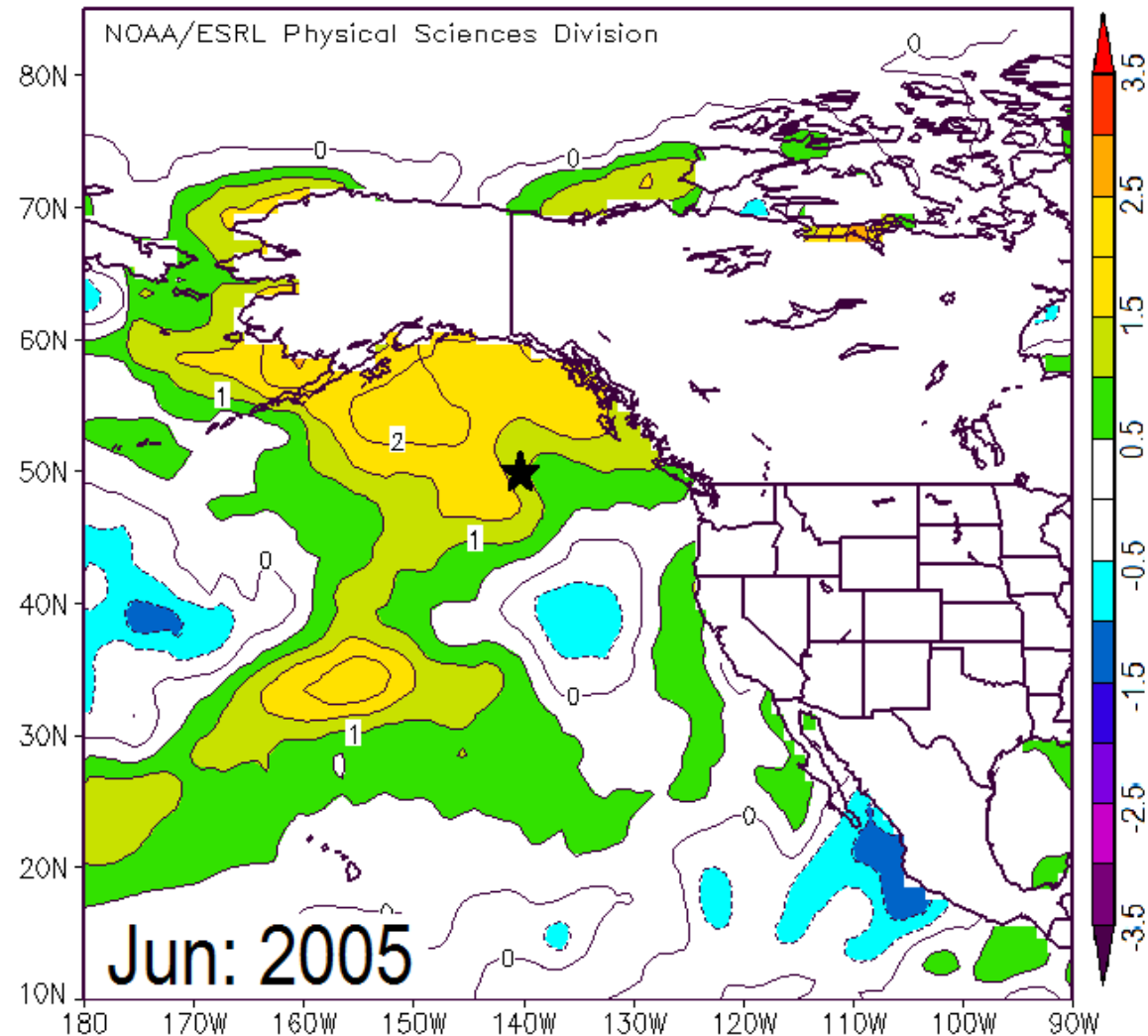


NCEP/NCAR Reanalysis Sea Level Pressure (mb)  
Composite Anomaly 1981–2010 climo

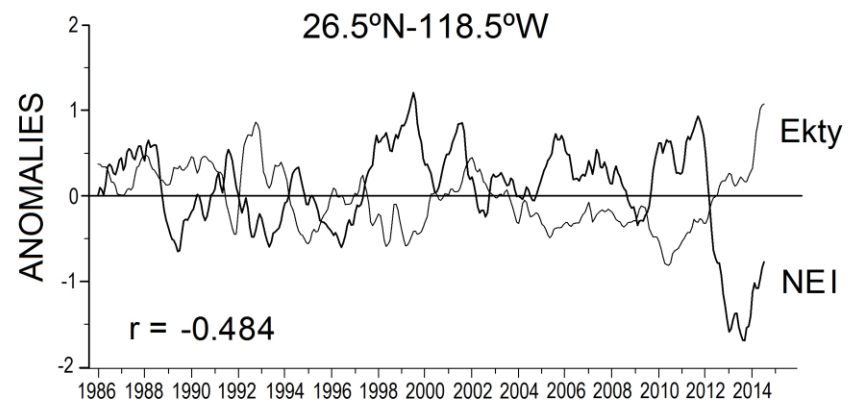
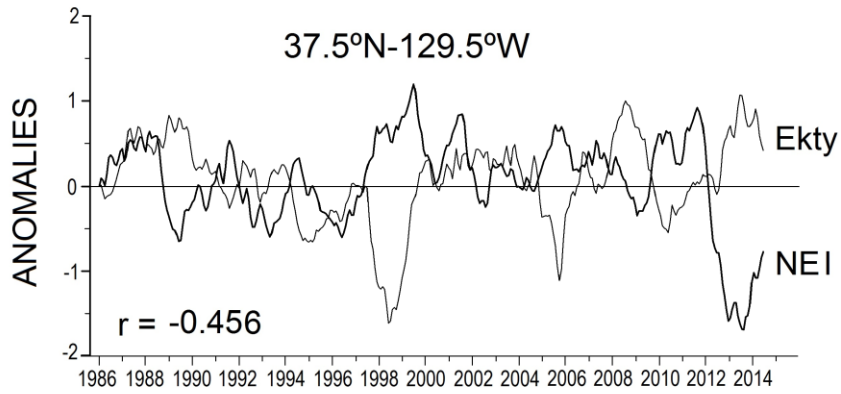
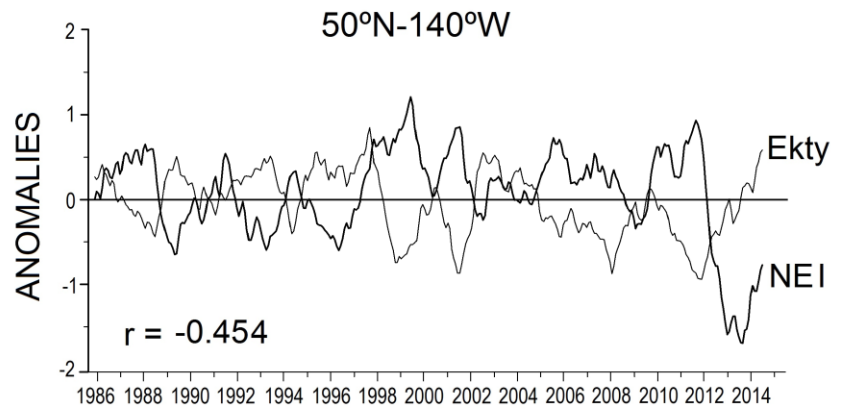


SLP

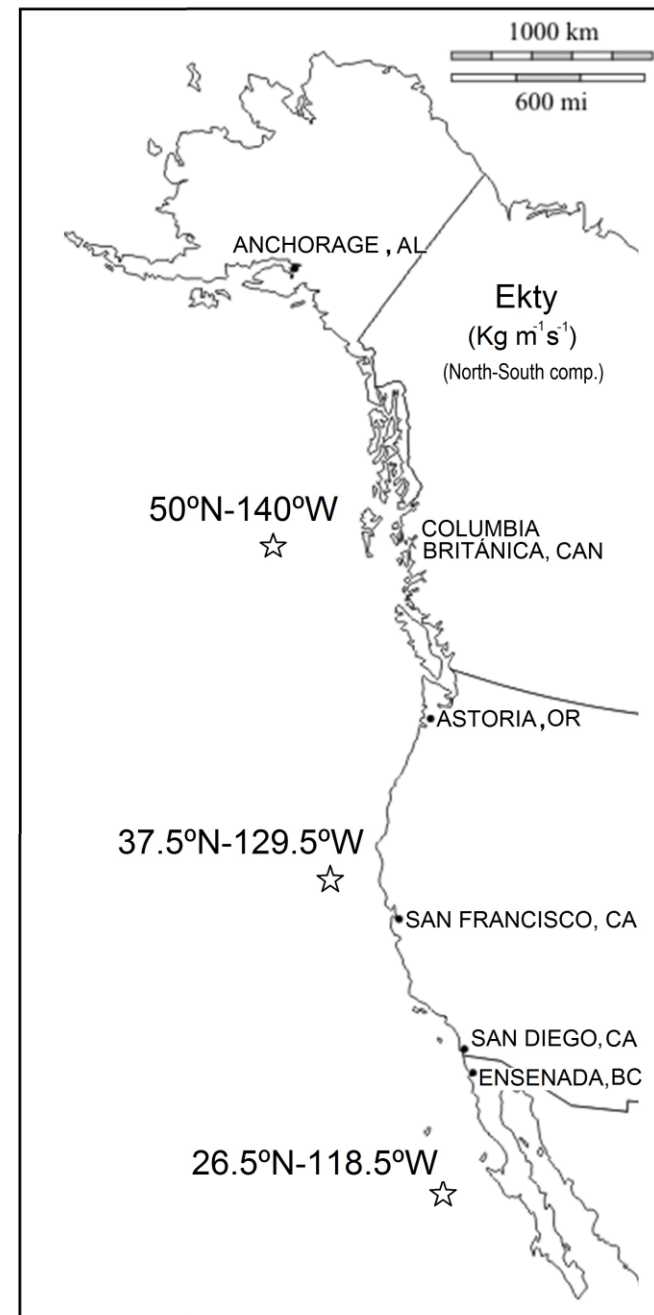
NOAA OI SST Surface SST (C)  
Composite Anomaly 1981–2010 climo



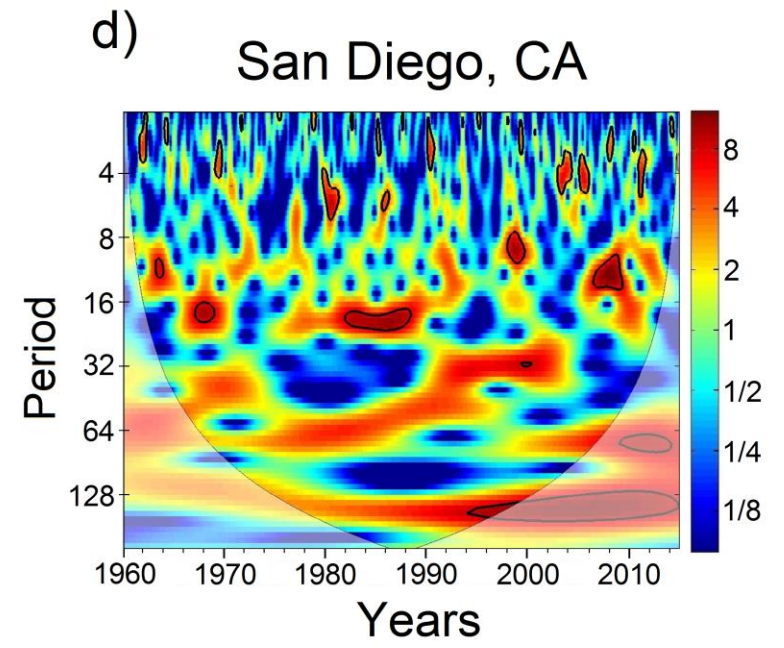
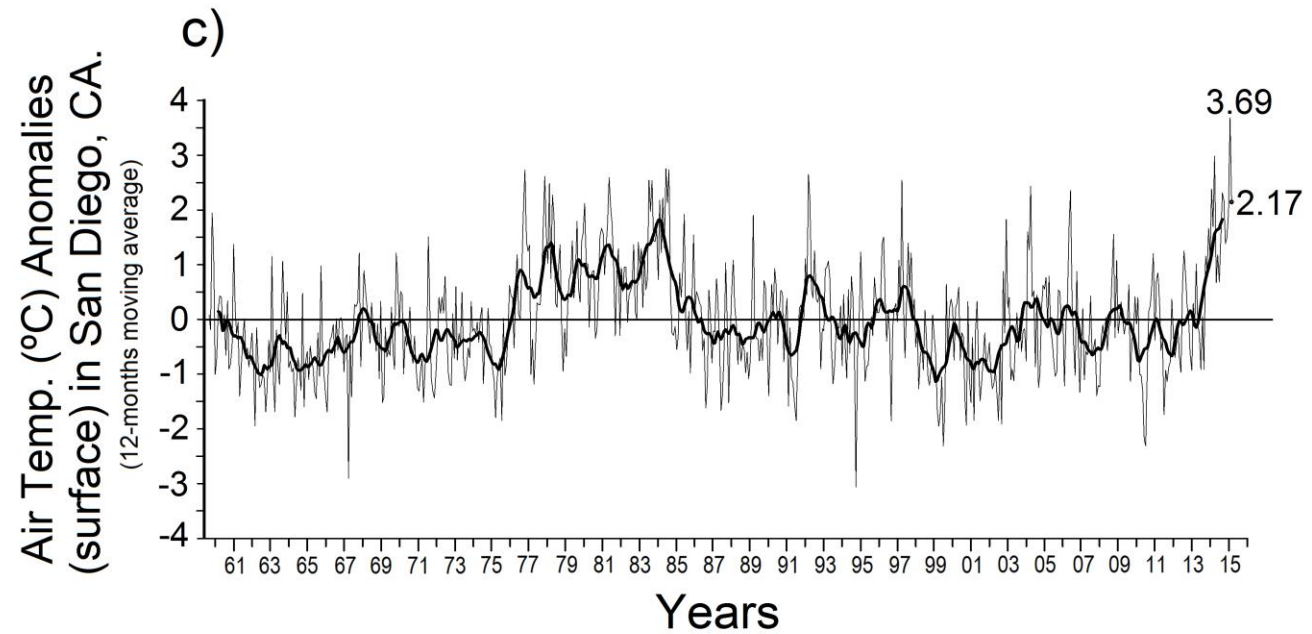
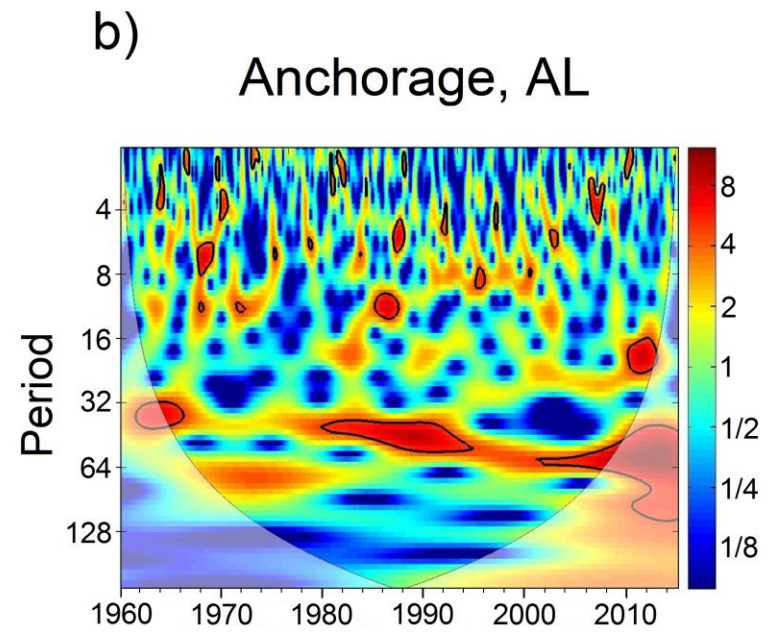
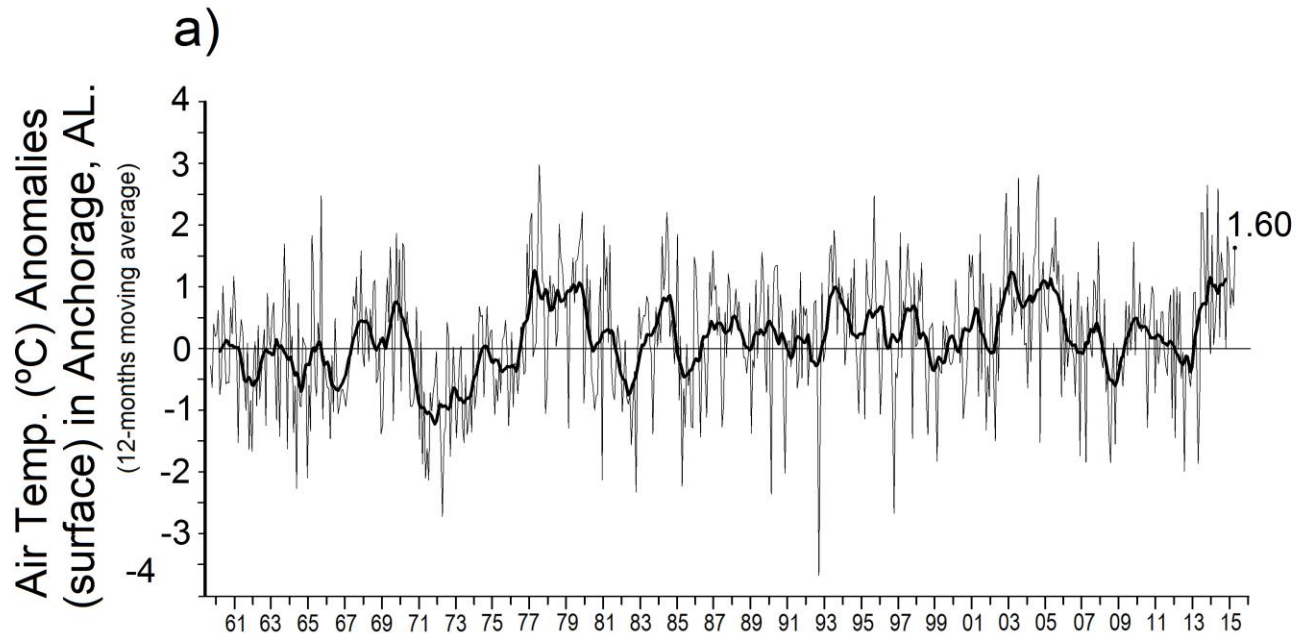
SST



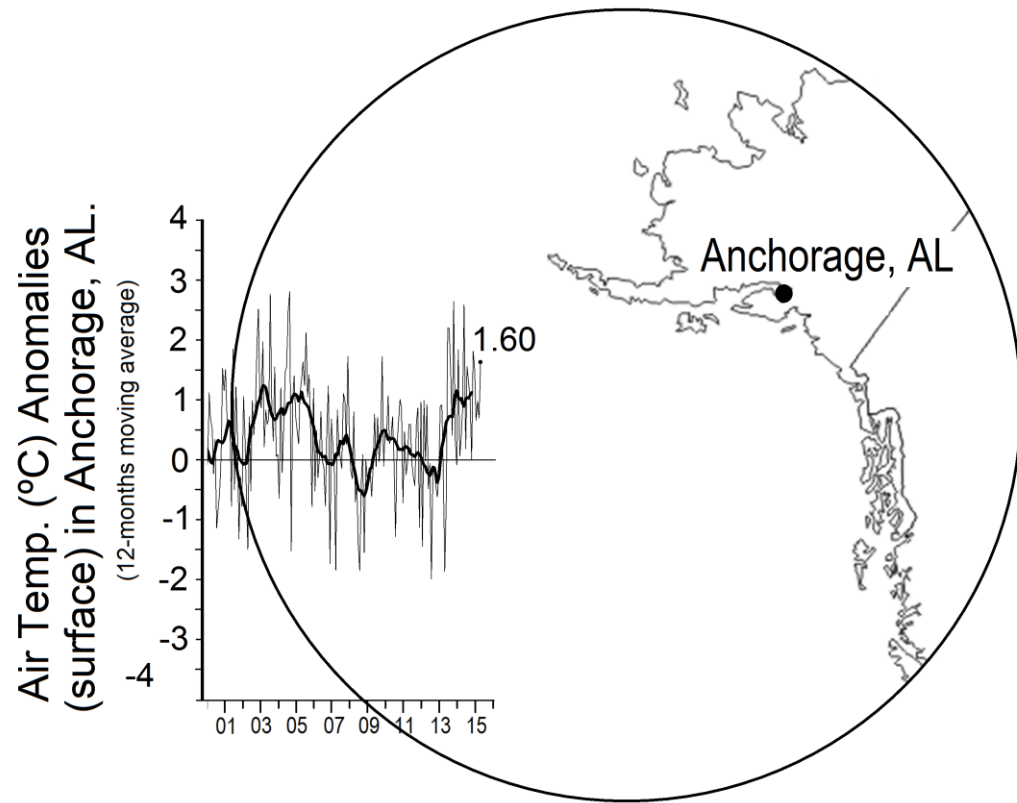
Years



surf. air temp. (°C)



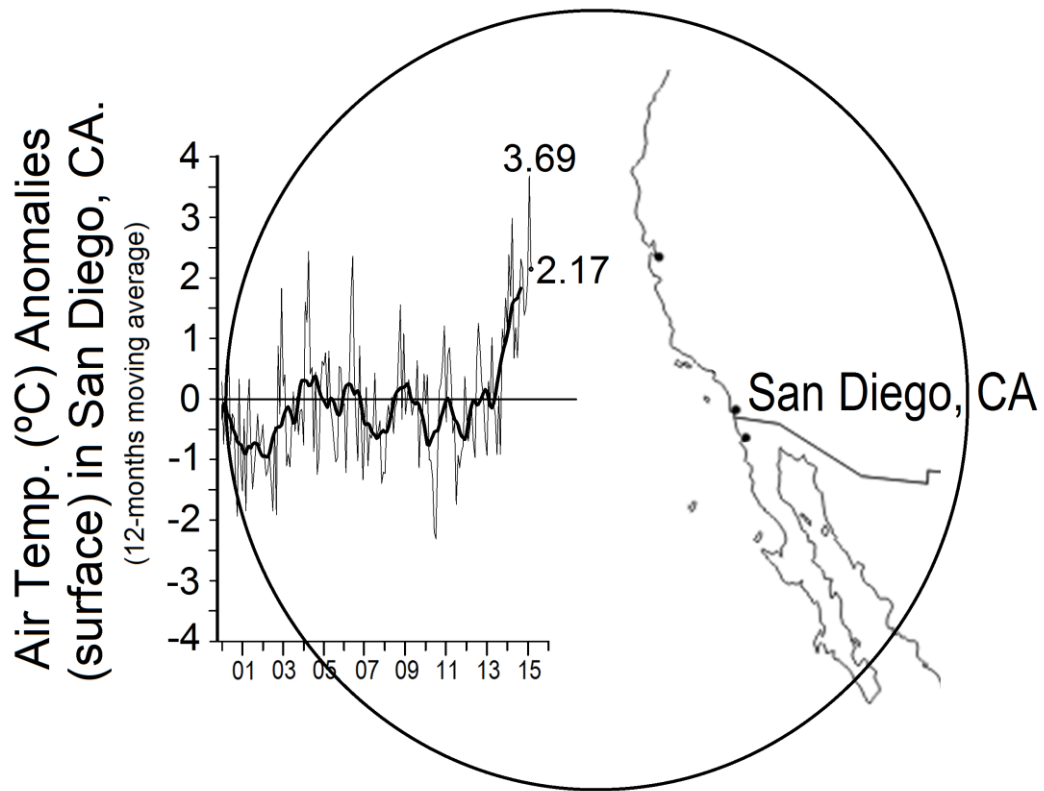




	below 1 anom.
	<b>cool</b>
	<b>warm</b>
	above 1 anom.

## Air Temp. (°C) anomalies (surface) in ANCHORAGE

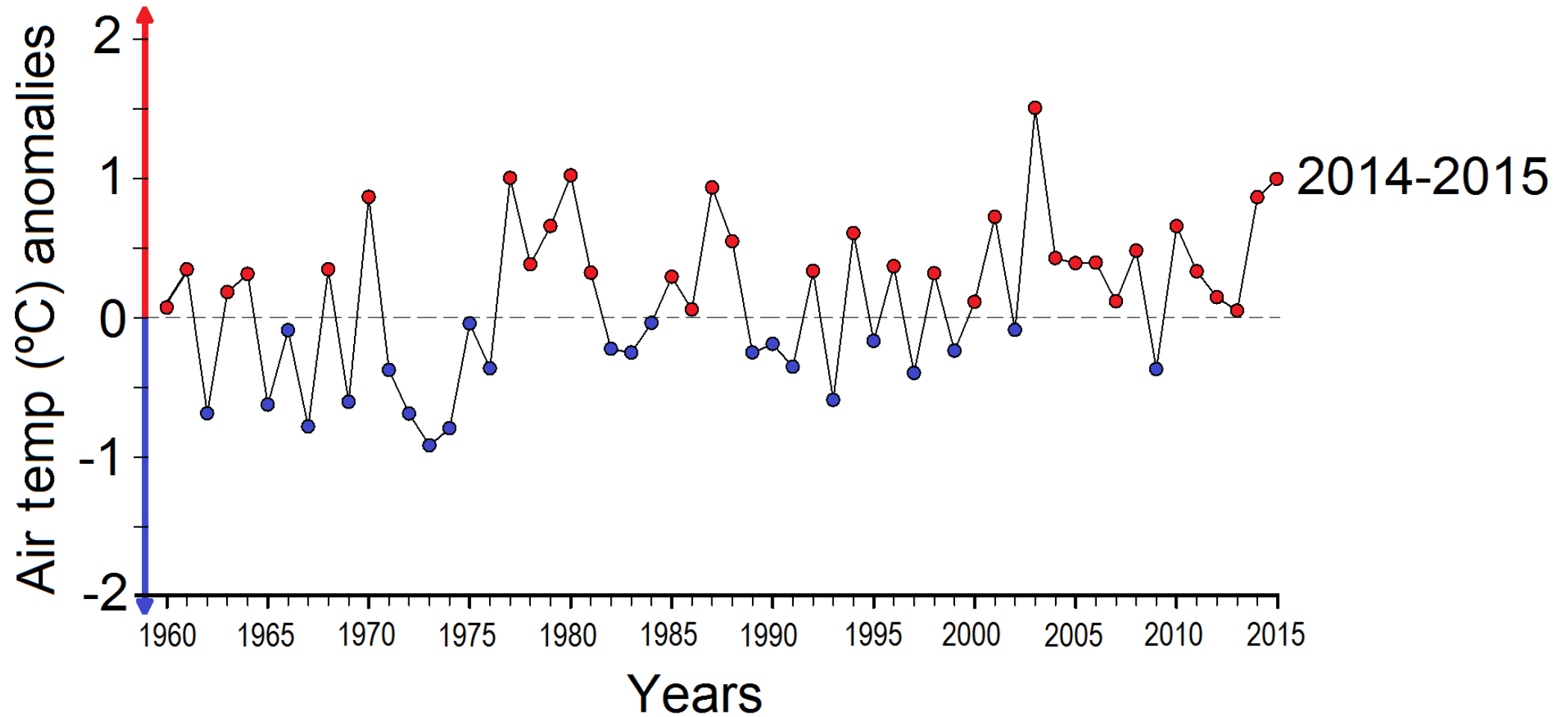
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	-1.45	0.99	-0.02	0.92	-0.49	-0.07	-1.99	-0.20	-0.19	-0.43	-0.62	-0.26
2013	0.90	0.91	-0.17	-1.87	-0.69	<b>2.20</b>	<b>2.20</b>	1.45	0.41	<b>2.64</b>	0.33	-0.09
2014	1.84	0.06	0.35	0.86	<b>2.59</b>	0.19	1.56	1.27	1.00	0.00	1.81	1.52
2015	0.66	0.98	0.70	1.60								



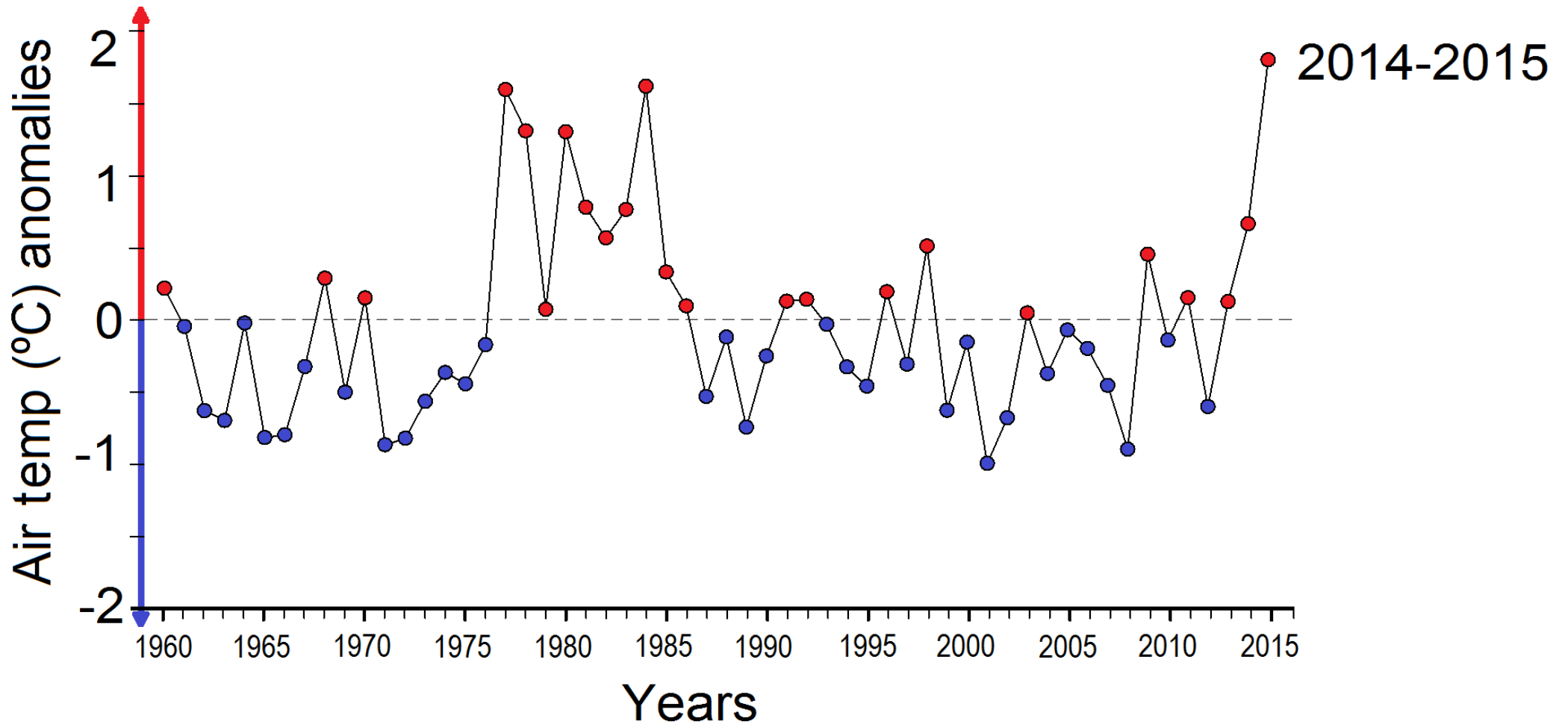
	below 1 anom.
	<b>cool</b>
	<b>warm</b>
	above 1 anom.

### Air Temp. (°C) anomalies (surface) in SAN DIEGO

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2012	0.37	-0.25	-0.70	-0.47	-0.14	-0.69	-0.97	0.63	1.25	0.81	0.26	0.02
2013	-0.63	-0.93	0.30	-0.10	1.01	-0.10	-0.27	-0.92	0.05	-0.91	1.16	0.90
2014	1.66	1.15	2.38	1.69	2.98	0.67	1.18	0.68	1.50	2.31	2.17	1.38
2015	1.50	1.95	3.69	2.17								



Surface Air Temperature anomalies  
(SONDJF mean) in Anchorage, AL.



Surface Air Temperature anomalies  
(SONDJF mean) in San Diego, CA

What do we currently know in this article?

A time series of a new climate index for atmospheric teleconnections between Anchorage and San Diego was generated.

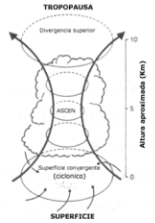
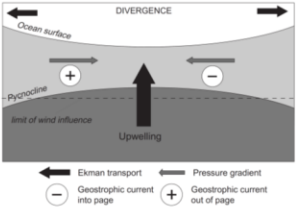

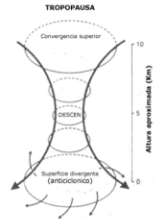
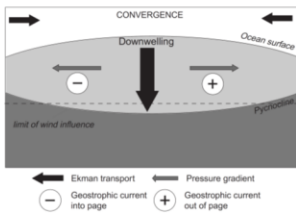

The NEI signal indicates an intensification of high-pressure system near the Gulf of Alaska.

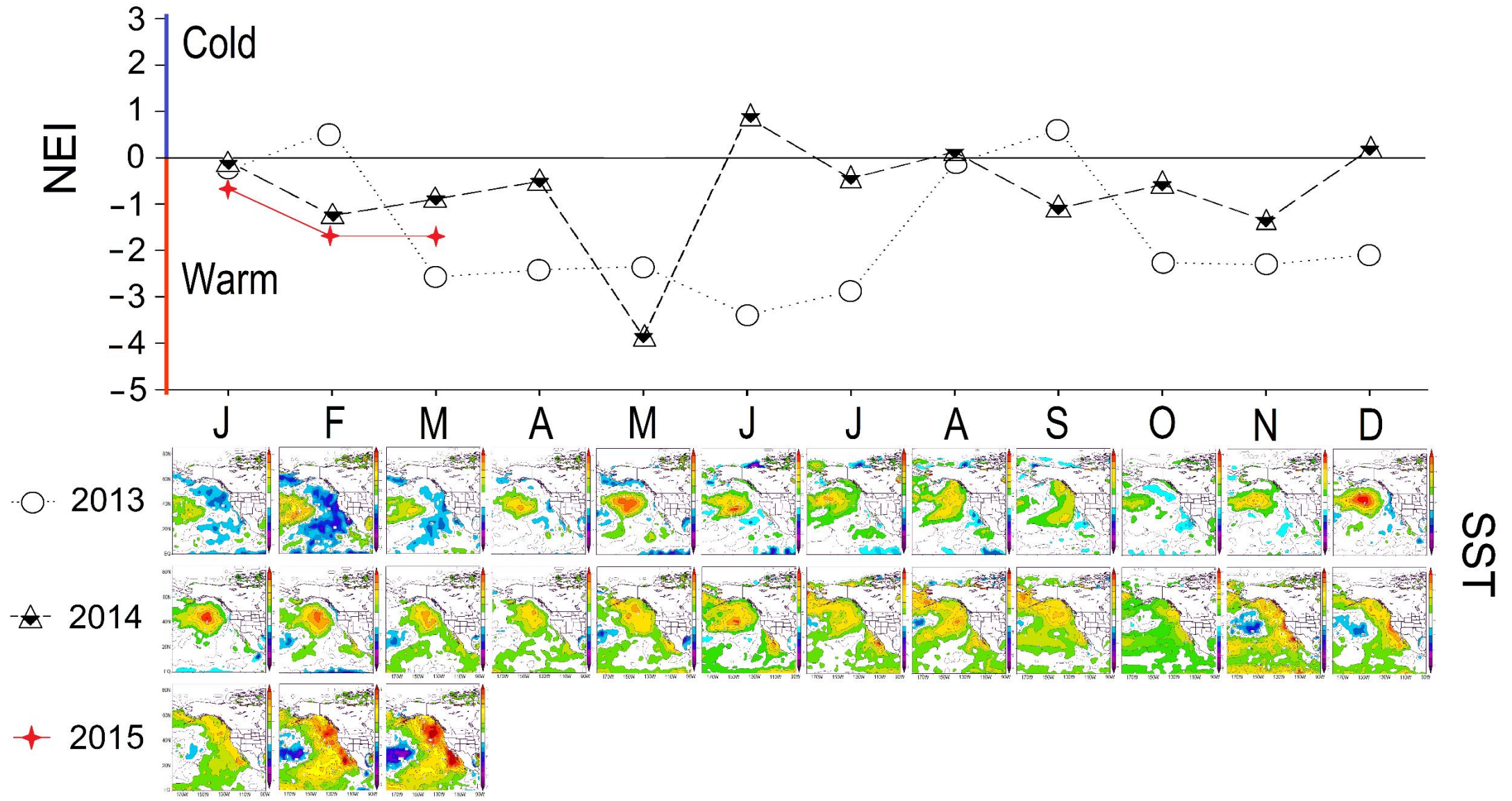
Ekman Transport ( $E_k$ ) trend is northward since 2010, not just at one point, but apparently all along the Pacific coast. This situation may have occurred before in the past, but the northward component had not stayed so long.

This may reflect the tendency of warm subtropical conditions over temperate and subpolar regions, as an increase in surface air temperature in Anchorage and SST since April 2013.

Thanks!

# NEI

	SLP				SST		Upw	SSH	TEK
why is +	prevailing Anchorage (L) Ensenada (H)	 <p>TROPOPAUSA Divergencia superior DESCEN Superficie convergencia (ciclónica) SUPERFICIE Altura aproximada (Km) Pérdida en masa de aire provoca caída de presión</p>	<p>Convergencia en Superficie Ciclónico</p> <p>Se fortalece Baja Presión Aleutianas y se debilita el Alta Presión en Ensenada</p>	<p>Se fortalece Corriente de Alaska y Disminuye Flujo de la Corriente de California al sur. (invierno)</p> <p>(Halpin <i>et al.</i>, 2004)</p>	<p>La Corriente de California trae temperaturas más frías de la región subártica</p>  <p>DIVERGENCE Ocean surface Pycnocline limit of wind influence Ekman transport Geostrophic current into page Pressure gradient Geostrophic current out of page Upwelling</p> <p>Régimen Frío</p>	<p>Aumenta Flujo de la Corriente de Davidson</p>	<p>Disminuyen las surgencias costeras</p> 		
why is -	prevailing Anchorage (H) Ensenada (L)	 <p>TROPOPAUSA Convergencia superior DESCEN Superficie divergencia (anticiclónica) SUPERFICIE Altura aproximada (Km) Aumento de la masa de aire, sube la presión</p>	<p>Divergencia en Superficie Anticiclónico</p> <p>Se fortalecen las Altas Presiones en la cuenca del Pacífico nororiental</p>	<p>Disminuye Flujo de la Corriente de Alaska y Aumenta Flujo de la Corriente de California al sur (Verano)</p> <p>(Halpin <i>et al.</i>, 2004)</p>	<p>La Corriente de California trae temperaturas más cálidas de la región subártica</p>  <p>CONVERGENCE Ocean surface Pycnocline limit of wind influence Ekman transport Geostrophic current into page Pressure gradient Geostrophic current out of page Downwelling</p> <p>Régimen cálido</p>	<p>Disminuye Flujo de la Corriente de Davidson</p>	<p>Aumentan las surgencias costeras por incremento del viento</p> 		



NorthEastern Index vs last two years SST