

“PERUVIAN NORTH AS A TRANSITION AREA DURING THE COASTAL EL NIÑO 2017 AND ITS IMPACT ON THE MARINE ENVIRONMENT (OCEANOGRAPHIC, ATMOSPHERIC AND ARTISANAL FISHERY)”

**International Symposium: Understanding Changes
in Transitional Areas of the Pacific**

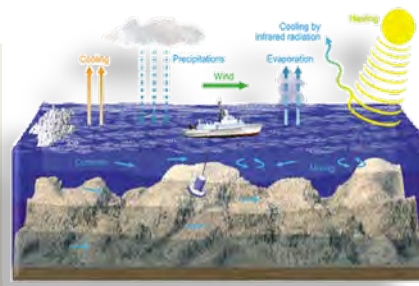
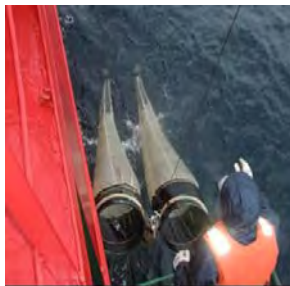
April, 24 – 26 2018

La Paz, Baja California Sur, México

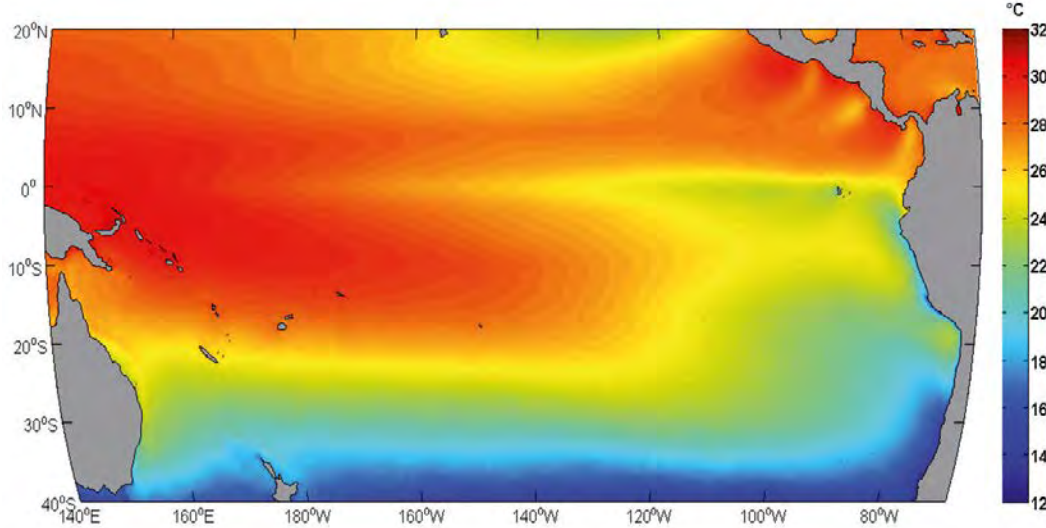


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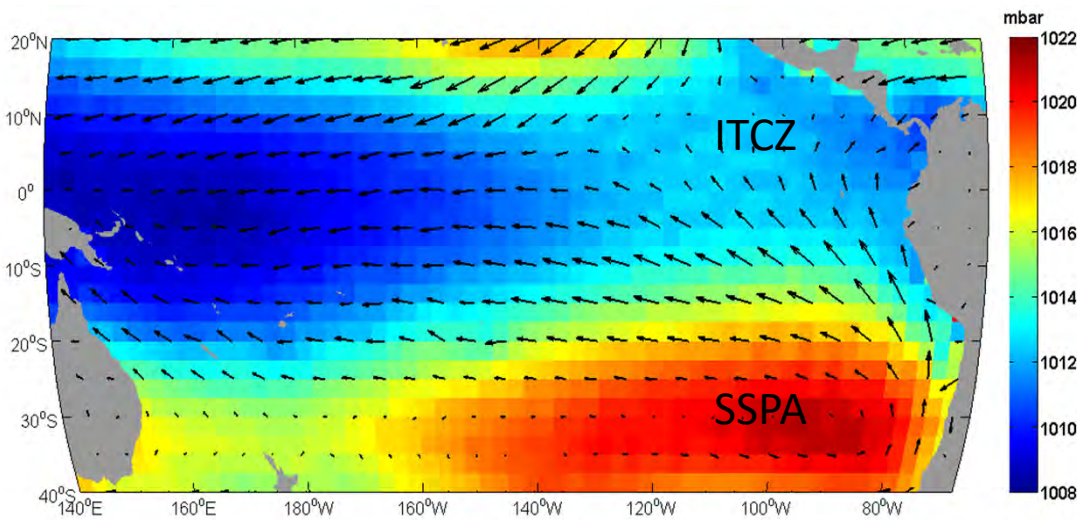
THE OCEAN AND ATMOSPHERIC INTERACTION IN SOUTH EAST PACIFIC FRONT OF PERU



Sea Surface Temperature (AVHRR Satellite)

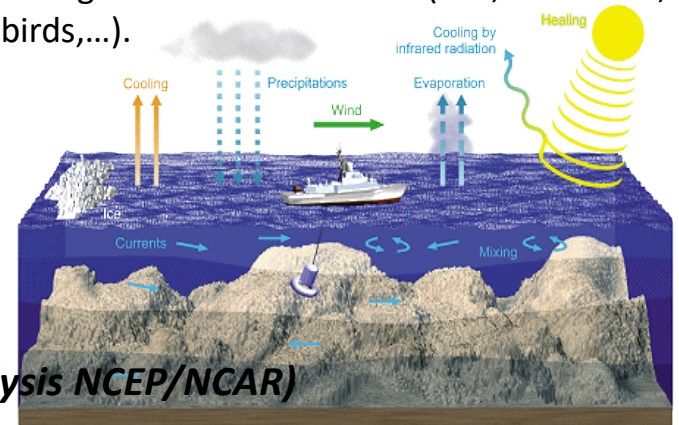
The ocean/atmospheric interaction in front of Peru include:

- ✓ Upwelling Peruvian System
- ✓ Cool water (temperature)
- ✓ El Niño/La Niña Condition
- ✓ Surface marine current (Humboldt)
- ✓ Sub Surface marine current (Equatorial, Cromwell).
- ✓ Trade winds
- ✓ Intertropical Convergence Zone
- ✓ Subtropical South Pacific anticyclone
- ✓ Oxygen Minimal Zone
- ✓ ...

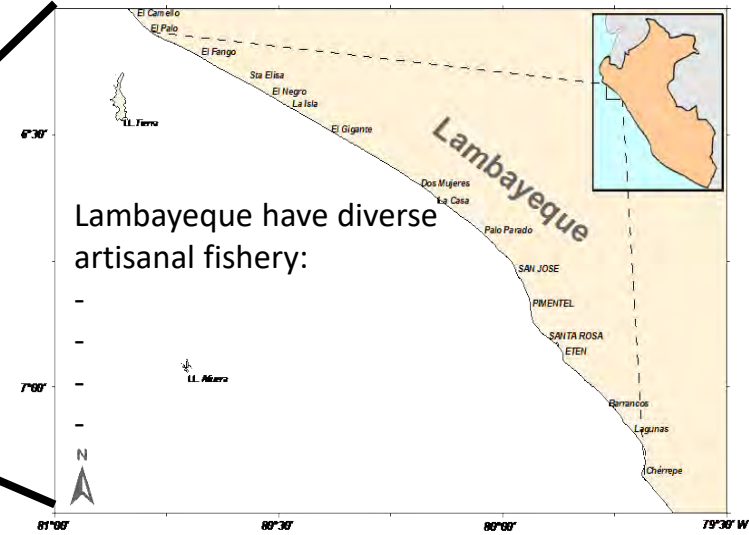
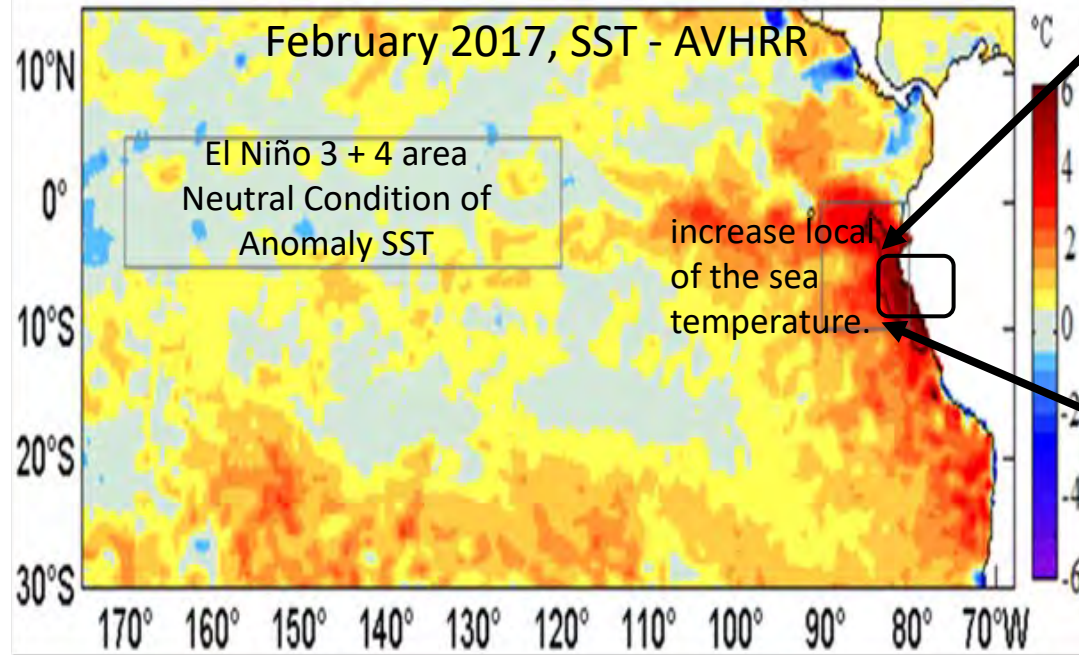


Wind speed (QuikSCAT/ASCAT) and Sea Level Pressure (Reanalysis NCEP/NCAR)

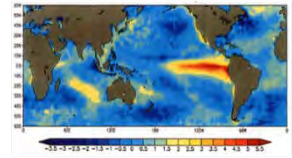
All these aspects influence the hydro biological resources of Peru (fish, mammals, birds,...).



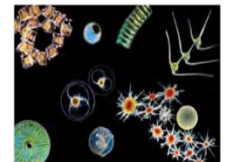
THE COASTAL EL NIÑO 2017 AND ITS IMPACT ON THE MARINE ENVIRONMENT



MARINE ENVIRONMENT



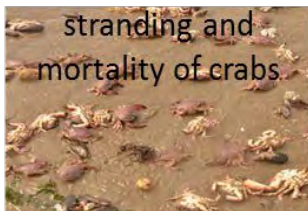
PHYTOPLANKTON
(PRIMARY PRODUCER)



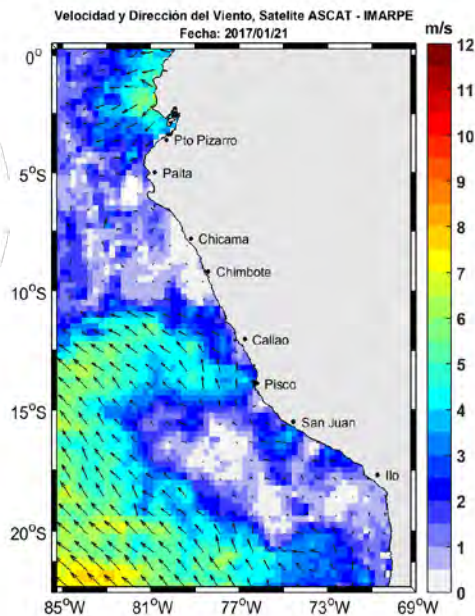
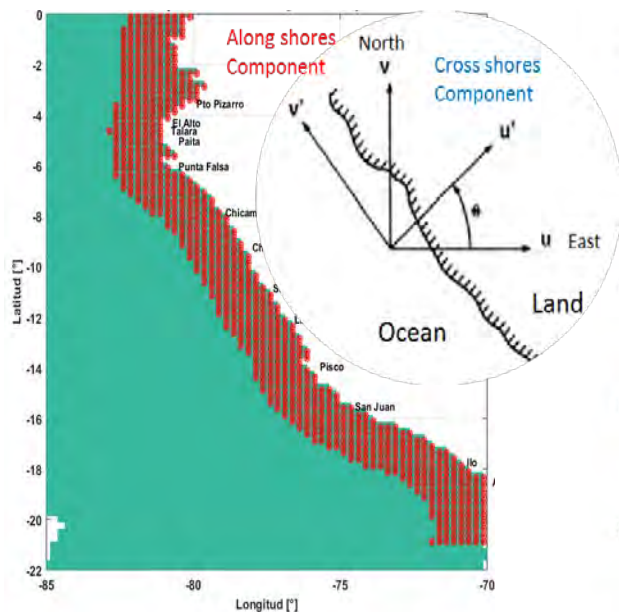
ZOOPLANKTON
(PRIMARY CONSUMER)



PREDATORY FISH
(SECONDARY CONSUMER)

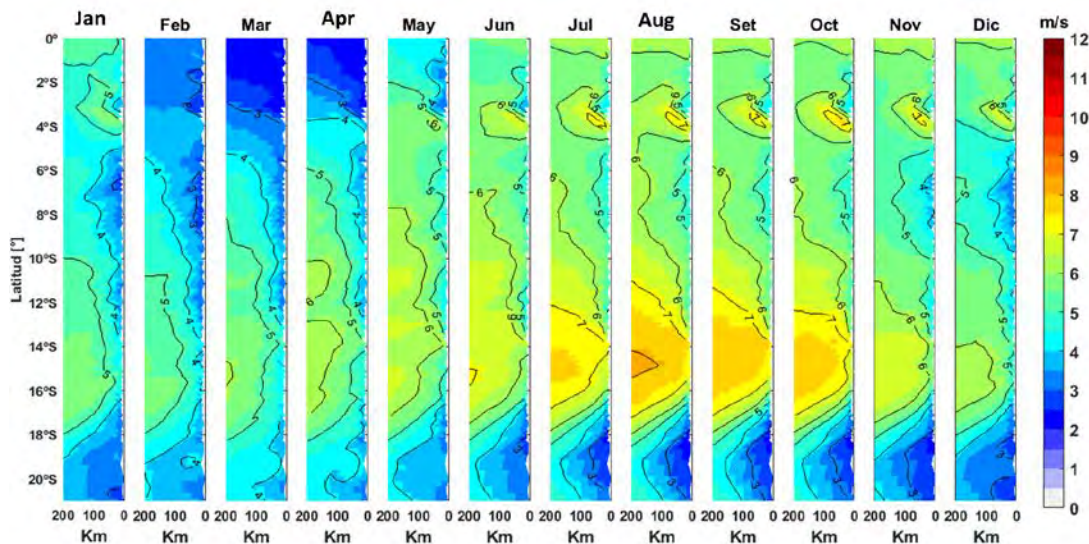


MONITORING OF ENVIRONMENTAL CONDITIONS IN FRONT OF PERU



To monitor the conditions in front and along of the Peruvian coast (Hovmoller diagram), we have created a series of products (pentadal climatologies), for to follow wind (ASCAT), sea temperature (AVHRR), sea level (AVISO), marine current (HYCOM model),...

To monitor wind speed have **Pentadal Climatology of satellite Wind Speed (CPVs17):**



Satellites: QuikScat and ASCAT Scaterometer
 Spacial resolution: 0.25°
 Period time: October 1999 to december 2017.
 Frequency: 5 days
 Latitude: 0° to 22°S
 Longitude: 85° to 70°W
 Front off the coast: 0 a 200 Km.

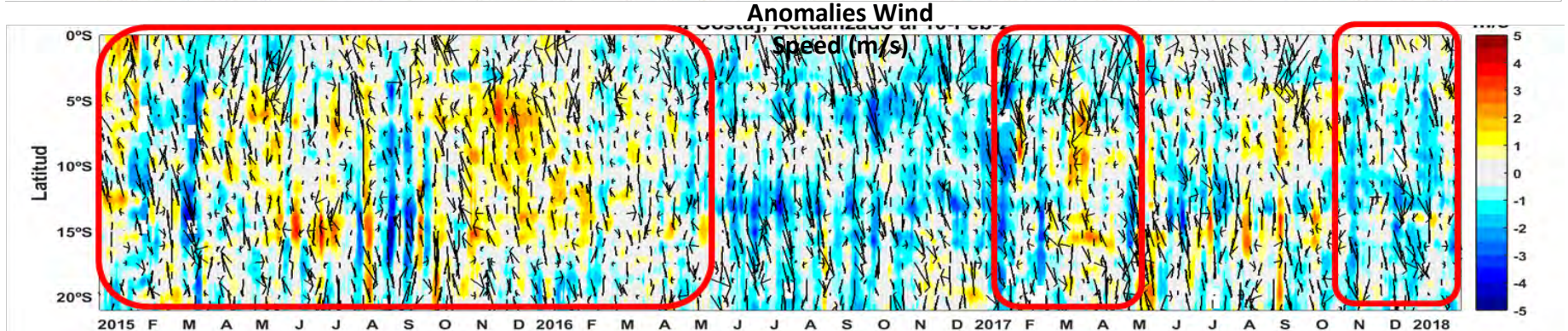
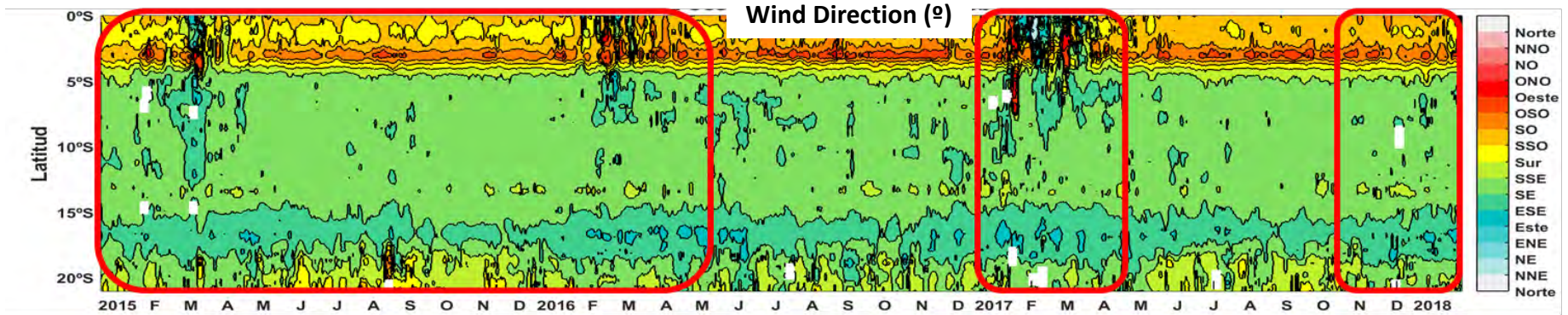
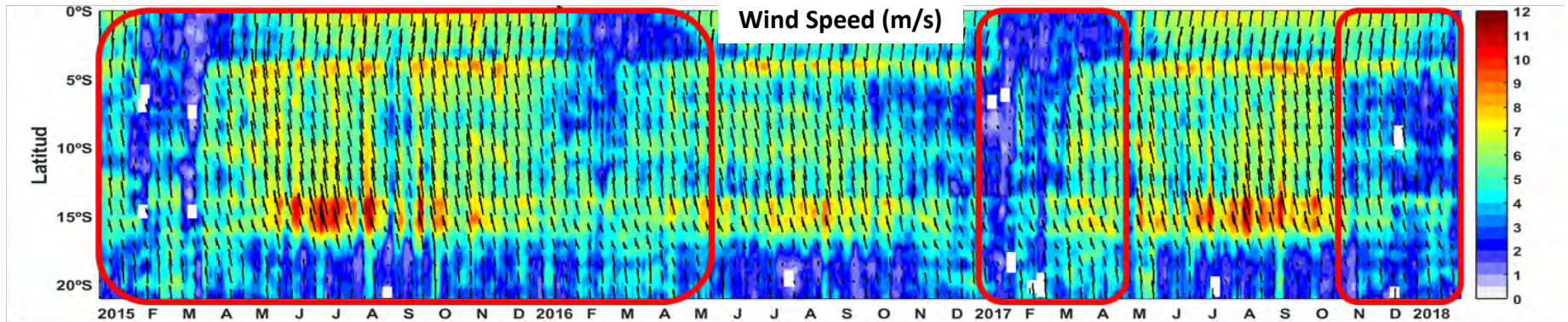
Pentadal climatology (5 days) of wind speed from satellite information (QuikSCAT (19999 - 2008) and ASCAT (2009 - 2017))

MONITORING THE CONDITIONS OF WIND OFF PERU, 2015 - 2017

Moderate El Niño 2015/2016

The coast El Niño 2017

La Niña 2018

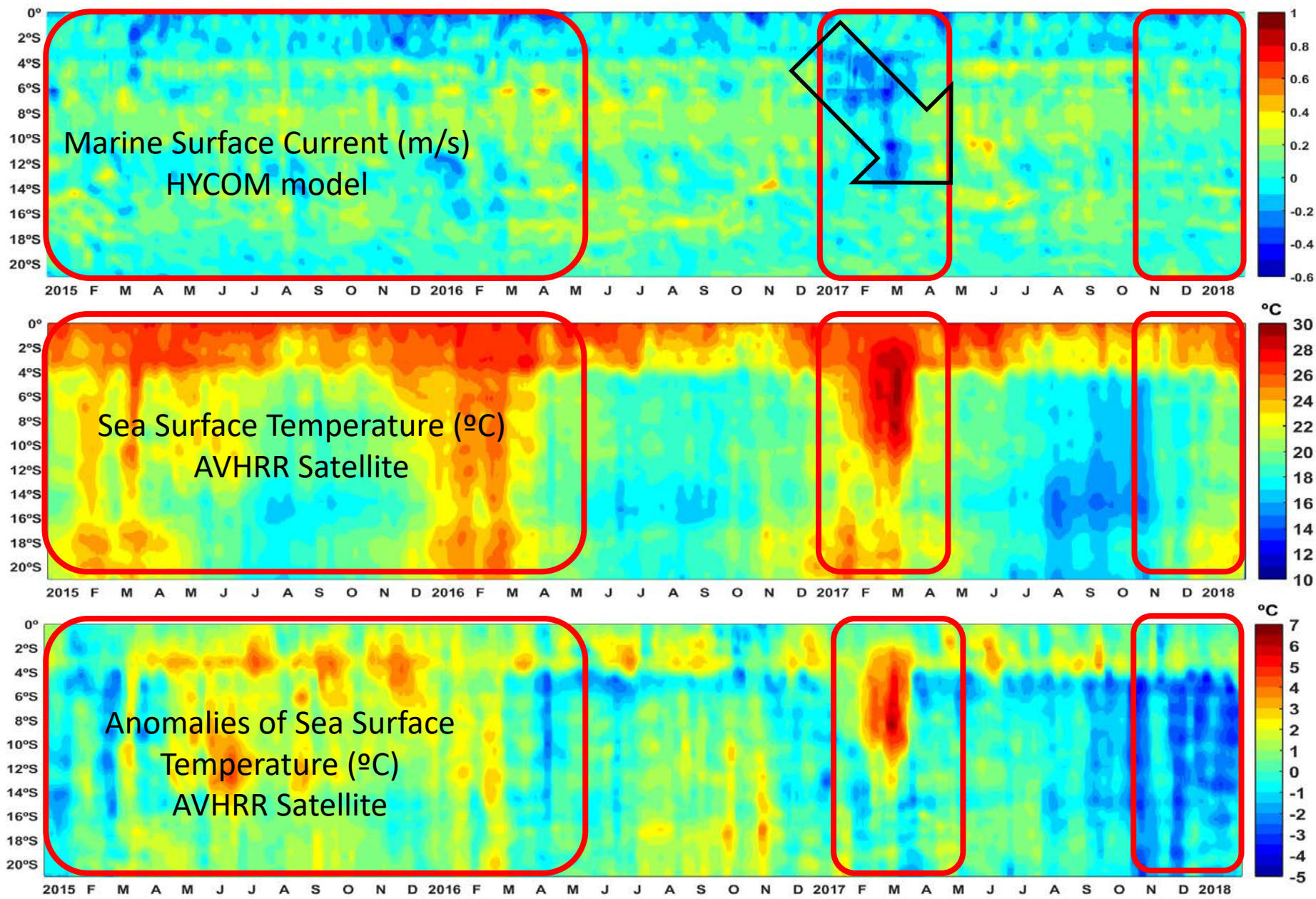


MONITORING THE CONDITIONS MARINE CURRENT AND TEMPERATURE OFF PERU, 2015 - 2017

Moderate El Niño 2015 - 2016

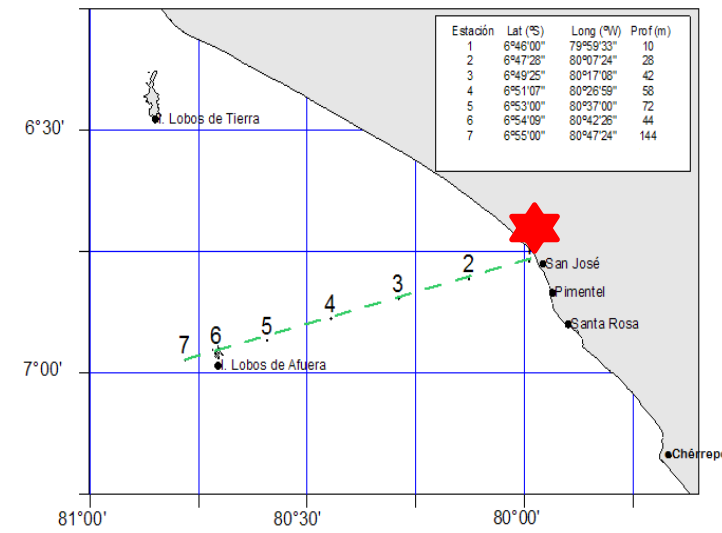
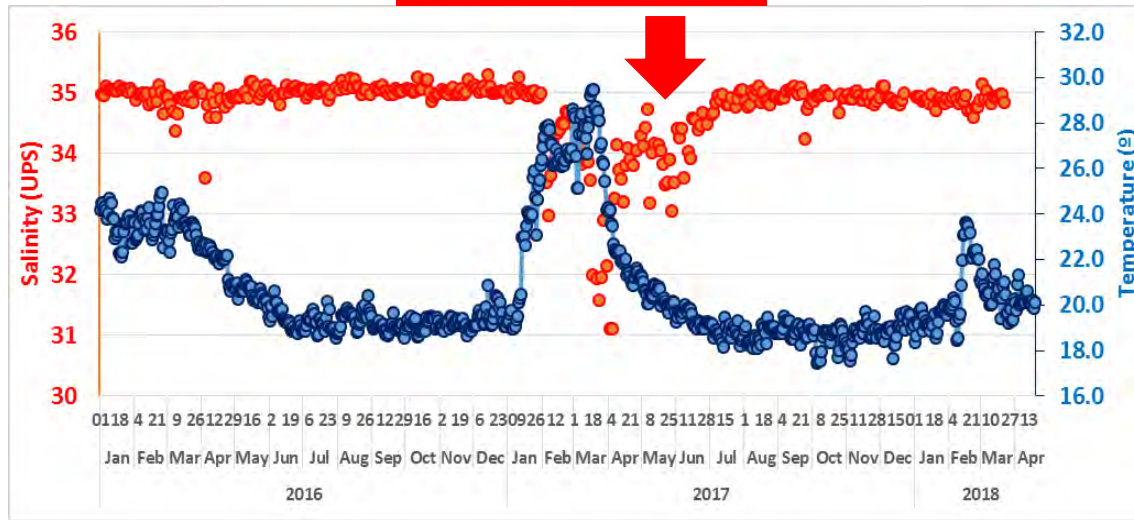
The coastal El Niño 2017

La Niña 2018

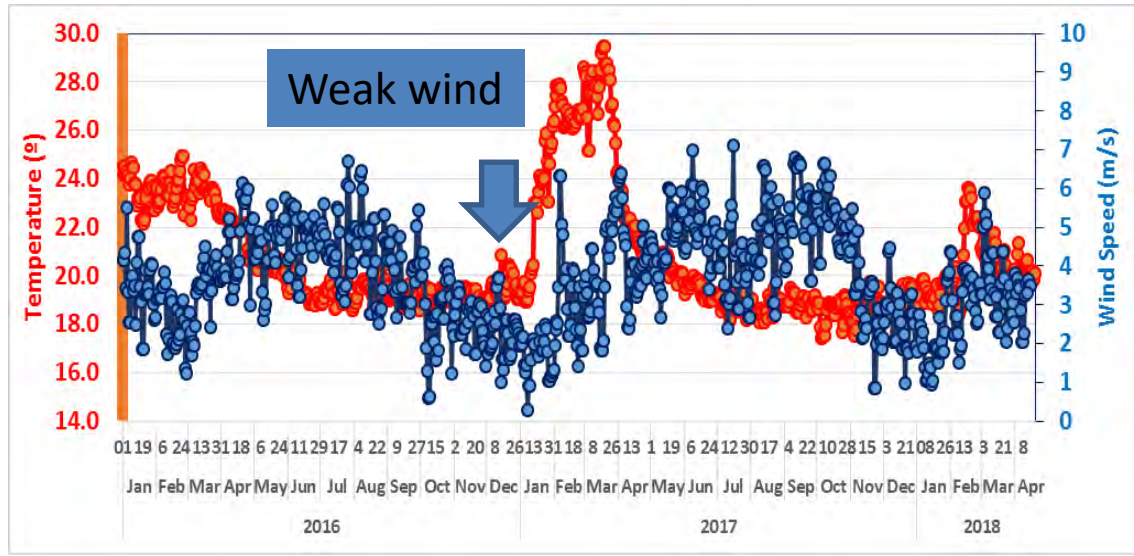


THE LOCAL ENVIRONMENTAL CONDITIONS AT LAMBAYEQUE

Input water river



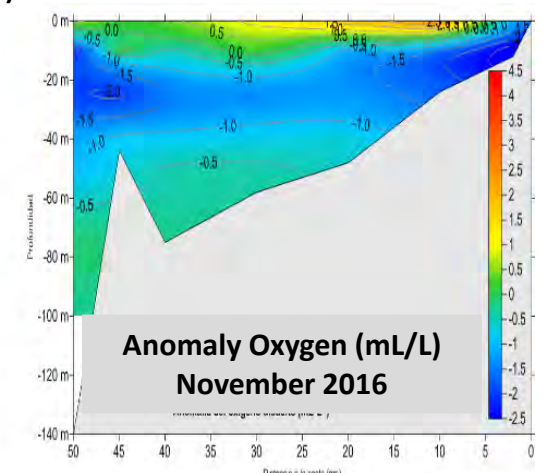
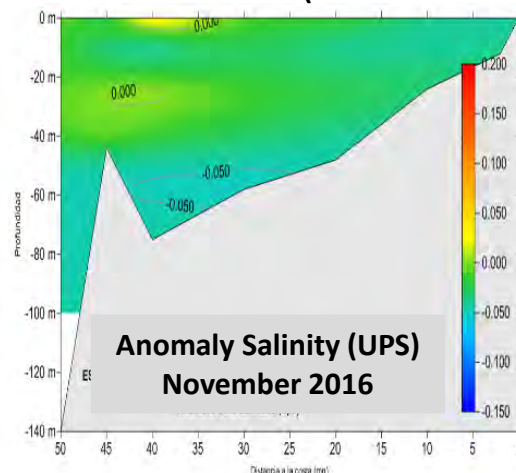
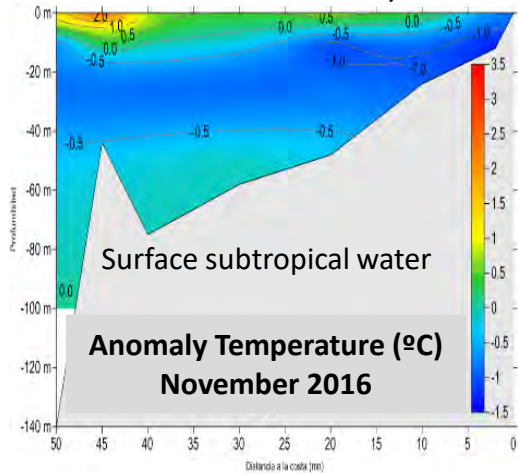
Coast Laboratory of Santa Rosa (IMARPE)
(Latitude: 06°46'15"S; Longitude: 79°58'00"W)



- ✓ There was weak wind from October 2016 until March 2017.
- ✓ The Sea surface temperature reached near to 30 degrees.
- ✓ The salinity decreases due to the contribution of the rivers and the rains on the coast.
- ✓ microalgal produced Harmful Algal Blooms (HABs), by the dinoflagellate *Ceratium fusus* species classified as non-toxic.

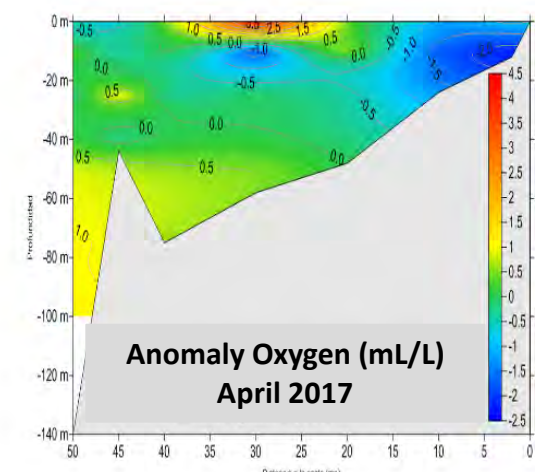
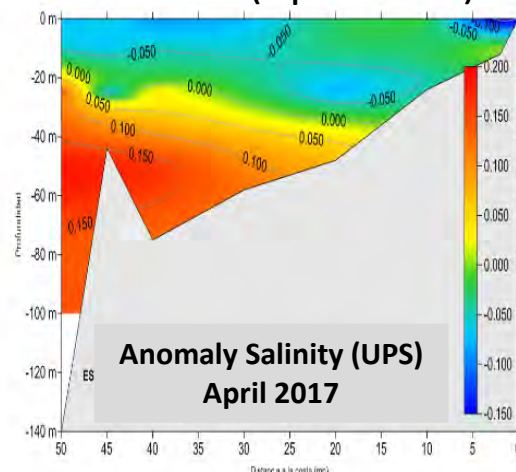
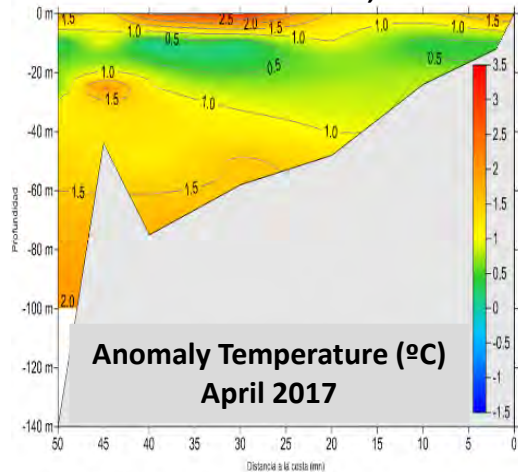
THE LOCAL ENVIRONMENTAL CONDITIONS FRONT LAMBAYEQUE

Normal Condition, Before The Coastal El Niño (November 2016)



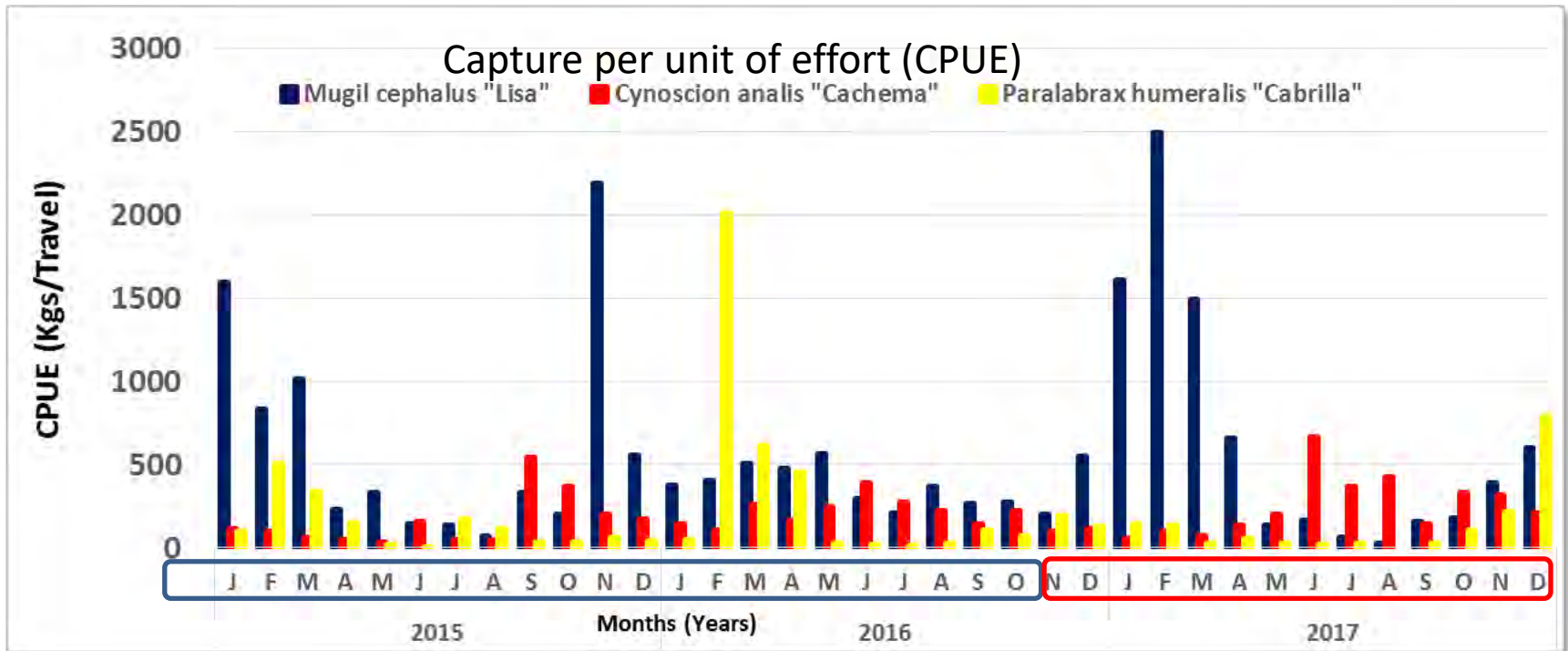
The vertical section show conditions of temperature (± 0.5 °C), salinity (> -0.05 UPS), oxygen (< -0.5 mL/L) anomalies.

Warm Condition, After The Coastal El Niño (April 2017)



The vertical section show conditions of temperature ($>+ 1.0$ °C), salinity (> 0.10 UPS), oxygen ($>+1.0$ mL/L) anomalies, these conditions were in decline of "the coast El Niño" condition.

ARTISANAL FISHERY OFF LAMBAYEQUE 2015 - 2017



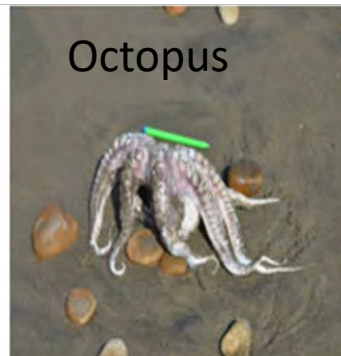
Capture per Unit Effort (Kgs /travel)				
Years	Month	Lisa	Cachema	Cabrilla
2016	December	549	115	132
2017	January	1606	57	144
	February	2498	98	136
	March	1492	75	29
	April	662	139	60



MARINE FAUNA STRANDED IN LAMBAYEQUE, FEBRUARY AND MARCH 2017

Marine fauna stranded between Zaña river and San José city (march, 2017)

Species	Scientific Name	Live	Dead	TOTAL
Guanay	Phalacrocorax bougainvillii	36	9	45
Pelicano	Pelecanus thagus	3	3	6
Gaviota	Larus dominicanus		1	1
Cuervo de mar	Phalacrocorax sp.		1	1
Camamay	Sula nebouxi		1	1
		39	15	54



Summary

- The rapid changes in marine conditions during the coastal El Niño 2017 produced impacts on marine fauna (fish, mammals, birds, algae).
- “The Coast El Niño” (January at April 2017), there were weak wind <3.0 m/s and sea surface temperatures that reached thermal anomalies of + 7 ° C.
- The capture of *Mugil cephalus* “lisa” (2490 kgs/travel, February 2017) was much high that reported for the same month in 2016 (404 kgs/travel, other year).
- The captures of *Cynoscion analis* “cachema”, and *Paralabrax humeralis* “were much small that reported for the same period for 2016.

Thank You very much