

Phytoplankton biomass of Baja California coasts (Mexico) evaluated with MODIS–Aqua imagery during a very warm period (February 2014 to May 2015)

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INAPESCA



Baja California Coasts

- ▶ One of the most productive of Mexico
- ▶ Coastal Upwelling along the Western Coast
- ▶ High productivity in the middle of Gulf of California and near of the Colorado River Delta
- ▶ Very high temperature during 2014 over Pacific Ocean
- ▶ ¿What happened in Baja California Coasts?

- ▶ MODIS–Aqua Imagery
- ▶ GIOVANNI–NASA Database
- ▶ Transect parallel to coastline (10 km)
- ▶ Chla, NSST, FLH, CDOM
- ▶ Statistical analysis
- ▶ Comparison with ENSO conditions

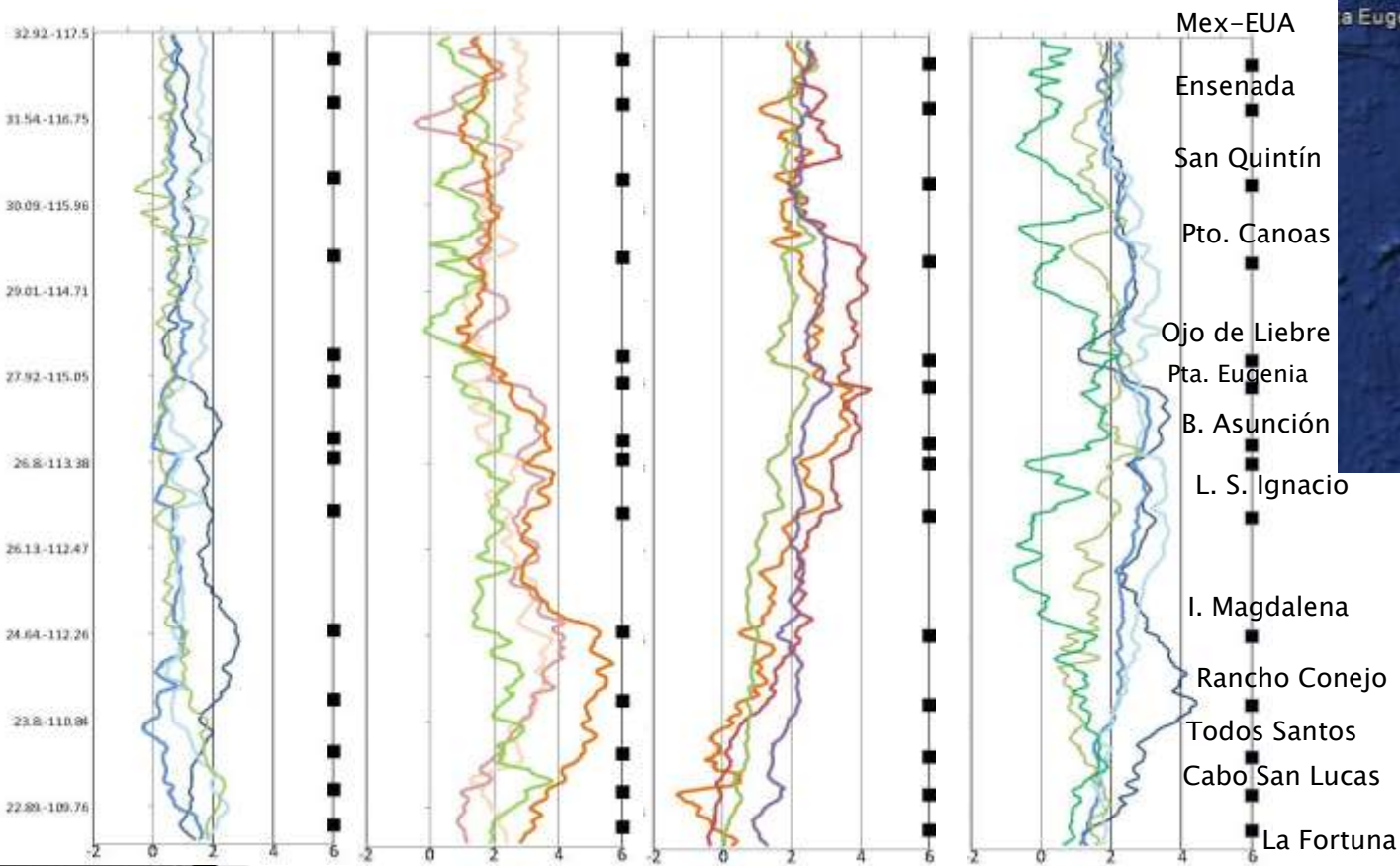
E Niño moderate: mayo 2002–marzo 2003
 junio 2009–mayo 2010
 enero 2015–

El Niños weak: junio 2004–mayo 2005
 agosto 2006–febrero 2007

La Niña moderate: julio 2007– julio 2008
 junio 2010– abril 2011
 julio 2011 –abril 2012

Thermal Anomalies

Jan-Apr 2014 May-Aug Sept-Dec Jan-May 2015



Thermal Anomalies (El Niño)

WCBC

Jan–May

Thermal anomalies (TA) of
2014 were similar to
moderate El Niño

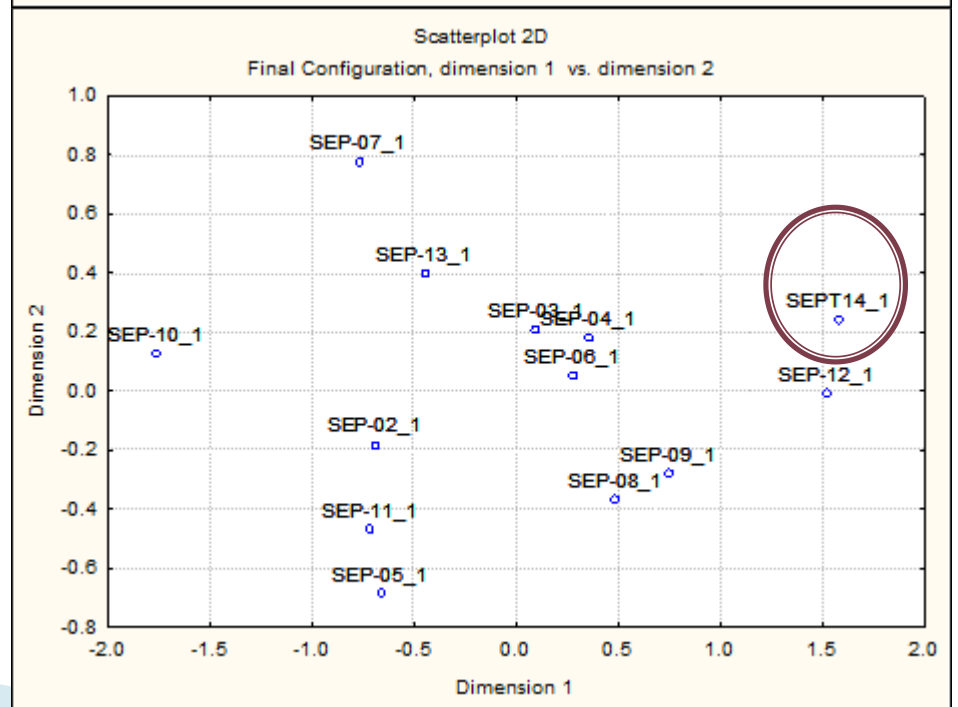
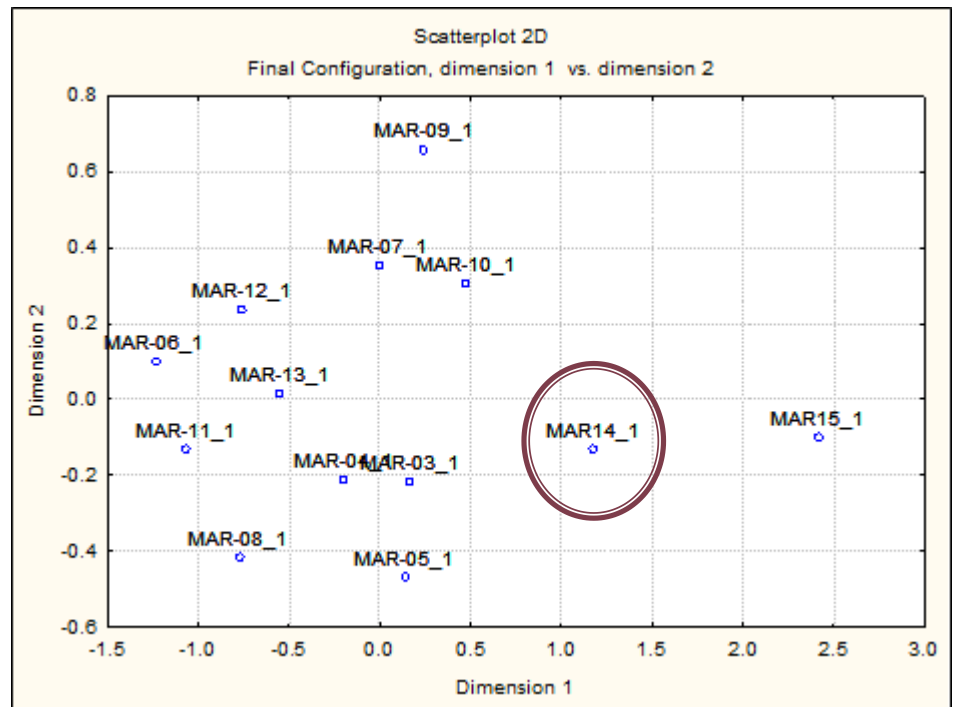
Analysis includes 2015

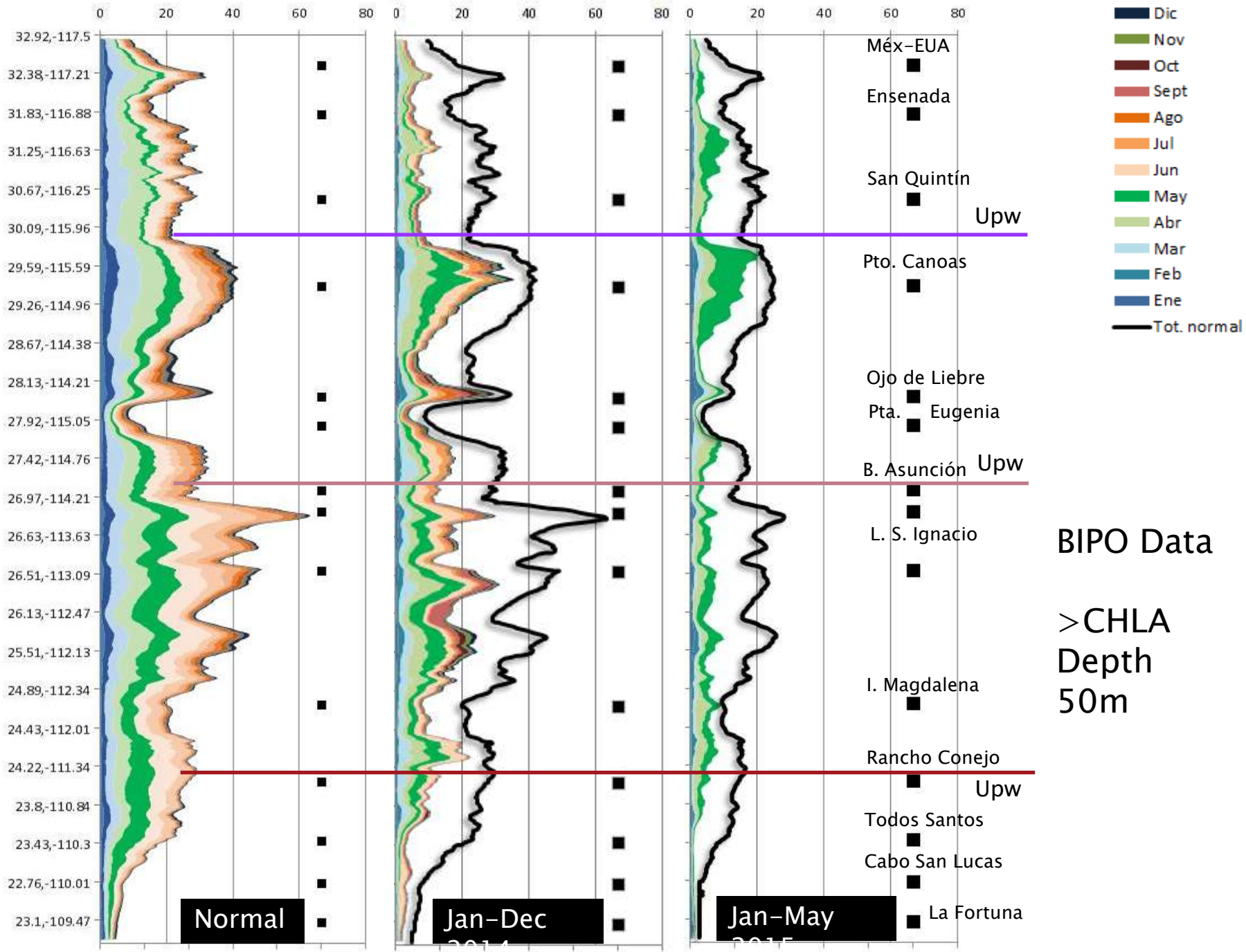
2015 NSST values > 13 years

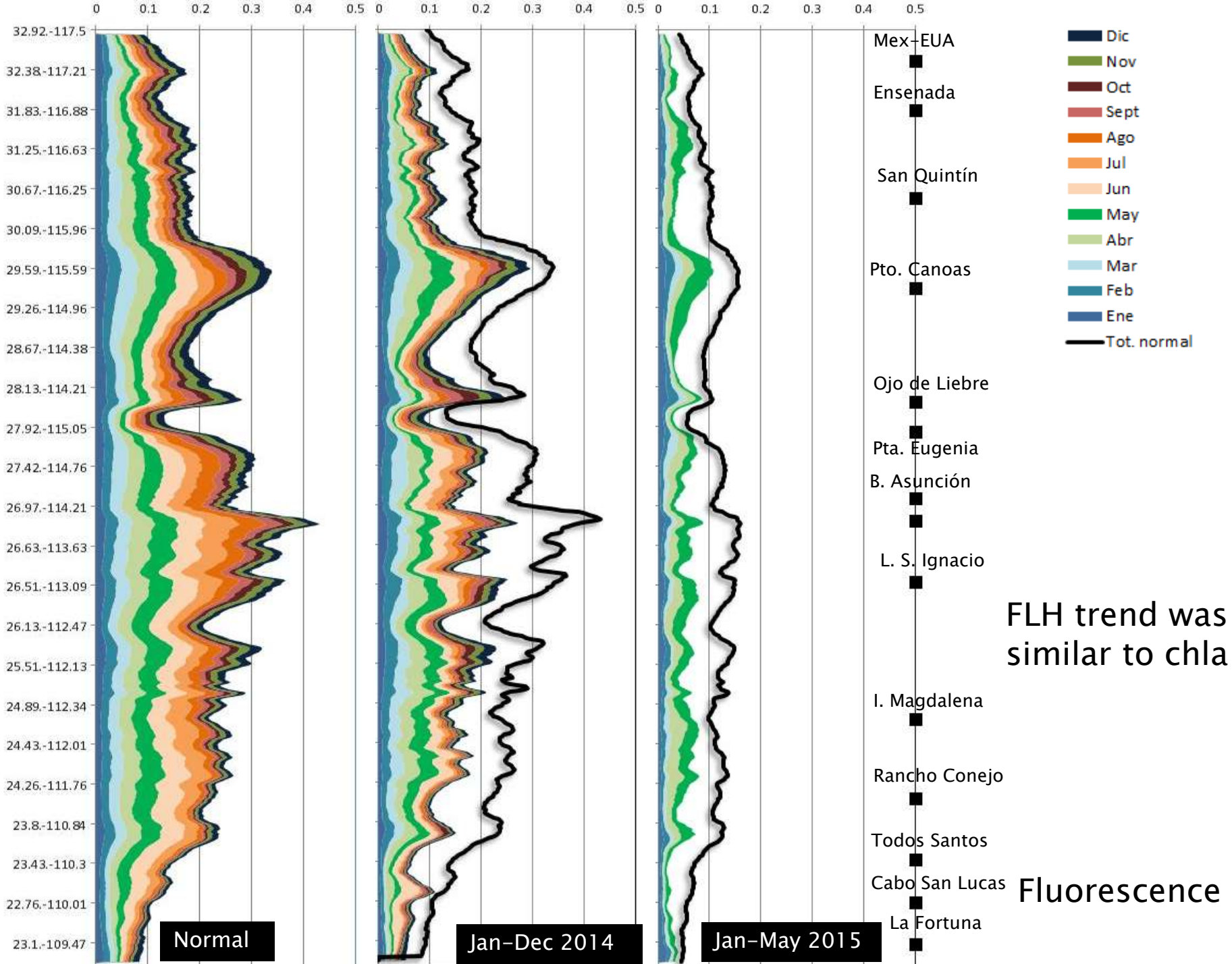
June–December

TA were greater than
moderate and weak El Niño

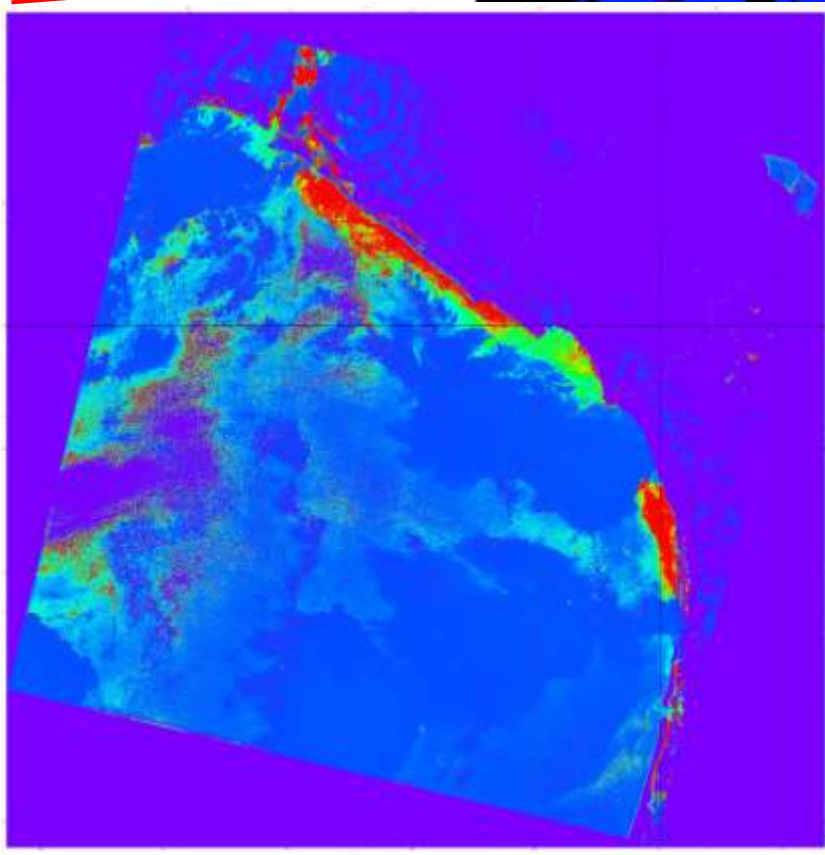
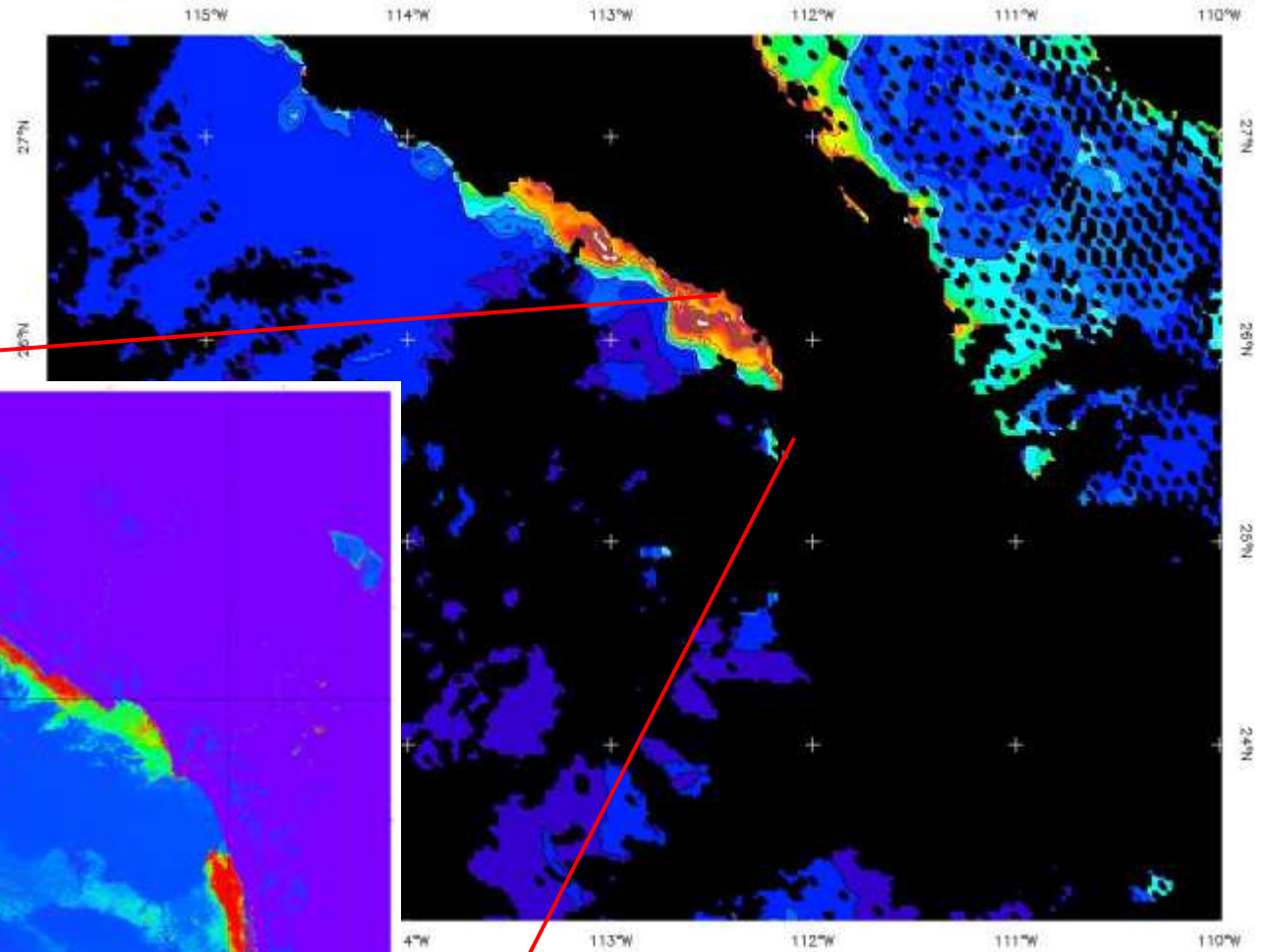
Analysis doesn't include 2015







Sept 19
 After the pass of
Odile
 SS+chl a

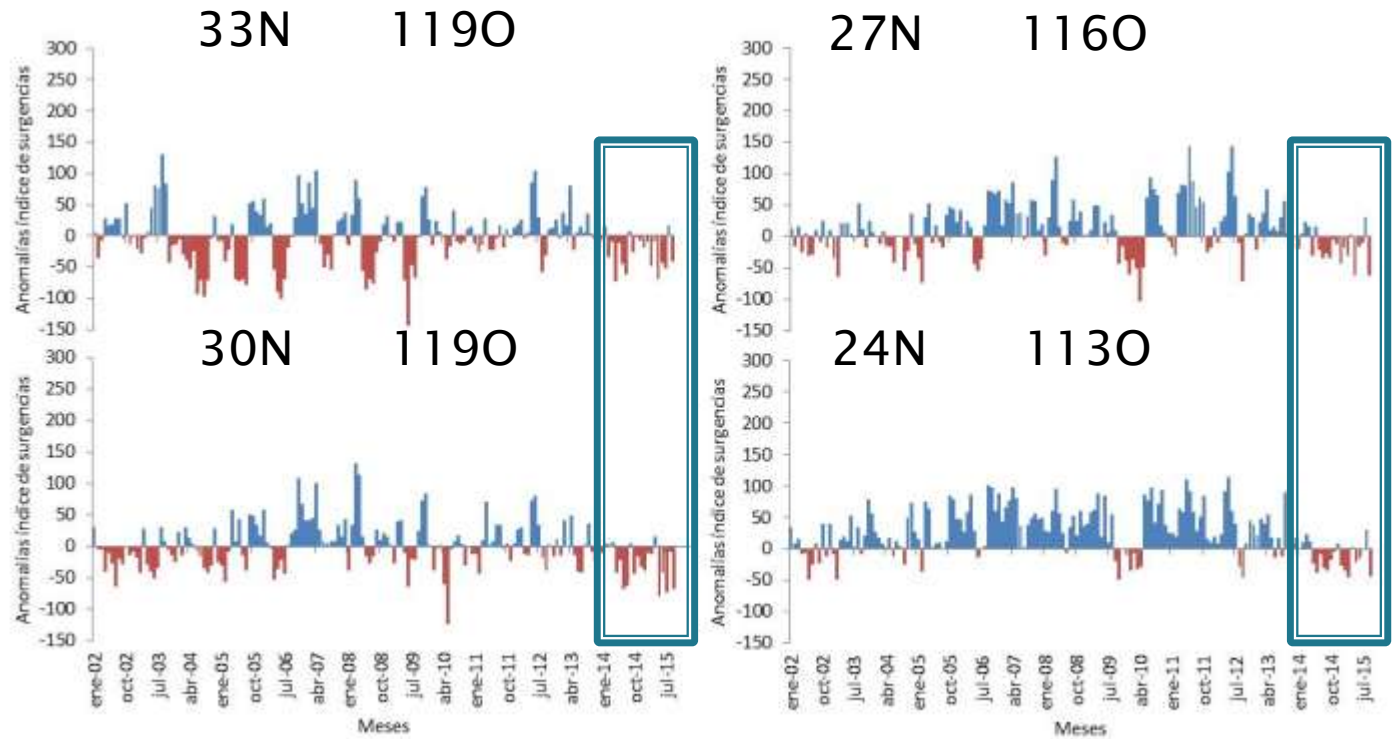


MODIS-Aqua
 ERDAPP (0.0125 °)

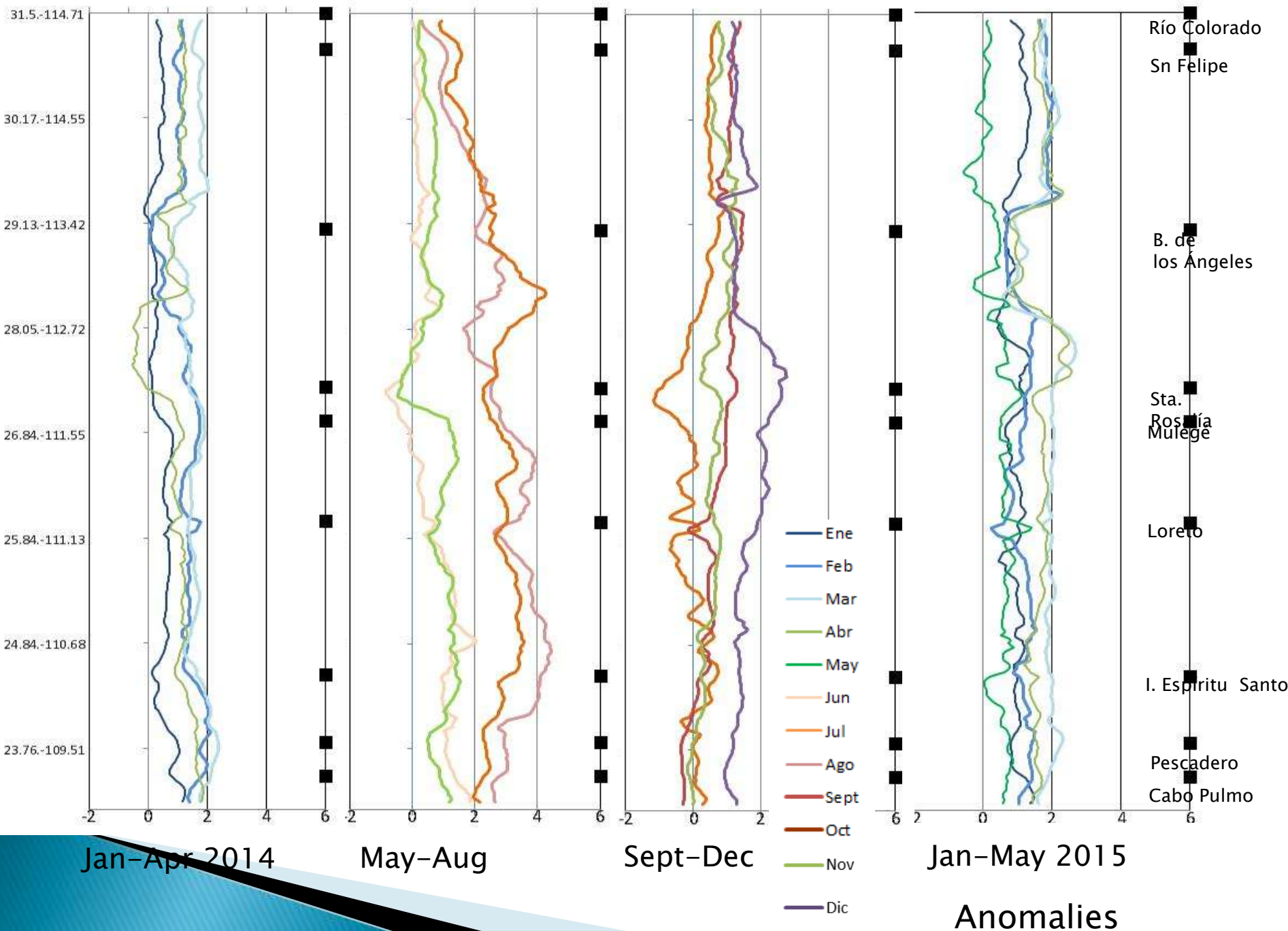
Landsat 8

$$SS\left(\frac{mg}{l}\right) = 131.55 * R\left(\frac{pband4}{pband2}\right)^2 - 94.335 * R\left(\frac{pband4}{pband2}\right)^2 + 18.838$$

Upwelling index: WCBC anomalies



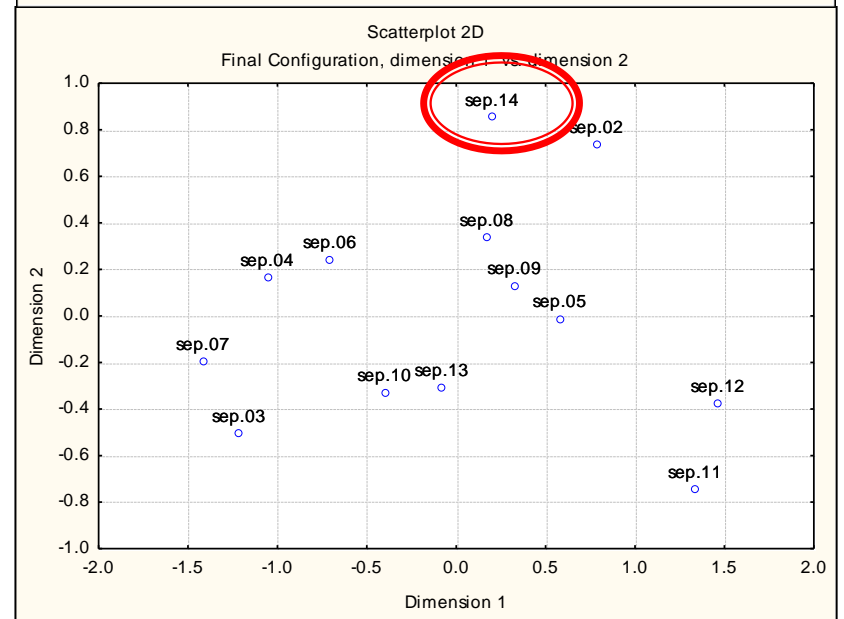
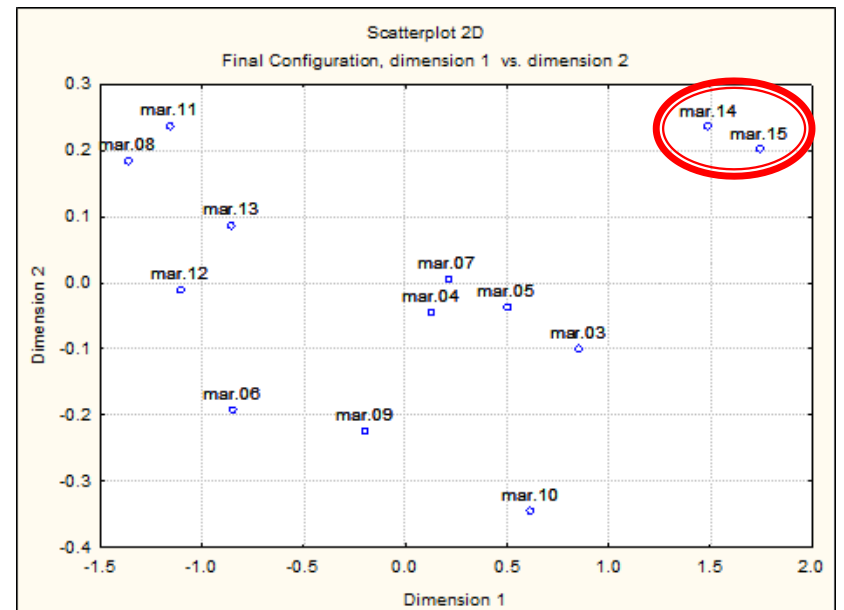
Coastal upwelling were weaker during 2014, than in other years

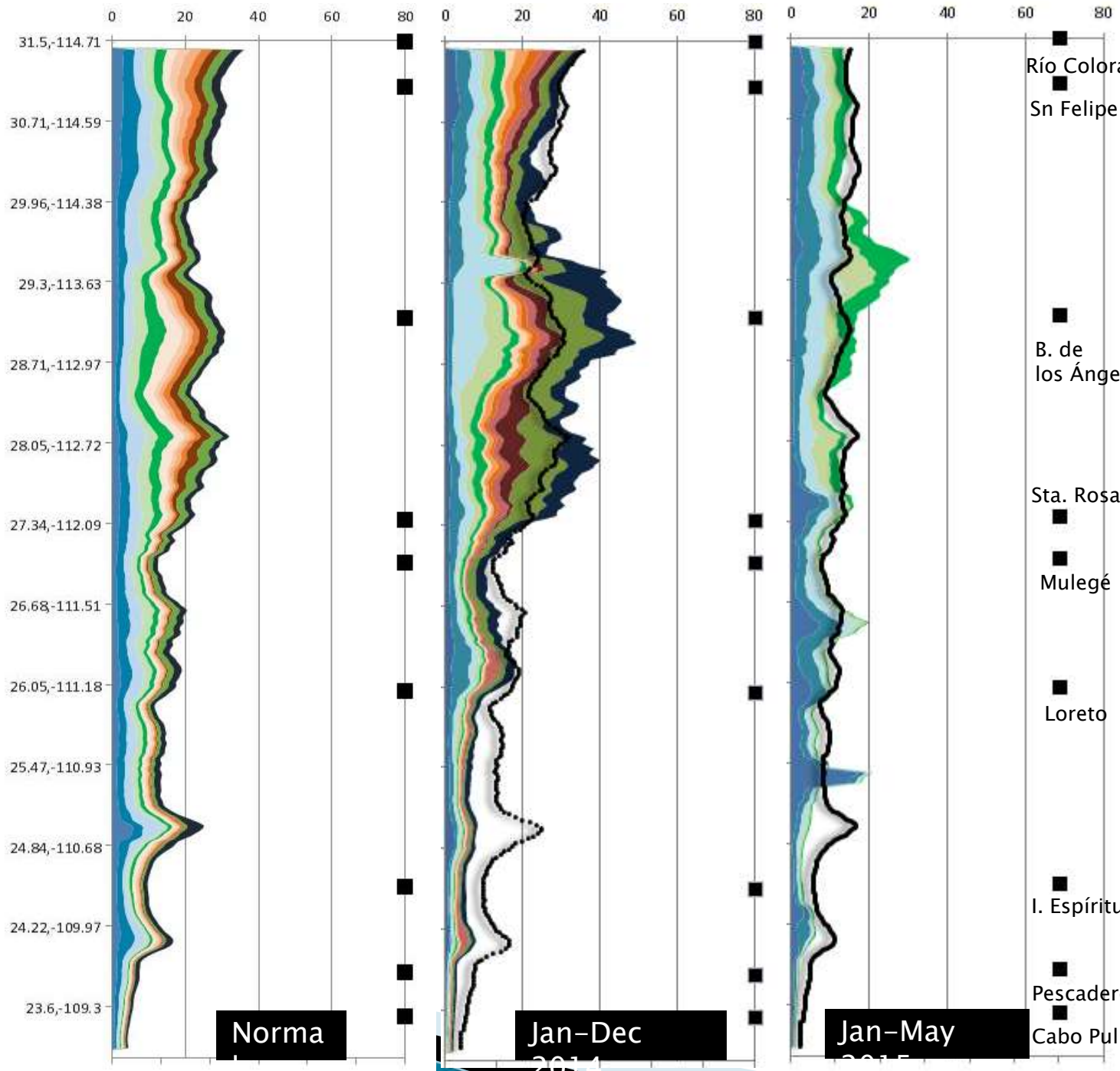


ECBC

Jan–May 2014
Thermal anomalies (TA)
were similar to moderate
El Niño
Analysis includes 2015

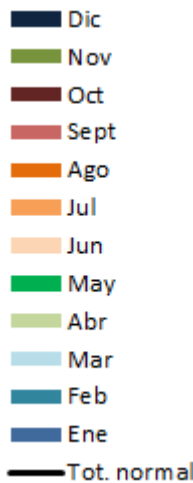
June–December 2014
TA were greater since
2002 (including El Niño
years)
Analysis doesn't include
2015

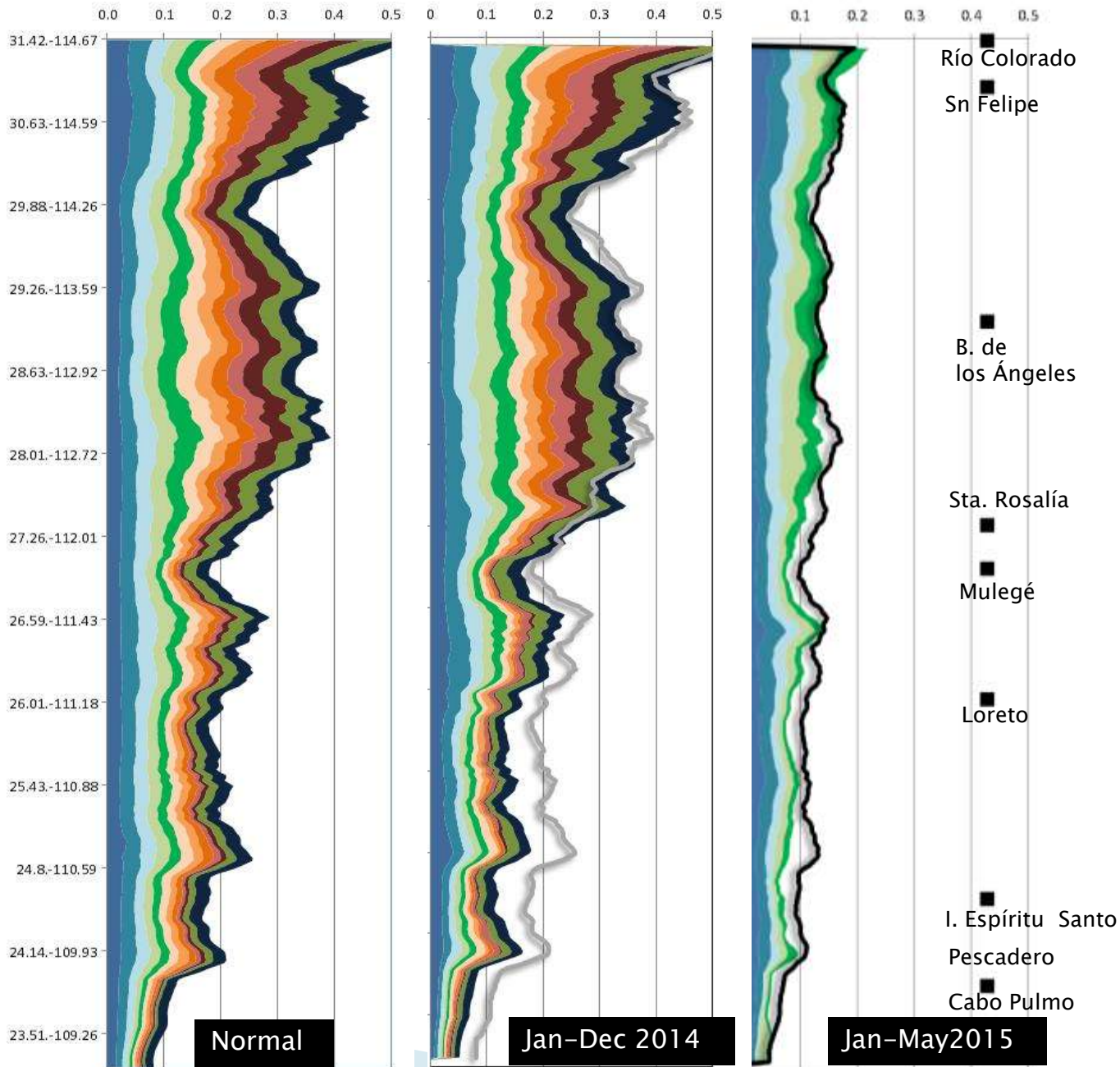




- Río Colorado
- Sn Felipe
- B. de los Ángeles
- Sta. Rosalía
- Mulegé
- Loreto
- I. Espíritu Santo
- Pescadero
- Cabo Pulmo

HAB (Saxitoxin
-paralytic
shellfish toxin)
Jan-May





Normal

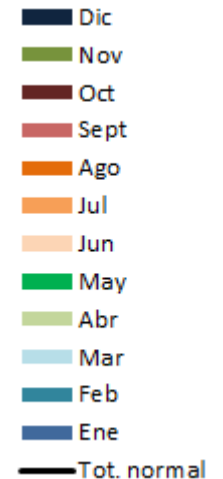
Jan-Dec 2014

Jan-May 2015

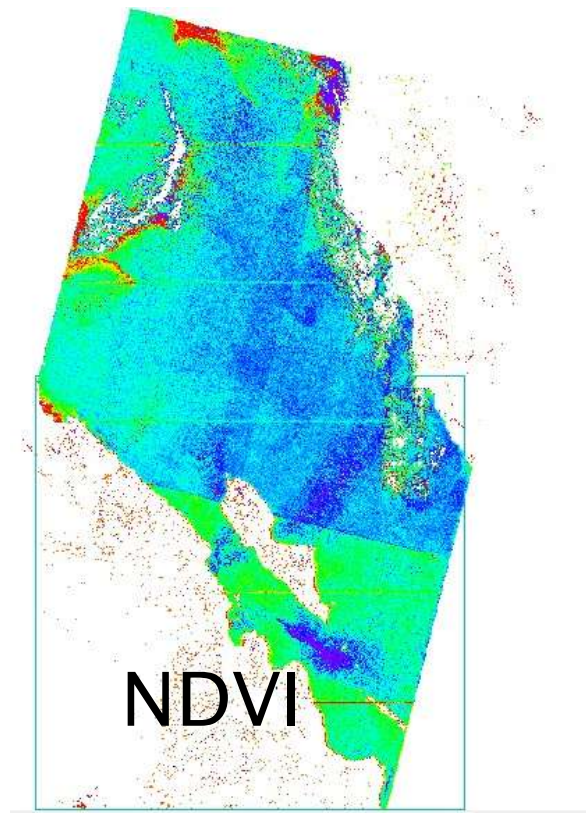
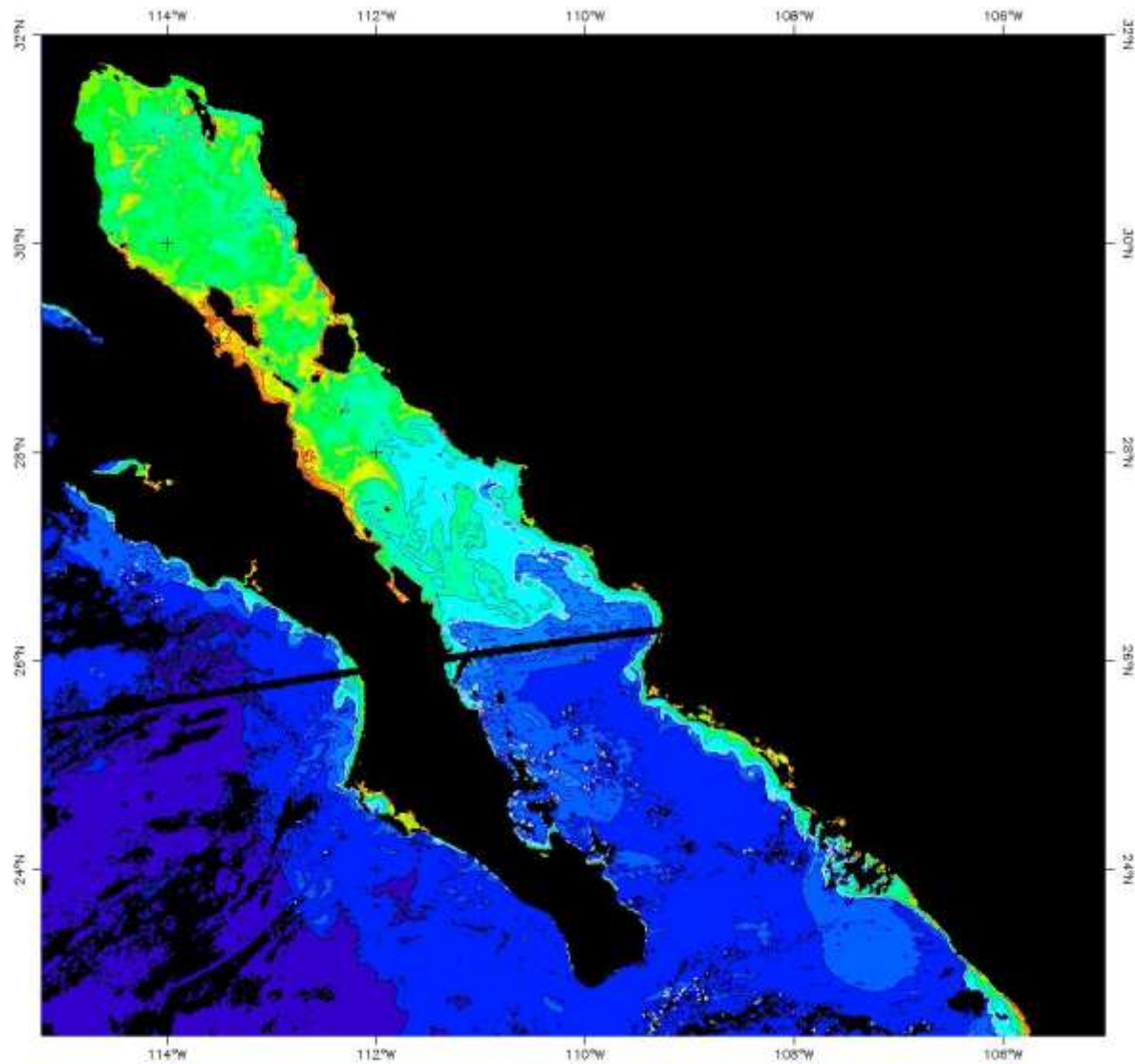
FLH

HAB
 JAN-MAY 2015
 (Saxitoxin -
 paralytic
 shellfish toxin)

*Gymnodinium
 catenatum*
 CICESE UABC
 11 648 birds
 190 marine
 mammals



MODIS-Aqua



Landsat-8

November 12



Conclusions

TEMPERATURE

CHLOROPHYLL-A

WCBC	NSST was higher during June and July of 2014, specially southward of Punta Eugenia (Ulloa Gulf). SST very high during 2015.	Concentrations were lower than normal Upwelling intensity has diminished since 2014.
WEBC	NSST was higher since San Luis Gonzaga until Mulegé. June–July 2014 were very warm	Concentrations have been high over the same zone were T°C was high; harmful algae blooms (Jan–Apr 2015).

