

LINKING CLIMATE AND ECOSYSTEM CHANGE IN THE SOUTHERN CALIFORNIA CURRENT

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OBJECTIVE:

Explore links between interannual and decadal climate variability and the changes in the state of the pelagic ecosystem in the California Current System off Baja California.

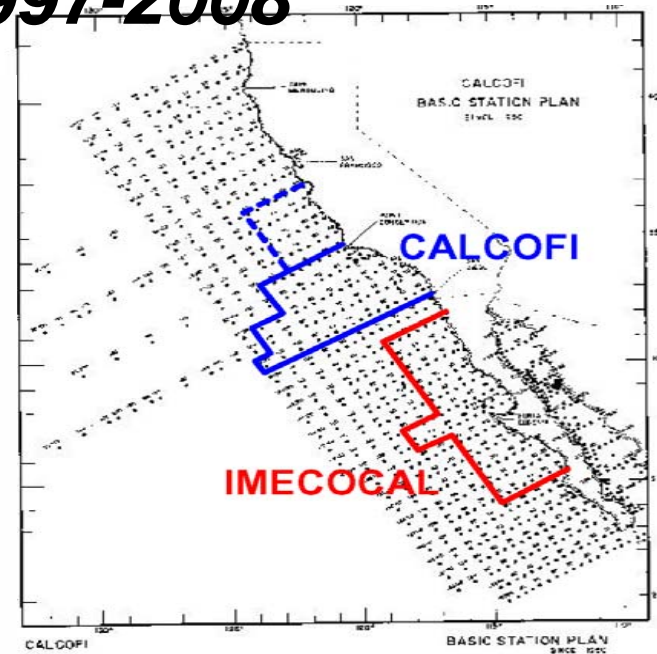
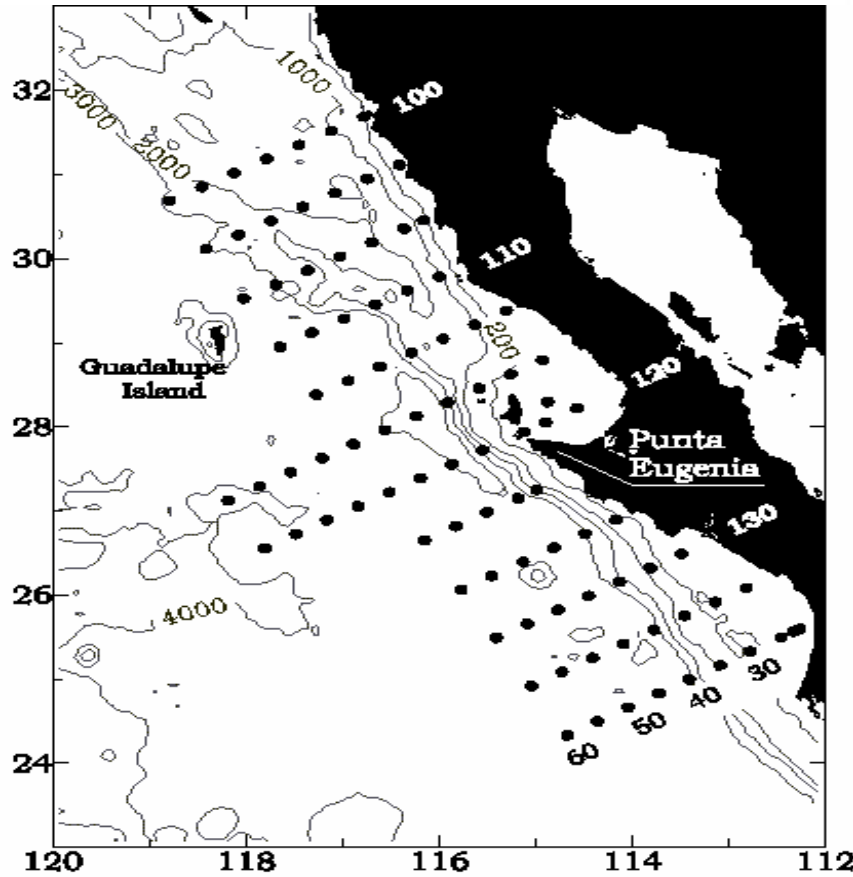
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APPROACH:

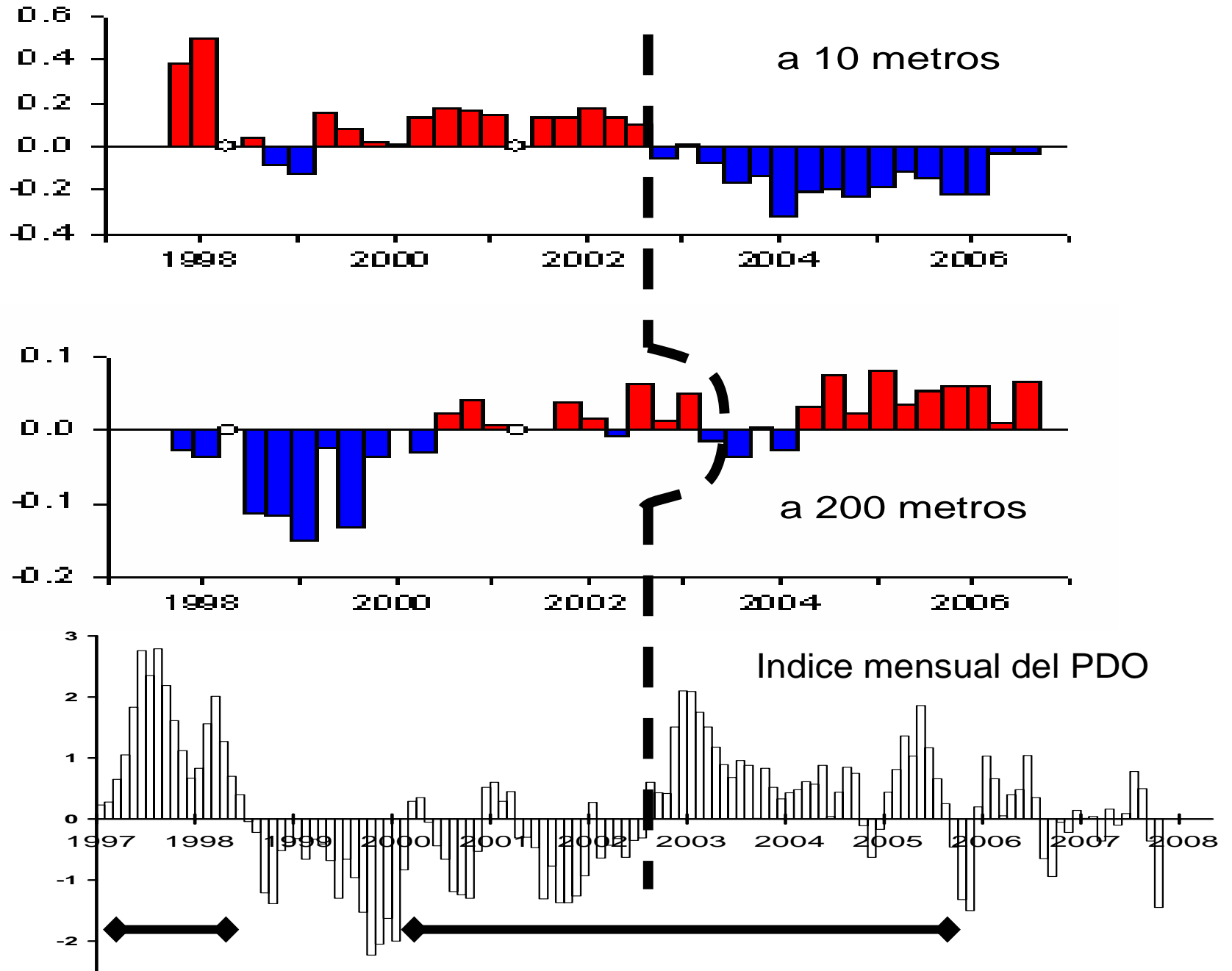
Compare and contrast the ecosystem changes associated with the period of the strong El Niño and La Niña during 1997-1999 with the period of more moderate but prolonged cooling and warming from 2000 through 2005.

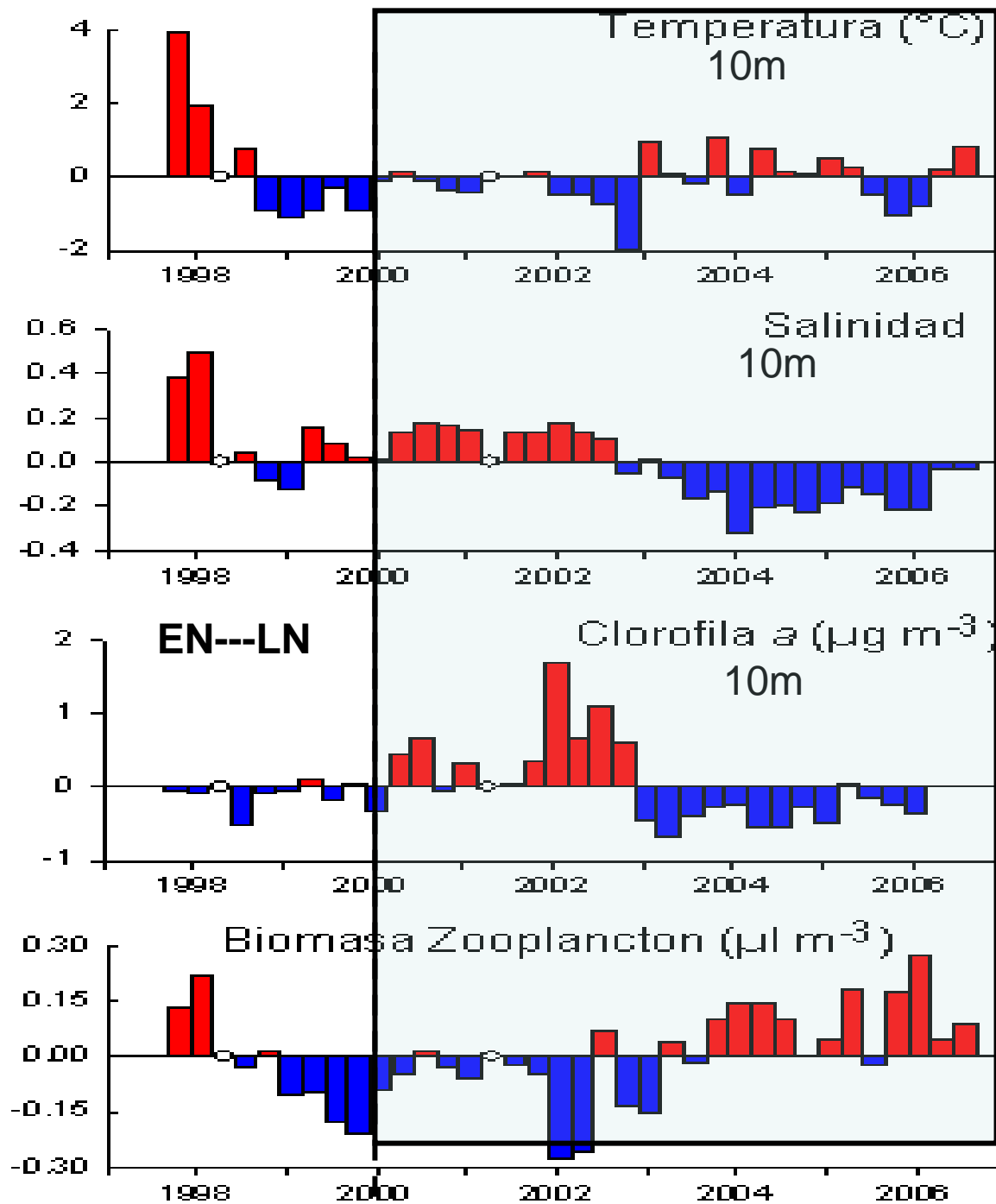
Ecosystem Indicators are taken from data collected during the past 10 years of ocean monitoring by the IMECOCAL program off Baja California.

IMECOCAL 1997-2008



Anomalías estacionales de salinidad





**Leading indicators
of change in
physical and
biological state
of pelagic
ecosystem –
from quarterly
IMECOCAL
cruises
1997 – 2006.**

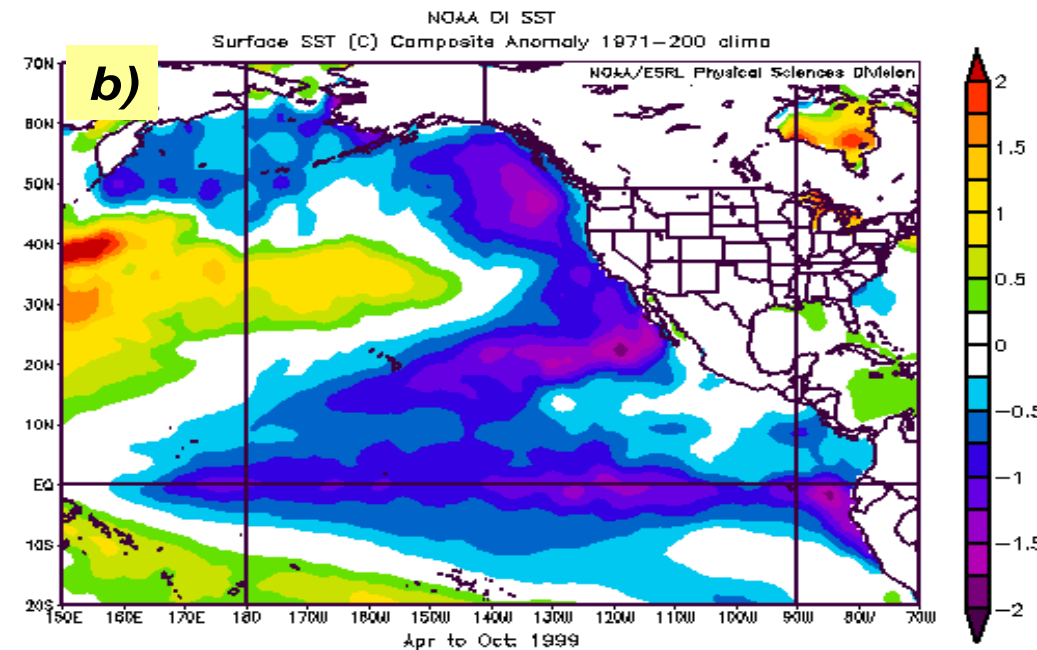
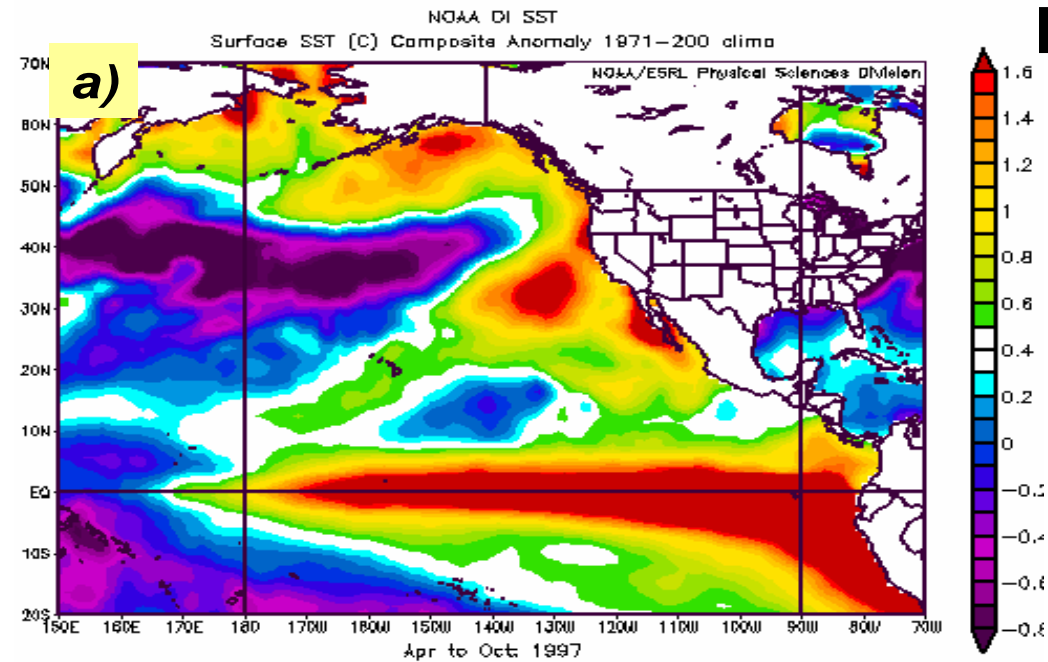
Anomalies

El Niño – La Niña 1997-1999

Ocean Climate Patterns

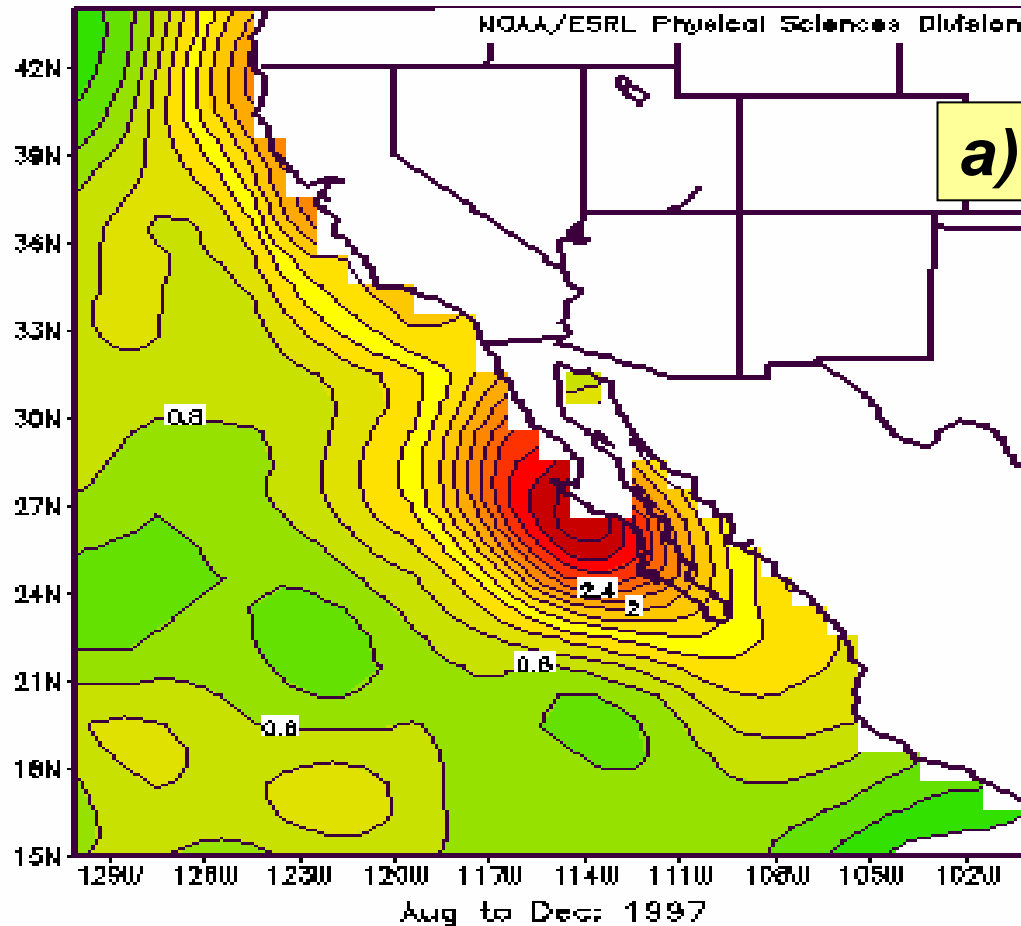
Development of SST anomaly during the 1997-98 El Niño (abr-oct 1997)

Data from NOAA-CDC website

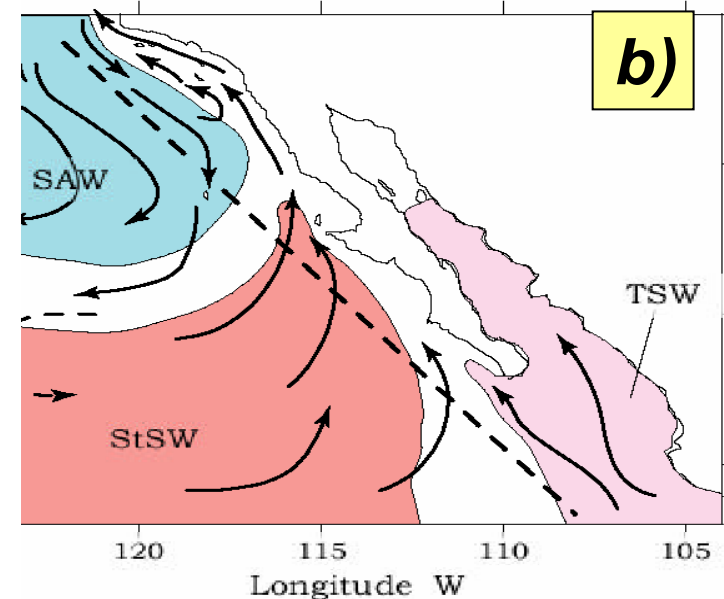


Development of SST anomaly during the 1998-99 La Niña (abr-oct 1999)

Data from NOAA-CDC website

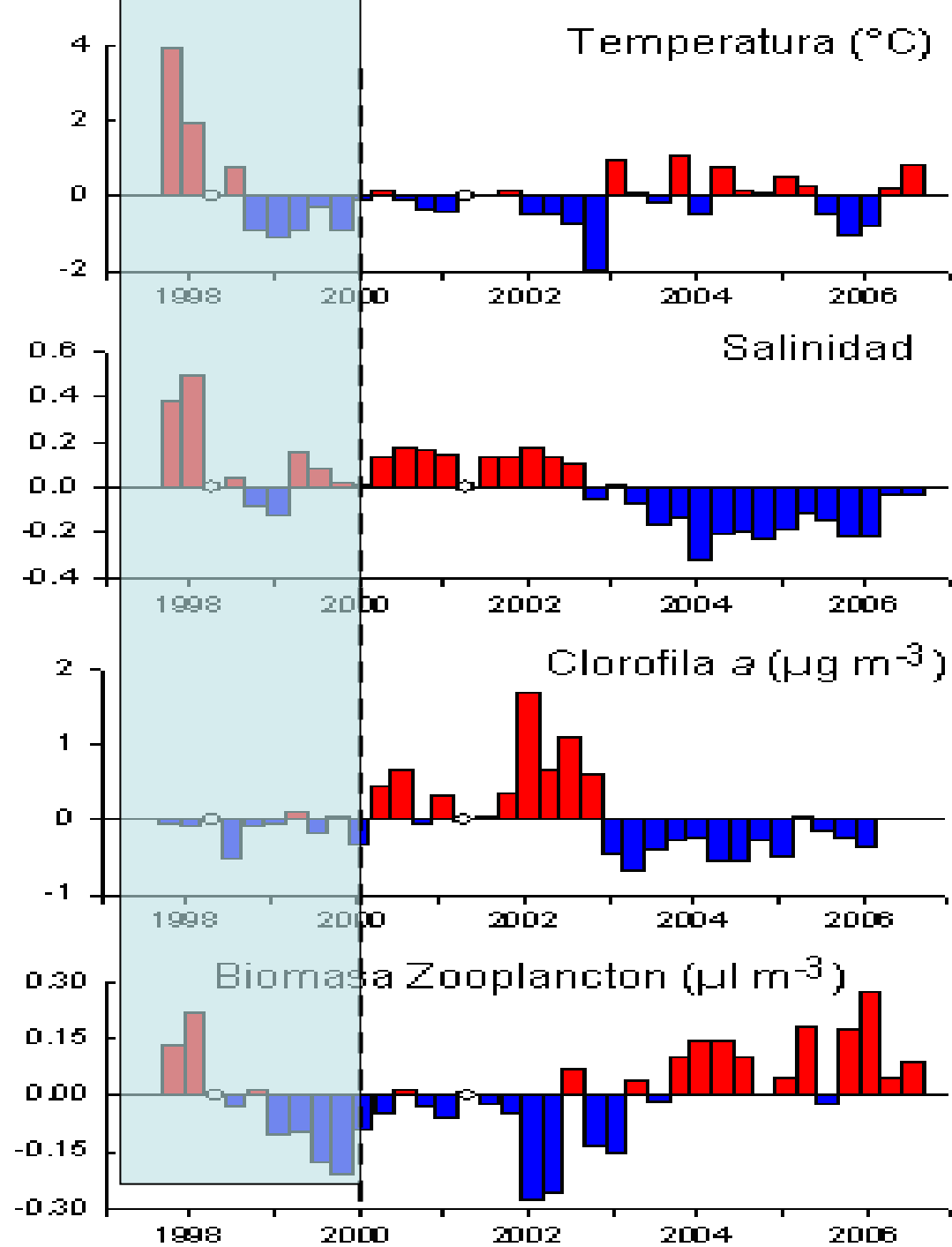


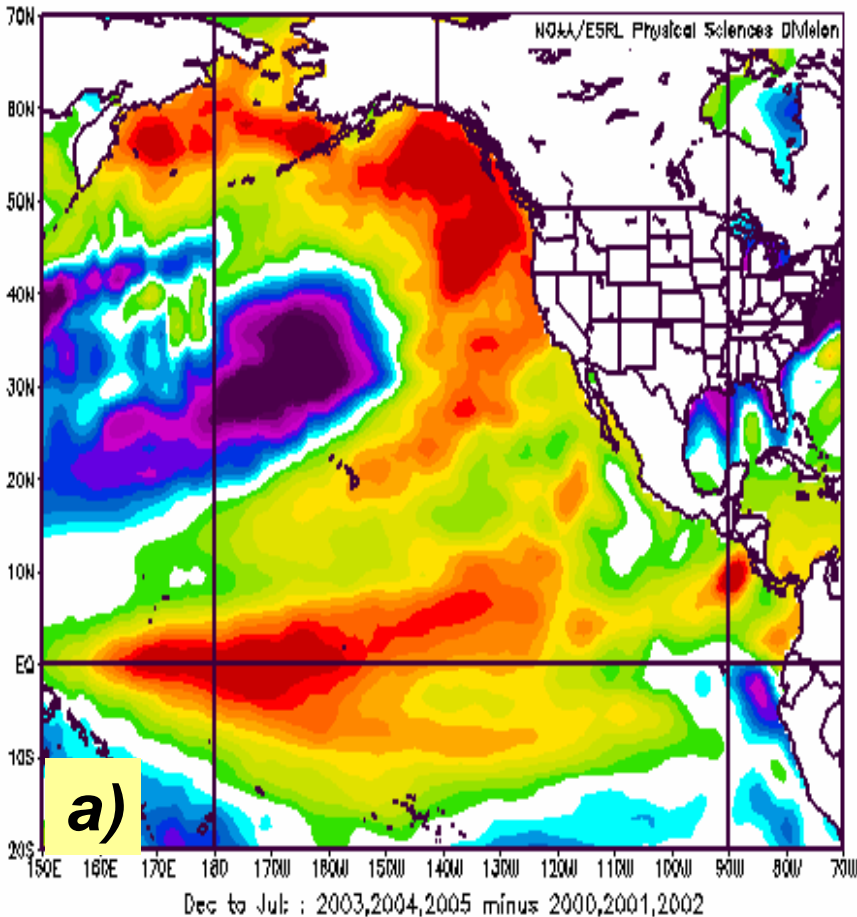
**Possible mechanism
for amplification of the warm
anomaly centered off Baja
California during 1997-98 El
Niño**



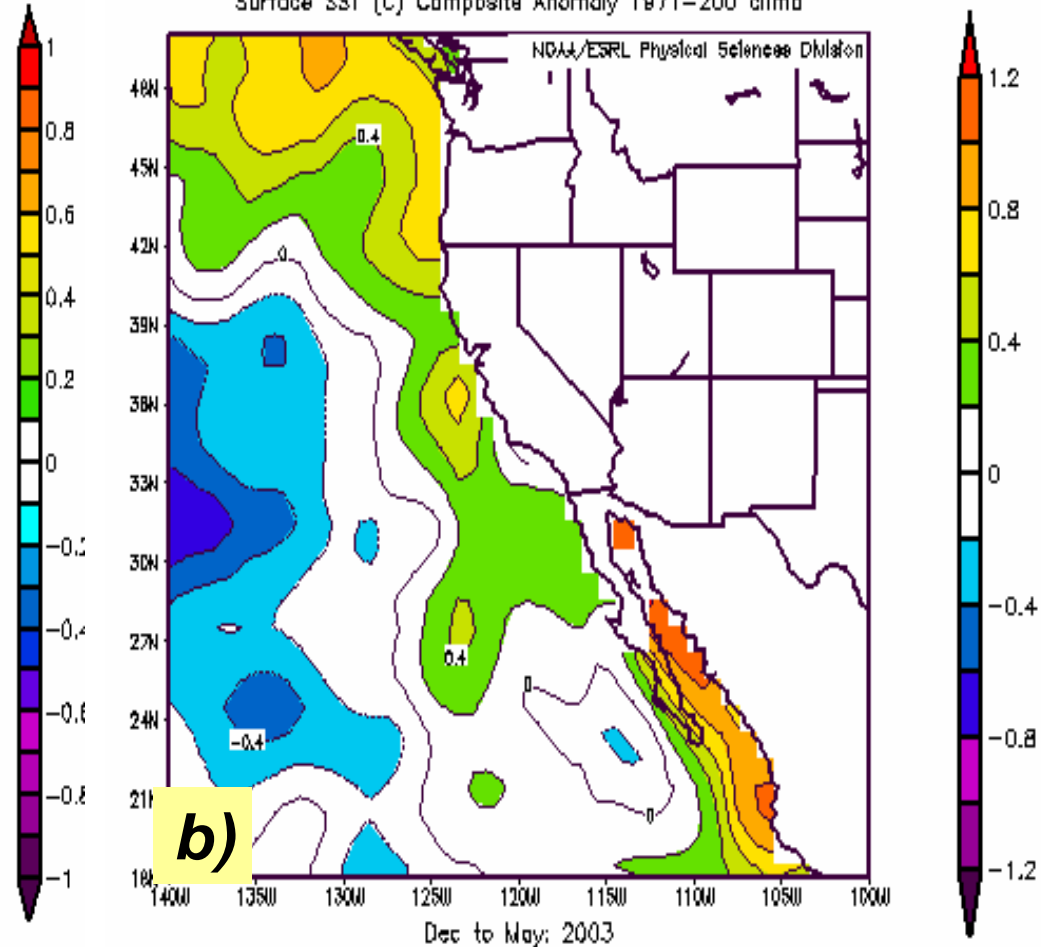
**a) Development of warm anomaly centered off Baja California
(Aug-Dec. 1997) and**

**b) Process proposed by Durazo and Baumgartner (2002) to explain water mass
distributions observed in Oct. 1997 and Jan. 1998: cool-fresh CC Water
displaced by advection and convergence of offshore warm-salty StS Water
towards coast.**





Development of SST anomaly associated with prolonged warming from mid 2002 through 2005 (Dec-July 2003-2005 minus 2000-2002)



Development of SST anomaly in CCS region during El Niño period 2002-2003 (Dec-July)

Changes in California Current during period of 2000-2005 were apparently dominated by shifts in regional wind field that led to large-scale relaxation of coastal upwelling between spring of 2002 and spring of 2003— leading to lowered salinity but generally warmer temperatures (opposite to what occurred during El Niño 1997-98)

LAS 6.5/Ferret 5.81 -- NOAA/PMEL

FERRET Ver. 5.81
NOAA/PMEL TRIP
Jan 28 2008 11:10:12

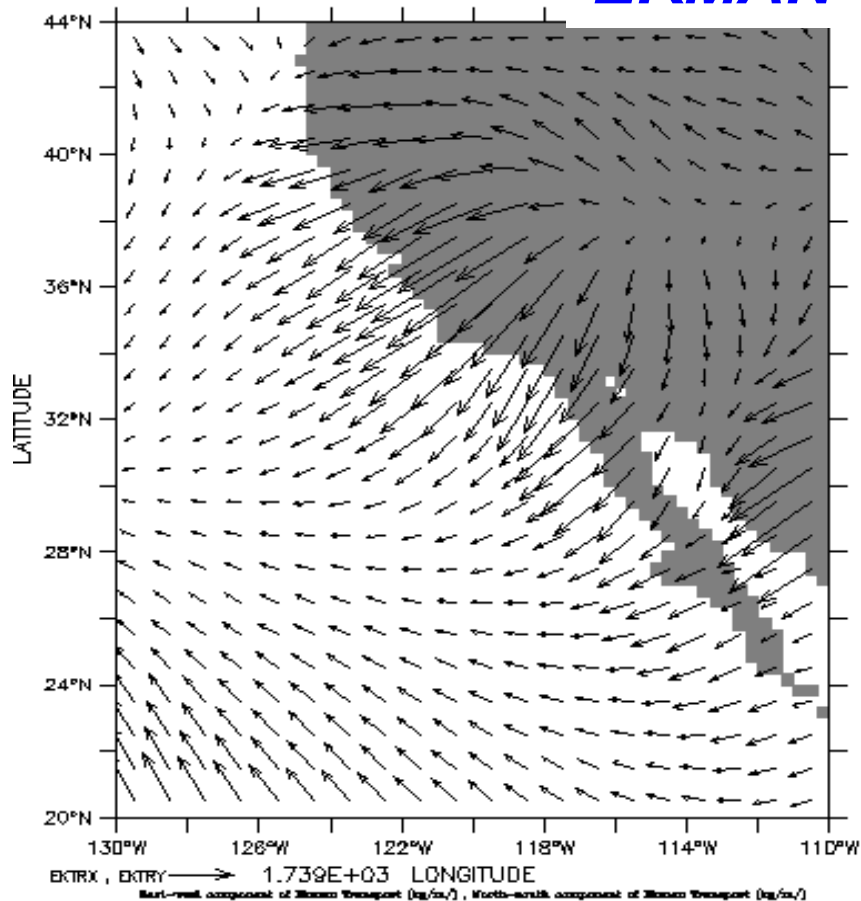
LAS 6.5/Ferret 5.81 -- NOAA/PMEL

FERRET Ver. 5.81
NOAA/PMEL TRIP
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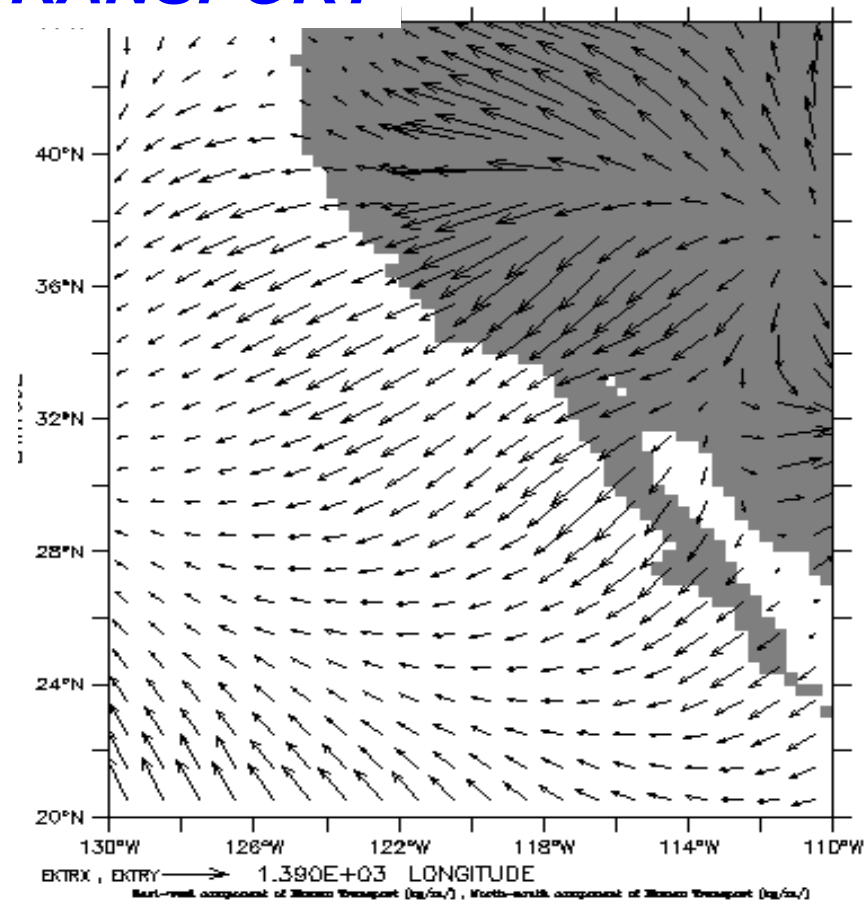
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Transports from FNMOC 144x72

EKMAN TRANSPORT

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FNMOC 144x72 6-hr pressure



→ 1.739E+03

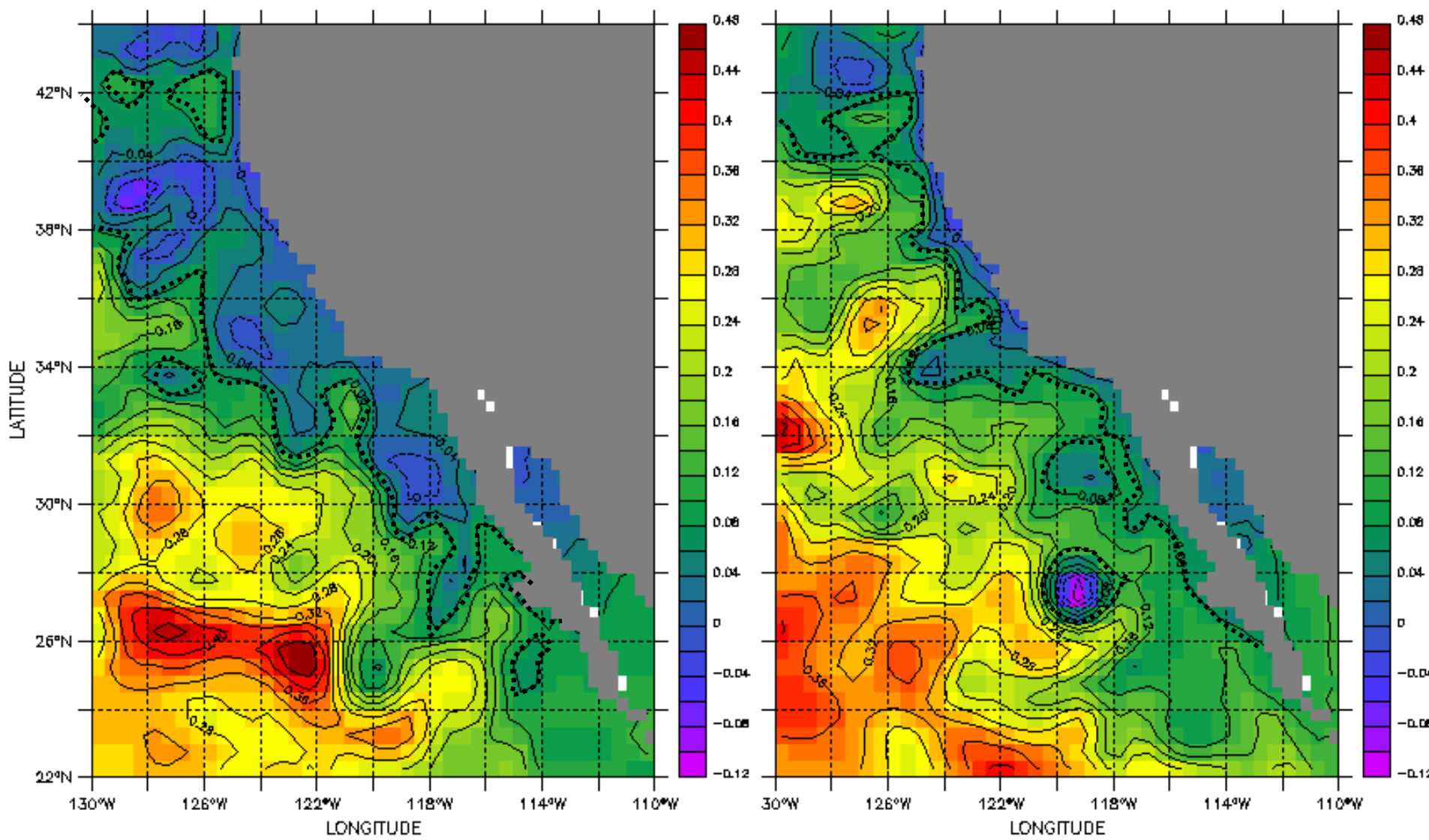


→ 1.390E+03

Courtesy NOAA PFEL Live Access Server

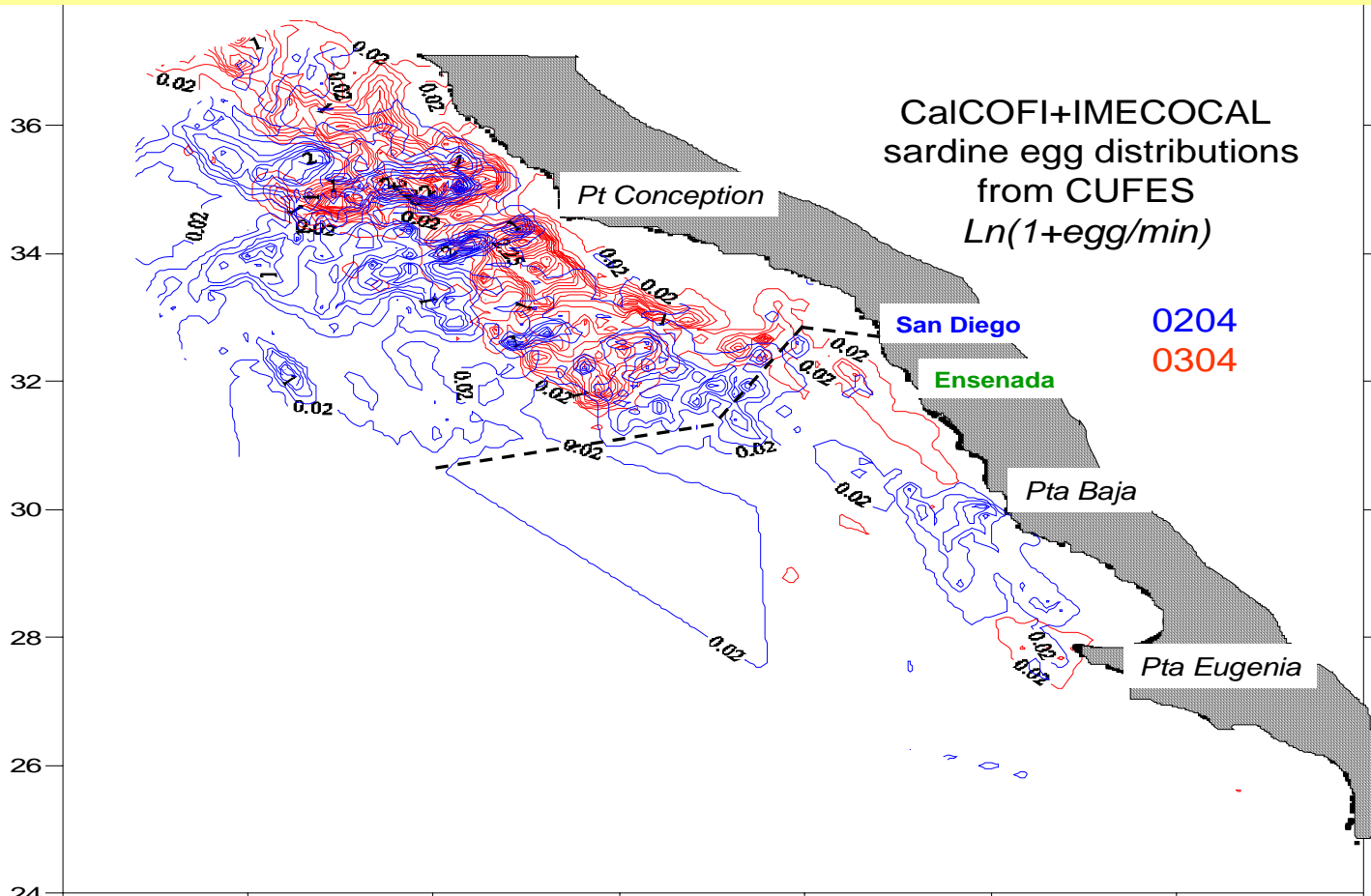
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SODA-POP v2.0.2 monthly means

TIME : 15-APR-2004 00 DATA SET: soda_pop2.0.3
SODA-POP v2.0.3 monthly means

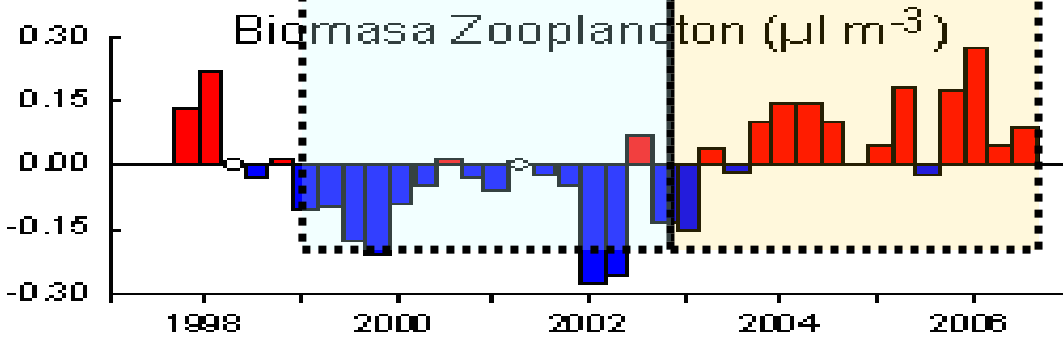
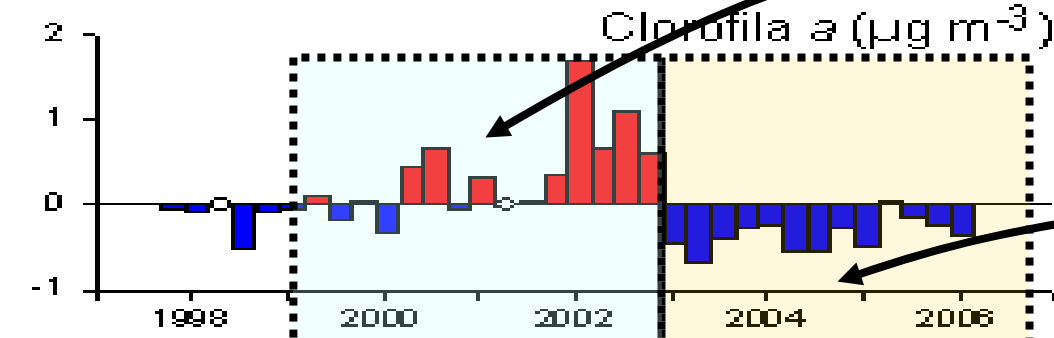
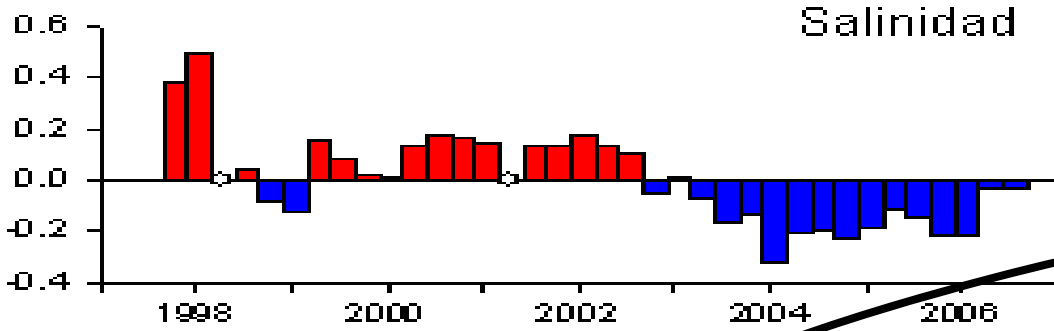
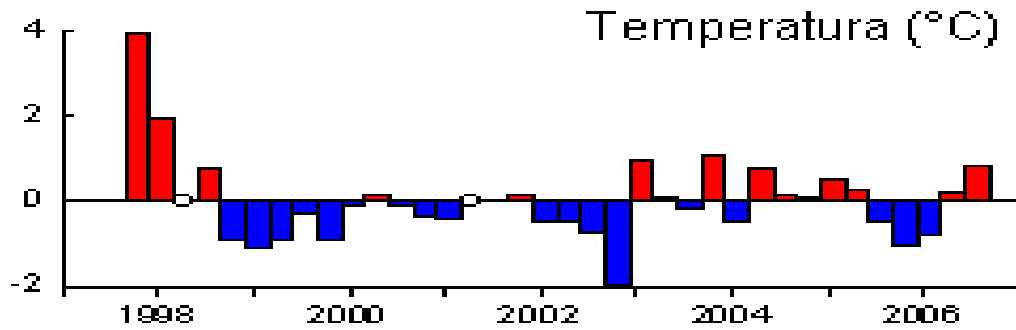


Sea Level (cm) Sea Level (cm)
Output of SODA Model, Sea Level Height (cm): April 2001 vs April 2004
Courtesy of PFEL Live Access Server

**Contrast in sardine egg distributions
between April 2002 and April 2003
from CalCOFI and IMECOAL surveys**



**Consistent with major shift in offshore Ekman transport
and weakened geostrophic flow of California Current
between April 2002 and April 2003**



Our concept of change in ecosystem organization/structure as a response to:

Strong regional upwelling and offshore Ekman Transport

Relaxation of upwelling and offshore Ekman transport

May be determined by our sampling tools...