Southern California Oceanography in the MLPA South Coast Study Region

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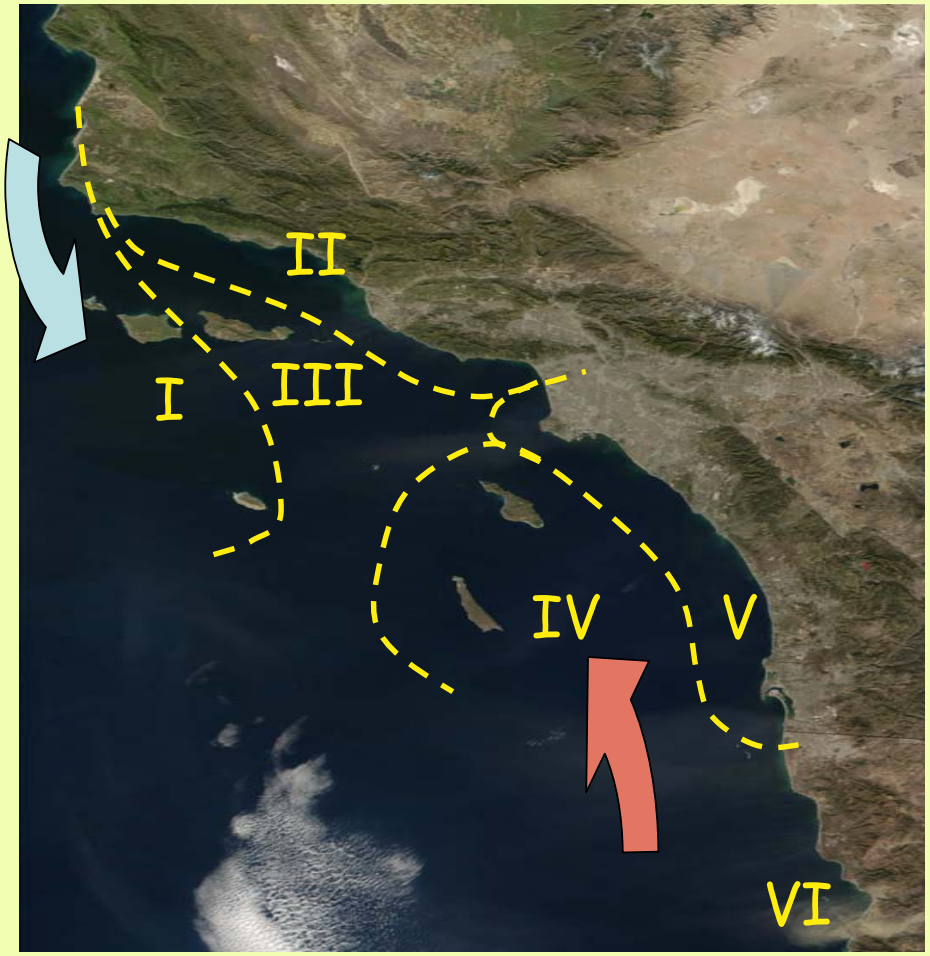
MLPA Master Plan Science Advisory Team

Presented January 13, 2009 in San Diego, CA

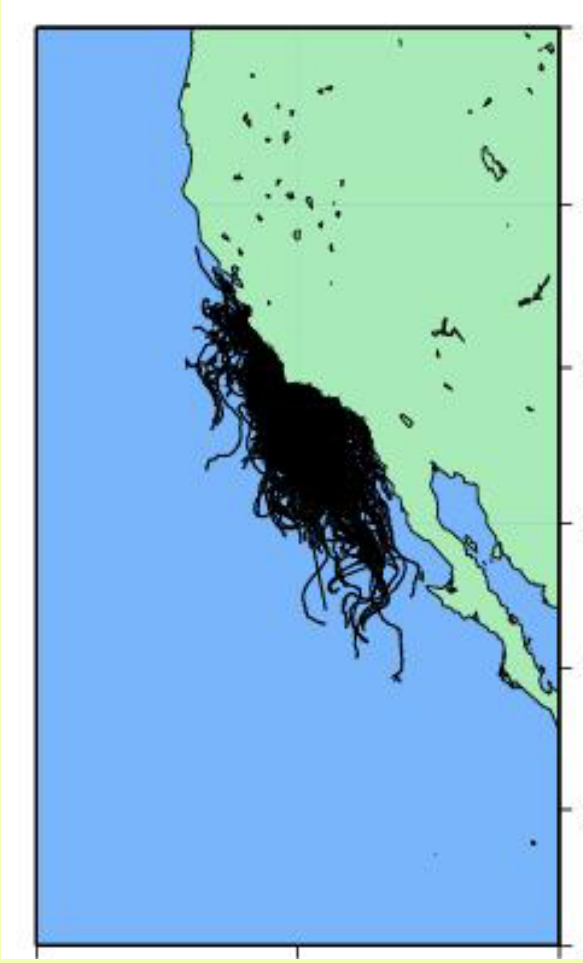
Developing an Oceanographic Perspective for MLPA in Southern CA

-- Currents & Connectivity

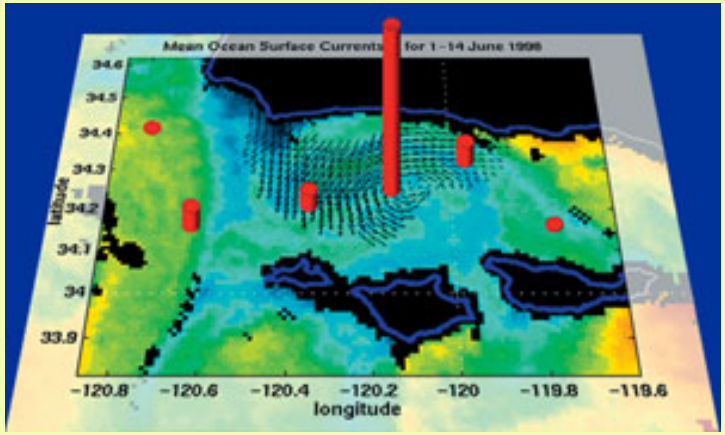
-- Water type & Habitat



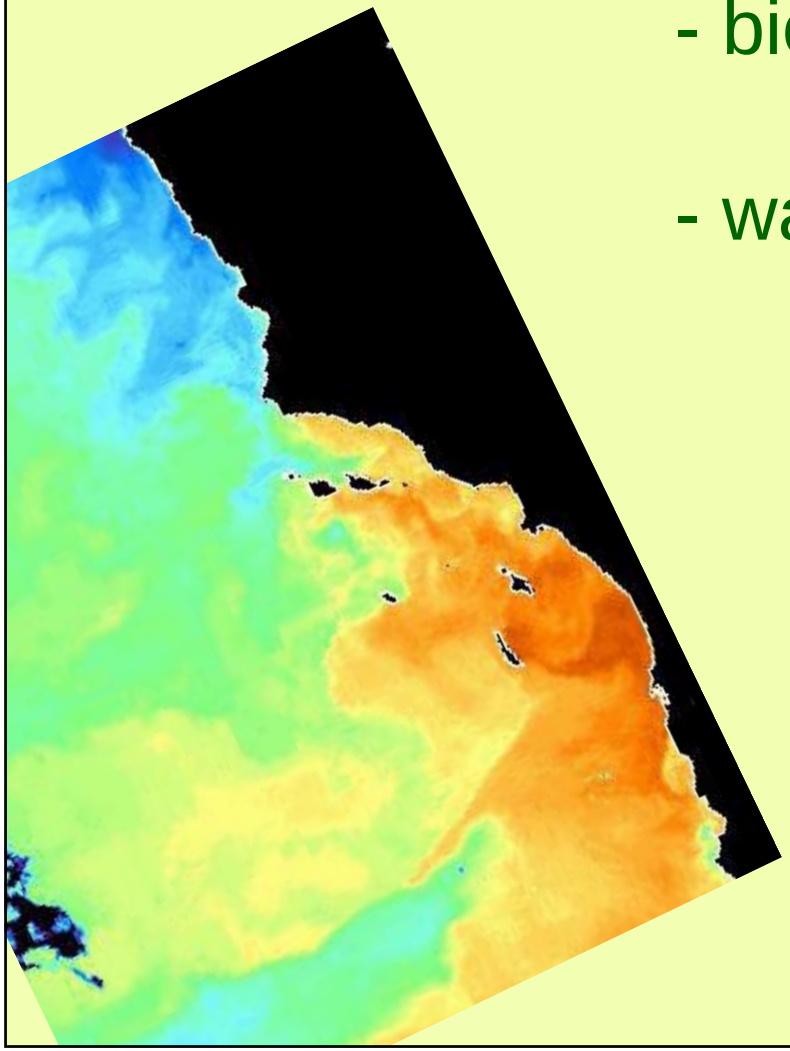
Connectivity



- typical circulation pattern
- variability …
  - … predictable currents?
  - … “stochastic” dispersion?
- features



Habitat



- biogenic water properties (SST, chlorophyll)
- water quality, i.e., contaminants

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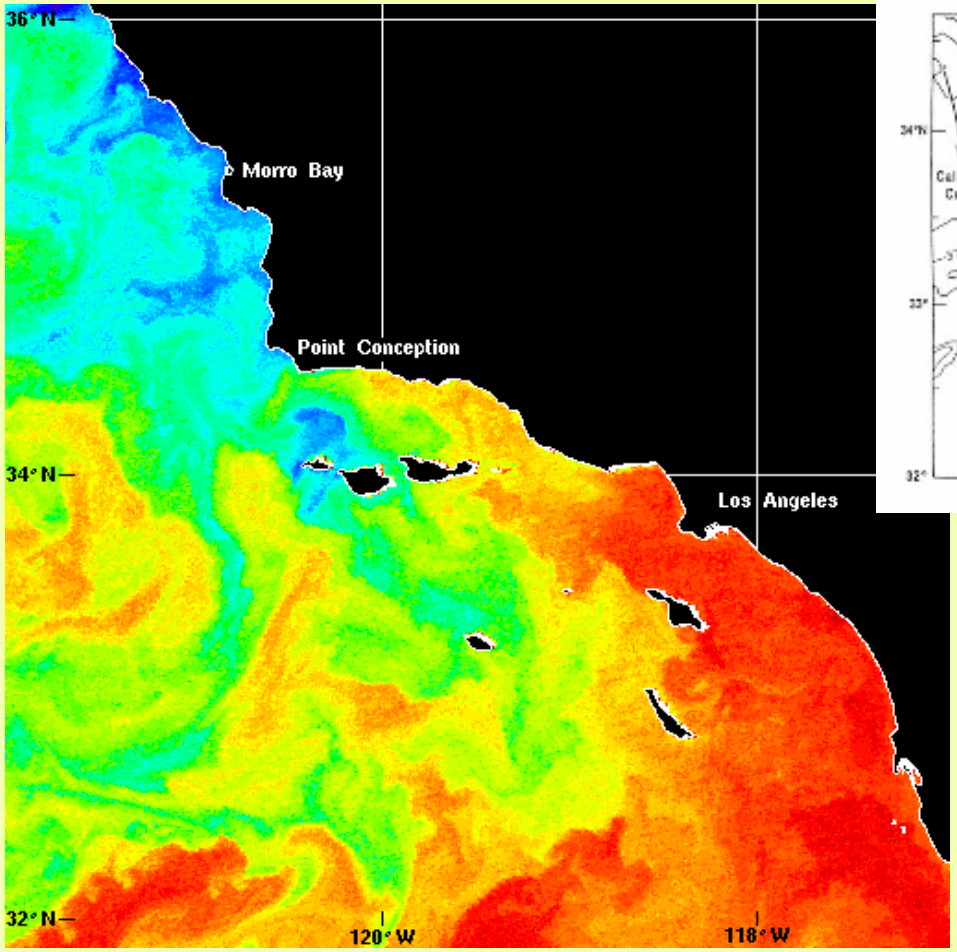
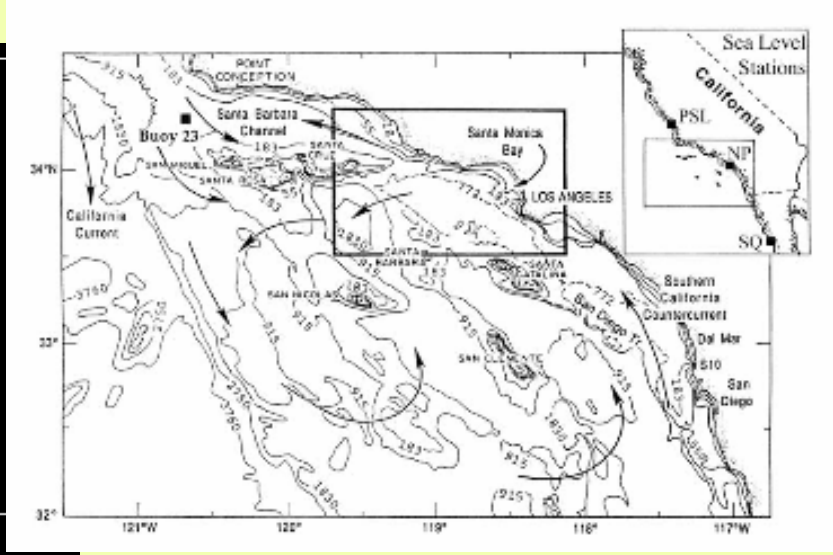
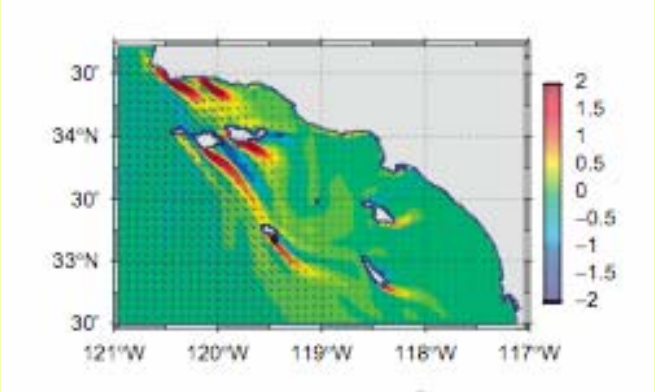
Large-scale circulation



schematic (Hickey 1992, 2003)





wind stress curl (Dong & McW 2007)

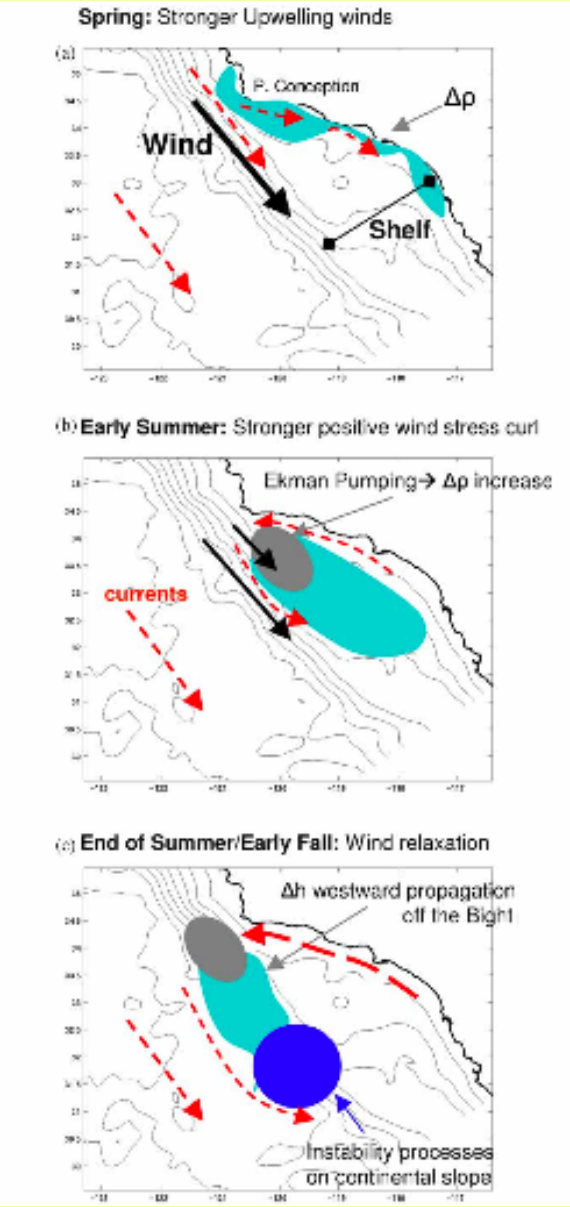
Large-scale circulation

Seasonal evolution …

… spring: winds & upwelling

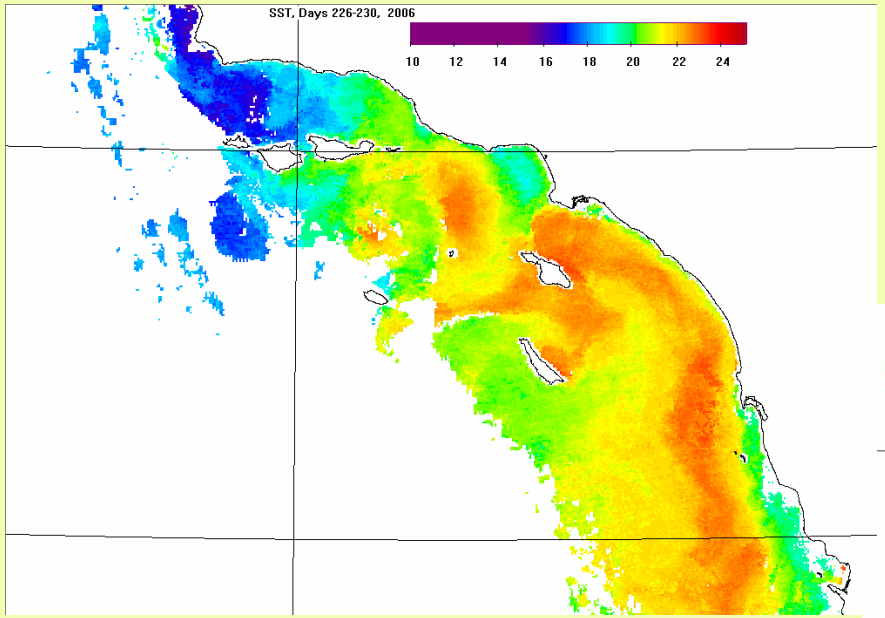
… summer: winds relax inshore,
curl & Ekman pumping,
SC Counter-current
Southern California Eddy

… fall: broadening recirculation
becomes unstable

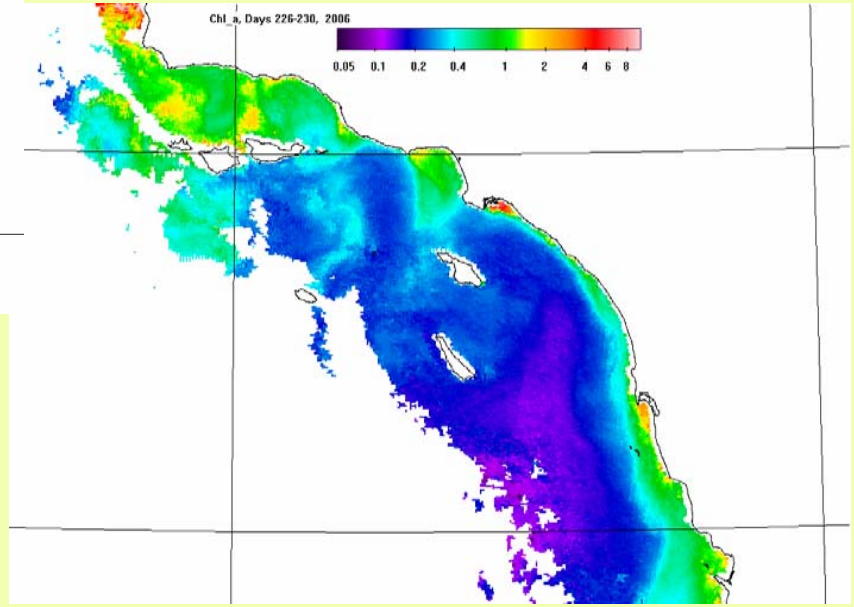


seasonal dynamics (Di Lorenzo 2003)

Multiple scales of patterns …



SBC, SMB, islands, upwelling, …

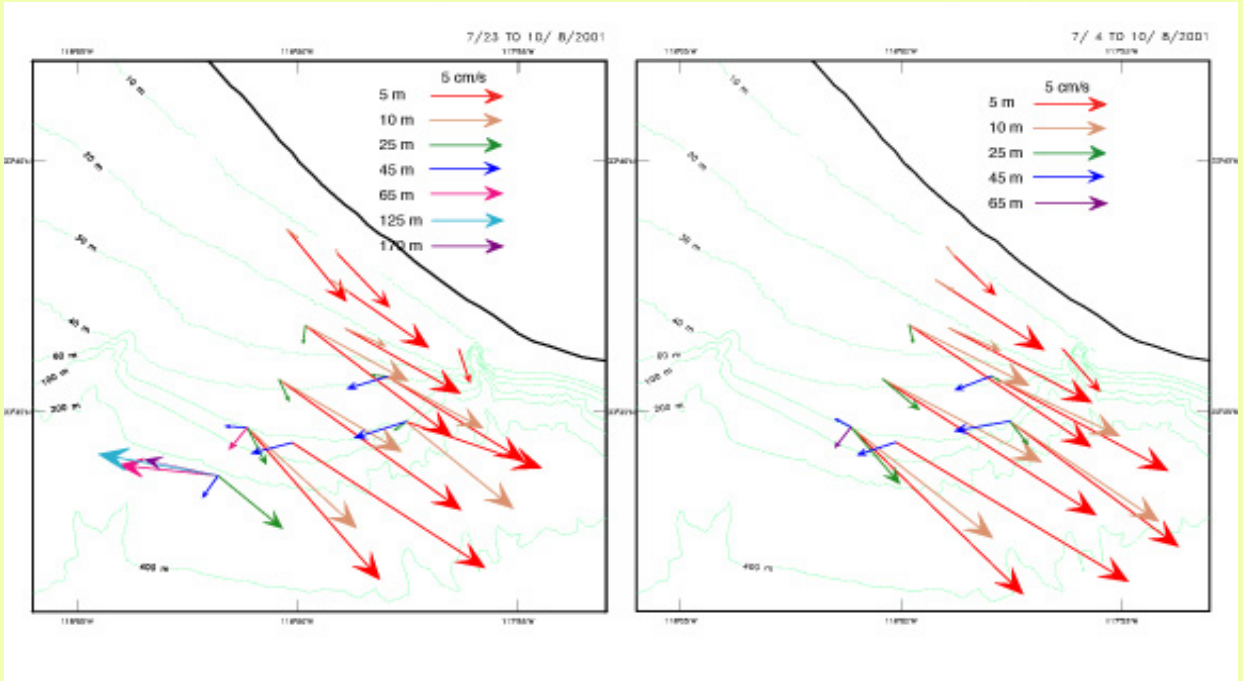


Merged MODIS Aqua and Terra products. (Aug 13 - 17, 2006). *Courtesy of M. Kahru and B.G. Mitchell, OPG Group, SIO*

Shelf currents

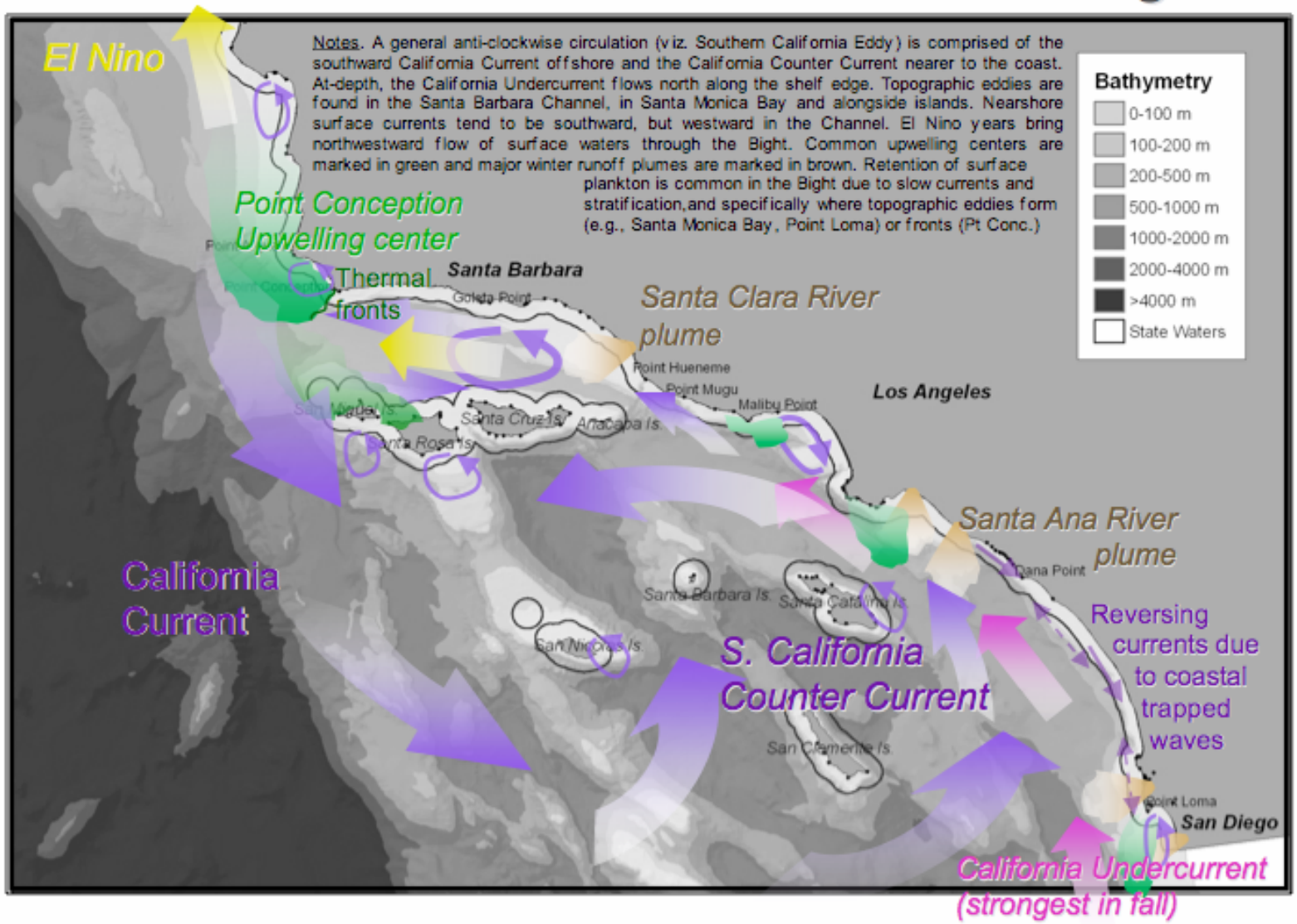
Southward currents over the shelf …

reversing at times (October - November?)



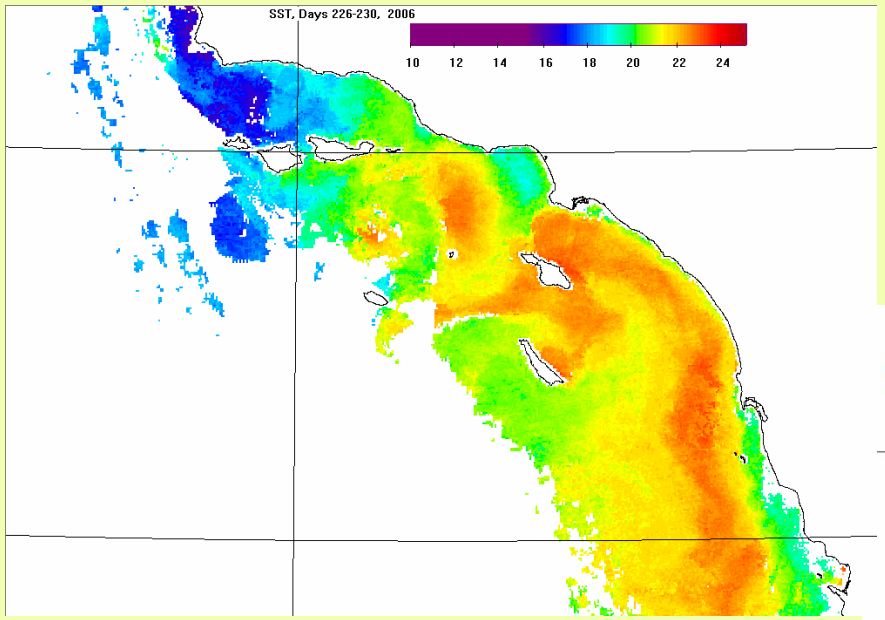
Huntington Beach (Noble et al 2004)

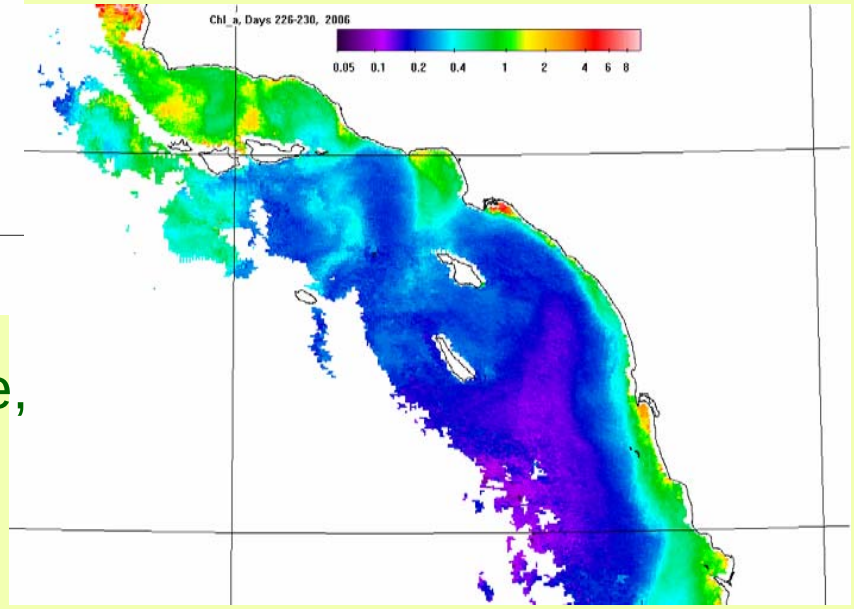
Circulation in the Southern California Bight



Upwelling

Shallow thermocline throughout Southern California Bight, breaks surface at specific times & places

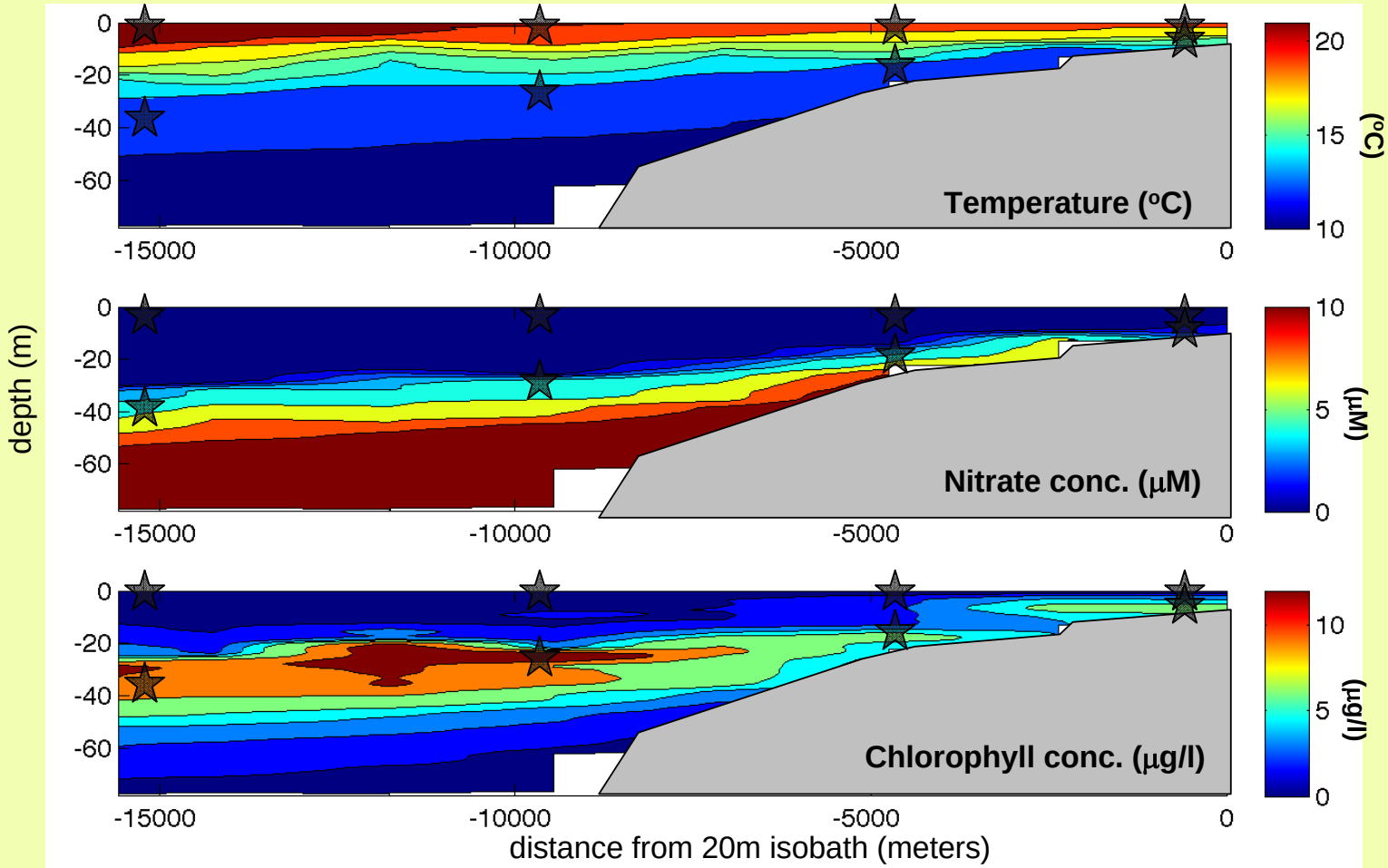




Point Conception, Point Dume, Palos Verdes, Point Loma, south of border

Upwelling … Shallow thermocline with Chlorophyll max

Cross-shore transects, shelf break to the inner shelf :

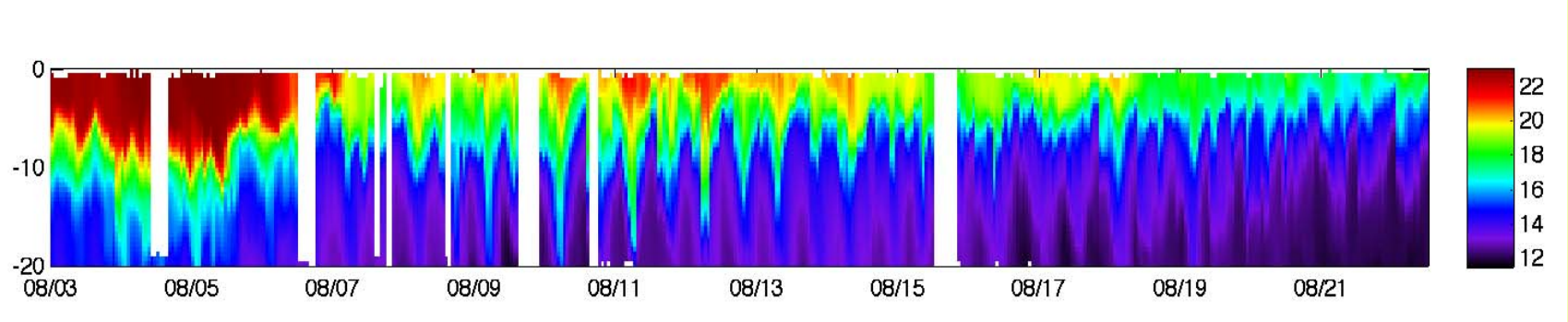


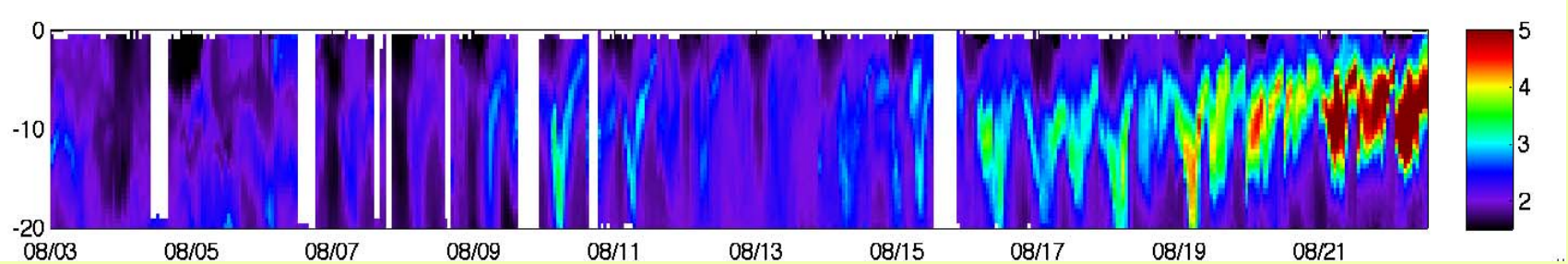
Sampling locations, 08/11/06

Drew Lucas data (unpubl.)

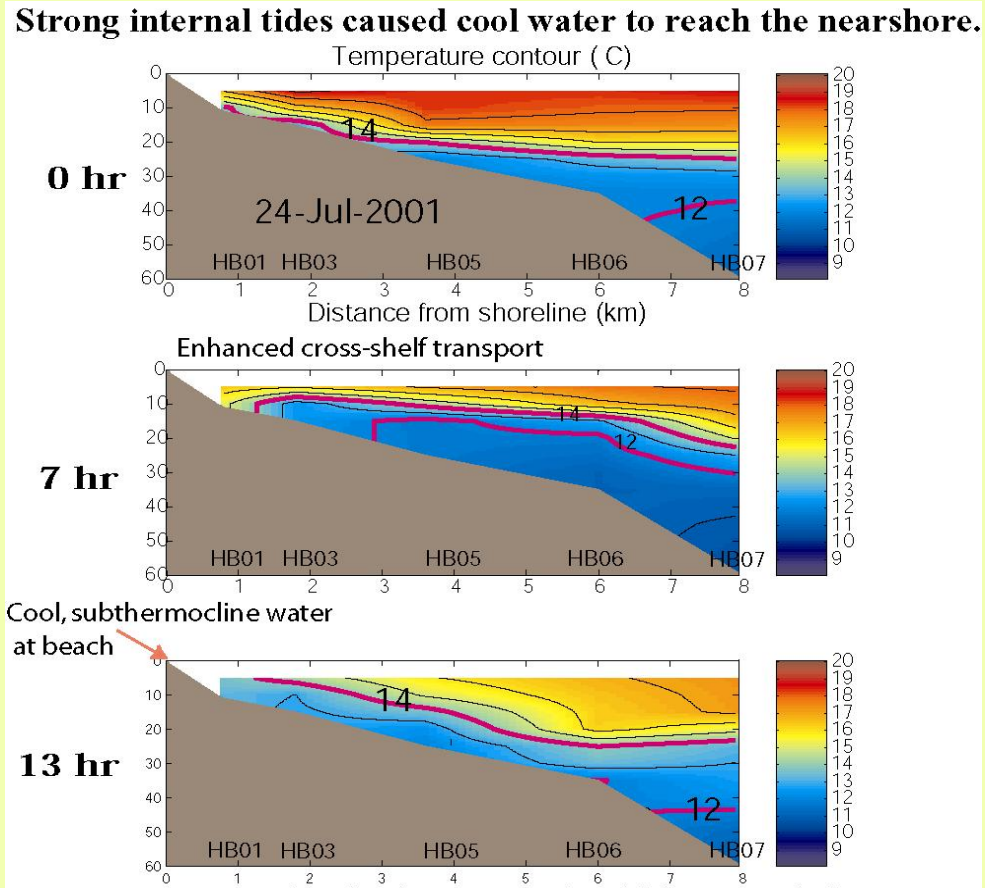
Internal Waves … and other HF motions

Temperature, fluorescence, (08/03 - 08/23/2006; 25 m WW):



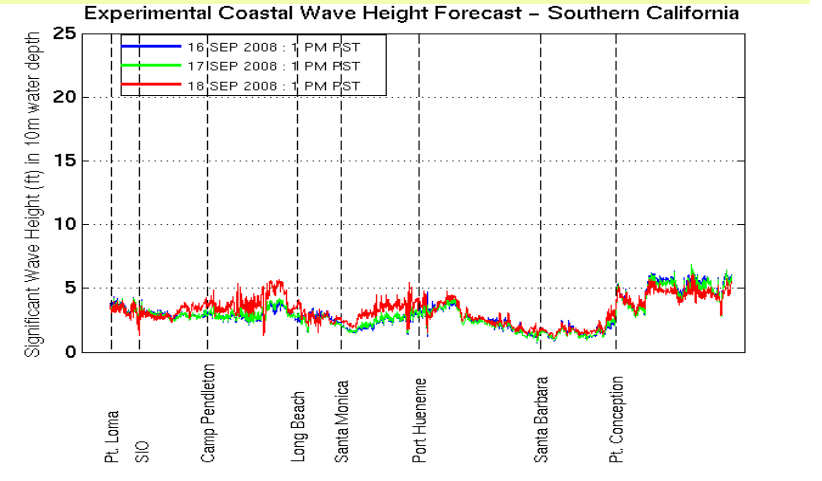


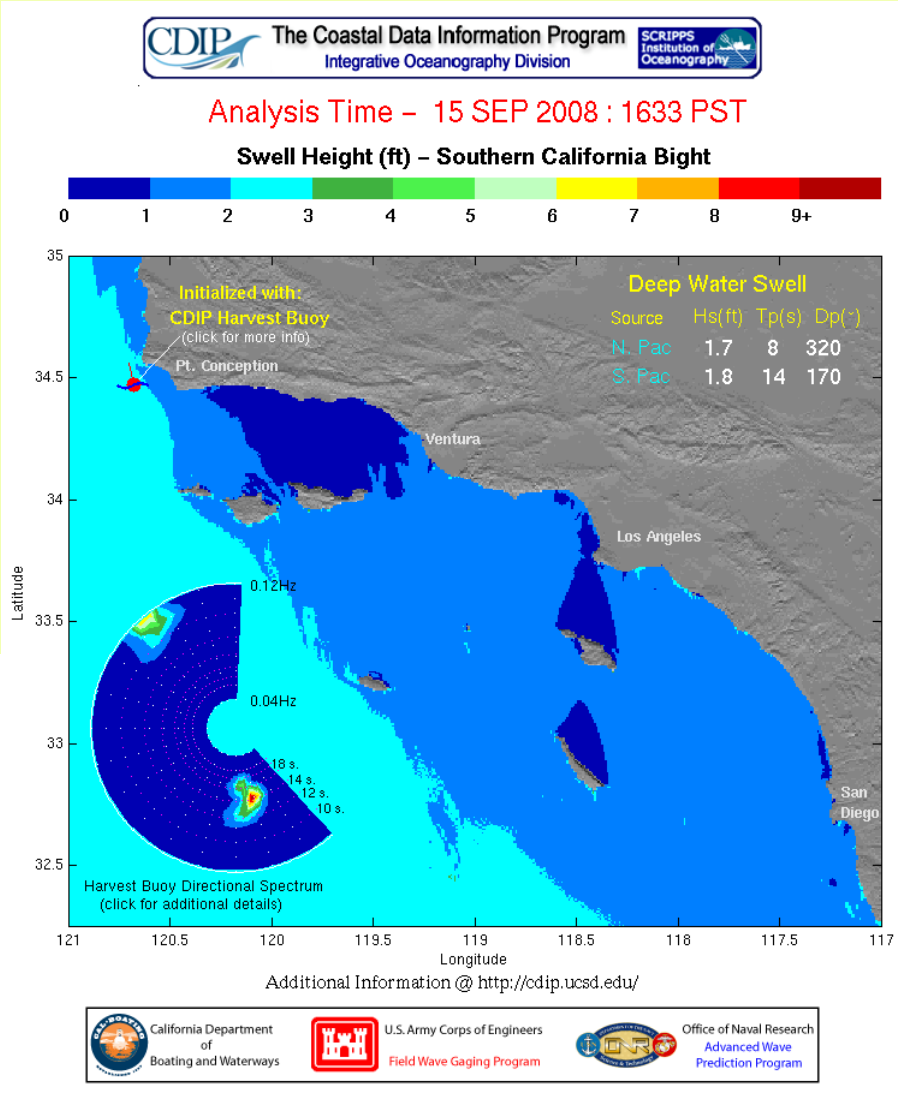
Internal Waves … and other HF motions



Temperature profiles for the rising, peak and falling period of a strong internal tidal event on July 24.

Waves


Experimental Coastal Wave Height Forecast – Southern California
16 SEP 2008 : 1 PM PST
17 SEP 2008 : 1 PM PST
18 SEP 2008 : 1 PM PST
Significant Wave Height (ft) in 10m water depth
0
5
10
15
20
25
Pt. Loma
SIO
Camp Pendleton
Long Beach
Santa Monica
Port Hueneme
Santa Barbara
Pt. Conception


CDIP
The Coastal Data Information Program
Integrative Oceanography Division
SCRIPPS Institution of Oceanography
Analysis Time – 15 SEP 2008 : 1633 PST
Swell Height (ft) – Southern California Bight
0
1
2
3
4
5
6
7
8
9+
Initialized with:
CDIP Harvest Buoy
(click for more info)
Pt. Conception
Deep Water Swell
Source Hs(ft) Tp(s) Dp(°)
N. Pac 1.7 8 320
S. Pac 1.8 14 170
Ventura
Los Angeles
San Diego
0.12Hz
0.04Hz
18 s.
14 s.
12 s.
10 s.
Harvest Buoy Directional Spectrum
(click for additional details)
Latitude
35
34.5
34
33.5
33
32.5
Longitude
121
120.5
120
119.5
119
118.5
118
117.5
117
Additional Information @ http://cdip.ucsd.edu/
California Department of Boating and Waterways
U.S. Army Corps of Engineers
Field Wave Gaging Program
Office of Naval Research
Advanced Wave Prediction Program

River and tidal plumes

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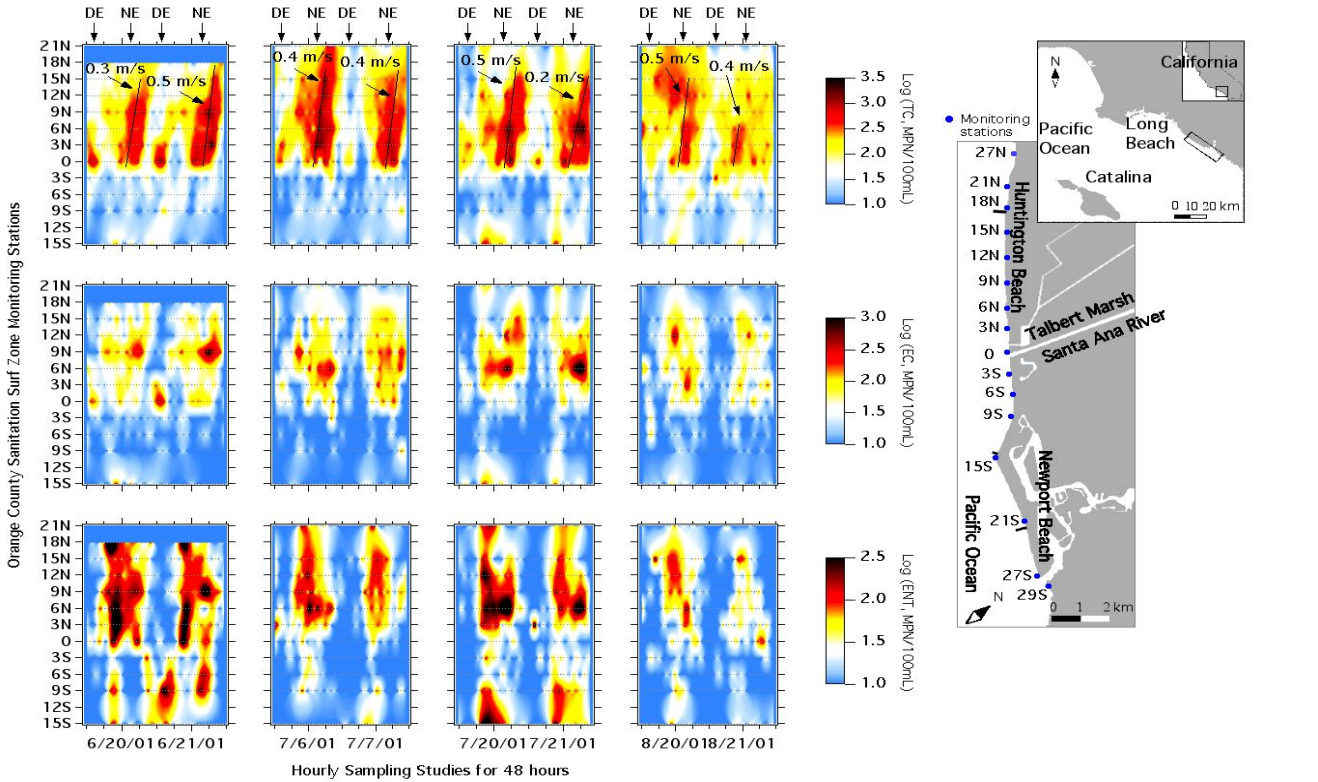

Figure 2
Kim *et al.*

Developing an Oceanographic Perspective for MLPA in Southern CA

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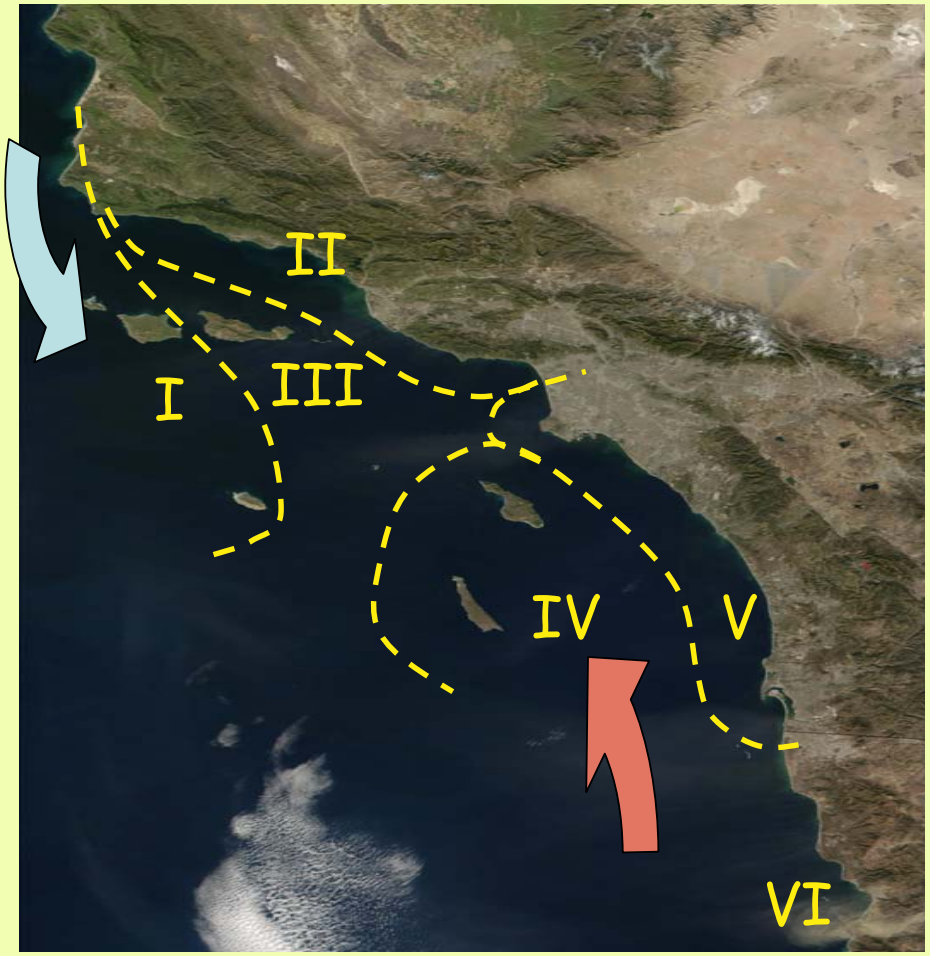
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