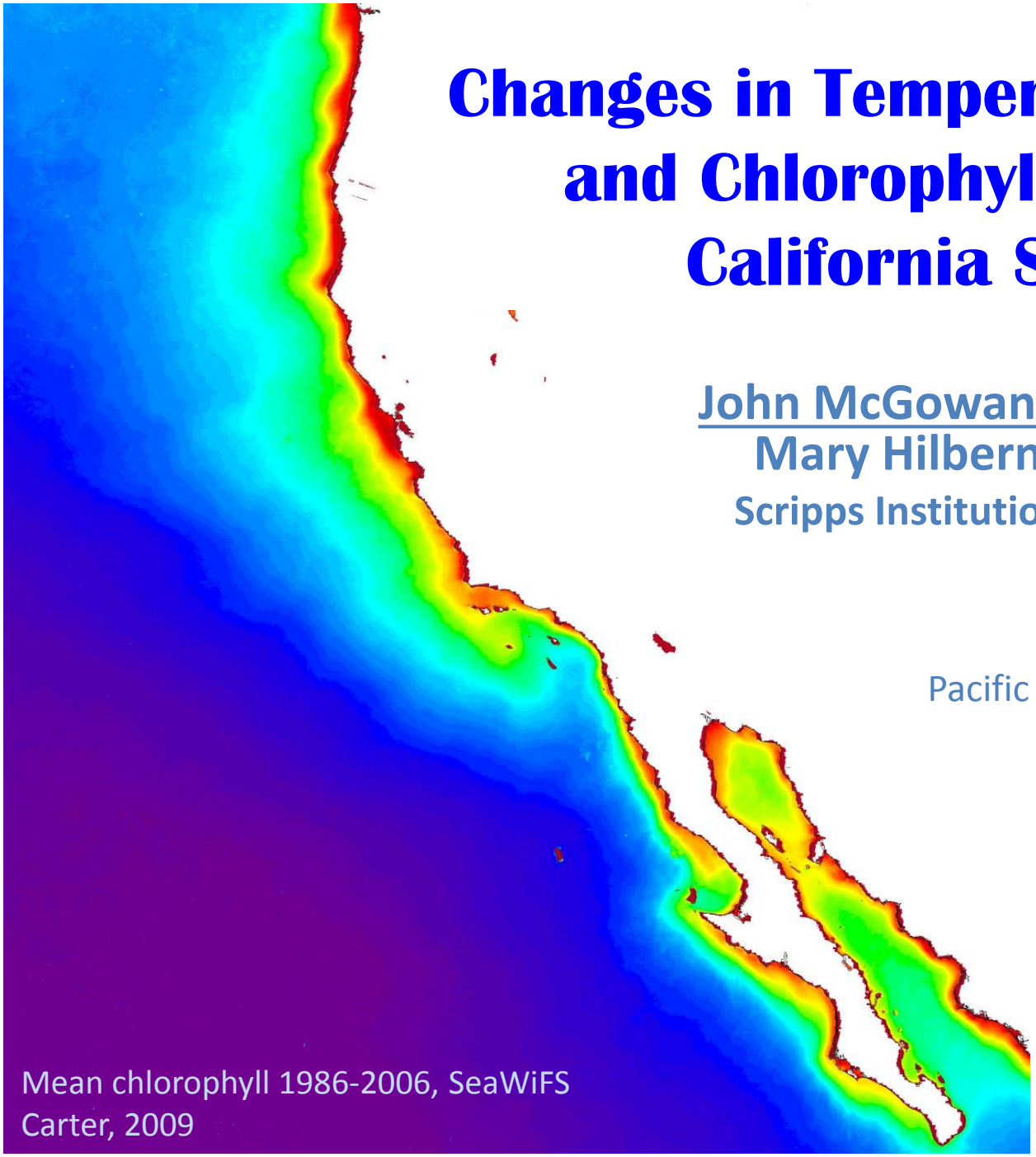


Changes in Temperature, Salinity, and Chlorophyll at Coastal California Stations

John McGowan, Melissa L. Carter, Mary Hilbern and Ed Parnell

Scripps Institution of Oceanography

Pacific Anomalies Symposium
May 4-5, 2015

Mean chlorophyll 1986-2006, SeaWiFS
Carter, 2009

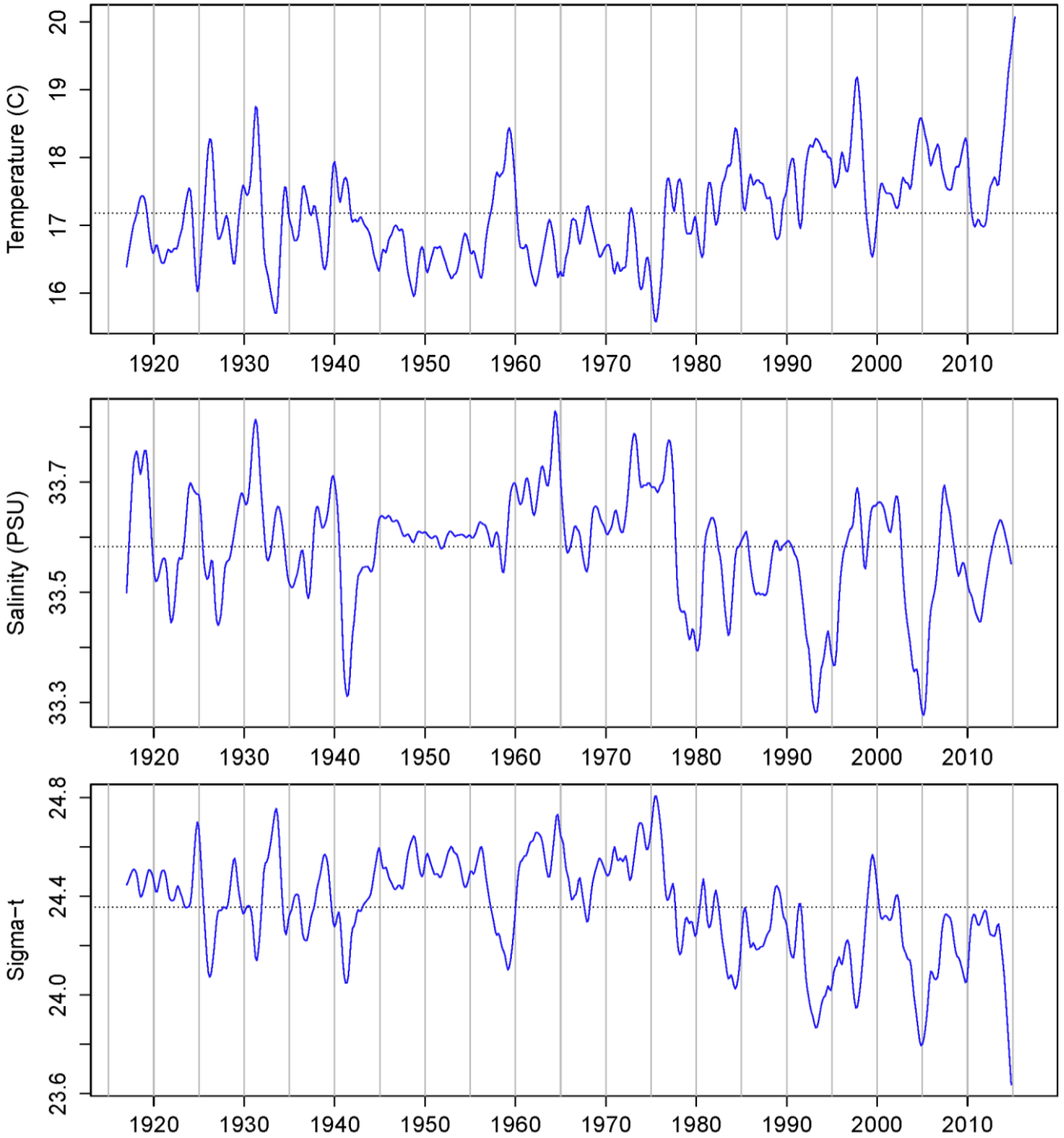
Long term daily temperature (10) and salinity (5) measurements

Funded since 2005 by:

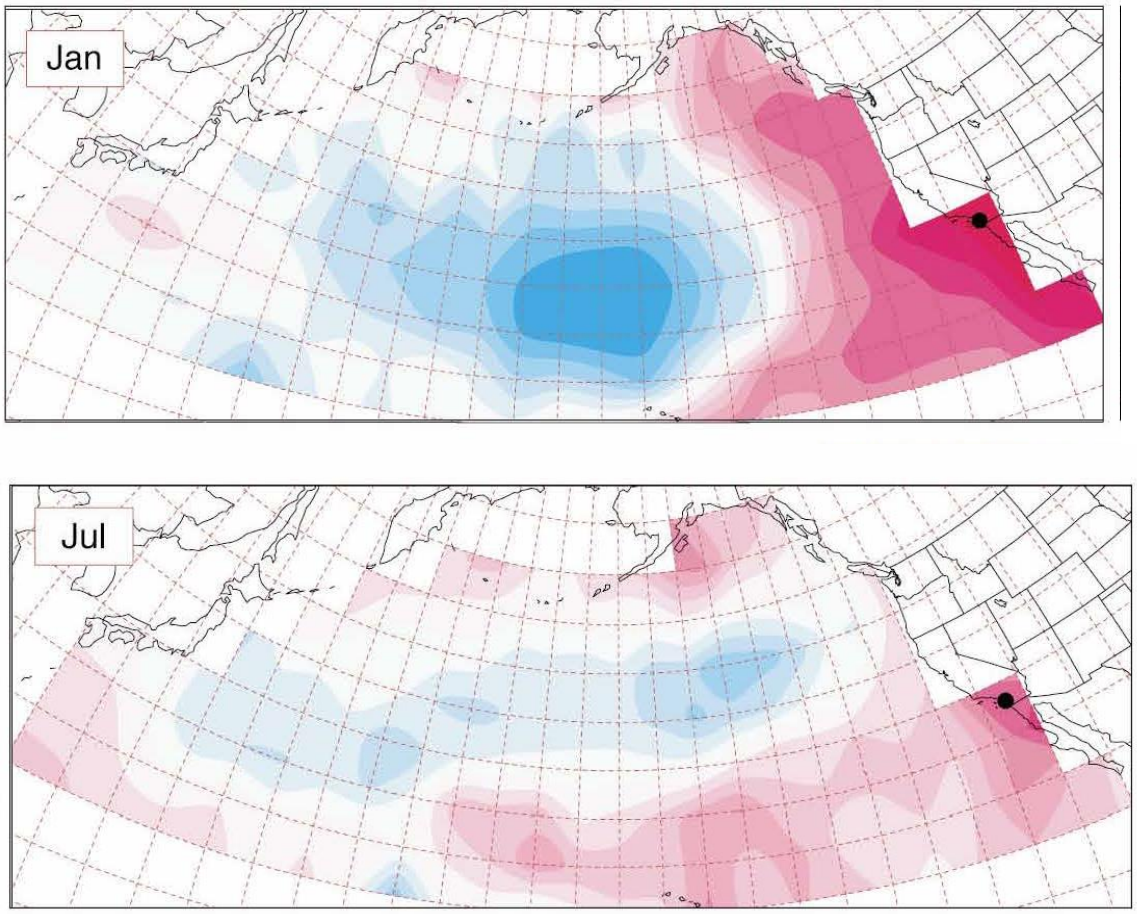
CALIFORNIA STATE PARKS BOATING AND WATERWAYS

Scripps Pier Trends

- 2014 warmest on record

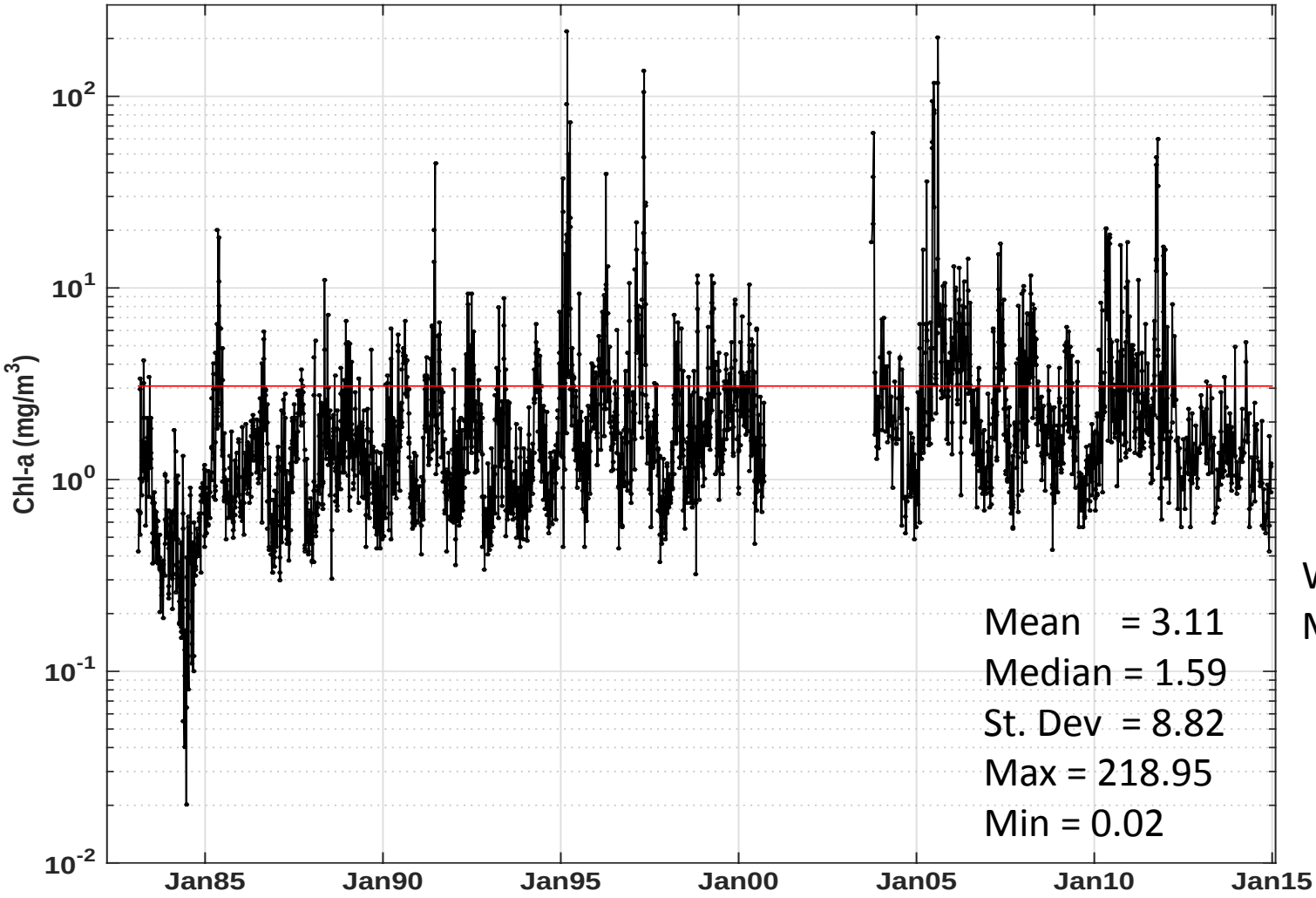


La Jolla SST representative of larger area



McGowan, Cayan, Dorman
Science 1998

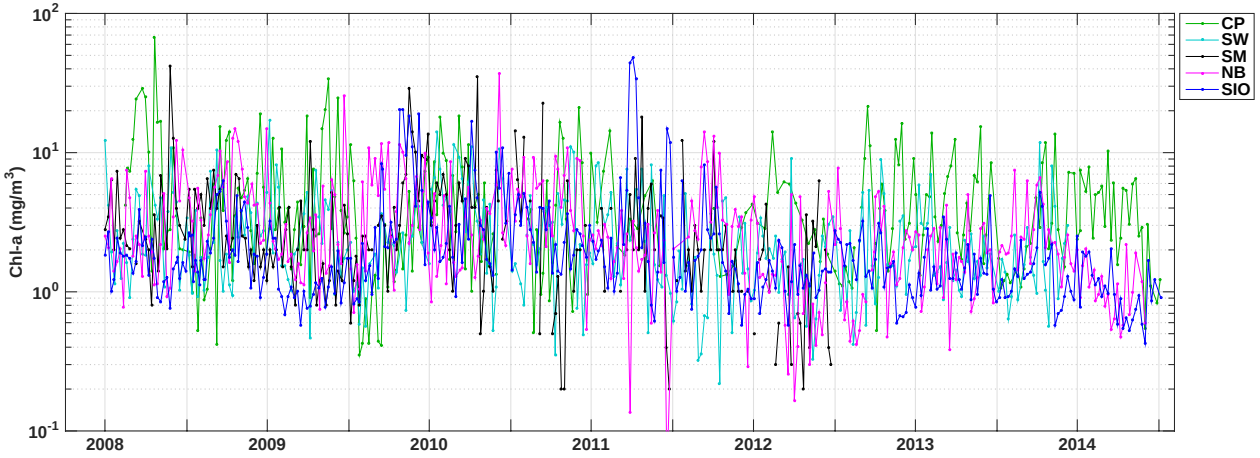
Scripps Pier chlorophyll timeseries 1983-2000, 2004-2015

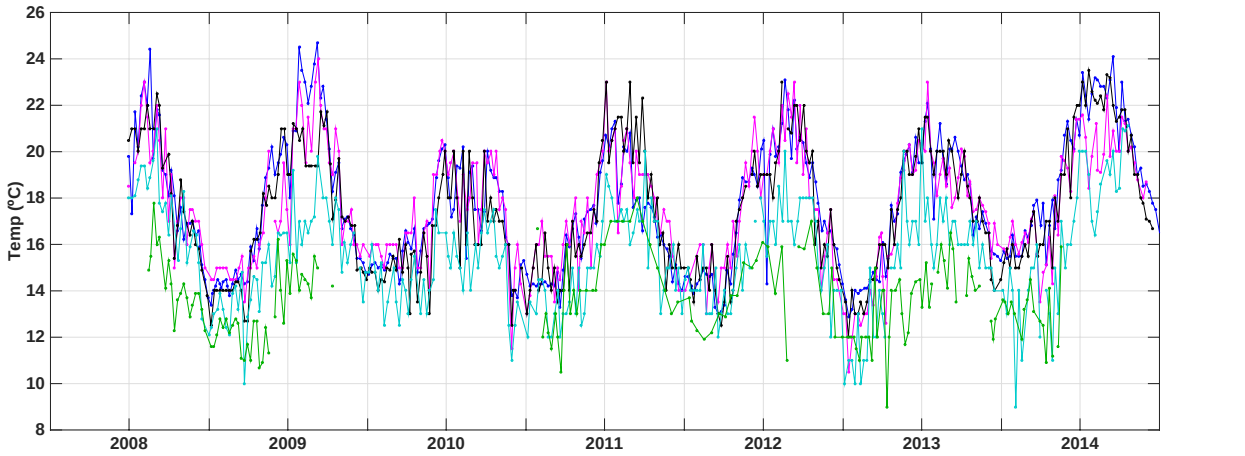


Warm “blob”
Mean = 1.33

Mean coastal chlorophyll within SCB declines by half during warm “blob” period (July 2013 - March 2015)

	5 yr mean July 2008 to June 2013	“Blob period” July 2013 to March 2015
Cal Poly Pier	5.93	4.18
Stearn’s Wharf	3.05	1.86
Santa Monica Pier	3.42	---
Newport Beach Pier	3.84	1.95
Scripps Pier	3.09	1.33





Thank you for your interest!

Funding and collaborations:

California Department of Boating and Waterways

Southern California Coastal Ocean Observing Systems (SCCOOS)

http://sccoos.ucsd.edu/

NOAA through COTS

MLRG CalCOFI – early temperature, salinity and chlorophyll, 1950-2000

Shore Stations Program

Reinhard Flick, Eric Terrill, Melissa Carter & Mary Hilbern

shorestation@ucsd.edu

http://shorestation.ucsd.edu/

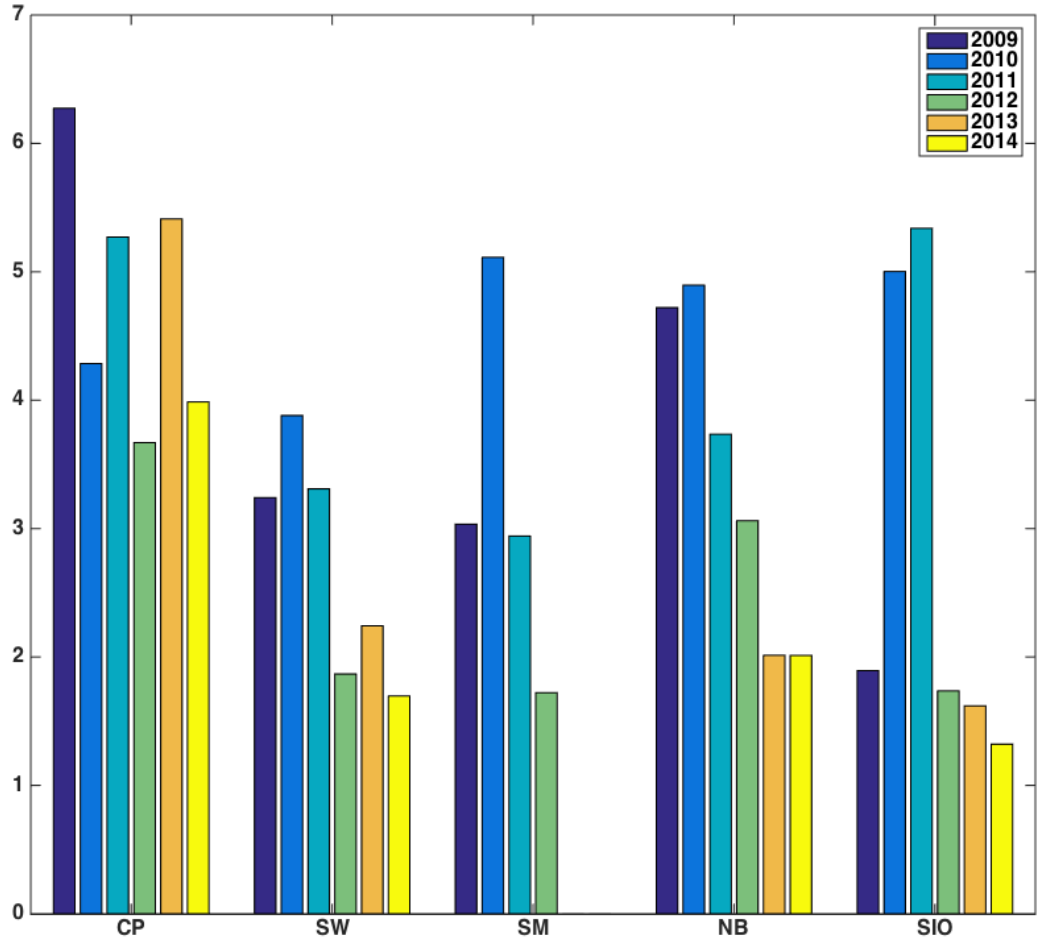
SCCOOS HAB Pier Program

John McGowan, Melissa Carter & Mary Hilbern

http://www.sccoos.org/data/habs/

Annual chlorophyll 2009-2014

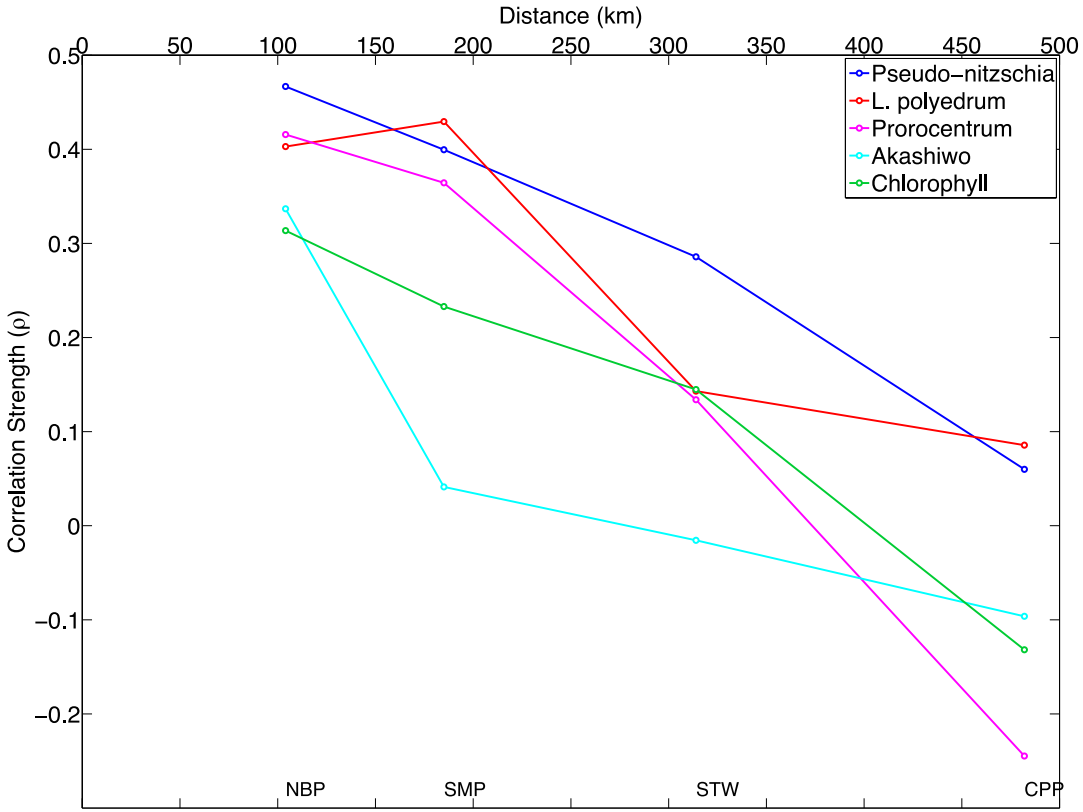
Chlorophyll below mean for stations within SCB



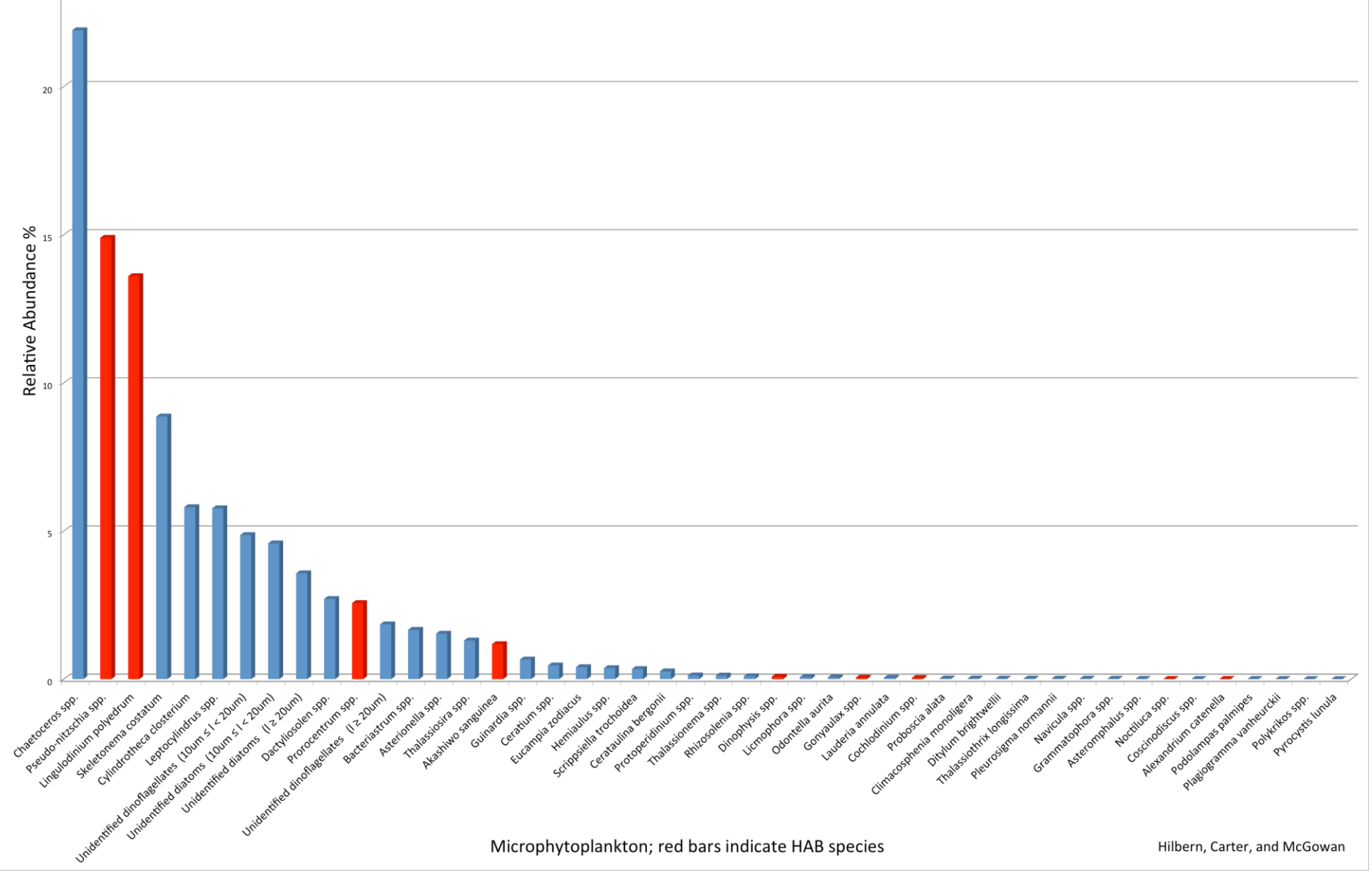
N → S

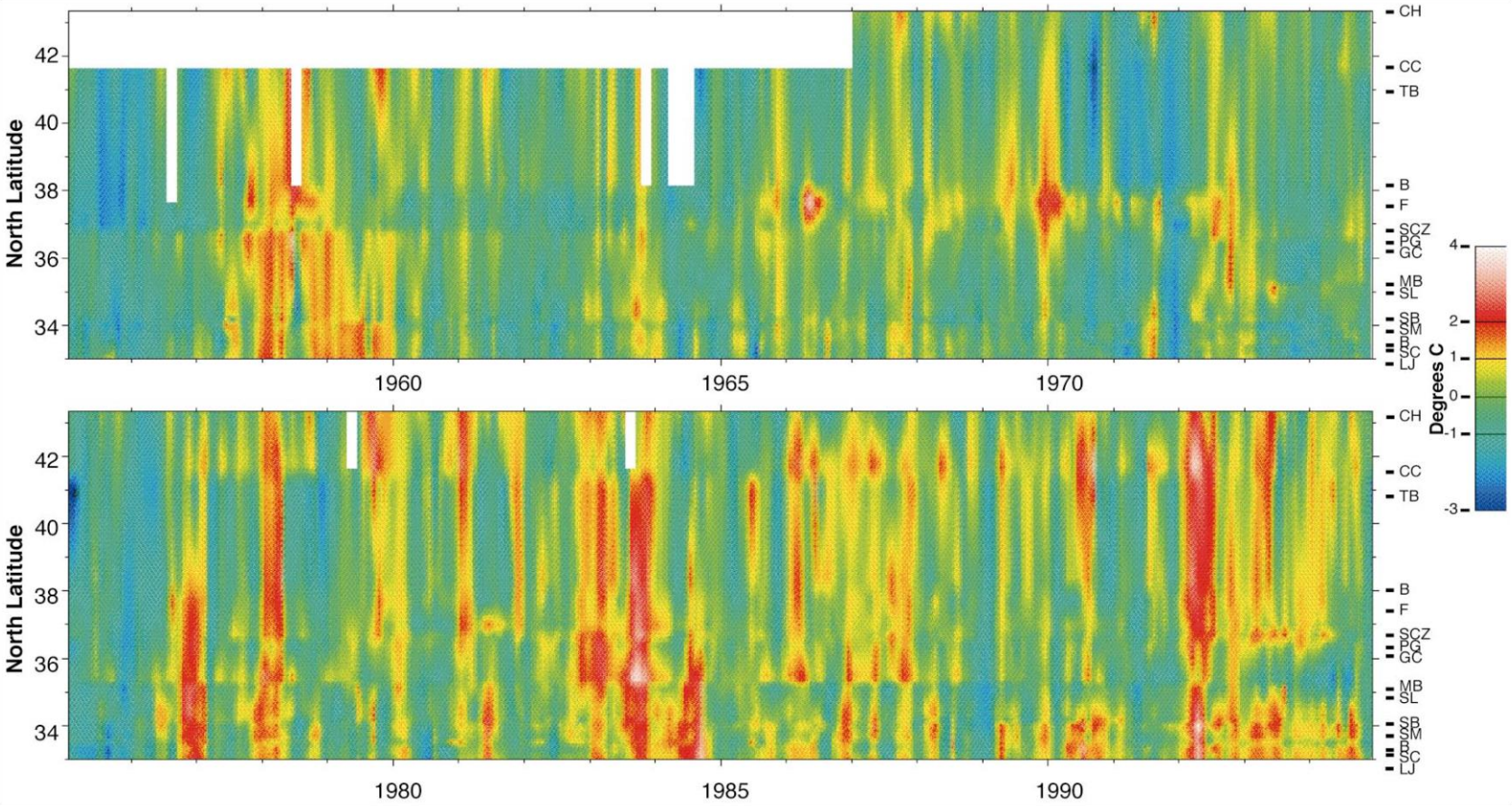
Spatial scales of coastal algal blooms

- Pseudo-nitzschia spp. significantly correlated for all stations within the SCB
  - Greater spatial cohesiveness
  - Regionally forced
- L. poly and Prorocentrum (Dinos) have the highest correlation with neighboring stations
  - Transport or local forcing?



Carter, M. L., J. A. McGowan, M. Hilbern, and E. Vu Spatial scales of coastal algal blooms in southern California. Ocean Sciences Meeting 2014.


Relative Abundance %
0
5
10
15
20
Chaetoceros spp.
Pseudo-nitzschia spp.
Lingulodinium polyedrum
Skeletonema costatum
Cylindrotheca closterium
Leptocylindrus spp.
Unidentified dinoflagellates (10um ≤ l < 20um)
Unidentified diatoms (10um ≤ l < 20um)
Unidentified diatoms (l ≥ 20um)
Dactyliosolen spp.
Prorocentrum spp.
Unidentified dinoflagellates (l ≥ 20um)
Bacteriastrum spp.
Asterionella spp.
Thalassiosira spp.
Akashiwo sanguinea
Guinardia spp.
Ceratium spp.
Eucampia zodiacus
Hemiaulus spp.
Scrippsiella trochoidea
Cerataulina bergonii
Protoperidinium spp.
Thalassionema spp.
Rhizosolenia spp.
Dinophysis spp.
Licmophora spp.
Odontella aurita
Gonyaulax spp.
Lauderia annulata
Cochlodinium spp.
Proboscia alata
Climacosphenia monoligera
Ditylum brightwellii
Thalassiothrix longissima
Pleurosigma normannii
Navicula spp.
Grammatophora spp.
Asteromphalus spp.
Noctiluca spp.
Coscinodiscus spp.
Alexandrium catenella
Podolampas palmipes
Plagiogramma vanheurckii
Polykrikos spp.
Pyrocystis lunula
Microphytoplankton; red bars indicate HAB species
Hilbern, Carter, and McGowan


North Latitude
42
40
38
36
34
1960
1965
1970
CH
CC
TB
B
F
SCZ
PG
GC
MB
SL
SB
SM
PB
SC
LJ
Degrees C
4
2
1
0
-1
-3
North Latitude
42
40
38
36
34
1980
1985
1990
CH
CC
TB
B
F
SCZ
PG
GC
MB
SL
SB
SM
PB
SC
LJ