Long-Term Observations, Real-Time Action: Southern California Coastal Ocean Observing System

Megan Medina
SCCOOS Deputy Director
Scripps Institution of Oceanography

27 October 2026
PICES, Nanaimo, Canada



SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

SCRIPPS INSTITUTION OF OCEANOGRAPHY
UC San Diego

IOOS
Integrated Ocean Observing System

U.S. Integrated Ocean Observing Systems in CA

IOOS Integrated Ocean Observing System

IOOS Association

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

U.S. Integrated Ocean Observing System Certified Regional Association

AOOS (Alaska)

CIOOS Canadian Integrated Ocean Observing System

NANOOS (Northwestern)

GLOS (Great Lakes)

NERACOOS (Northeast)

CeNCOOS Central & North Cal

MARACOOS (Mid-Atlantic)

U.S. IOOS

SCCOOS SoCal

SECOORA (Southeast)

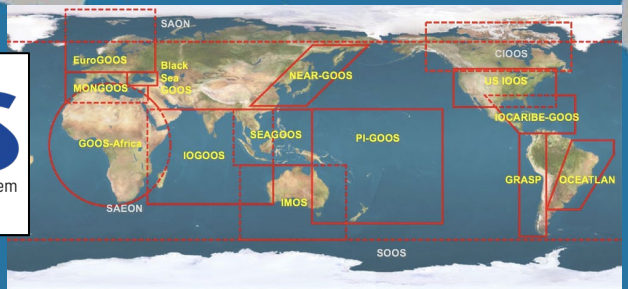
GCOOS

PacIOOS (Pacific)

CariCOOS (Caribbean)

Partnership effort that leverages dispersed national investments to deliver ocean, coastal and Great Lakes data relevant to decision-makers.

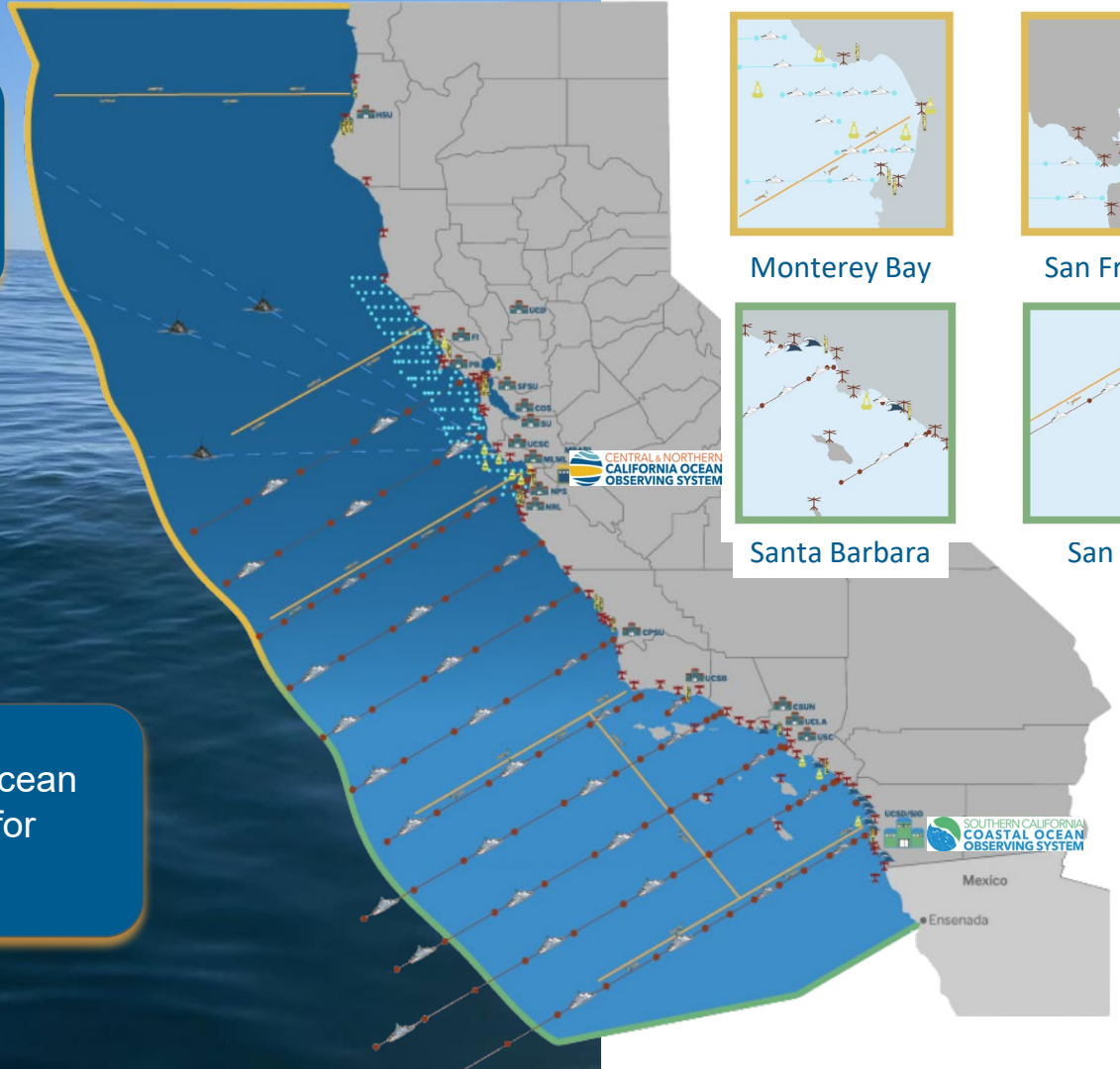
GOOS Global Ocean Observing System



OCEAN VISION: Prosperity and safety catalyzed by ocean observations, data, and information.



MISSION: Deliver high-quality ocean and coastal data and information for improved decision-making.



Monterey Bay



San Francisco

Santa Barbara



San Diego

SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

Organizational Structure

Leadership Team

Program Office

Board of Governors
(Founding Members)

Board of Executive Committee
(Subset of BOG)

Executive Steering Committee
(Funding Recommendations)

Joint Advisory Steering Committee
(Stakeholders)

Principal Investigators
(Research Scientists)

Leadership Team



Clarissa Anderson, Ph.D.
SCCOOS Director &
CIMEAS Director



Megan Medina, M.Sc.
Deputy Director



Dan Rudnick, Ph.D.
Executive Chair, PI
SIO Professor



Libe Washburn, Ph.D.
Board Chair, PI
UCSB Professor

Program Office



Ian Brunjes, MProf.
IoT Data Scientist
Data Product and Web App Development



Danielle Muller
Program Coordinator
Administrative Assistant, Outreach, & Blue Economy

NOW HIRING!

HIRING!
Oceanography Data Scientist
(**UCSD Job #141464**)



Makenna Martin, Ph.D.
Outreach Specialist
SCCOOS/DDT
Community Engagement, Education, and Outreach



Kasia Kenitz, Ph.D
Research Scientist,
SCCOOS/IOD
HAB Early Warning System



Carlene Burton, Ph.D Candidate
Social Scientist,
SCCOOS/StartBlue

Data for Societal Benefit

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

SUBSYSTEMS

GOVERNANCE AND MANAGEMENT

Provides the leadership and administrative foundation necessary to operate and sustain the IOOS certified Regional Coastal Observing System.





OCEAN OBSERVING

sustains long-term, high-quality observations of the coastal ocean and ecosystems to provide valuable information for society.

DATA MANAGEMENT AND CYBERINFRASTRUCTURE

delivers standardized, reliable, and accessible data through a public portal and automated data services.





MODELING AND ANALYSIS

supports forecasts and predictions from regional downscaled models and generate information at the scales required for decision-making.

ENGAGEMENT AND PRODUCTS

increases reach and efficacy through partnership and collaborative discourse and engage data users to create accessible, integrative, and valuable products



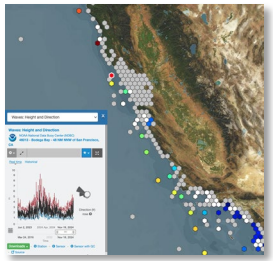


Ocean Observing and Modeling	Data Management and Cyberinfrastructure	Network Engagement and Co-Design
Employ a variety of in situ and remote sensing technologies to measure physical, chemical, biological, and geological parameters and support ocean models and provide forecasts of future conditions.	*Promote Findable, Accessible, Interoperable, and Reusable (FAIR)*	*Generate and disseminate accessible, user-driven, curated data visualizations and tools to support decision-making and respond to environmental issues and seasonal hazards*

Focus Areas

Focus Area 1
Ocean and Weather Predictions

- ➔ Access to real-time conditions used to track anomalous conditions (data.caloos.org)
- ➔ MPA Dashboard with climate projections (mpa-dashboard.caloos.org)
- ➔ Marine heat wave model





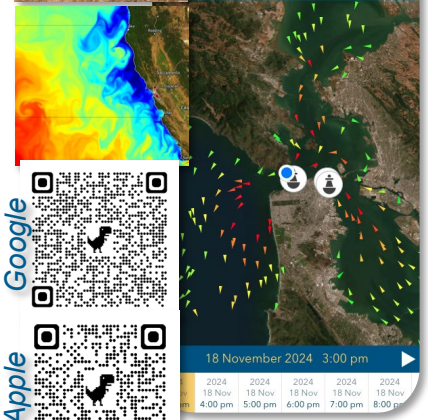




Focus Area 2
Safe & Efficient Shipping and Navigation

- ➔ High Frequency Radar data access
- ➔ BayCurrents Mobile App
- ➔ Forecast model access (COAMPS, WCOFS)



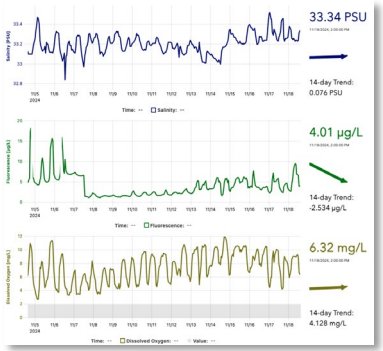


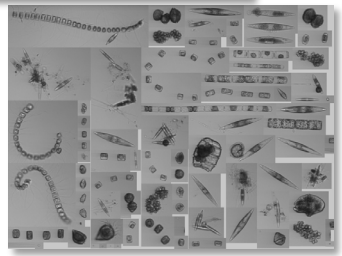
Google

Apple

Focus Area 3
Preparedness and Risk Reduction

- ➔ HAB Products (IFCB, CalHABMAP, C-HARM, CA HAB Bulletin)
- ➔ Oyster Dashboards
- ➔ Sea-level gauges, WebCOOS
- ➔ OAH Portal (oah.caloos.org)





Focus Area 4
Robust Ocean Resources

- ➔ Mobilizing Bio/Eco data into CalOOS Portal, OBIS/GBIF
- ➔ Real-time access to water quality observations
- ➔ OAH Dashboard



56 Principal Investigators


E. Terrill


L. Washburn


B. Emery


M. Ragan


M. Carter


C. Frieder


A. Santoro


R. Shipe


J. Smith


A. Pasulka


M. Gold


E. Satterthwaite


J. McWilliams


D. Bianchi

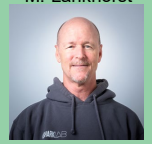

U. Send

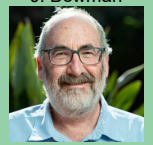

M. Lankhorst


J. Bowman


Z. Gold


A. Thompson


C. Lowe


D. Siegel

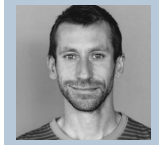
SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM


M. Merrifield


A.Young


D. Rudnick

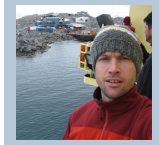

Y. Takeshita


R. Bochenek


I. Su


T. Bell


J. Dorman


I. Robbins


R. Walter


L. Peavey Reeves


S. Baumann


B. Sydeman


M. Garcia-Reyes


R. Freedman


E. Bockman


A. Moore


T. Martz

18 Joint PIs!


A. Parker


B. Block


C. Whelan


C. Edwards


D. Costa


H. Bowers


F. Chavez


J. Barth


J. Jahncke


J. Doyle


J. Abell


J. Joseph


J. Largier


M. Ferner


R. Kudela


T. Hill


T. Connolly


E. Bjorkstedt

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

100 Letters of Support - THANK YOU!!

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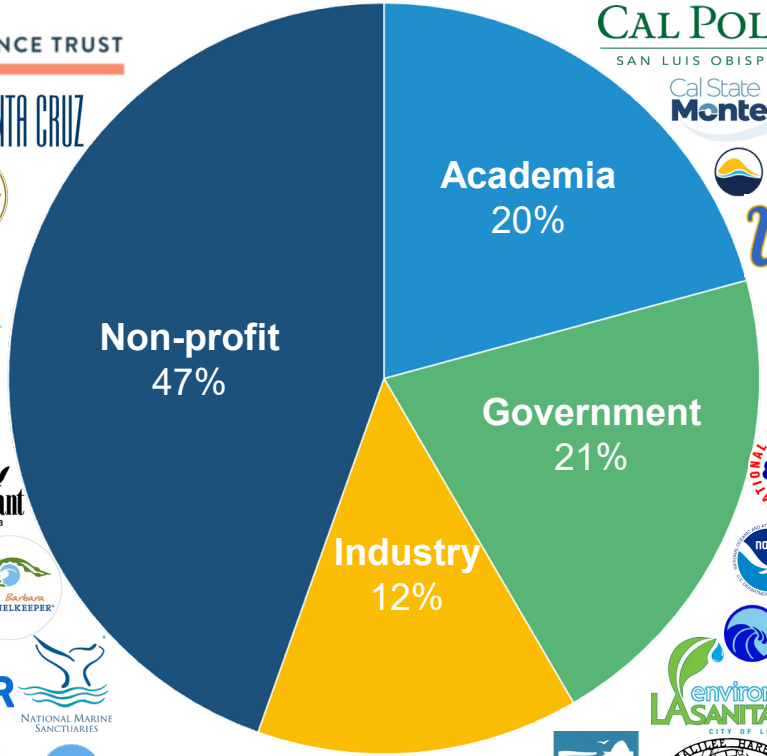
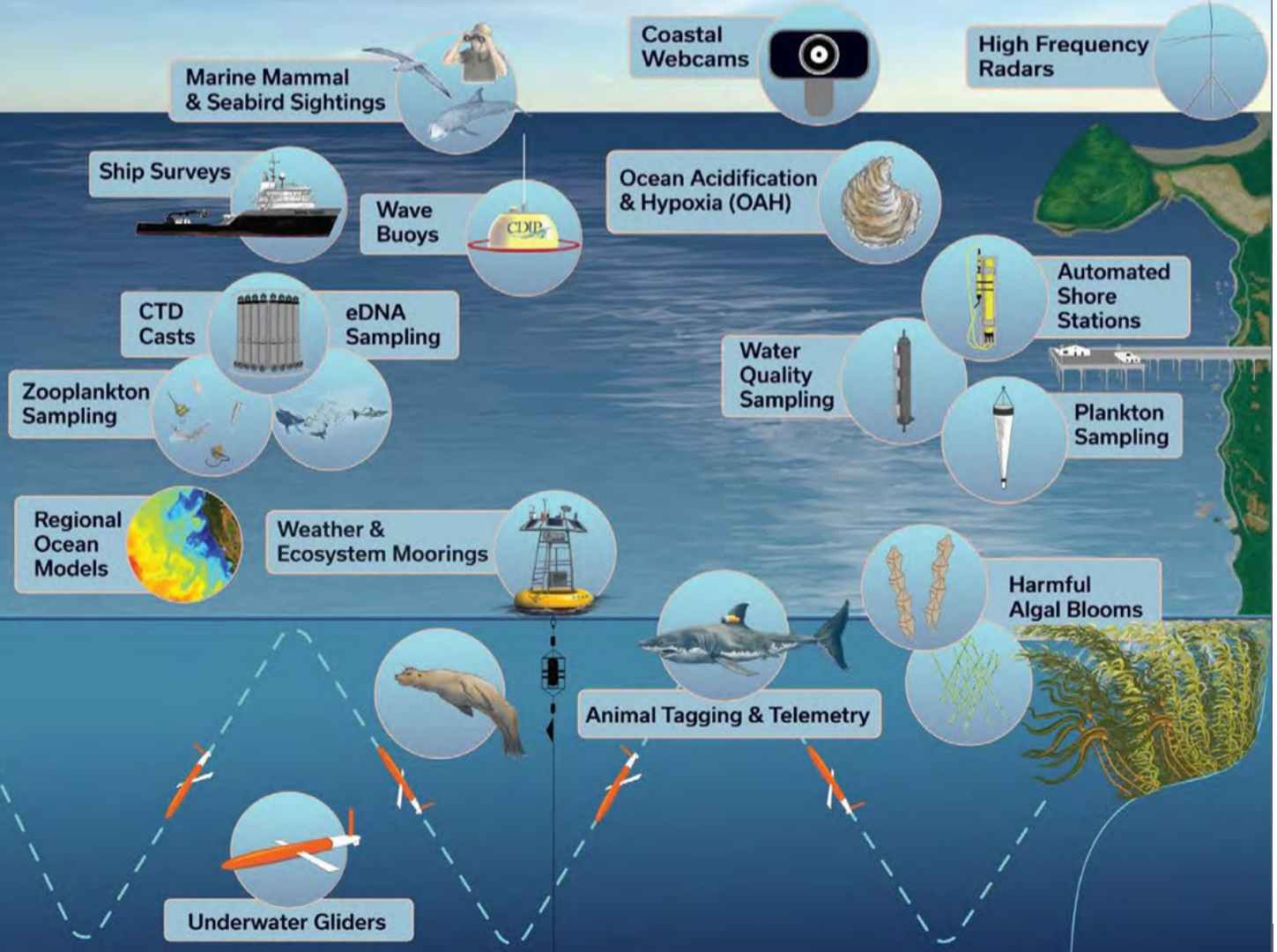


AltaSea
California Ocean Science Trust
Cal Poly San Luis Obispo
CICESE
UC San Diego
Scripps Institution of Oceanography
Western Regional Climate Center
UC Santa Cruz
Tijuana River National Estuarine Research Reserve
Marine Exchange of the San Francisco Bay Region
Cal State Monterey Bay
Marine Exchange Southern California VTS
Bridge Builders Foundation
California Aquaculture Association
UC Davis Coastal and Marine Sciences Institute
Ucla
BayQuest
Aquarium of the Pacific
Farallon Institute
Get Hooked
California Surfrider Beach Preservation Association
Elkhorn Slough Foundation
Sea Grant
TMA BlueTech
Merito Foundation
California Marine Sanctuary Foundation
Cordell Marine Sanctuary Foundation
cicru
Channel Islands Cetacean Research Unit
CIMI
West Coast Ocean Data Portal
Ocean Discovery Institute
Pacific Marine Mammal Center
California Wildlife Center
exploratorium
OpenOceans Global
Outdoor Outreach
West Coast Ocean Alliance
Sea Grant California
National Weather Service
Elkhorn Slough Foundation
U.S. Coast Guard Search and Rescue
Greater Farallones Association
Ocean Protection Council
SeaWorld San Diego
wcfc West Coast Fisheries Consultants
Marine Mammal Care Center Los Angeles
Marine Animal Rescue Nonprofit • Since 1985
Surfrider Foundation
Santa Barbara Channelkeeper
NOAA Fisheries
Heal the Bay
California Water Boards
California Department of Fish & Wildlife
Birch Aquarium
The Marine Mammal Center
SOFAR
PCSGA
National Marine Sanctuaries
California Coastal Commission
LA Sanitation
OEHHA
California State Parks
County of San Diego
Wildcoast Costasalvaje
Ocean Motion
OpenOceans Global
OARRA
Point Blue Conservation Science
Galilee Harbor Sausalito
Imperial Beach
City of Sausalito
Port of San Diego
City of Morro Bay
Sea Tactics Marine Weather Solutions
Surfrider Foundation Ventura County
Morro Bay National Estuary Program
Coastal Ocean Sensors
CSA
Hog Island Oyster Co.
Ocean Rainforest
Monterey Abalone Company
Center for Sea Rise Solutions
MPA Collaborative Network
The City of San Diego
Monterey Bay Aquarium
International Bird Rescue
CDPH California Department of Public Health
Applied Marine Sciences



SCCOOS by the Numbers

California Surface Current Mapping Network
31 HF Radars

California Underwater Glider Network
3 Glider Lines

California Coastal Observing Network
5 Automated Shore Stations
1 Ecosystem Mooring
3 Mini-Moorings

HAB Monitoring
5 Shore Stations - net tows, nutrient samples, toxin analysis, eDNA
5 Imaging FlowCytobots - real-time imagery

California Coastal Flood Network
9 Coastal Monitoring Stations - LiDAR
2 CDIP Wave Buoys
6 Webcams

Marine Mammal, Seabird, and Sea Turtle Observations
CalCOFI and Rockfish Cruises

North Pacific Acoustic Telemetry Network
14 Real-time White Shark Detection Buoys

Ocean Sound Observing Network
1 HARP Sound Station

Models
1 Coastal Circulation Model
1 ROMS-Biogeochemical Elemental Cycling

Principal Investigators
36 PIs across 16 Institutions

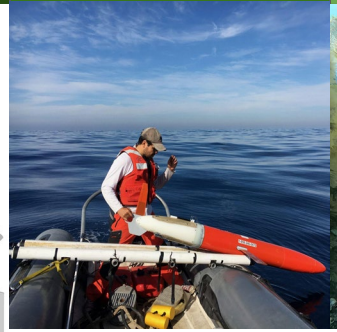
CalOOS Flagship Programs - HIGHLY LEVERAGED PROJECTS

CA Surface Current Mapping Network (HF Radar)



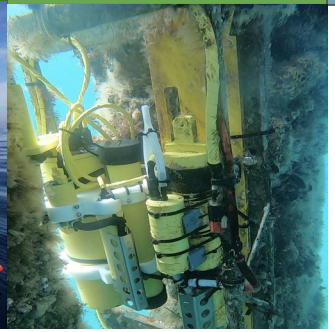
- Largest network in the world - began in 2003
- 32 Antenna in SoCal, 64 total in CA
- Aids in SAROPS, Oil Spill Response, Coastal Pollution Tracking, HAB Forecasting and Tracking, Understanding Larval Connectivity for MPAs

California Underwater Glider Network



- Sustained since 2007
- Includes Temperature, Pressure, Salinity, Velocity, Chl. Fluorescence, Acoustic Backscatter, Dissolved Oxygen, pH
- Critical for Models,
- ENSO Forecasts, etc.

Automated Shore Stations



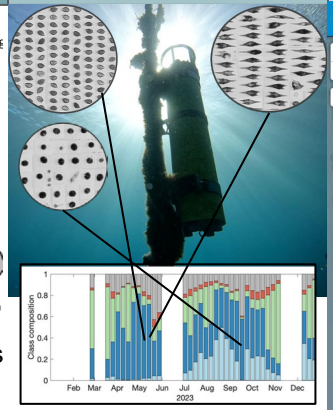
- Sustained since 2005
- Includes Temperature, Salinity, Chlorophyll, Conductivity, Water Density, Pressure, pH, and Oxygen
- Aids our understanding of mixing, upwelling, land run-off, and algal blooms

CA HAB Monitoring and Alert Program



- Weekly Water Samples and Net Tows at Shore Stns Since 2008
- Includes Chl.-a, Temperature, HAB Species, Nutrients, Domoic Acid, SPATT Toxins
- Aids CDPH in targeted sampling for public safety
- Supports Marine Mammal Stranding Network

Plankton Imaging (IFCBs)



- Established in 2020
- Robotic microscopes provide real time image classification
- Fills offshore obs gaps
- Prototype Technology for National HAB Observing

CalOOS Data Portal



Search Over 1100+ Datasets

CENTRAL & NORTHERN CALIFORNIA OCEAN OBSERVING SYSTEM

SOUTHERN CALIFORNIA COASTAL OCEAN OBSERVING SYSTEM

EcoObs Buildout in Partnership with IOOS W.C. Regional Associations

	AOOS (AK)	NANOOS (WA/OR)	CeNCOOS (CA)	SCCOOS (CA)	Stay tuned to learn more!
BGC SENSORS - FIXED & MOBILE					
Next-generation gliders	○	●	●	●	Rudnick, Barth
Nitrate & pH on glider lines	○	●	●	●	Rudnick, Barth
Upgraded sensors on buoys/moorings	○	●	○	●	Send, Lankhorst, Chavez
Modernized shore stations	○	○	●	●	Carter, Martz, Bockman
ZOOPLANKTON INDICATORS					
Biomass from ADCP backscatter	○	○	●	●	Dorman
eDNA METABARCODING					
eDNA at shore stations	○	○	●	●	Pasulka, Bowman, Chavez
Zooplankton eDNA, CalCOFI archive	○	○	○	●	Z. Gold
HABs, PLANKTON, & IMAGING					
IFCBs at shore stations	○	○	●	●	Anderson, Kudela, Pasulka
HAB Data Assembly Center	○	○	●	●	Anderson, Bochenek
OCEAN SOUND					
PAM on gliders	○	○	●	●	Rudnick/Baumann-Pickering
3 sound stations	○	○	●	●	Baumann-Pickering/Peevey-Reeves
ACOUSTICS & TAGS					
Northeast Pacific Acoustic Telemetry	●	●	●	●	Freedman
Acoustic receiver on WA shelf glider	○	●	○	○	Barth
9 real-time acoustic buoys	○	○	○	●	Lowe/McInturf

1	5	10	13
AOOS	NANOOS	CeNCOOS	SCCOOS

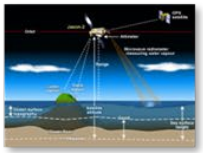
investments



In Situ Obs → Models → Example Integrated Data & Info

Model boundaries

Satellites



High-Freq. Radar



Buoys/ Stations



Gliders



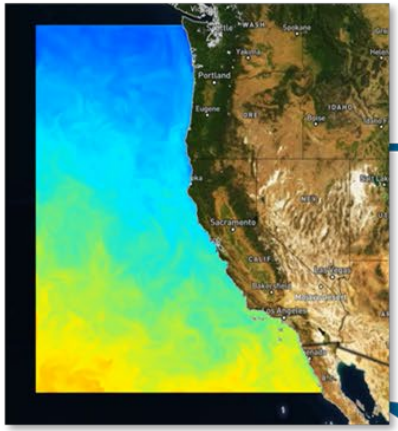
Tags



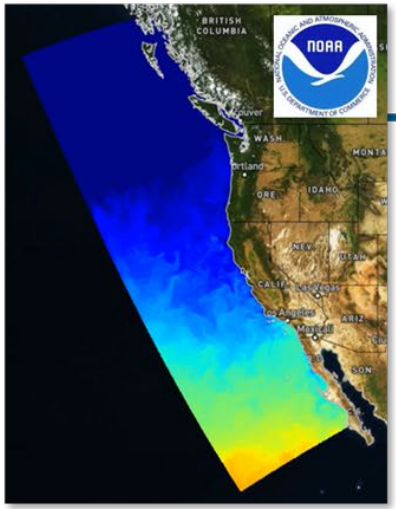
Other tools

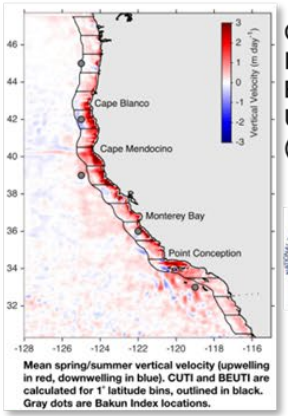
Observation data assimilation into models

West Coast ROMS NRT Nowcast



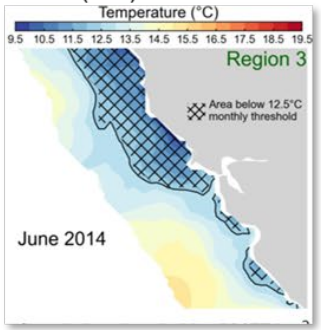
WCOFS Nowcast + 3-day Forecast

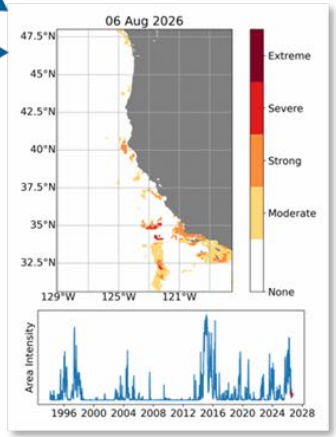




Coastal Upwelling Transport Index (CUTI) & Biologically-Effective Upwelling Transport Index (BEUTI) – *Jacox et al.*

Habitat Compression Index (HCI) – *Santora et al.*



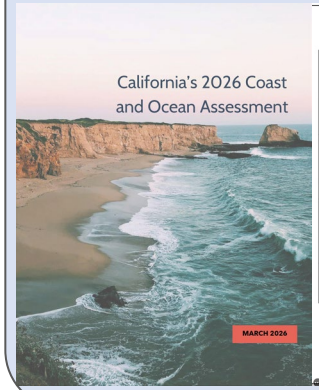


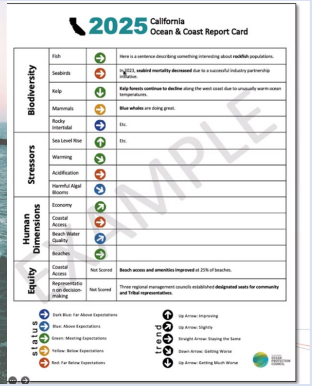
Heatwave Classifier – *sensu Hobday et al.*

+Many more

CalOOS Data for Place-Based Management

OPC California Coast and Ocean Report

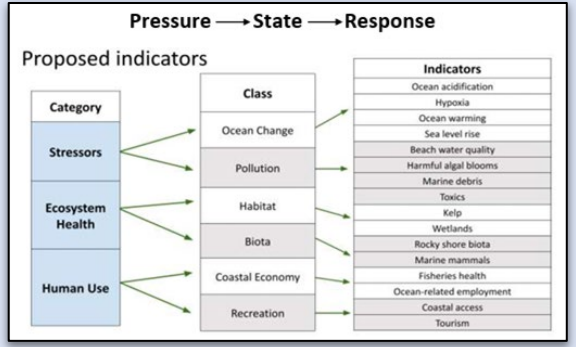




H. Ruhl on **OPC, Science Advisory Team**

C. Anderson on OST and OPC, **El Nino Science Task Force**

West Coast Ocean Alliance Indicators



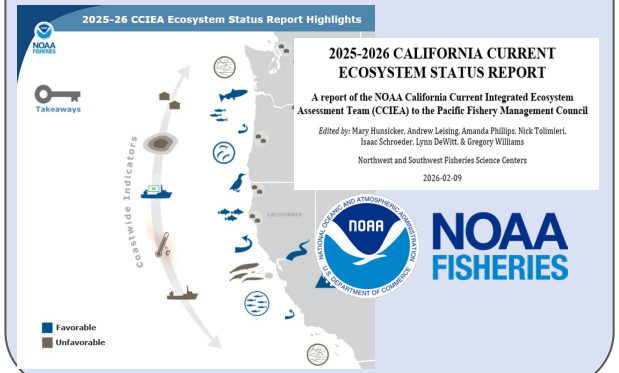
West Coast OCEAN ALLIANCE

Invited to Expert Working Groups:

- Marine Mammals - C. Anderson, H. Ruhl
- HABs - C. Anderson, A. Harper
- OAH - A. Harper
- Temperature - M. Medina,, A. Harper



State of the California Current Report

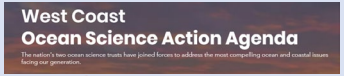


Sanctuary Condition Reports



H. Ruhl, A. Harper, and C. Anderson on **Research Activities Panel** for MBNMS, CHNMS, CINMS, respectively

West Coast Ocean Science Action Agenda

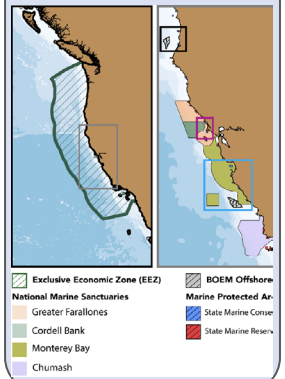


CALIFORNIA OCEAN SCIENCE TRUST

OREGON OCEAN SCIENCE TRUST

C. Anderson and J. Newton on **Advisory Committee**

Offshore Wind



NEW CalOOS El Niño Tracker Tool!!

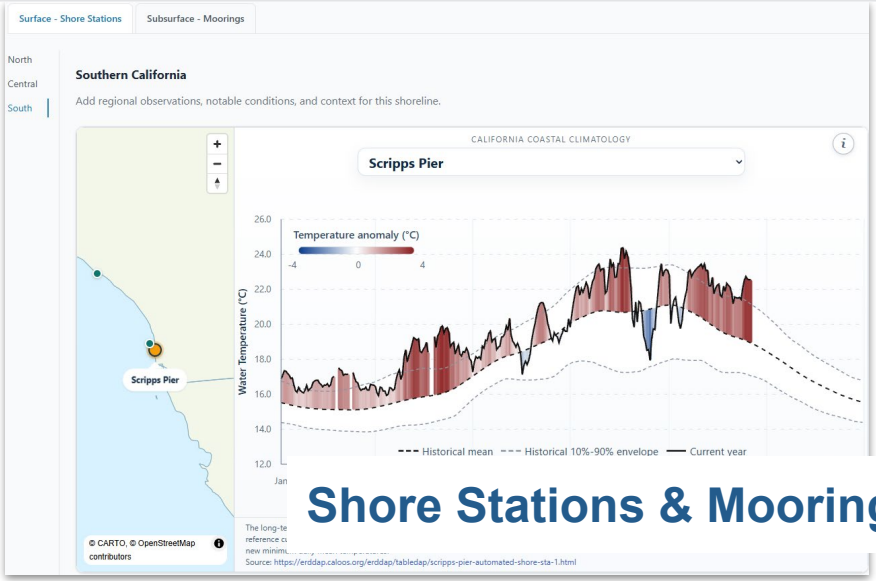
CALIFORNIA OCEAN OBSERVING SYSTEM

Monitoring El Niño with the California Ocean Observing System

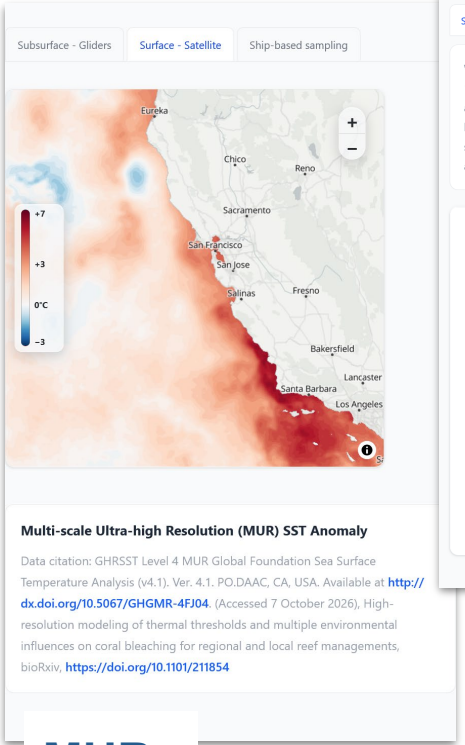
Current Outlook: El Niño Advisory

Updated: October 7th, 2026

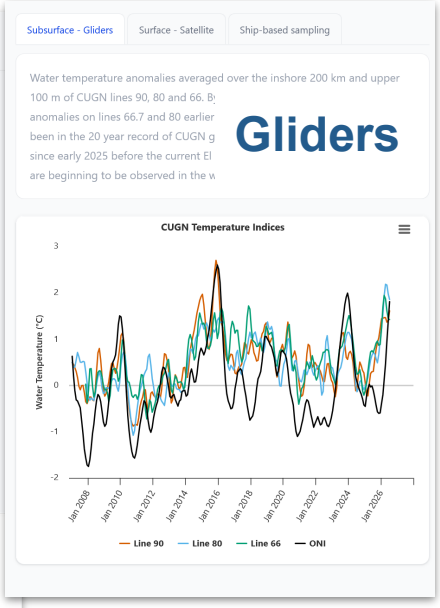
- A persistent warm anomaly has been observed along much of the coast data back to September 2025 (see Coastal Conditions, Offshore Conditions).
- El Niño temperature signals evident at Southern California, both at shore stations and along the glider lines (see Gliders).
- In Central and Northern California, upwelling has brought short bursts of cooling. These dips interrupt the warm anomaly but haven't reversed it (see Upwelling).
- Much of this warmth started as a marine heatwave before El Niño arrived. Earlier this year, glider temperature anomalies on Lines 66.7 and 80 were the largest in the 20-year glider record.



Shore Stations & Moorings



MUR



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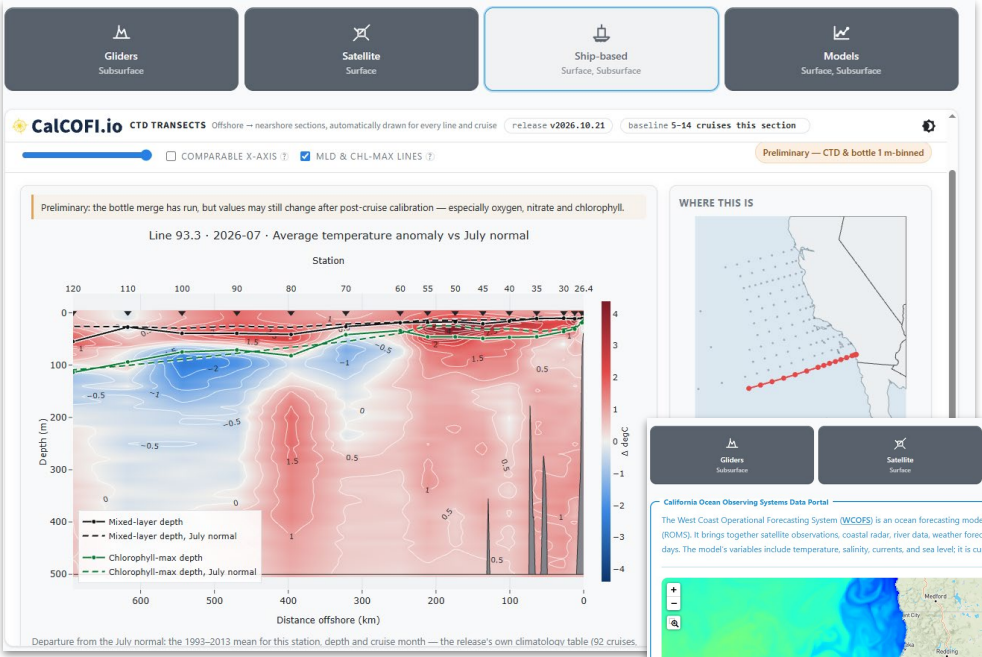
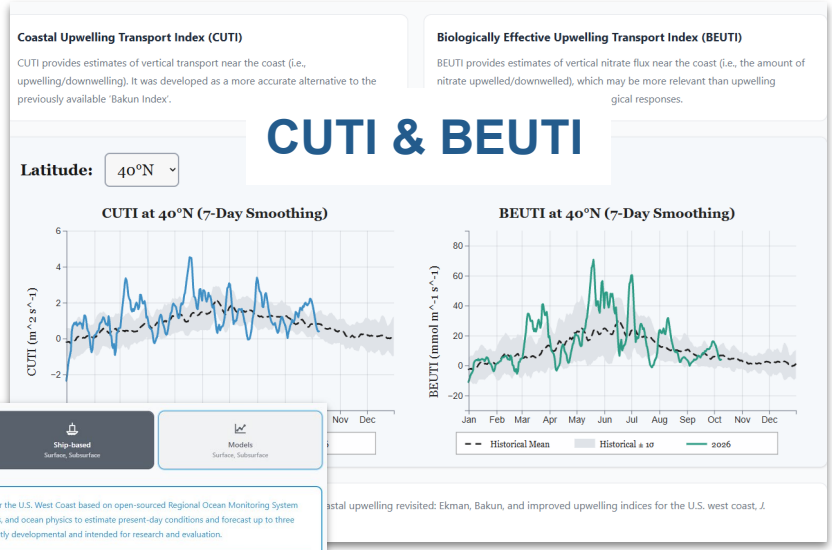
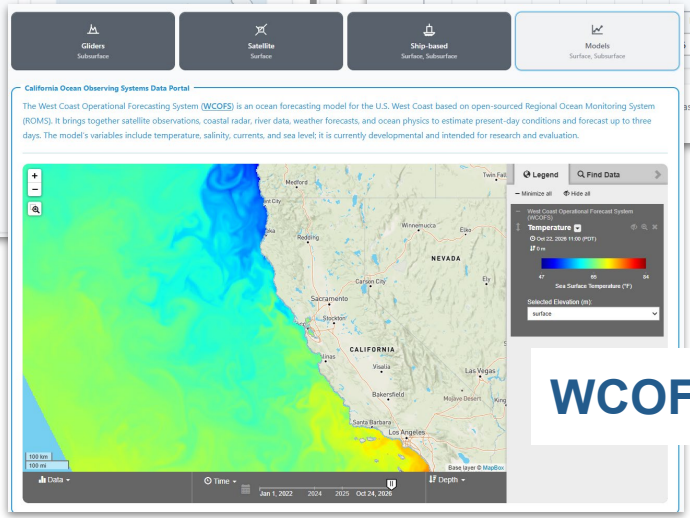
NEW CalOOS El Niño Tracker Tool!!



CalCOFI CTD Data





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