SCCOOS: Integrating Regional Compliance Monitoring and Ocean Observing Systems

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What factors differentiate Southern California from other regions?

- Beach-related water quality is a high priority
- Observational resources are different from other regions

Development of Collaborative Observational Efforts

- Historical observing systems
- Evolution of NPDES efforts
- Specialized observation efforts
- Integrated ocean observing system

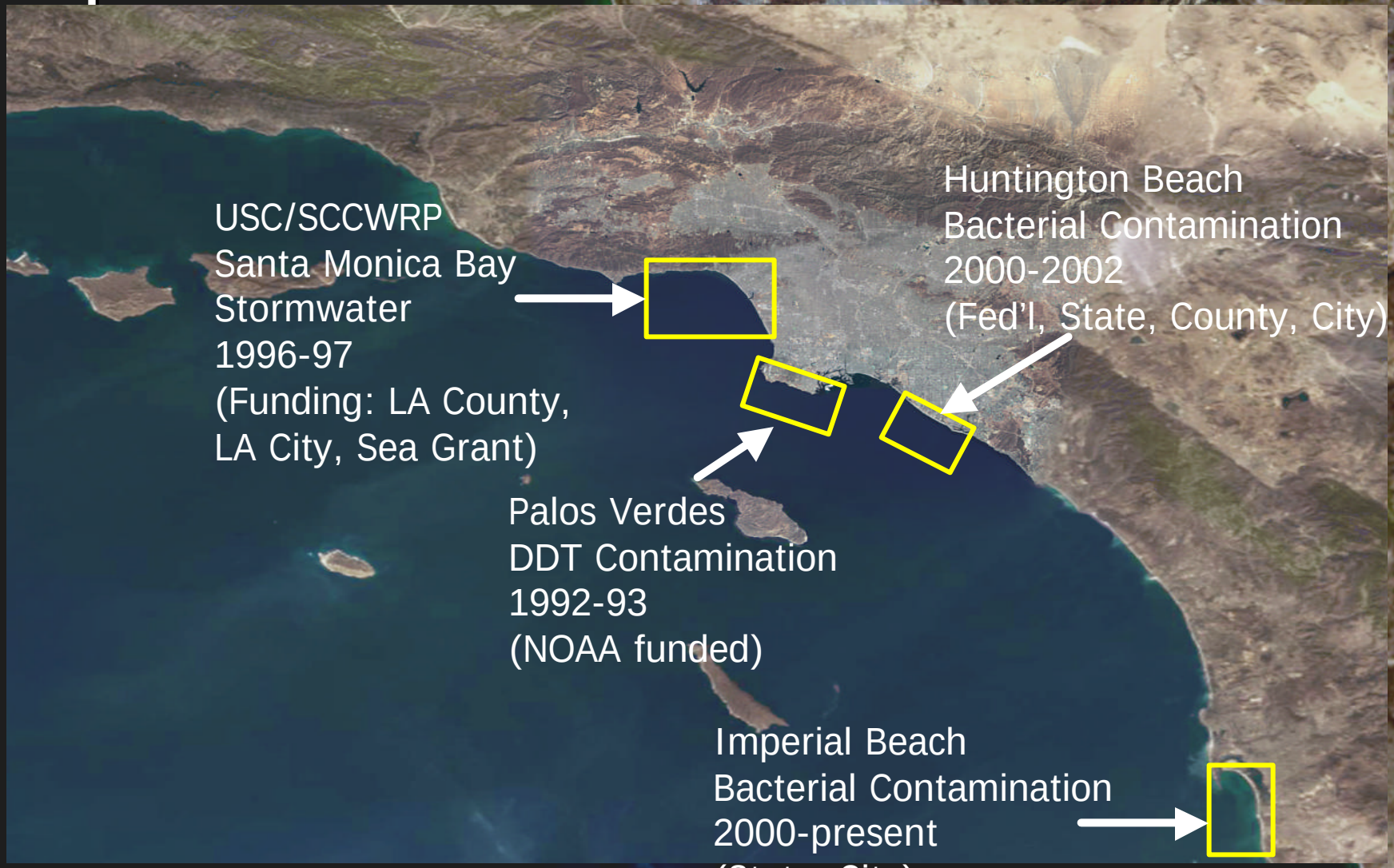
Historical Ocean Observing Systems in Southern California

- CalCOFI (California Cooperative Fisheries Investigations)
  - >50 years
- NOAA Buoys
- CDIP – Coastal Wave Prediction
- NPDES Permittee Monitoring (Clean Water Act)
  - Local Monitoring
  - Regional Monitoring / Assessment beginning 1994

Evolution of NPDES Regional Monitoring

- Bight 94 (EMAP affiliation)
  - Goal: State of the Bight
  - Municipal monitoring agencies only
- Agency transition from independent local sampling to regionally coordinated sampling
- Bight 98
  - Beginning of academic collaboration with monitoring agencies
  - Water Quality focus on Stormwater Runoff
- Bight 03
  - Larger role of academic involvement
  - Collaboration of SCCOOS Components to provide complementary observational tools
    - Remote sensing
    - Drifters
    - HF Radar surface current mapping

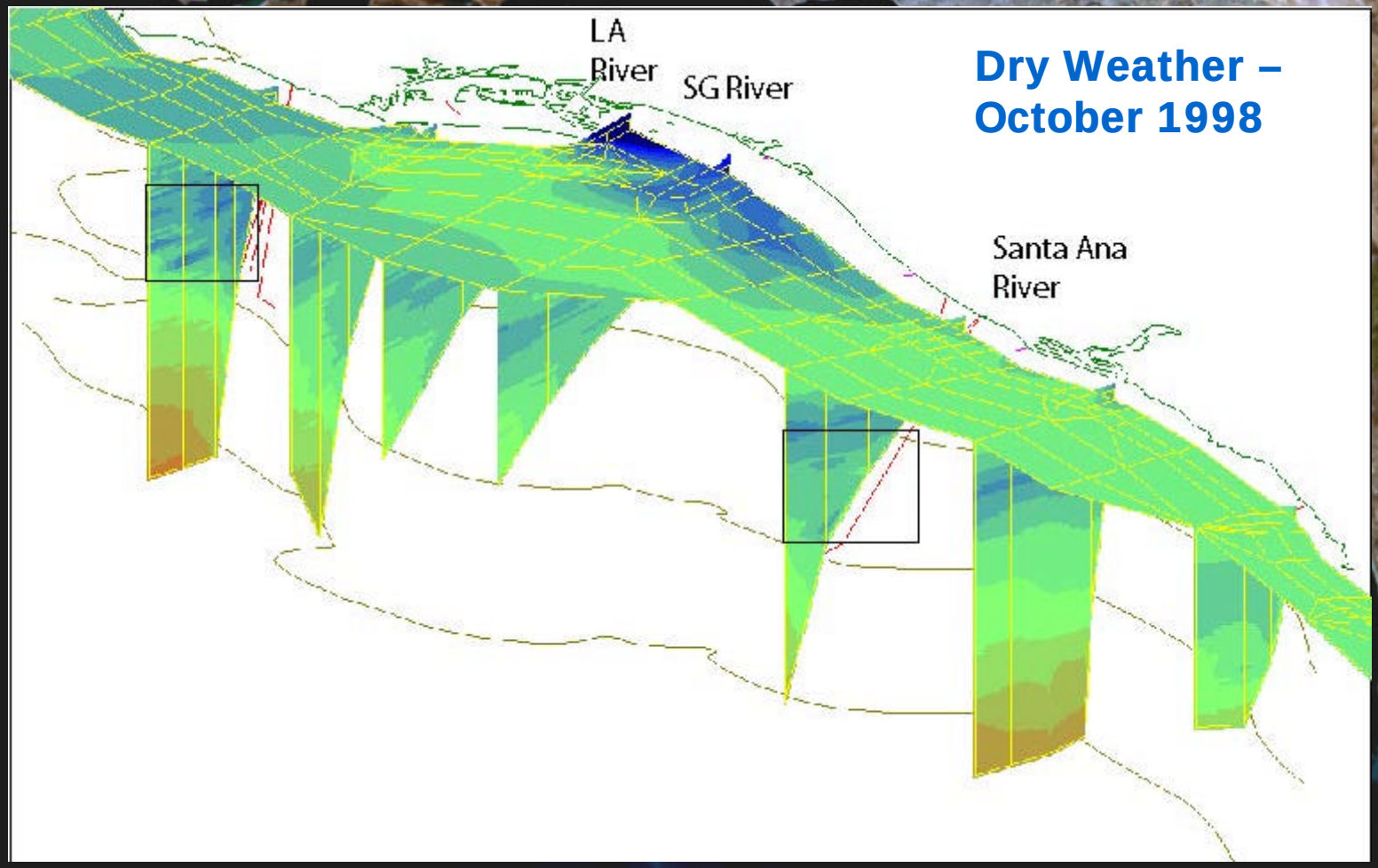
Focused Observational Programs: Specific Problem Areas



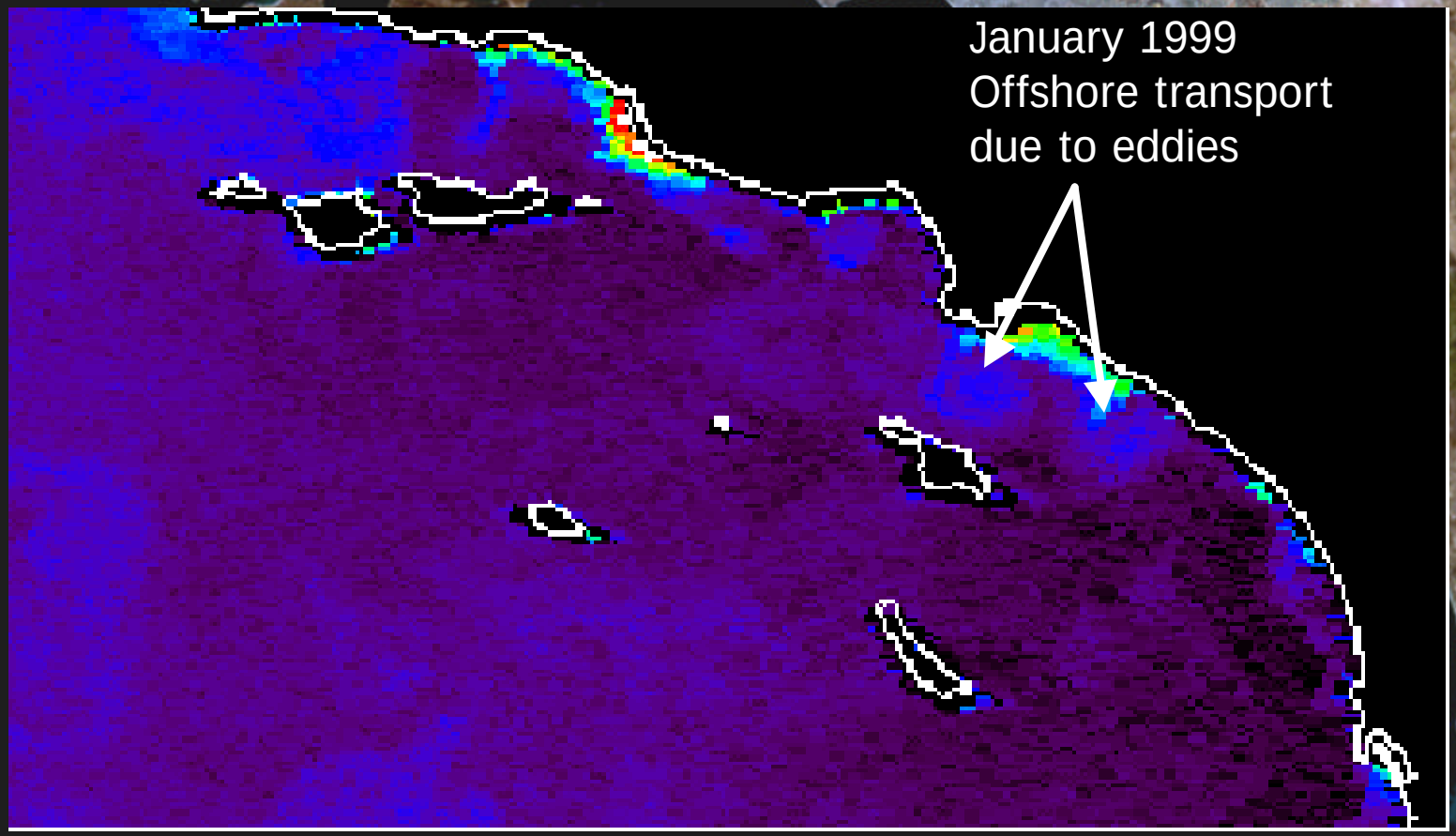
Recent Examples of NPDES Permittee/Academic Collaborations

- Bight 98 / Bight 03 Regional Studies

Bight 98 / 03 – Significance and Dispersion of Freshwater Plumes



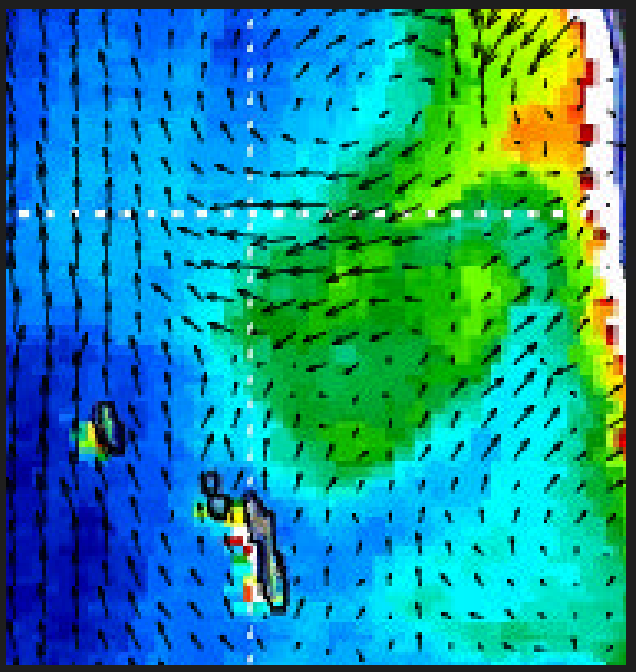
Bight 98/03 – Complex transport of plumes

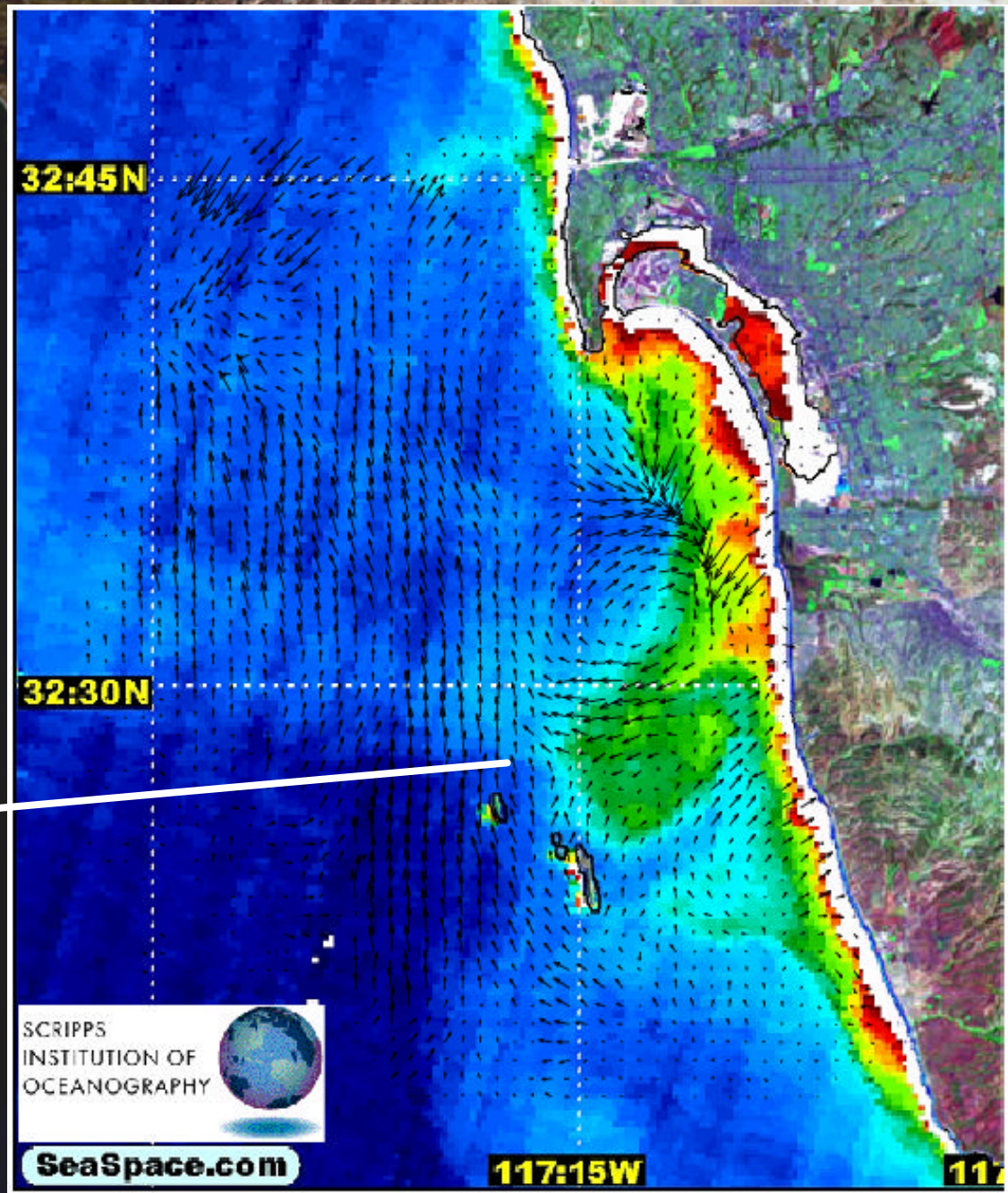


Bight 98/03 – Correlation between coastal currents and runoff properties

Combination of HF RADAR CURRENTS with OCEAN COLOR satellite data

2/5/03





Where do we go from here?

Monitoring: *systematic collection of mission driven environmental data to determine current conditions, trends, variation*

Observing: *collection of real-time environmental data for a host of uses*

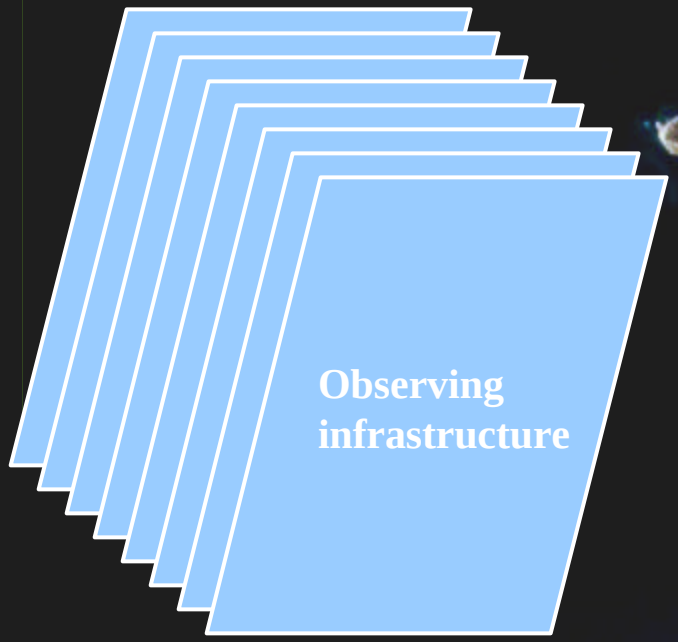
Research: *scientific investigation and scholarly pursuit of knowledge*

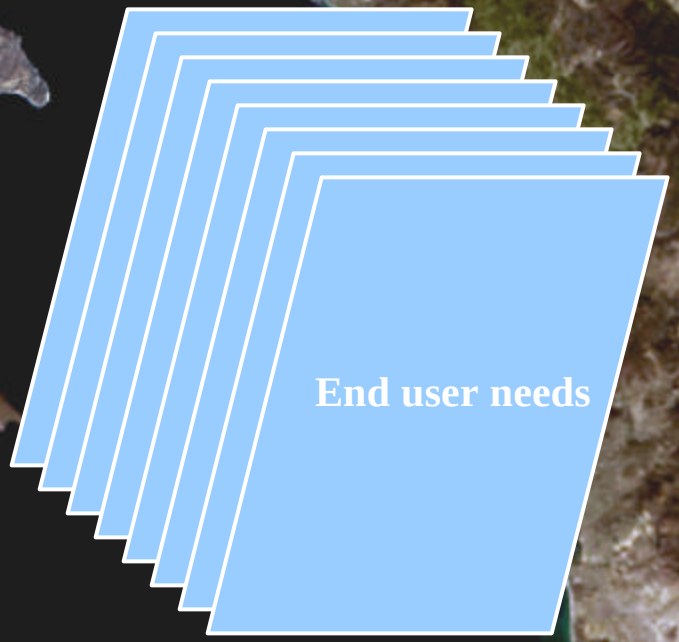
Education: *presentation of information in a manner that people can take action*

….the many layers of an integrated coastal observing system

- Existing agency monitoring
- surface current measurements
- satellite and aircraft remote sensing
- physical,bio-optical moorings
- autonomous vehicles
- meteorological measurements
- modeling
- distributed databases
- ……. ?

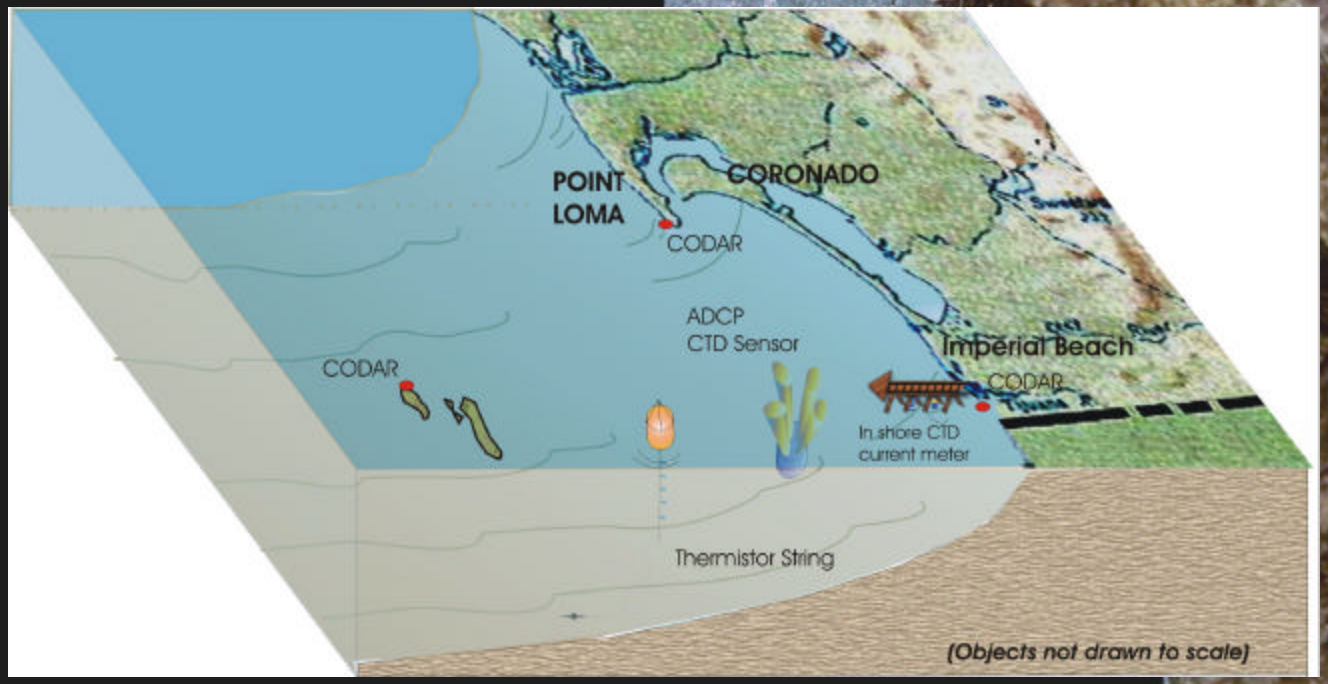
- water quality
- marine life resources
- coastal hazards
- educators
- search and rescue
- spill response
- security
- regional marine science
- …….?





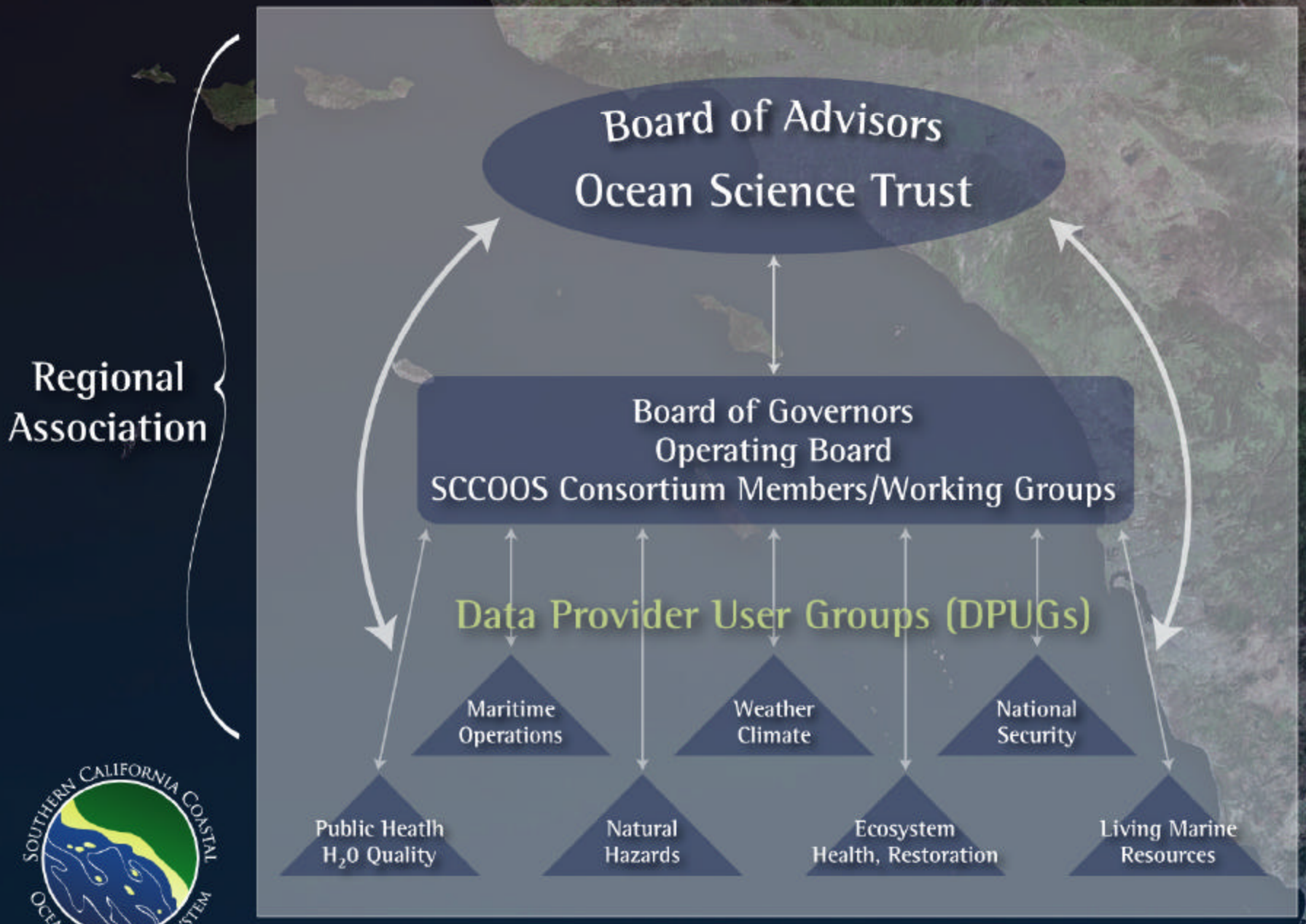
Apply real-time sensors to build a system to continuously monitor the coastal ocean

- Moorings
- Instrument city piers
- Bottom mounted sensors
- HF radar
- Satellite remote sensing
- Autonomous vehicles



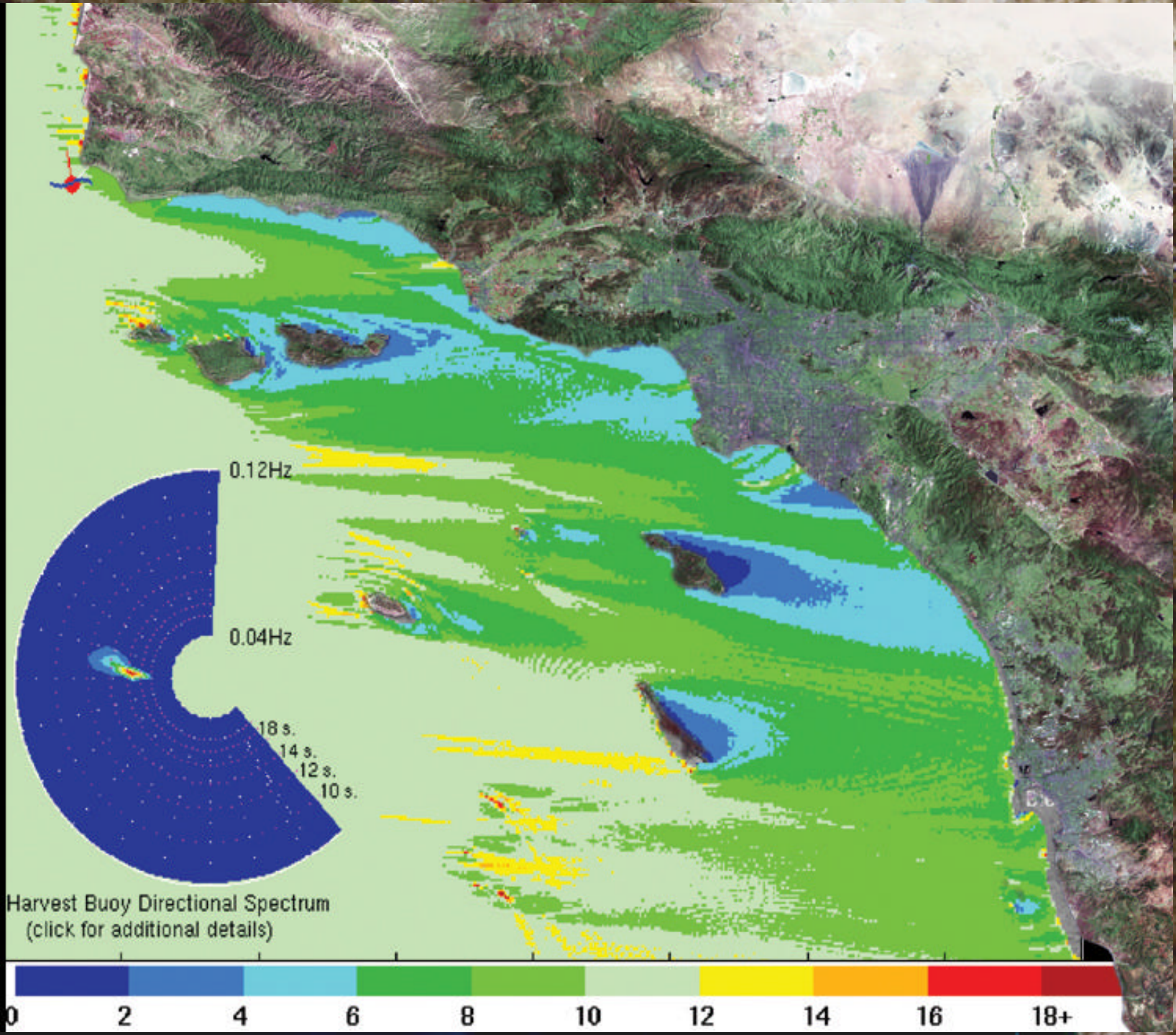
Couple data to existing monitoring efforts - provides framework for interpretation/understanding

Draft organization structure for SCCOOS

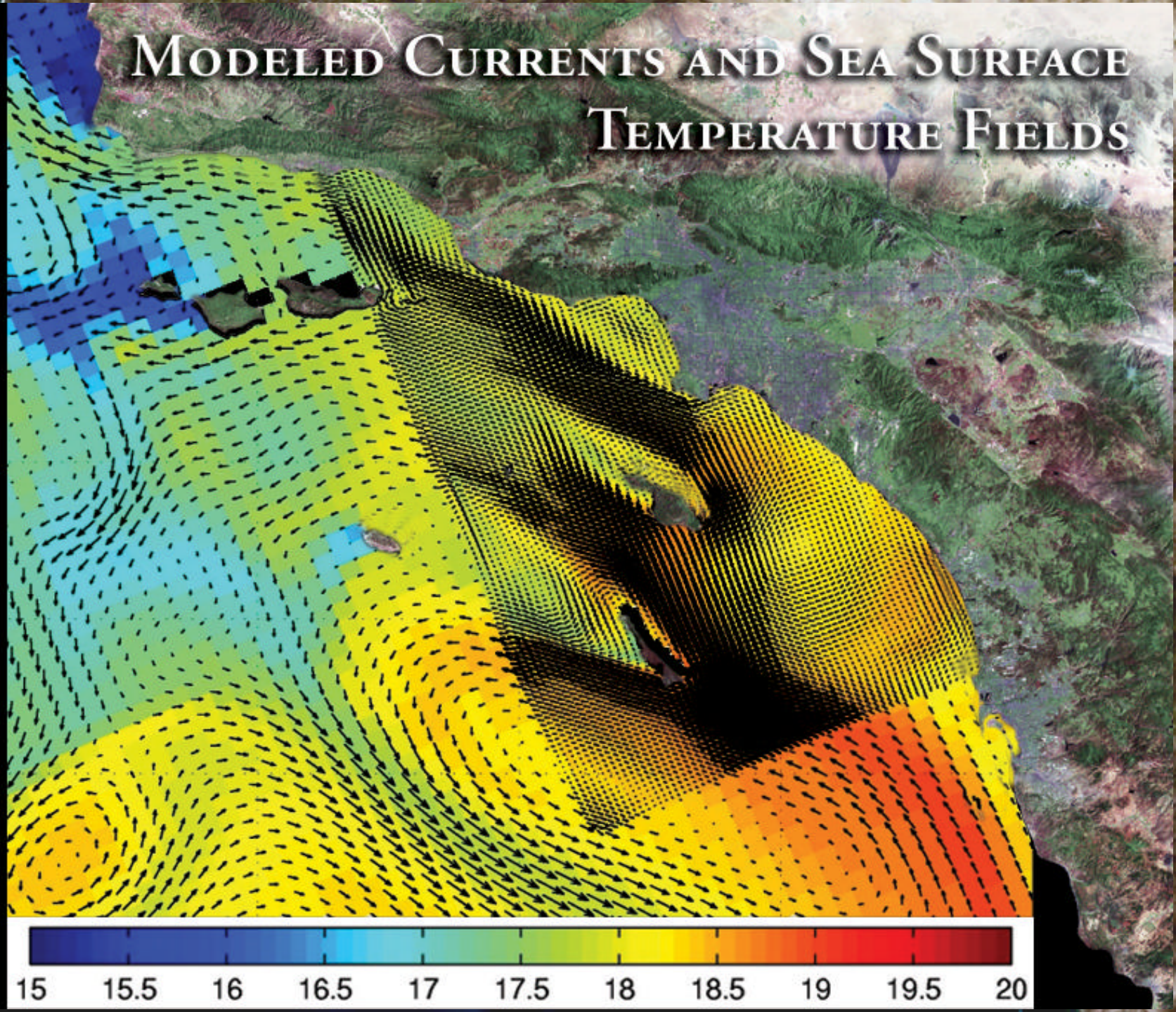


Southern California
Discharger Quarterly Stations
CalCOFI Present Pattern
NDBC Buoys
NDBC C-Man Station
NWS Coastal Observation System
CDIP Wave Buoy
Santa Barbara Channel Moorings
Proposed Moorings
PISCO Moorings
SB Charm
NERR Tijuana River
NOAA PORTS
NOAA-NWLON
LTER Mooring
Proposed Glider Tracks
CODAR Range in SD
SCCOOS Shore Stations
Southern California Coastal Ocean Observing System

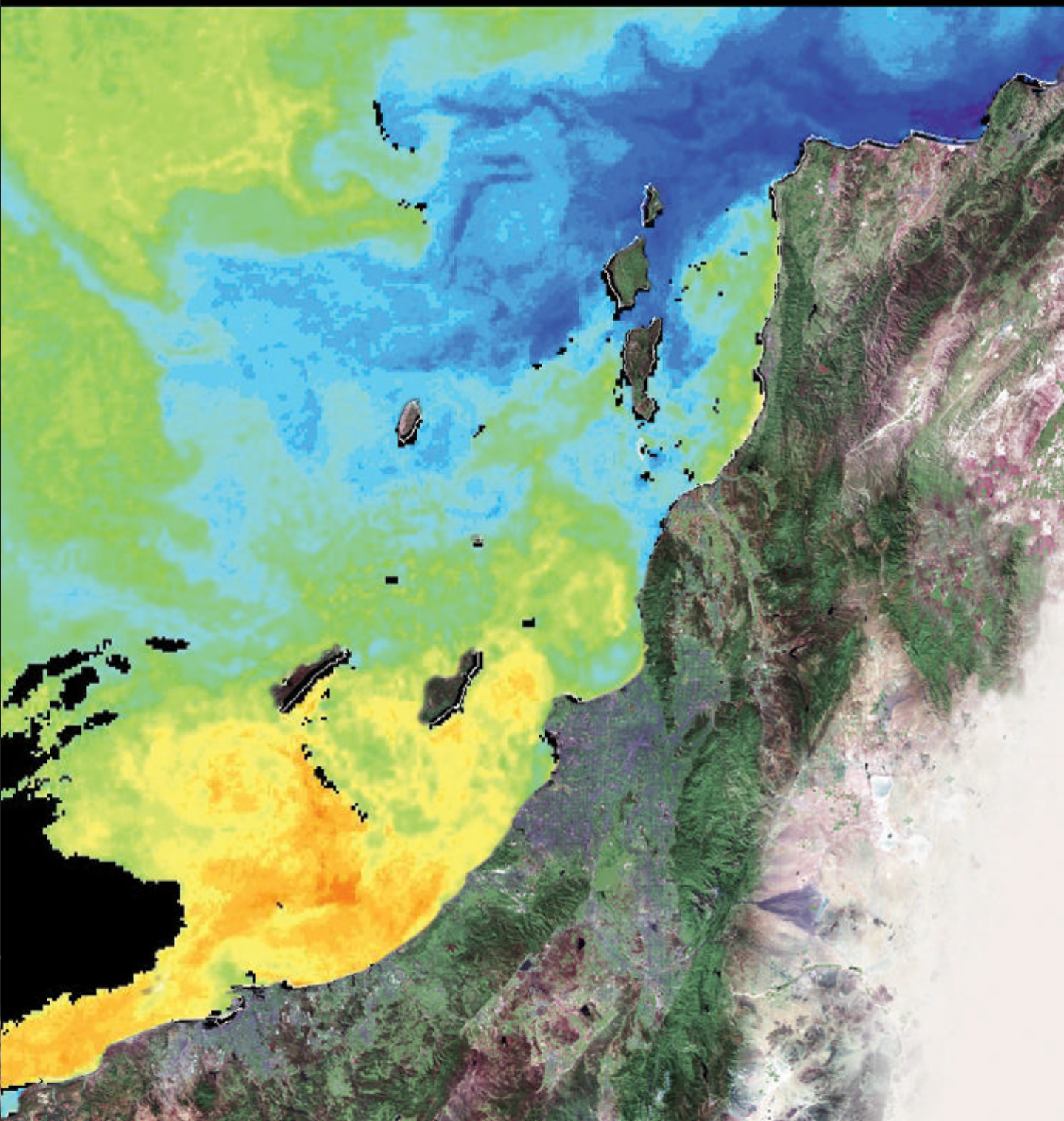
CDIP WAVE HEIGHT (FT) MEASUREMENTS & PREDICTIONS



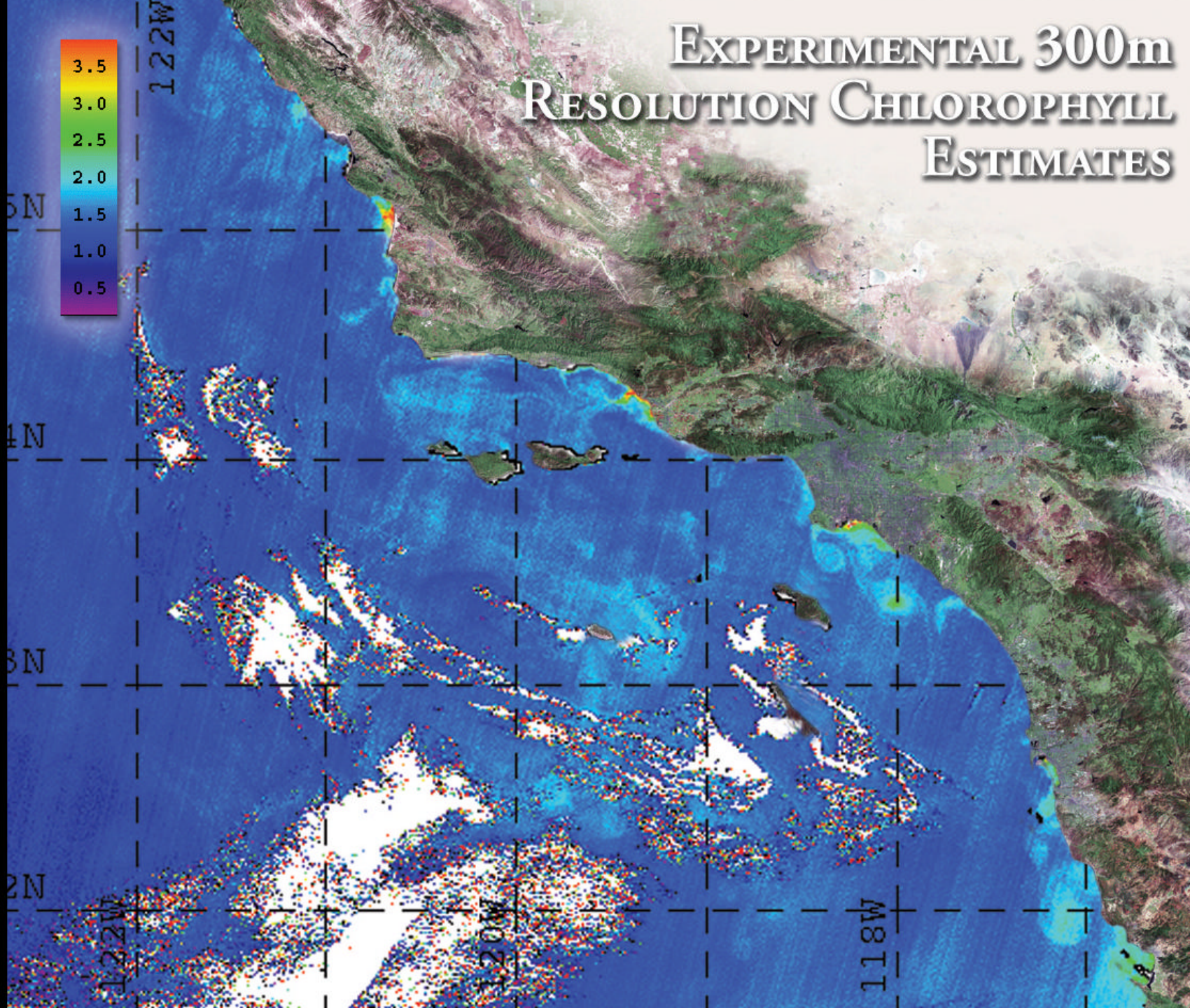
ROMS NESTED MODEL OUTPUT



SATELLITE REMOTE SENSING OCEAN TEMPERATURE FIELDS



Experimental 300m Resolution Chlorophyll Estimates



IMPLEMENTATION OF OCEAN CURRENT MAPPING INFRASTRUCTURE UNDER CALIFORNIA STATE PROP 40

Southern California

Regional Coverage Provided by Nested Array

Southern California Coastal Ocean Observing System

Southern California

Site Locations for High Resolution Ocean Current Mapping HF Radar with ~40km Range

Small Arrays: 1. Pt Estero 2. Pt Puchon 4. Pt San Luis 5. Mussel Shoals 6. Pt Sal 7. Pt Arguello 8. Pt Conception 9. Refugio St Beach 10. Coal Oil Pt 11. Rincon Isl 12. Mandalay Station 13. Ventura 14. Oxnard 15. NE Santa Cruz Isl 16. Pt Dume 17. Pt Vicente 18. Pt Fermin 19. Huntington Beach 20. Newport Harbor Entrance 21. San Clemente 22. Avalon 23. Oceanside Pier 24. SD N County 25. La Jolla Pt 26. Sunset Cliffs/Pt Loma 27. Point Loma 28. Border Pk 29. S Coronado 30. Rosorito Beach

Southern California

green: historical site

blue: existing UCSB

orange/yellow: existing SDCOOS

light blue: proposed new sites

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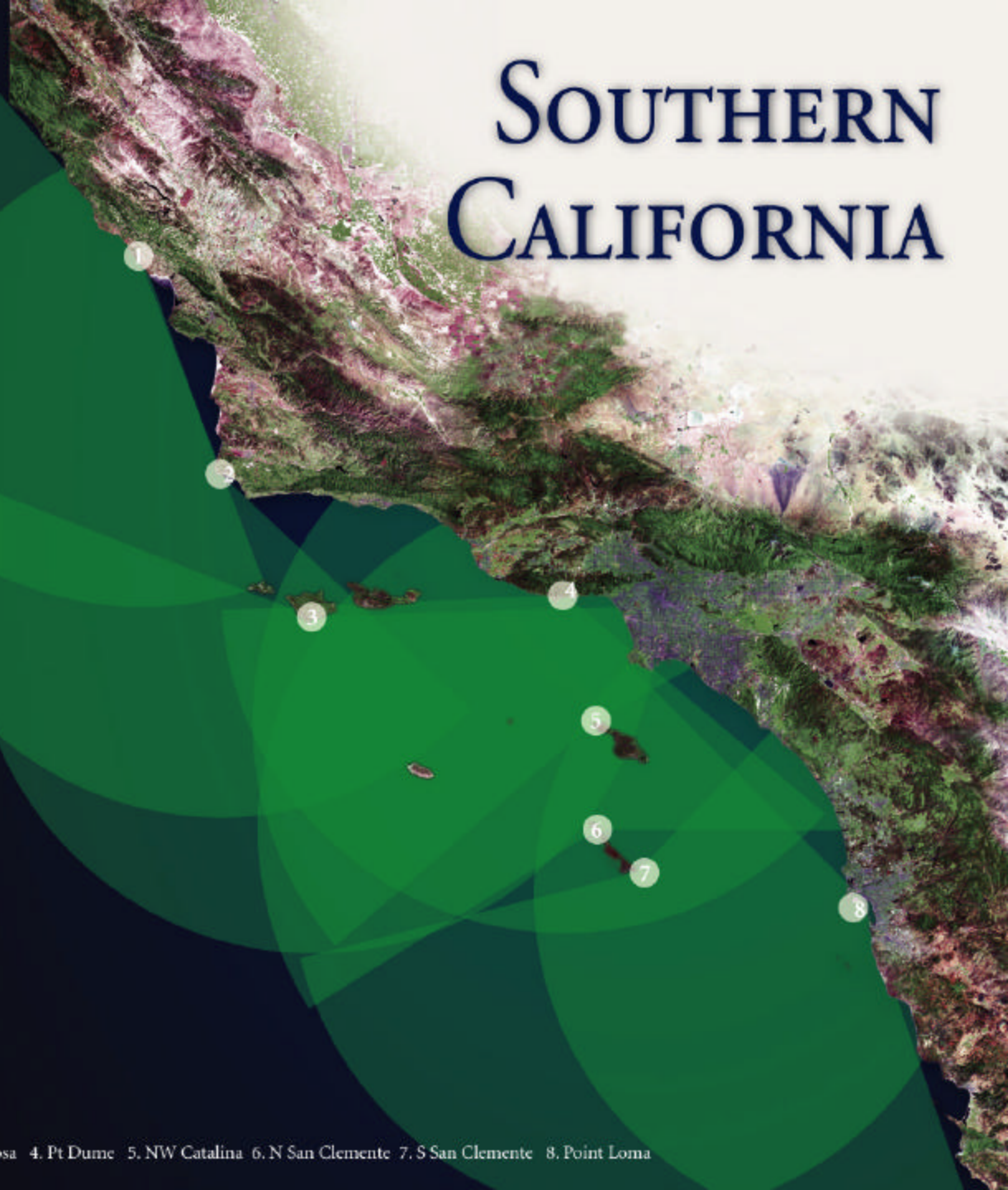
Southern California



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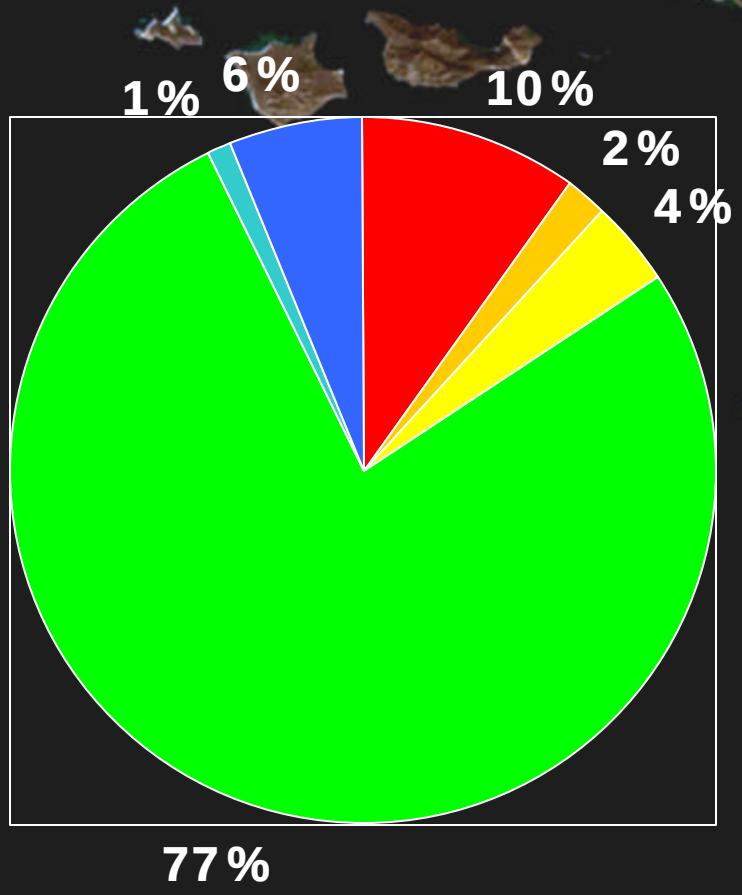
Summary

- Set of observing systems already existing in Southern California
- NPDES Permittees have a significant existing observational program whose costs exceeds all other existing programs
- History of collaboration between the municipal agencies and the academic community
- Implementation of new observing systems that:
  - Complement existing observing programs
  - Provide understanding / interpretation not available from previous observations
- Development of integrated products to serve the user community

User Issues for SCCOOS

- Water Quality / Public Health
- Living Resources
  - Fisheries Management
  - Marine Protected Areas
  - Harmful Algal Blooms
- Shipping and Transportation
- Oil Spills / Search and Rescue
- Beach Dynamics / Sediment Transport
- National Security

Southern California Monitoring Expenditures - Year 1997



Fed'l	$3.15M
State	$0.55M
Local	$1.27M
NPDES	$24.00M
Private	$0.39M
University	$1.88M

Total: $31.3M