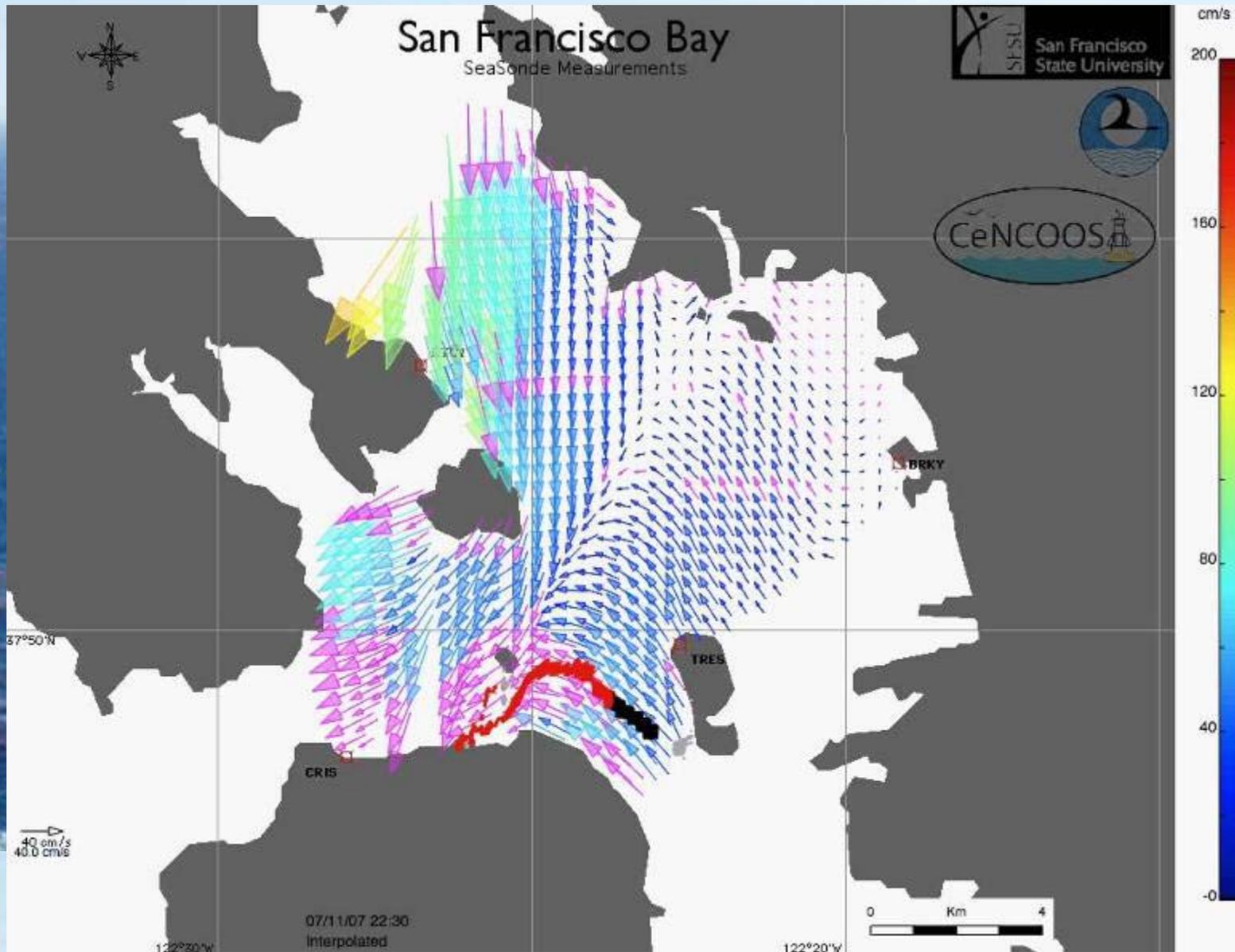


Case Study 1: Oil Spills - Timeline

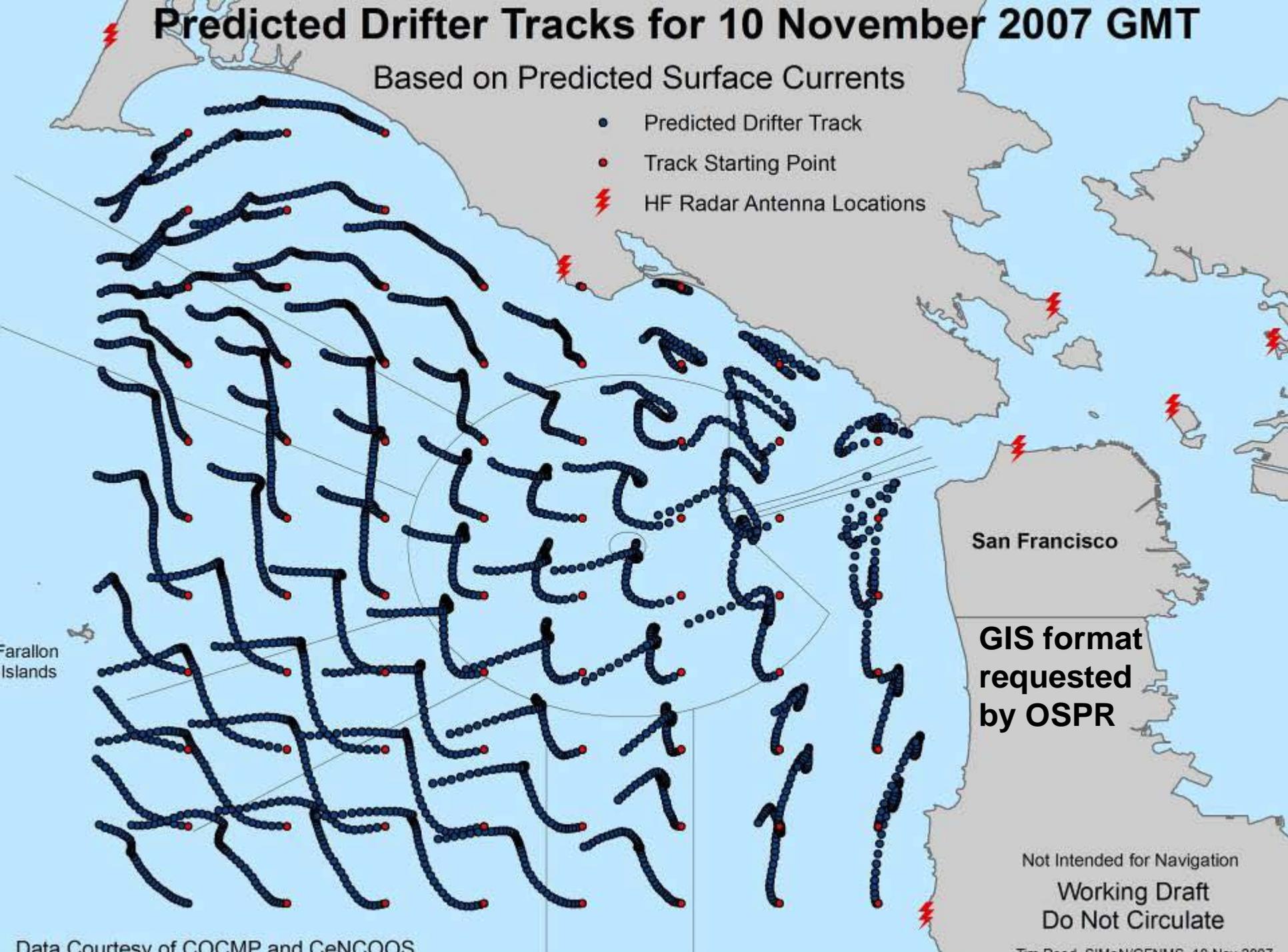
- Cosco Busan hit Oakland Bay Bridge Nov. 7, 2007
 - 2004-present Establishment of California HF Radar array
 - 2005 IOOS office supports CORDC to develop HFR national network distribution
 - 2006 SafeSeas06 was the first collaborative effort between OOS and NOAA OR&R netCDF format standardized,
 - 2007 *CoscoBusan* incident used HFR in spill predictions, development of GIS format
 - 2008 HF Radar integration into both Office of Spill Prevention and Response (OSPR) and Office of Response and Restoration for GNOME forecasting model and used in National Preparedness for Emergency Response Planning (NPREP)
- Deepwater Horizon well blowout Apr. 20, 2010
 - April 20, 2010 No Gulf of Mexico HF Radar systems online
 - April 24, 2010 University of Southern Florida Systems online in national network
 - May 01, 2010 University of Southern Mississippi systems online in national network



Predicted Drifter Tracks for 10 November 2007 GMT

Based on Predicted Surface Currents

- Predicted Drifter Track
- Track Starting Point
- ⚡ HF Radar Antenna Locations



San Francisco

GIS format
requested
by OSPR

Not Intended for Navigation
Working Draft
Do Not Circulate

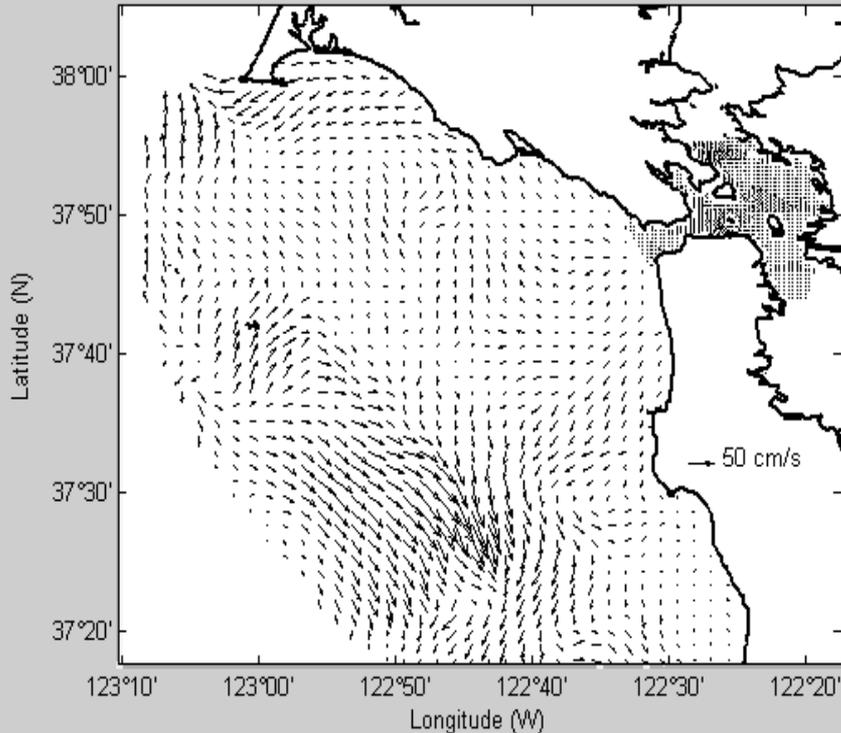
Farallon
Islands

Data Courtesy of COCMP and CeNCOOS

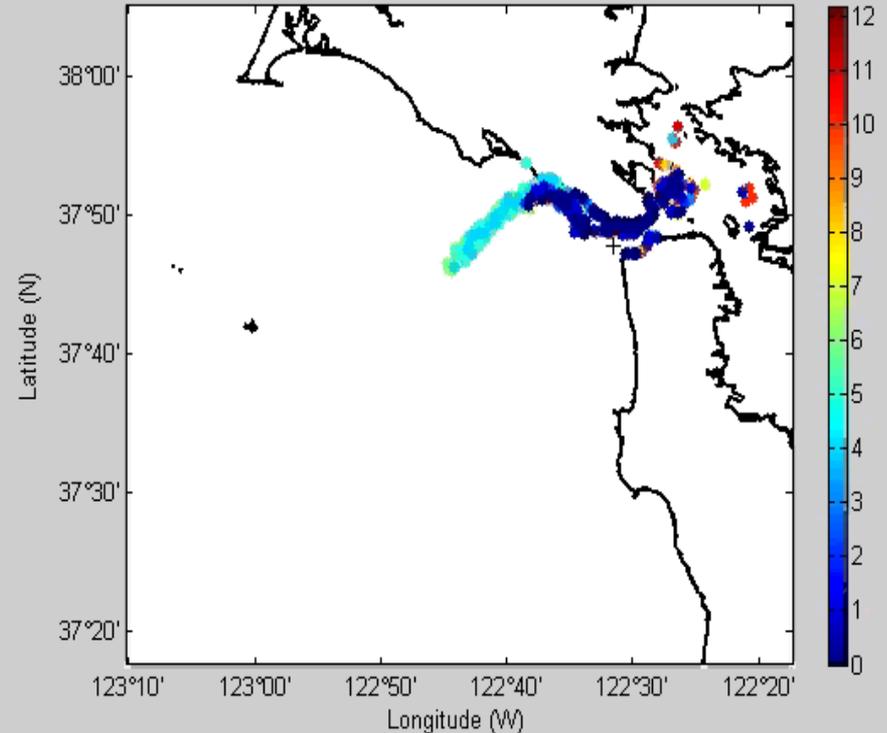
Tom Reed, CIM/NCEMMS, 10 Nov 2007

Oil Spills – Cosco Busan, San Francisco Bay gap filled data, trajectories

SF Bay Oil Spill-UV: 2007 11 14 07:30 (PST) [168]



SF Bay Oil Spill-TRAJ: 2007 11 12 00:30 (PST) [108]



Oil spilled or flowing into offshore waters is within an environment where HF radar observations can be uniquely helpful in tracking and predicting movements

Please take this moment to go to...

CeNCOOS Cosco Buscan summary page

http://www.cencoos.org/sections/news/SF_oil_spill_2007.shtml

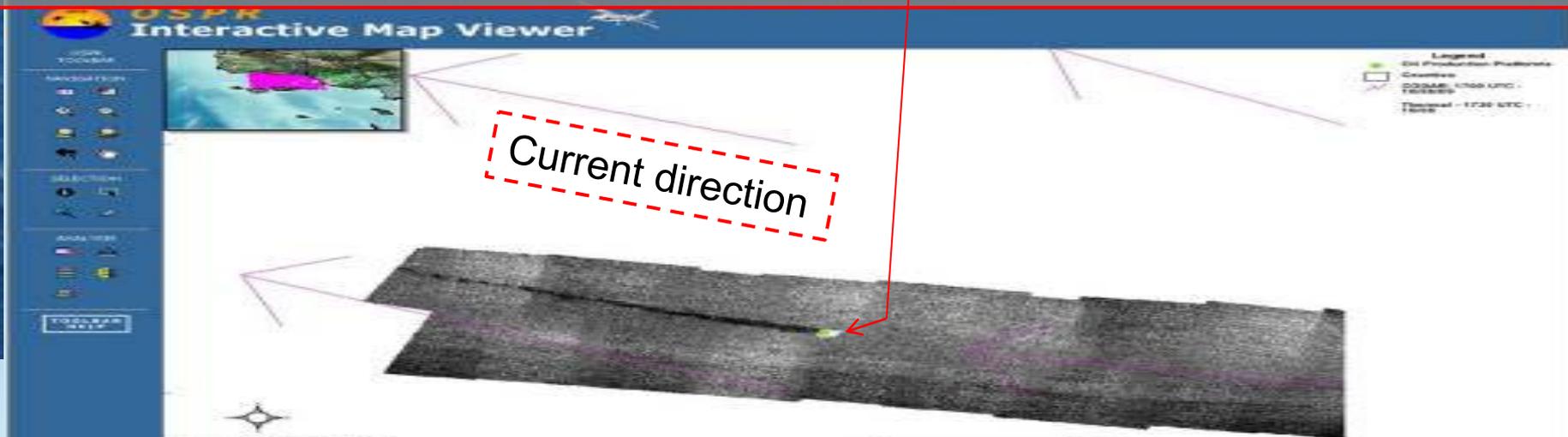
Trajectory report of 1st oil report in SF Bay

http://www.cencoos.org/visual_media/news/SFBay_Traj.png

Click on Google Map under oil spill maps
and photos

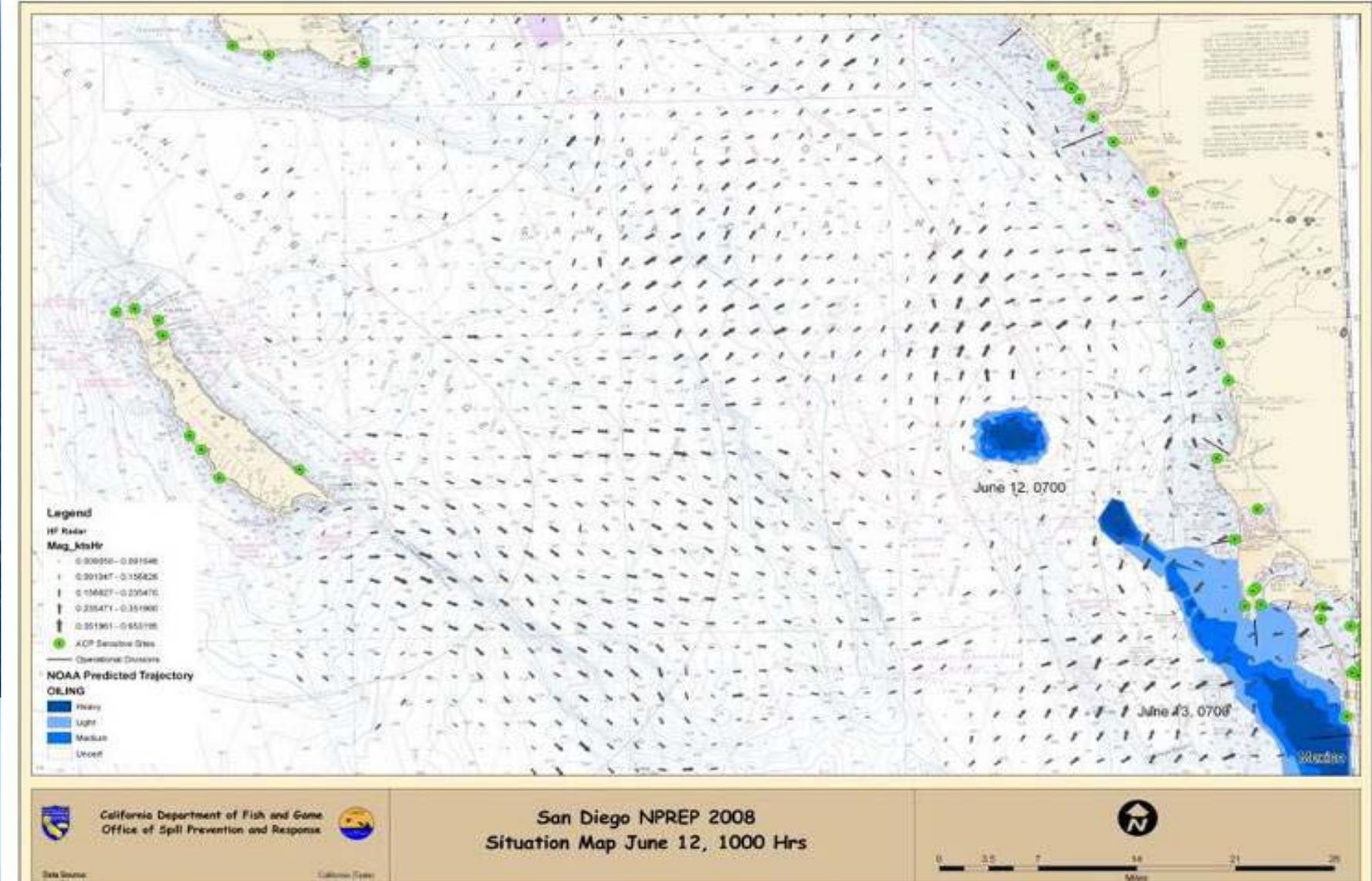


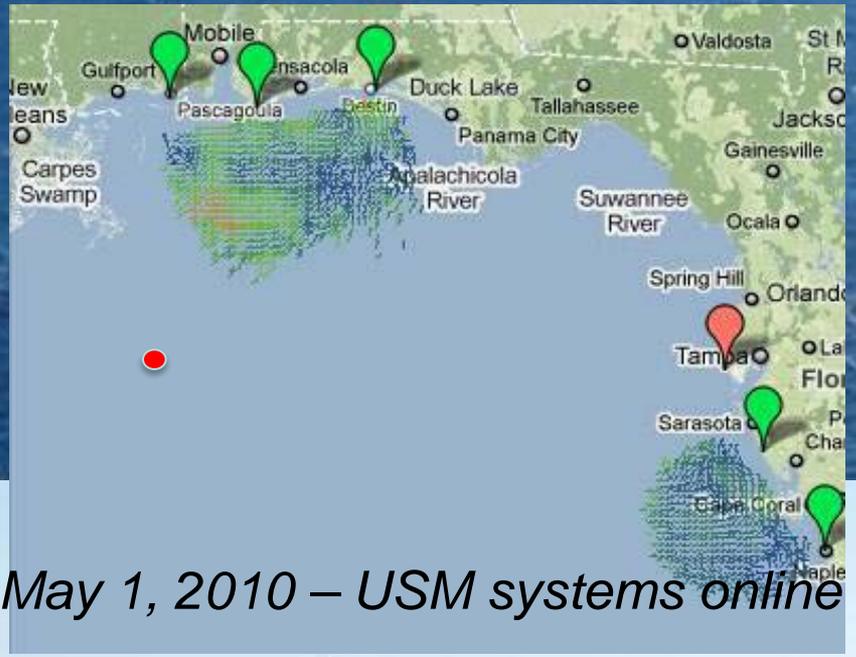
Improved network response and data integration between Cosco Busan and Deepwater Horizon



Overlay of HF radar surface currents with hyperspectral imagery from a natural seep near a platform

Oil spill response: OSPR-generated response exercise map with integrated HFR surface current data (arrows show speed and direction)

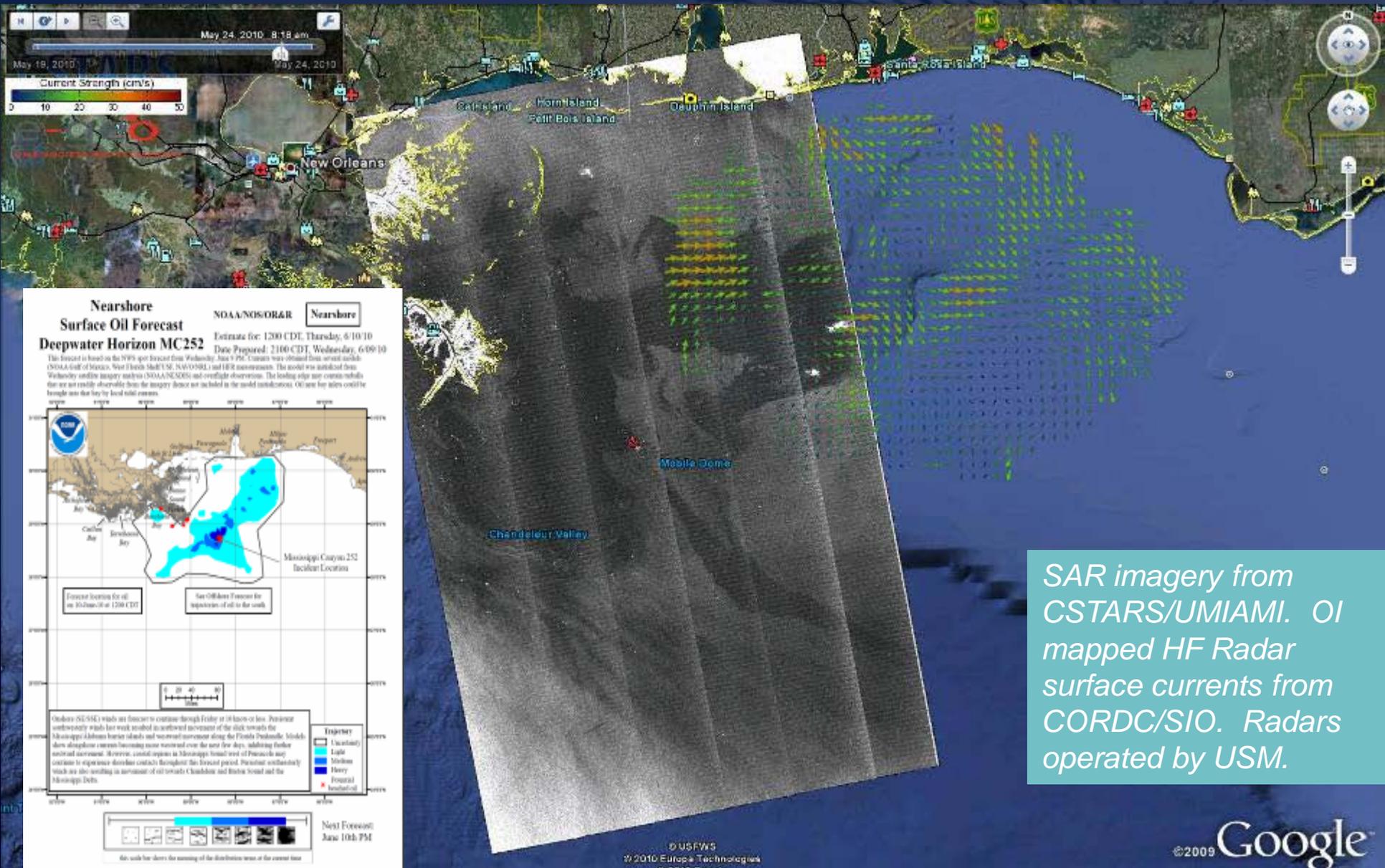




- CORDC – HFR National Network
- IOOS Liaison at the BP Incident Command Center
- OR&R Emergency Command Center – Official NOAA forecast for Oil Spill via GNOME
- OR&R Assessments and Restoration Division – GIS shape files for HFR and data feed for ERMA

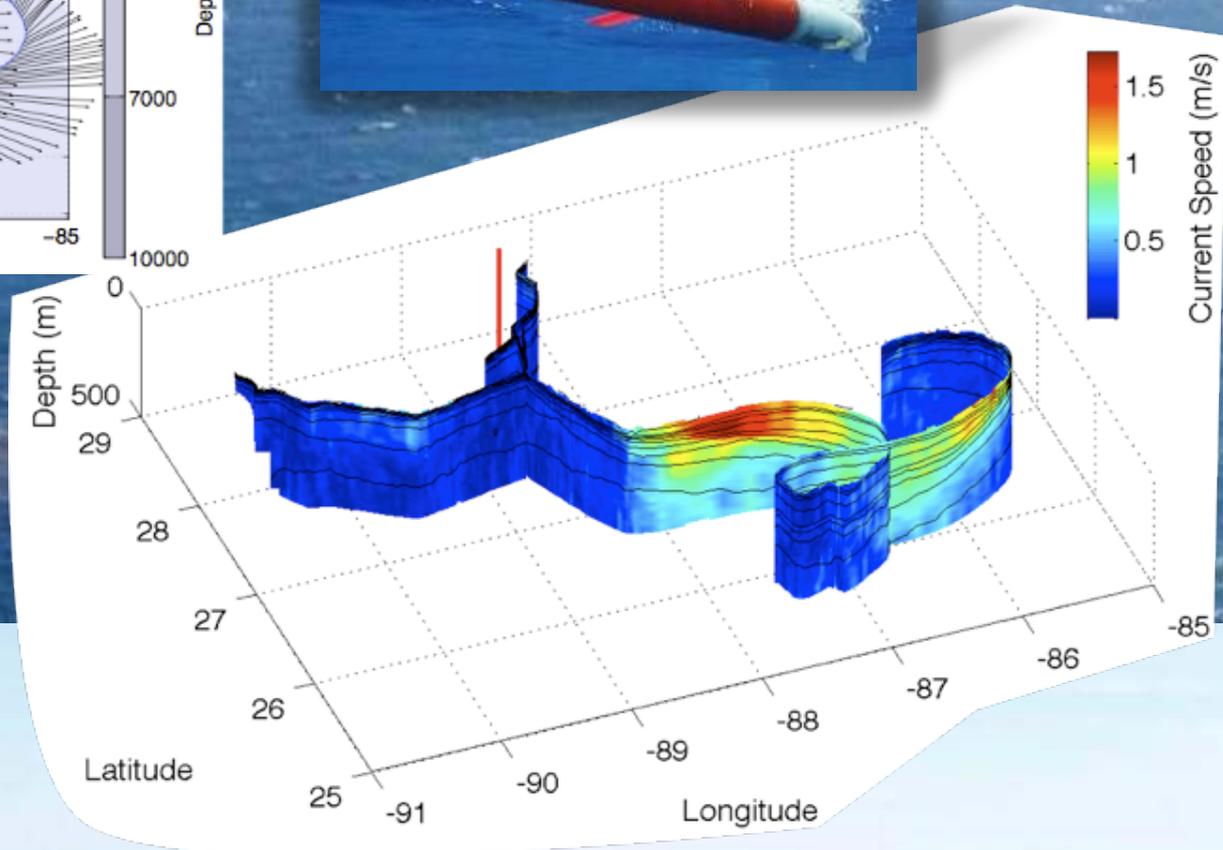
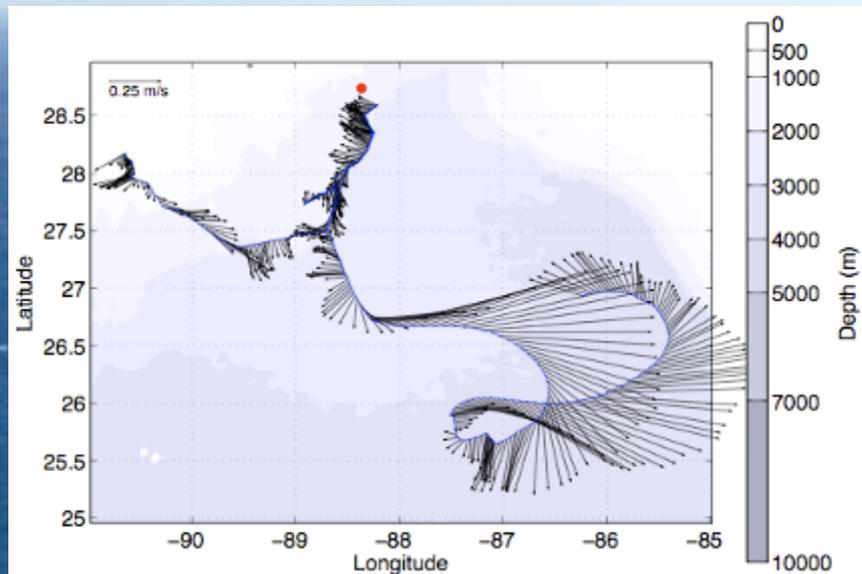
Mapping Surface Currents in Gulf of Mexico with HF Radar

Scripps Point of Contact: Eric Terrill (eterrill@ucsd.edu)
www.cordc.ucsd.edu/projects/mapping



SAR imagery from CSTARS/UMIAMI. Oil mapped HF Radar surface currents from CORDC/SIO. Radars operated by USM.

Subsurface Monitoring Using Autonomous Vehicles



June 7 - July 26, 2010
Ocean Currents

Please take this moment to go to...

Ocean Observing assets and data availability:

<http://rucool.marine.rutgers.edu/deepwater/>

Click on Google earth KMZ

Click on IOOS asset map

More sites to access data

Near real-time currents available in various formats
(NetCDF, GNOME NetCDF, Shapefile, kml):

<http://cordc.ucsd.edu/projects/mapping/>

Near real-time currents available via THREDDS at NDBC:

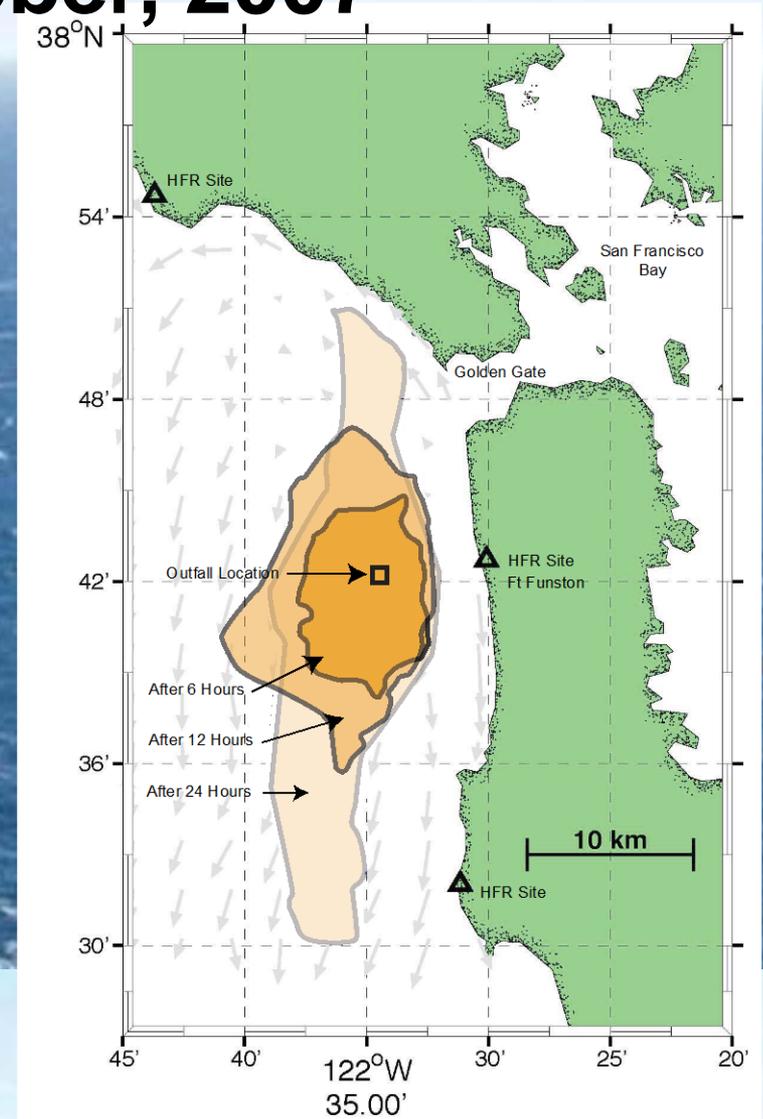
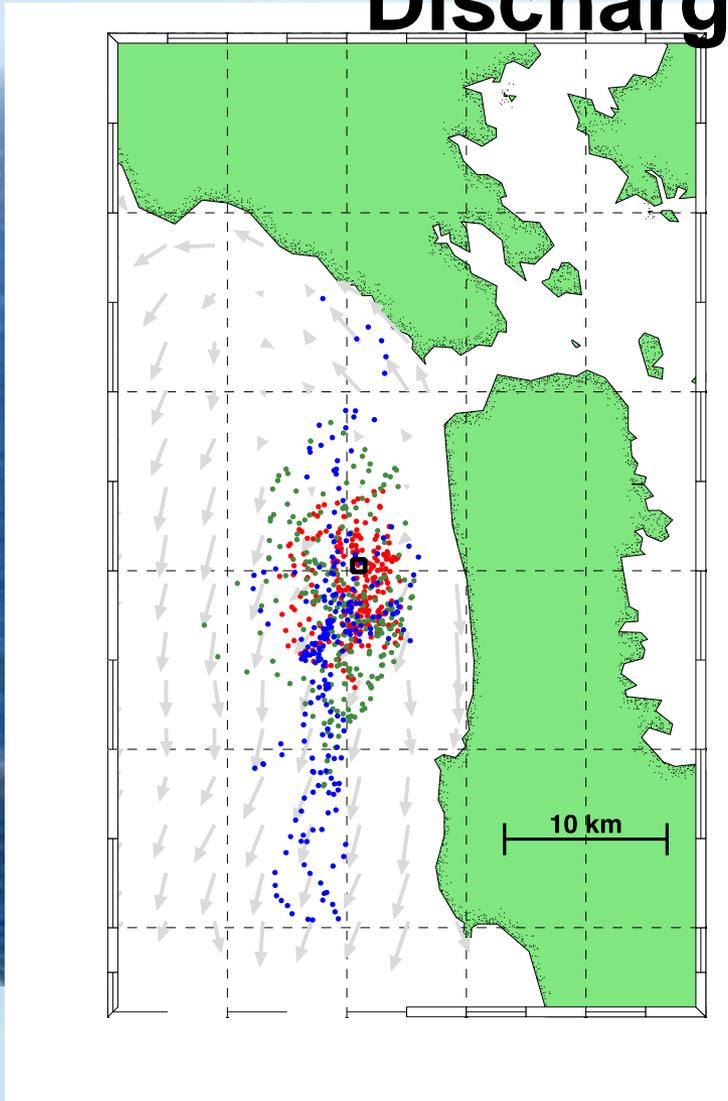
<http://sdf.ndbc.noaa.gov:8080/thredds/catalog.html>

Case Study 2: Outfall and Coastal Plume Tracking

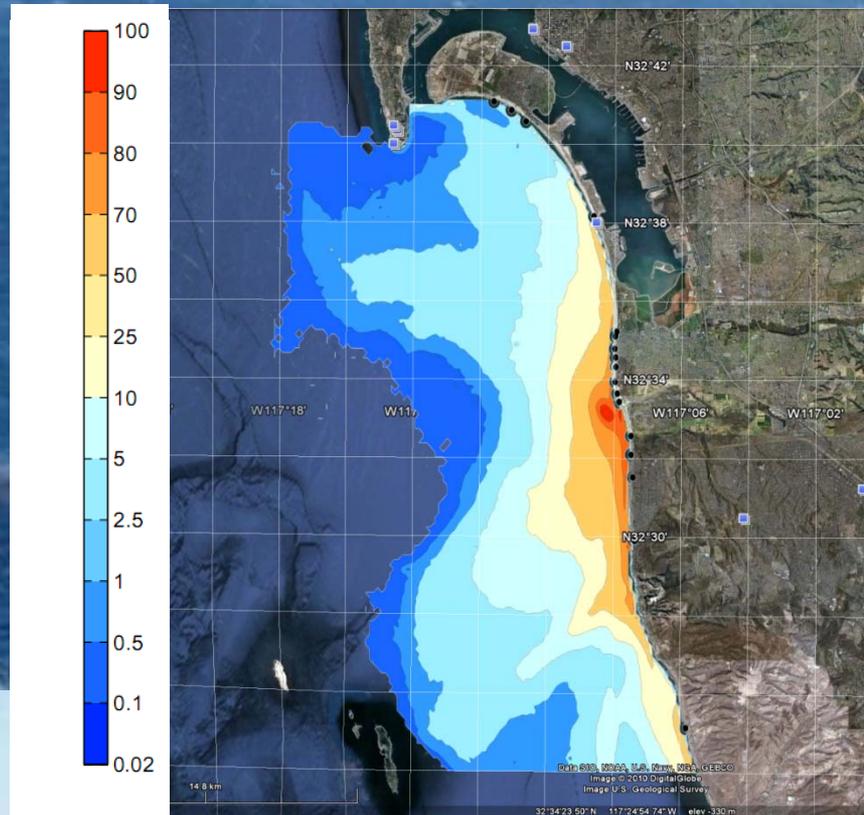
- Hyperion Treatment Plant Diversion
- SF Ocean Beach Outfall Accidental Release
- Tijuana River Plume Tracking and South Bay Ocean Outfalls
- Orange County Sanitation District Outfall Diversion (September 14 – October 4)

SF Sewage District Ocean Beach Outfall Discharge October, 2007

Figure Title Here



Coastal Plume Tracking Tijuana River

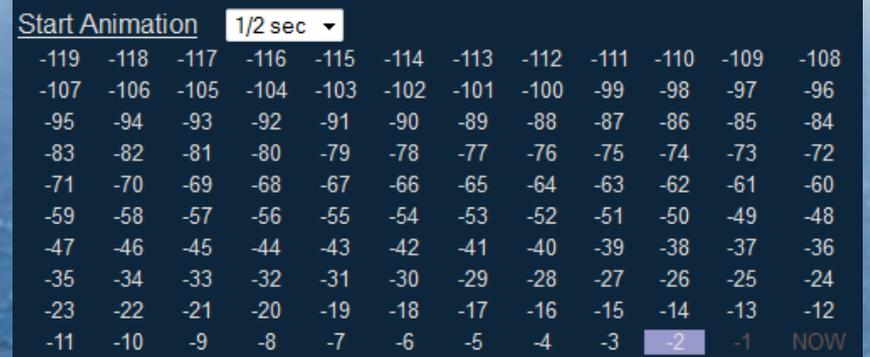


Tijuana River Flow Rate

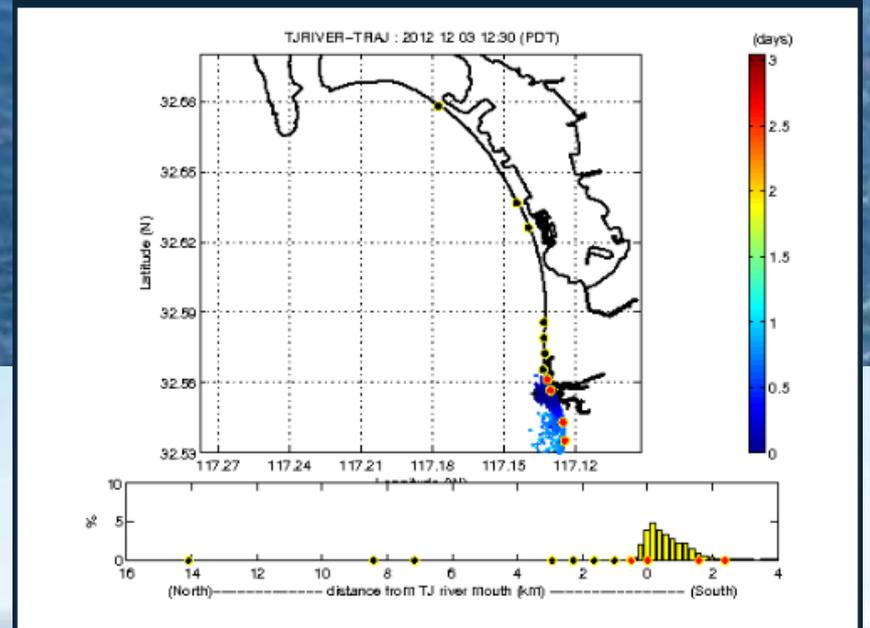
| Latest Observations | 24hr Maximum | 24hr Minimum |
|-------------------------|-------------------------|-------------------------|
| 2.74 MGD | 2.74 MGD | 2.74 MGD |
| 0.12 cm/s | 0.12 cm/s | 0.12 cm/s |
| 2012-12-03 20:15:00 UTC | 2012-12-03 20:15:00 UTC | 2012-12-02 22:00:00 UTC |

MGD = Millions of gallons per day, cm/s = Cubic meters per second.
 Values in red indicate the data is greater than 24 hours old. Otherwise values are displayed in black.

Tijuana River Plume Tracking



An [animated gif](#) has been created as an alternative to this animation sequence.



Coastal Plume Tracking Tijuana River

INTERMITTENT SIGNAL
APPROXIMATELY 10%
OVER 4 YEARS.

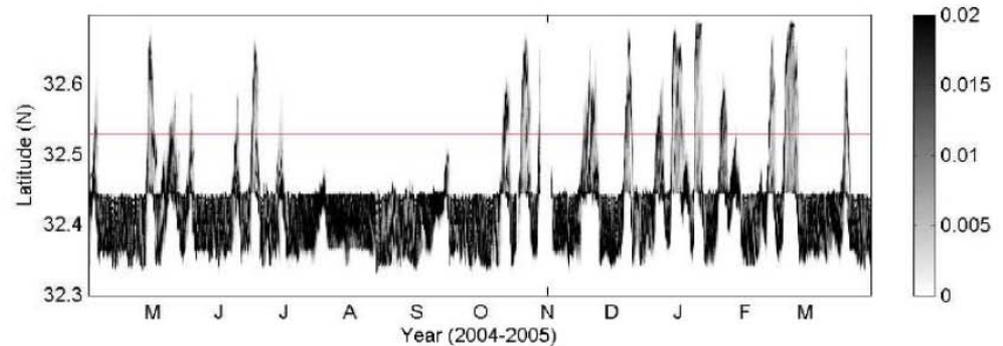
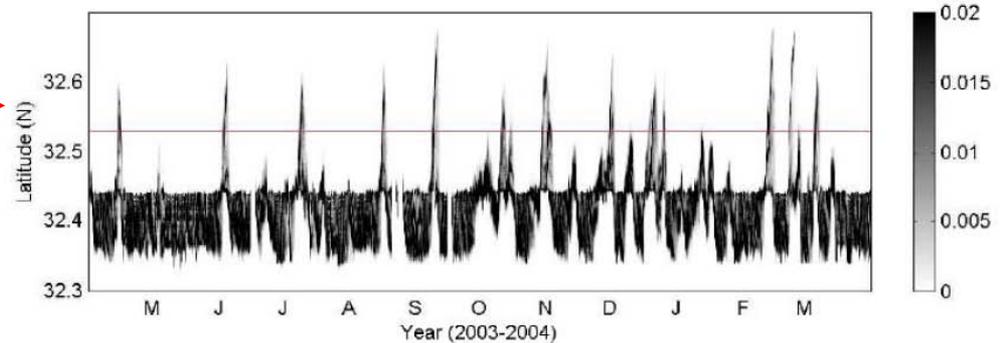
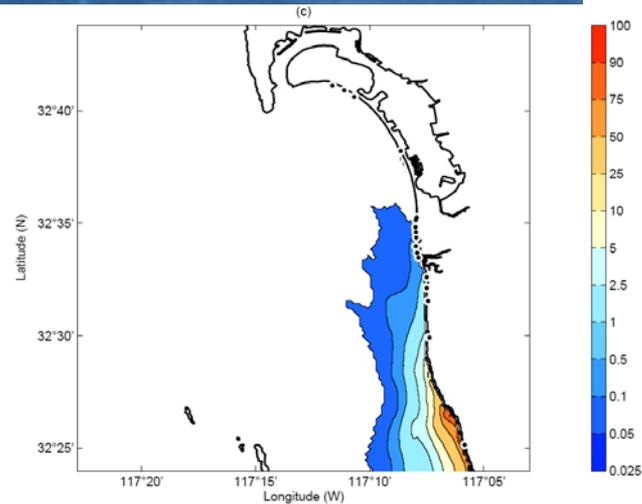
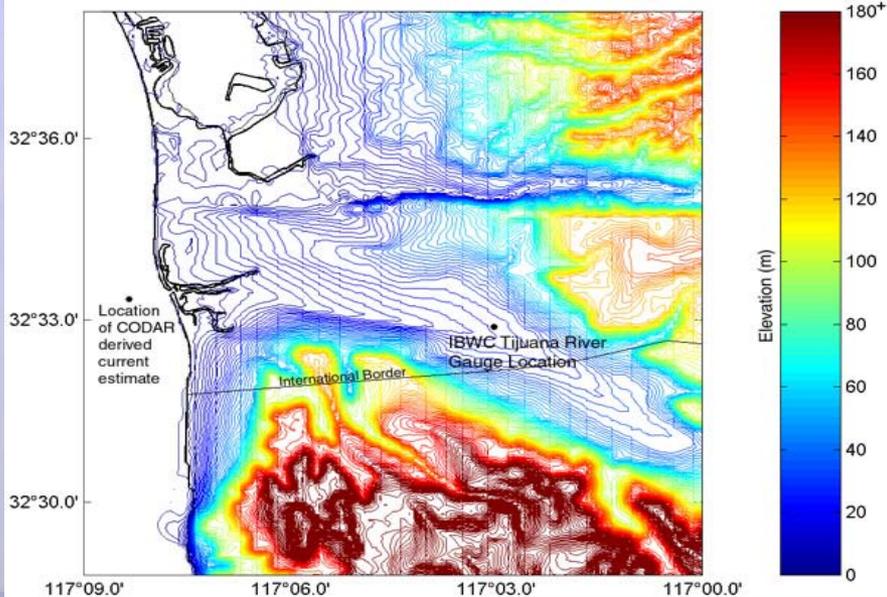


Figure 3: Concentration of the particles in latitude based on random walk model. 50 particles are released at every hour, and each particle has 3 days life time. extended border line (red line)

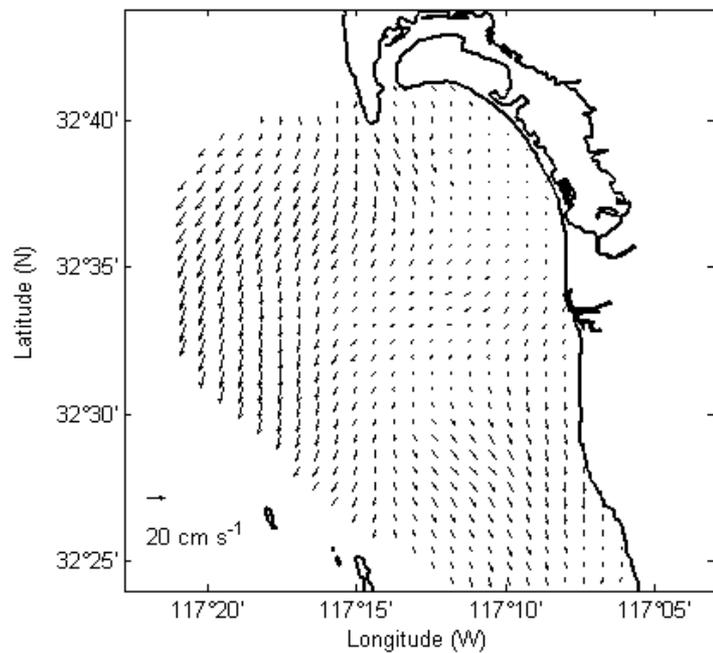
Punta Bandera plume potential modeled for 4 years with HF radar



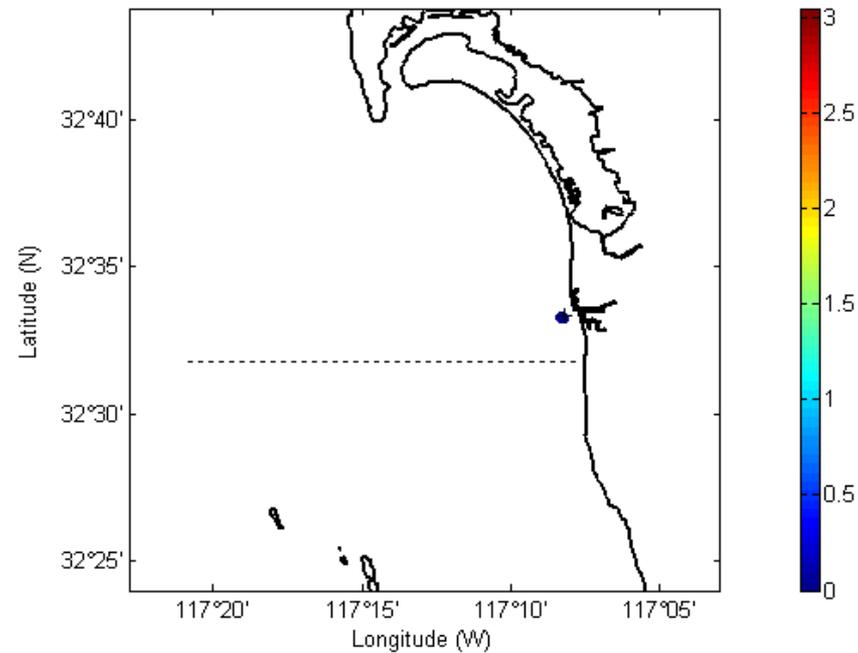
HF RADAR Sites
 Overlay Surface Currents
 Use 25hr Averages
 2 km Resolution
 2008-06-26 00:00:00 UTC SET
 2008-06-26 00:00:00 UTC
 2008-06-25 17:00:00-0700

IMAGED BY Google 2 mi 2 km

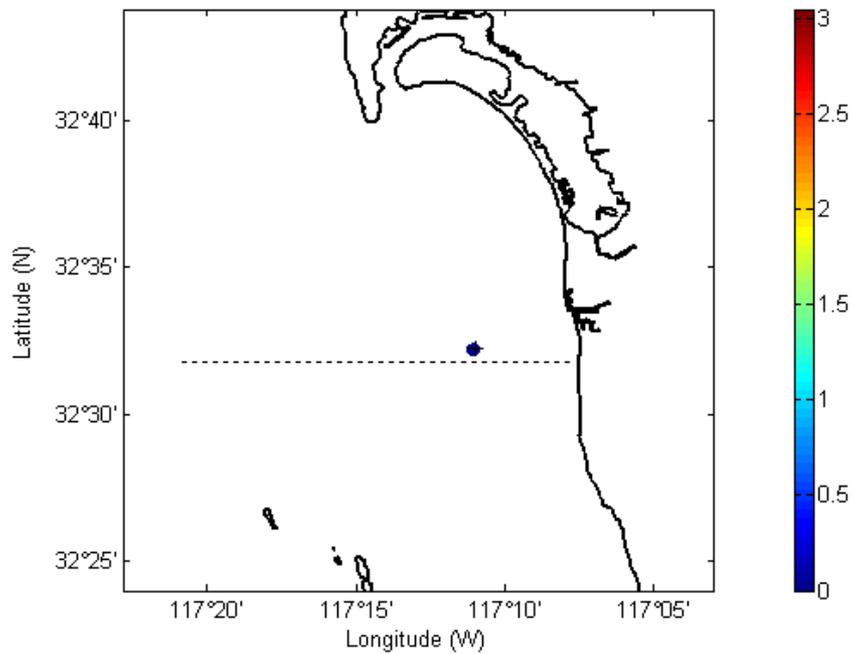
SFC UV : 2005 01 05 03:30 (GMT) [1]



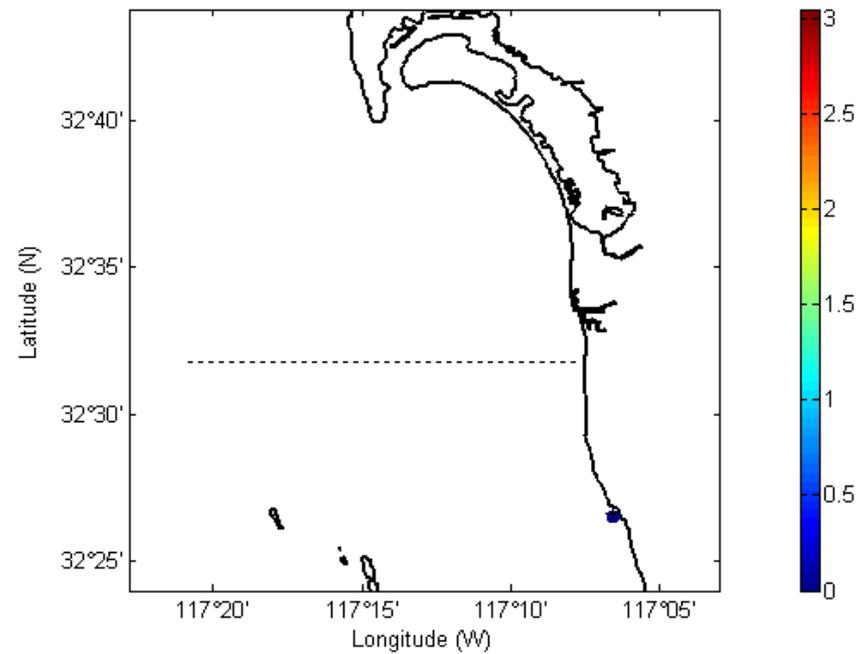
TJR: TRAJ : 2005 01 05 03:30 (GMT) [1]



SBO: TRAJ : 2005 01 05 03:30 (GMT) [1]



PBD: TRAJ : 2005 01 05 03:30 (GMT) [1]



South Bay Ocean Outfall Mooring

- June 19, 2007 Mooring Deployment
- January 15, 2007 Mooring Refurbishment



SBOO Mooring Near Real-time Data

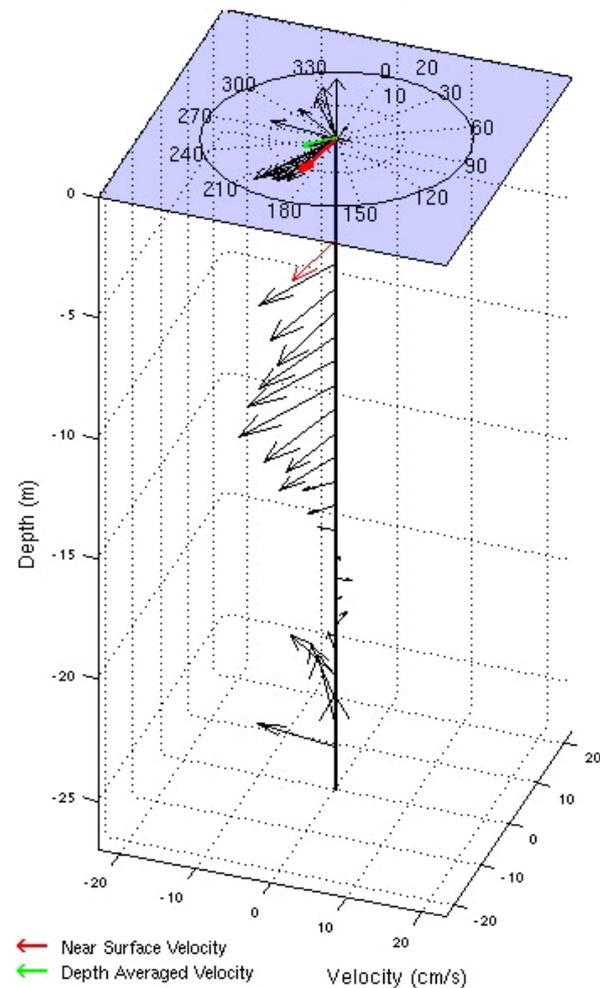
South Bay Ocean Outfall
Current Profile

UTC Time: 2008-0:
Local Time: 2008-0:

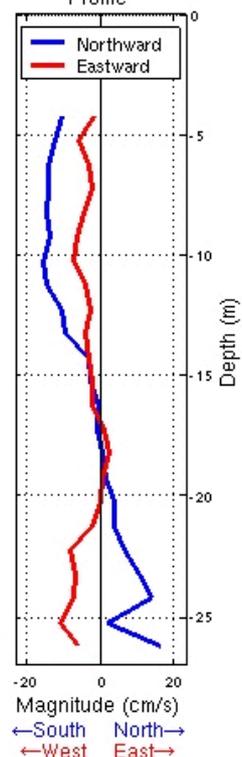
South Bay Ocean Outfall
Ocean Stratification

UTC Time: 2008-02-20 21:36:11
Local Time: 2008-02-20 13:36:11

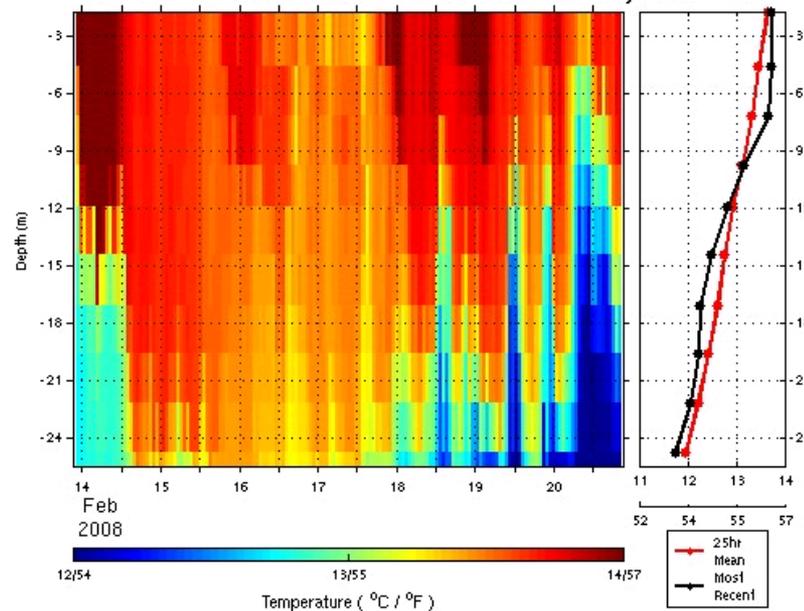
Near-Real Time Current Profile
Feb 20, 2008 20:24 UTC



Most Recent
Current Magnitude
Profile



Near-Real Time Stratification Measured at the South Bay Ocean Outfall



Last Sample Values

| Depth | Temp. °C | Temp °F |
|--------|----------|----------|
| 1.7 m | 13.73 °C | 56.71 °F |
| 4.6 m | 13.72 °C | 56.70 °F |
| 7.2 m | 13.66 °C | 56.59 °F |
| 9.8 m | 13.16 °C | 55.69 °F |
| 11.9 m | 12.83 °C | 55.09 °F |
| 14.4 m | 12.49 °C | 54.48 °F |
| 17.1 m | 12.26 °C | 54.07 °F |
| 19.6 m | 12.22 °C | 54.00 °F |
| 22.2 m | 12.05 °C | 53.69 °F |
| 24.8 m | 11.74 °C | 53.13 °F |

2008-02-20 20:29:25 GMT

Autonomous Underwater Vehicle

REMUS

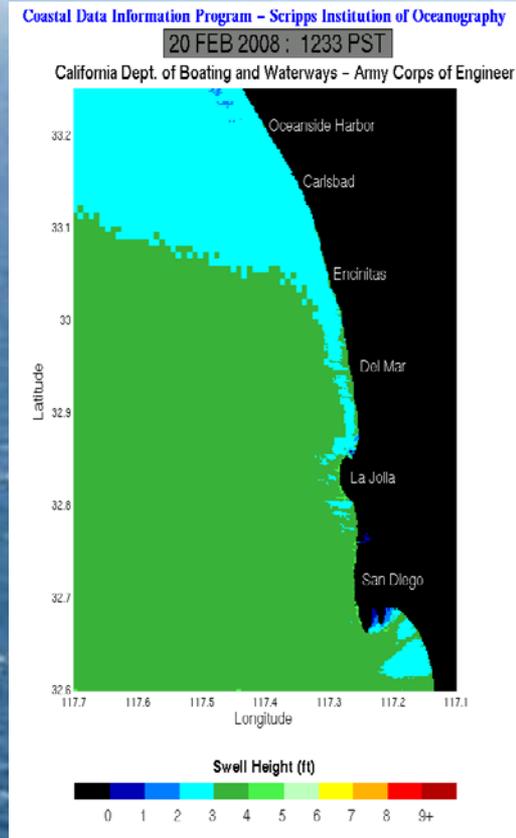
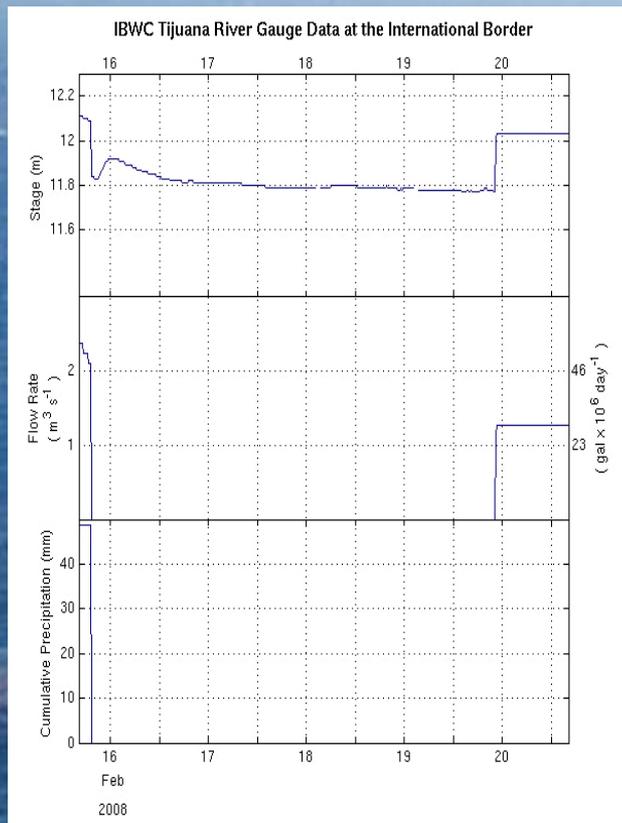
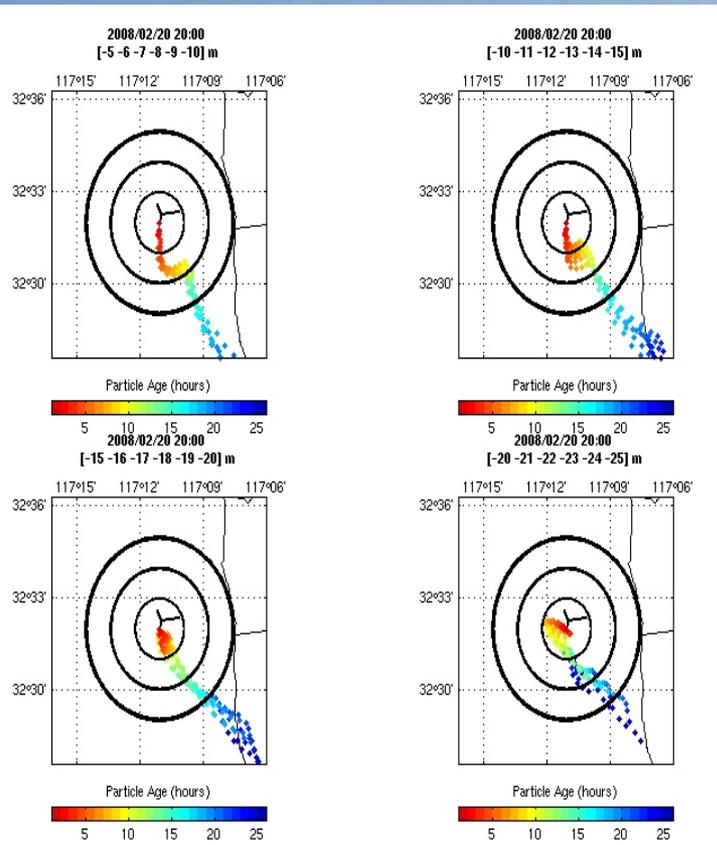
- Payload
 - Conductivity, Temperature, Depth (CTD)
 - Colored Dissolved Organic Matter (CDOM)
 - Compass
 - GPS
 - Iridium communications
 - Onboard navigation system



CTD and Optical Package



Autonomous Under Water Vehicle Mission Planning: Environmental Assessment



Trajectory estimates of

- Depth
- Averaged current
- Velocity

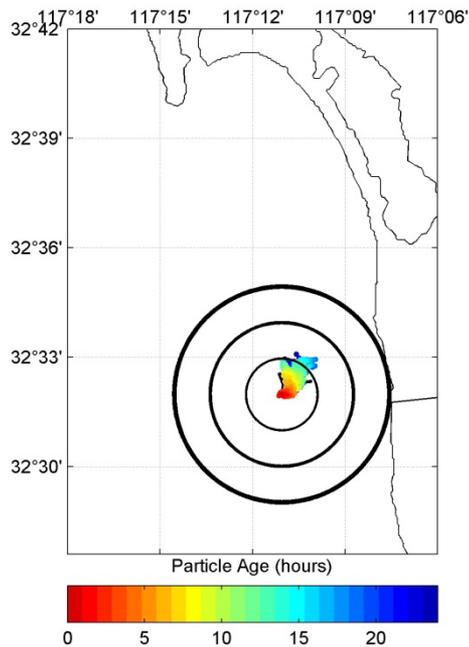
*Time series of IBWC TJ
River Gauge and Rainfall*

CDIP Swell Model

South Bay Ocean Outfall Survey

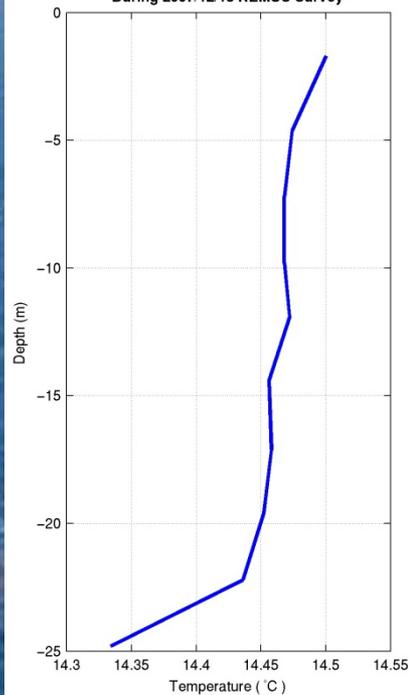
December 13, 2007

SBOO Plume Distribution Estimate for 2007/12/13 19:00
at Depth(s): [-10 -11 -12 -13 -14 -15 -16 -17 -18 -19 -20 -21 -22 -23 -24 -25] m



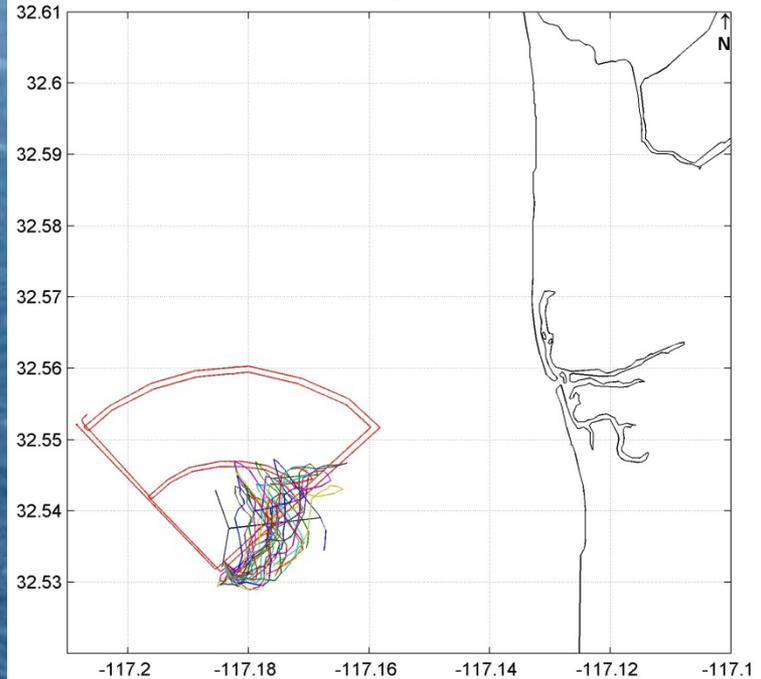
Plume Distribution Estimate

SBOO Buoy Mean Temperature Profile
During 2007/12/13 REMUS Survey



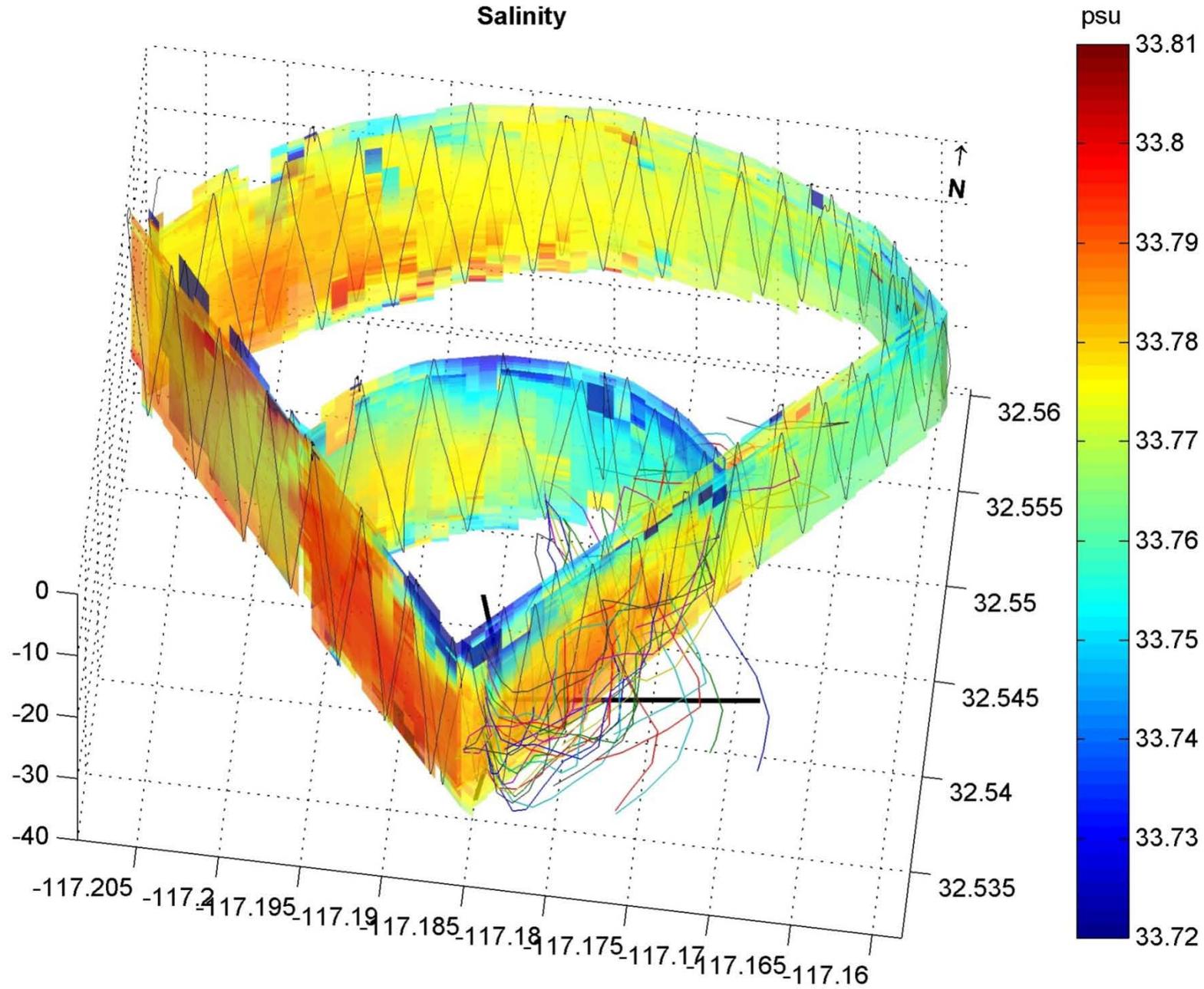
Buoy Mean
Temperature
Profile

2007/12/13
REMUS Mission Track



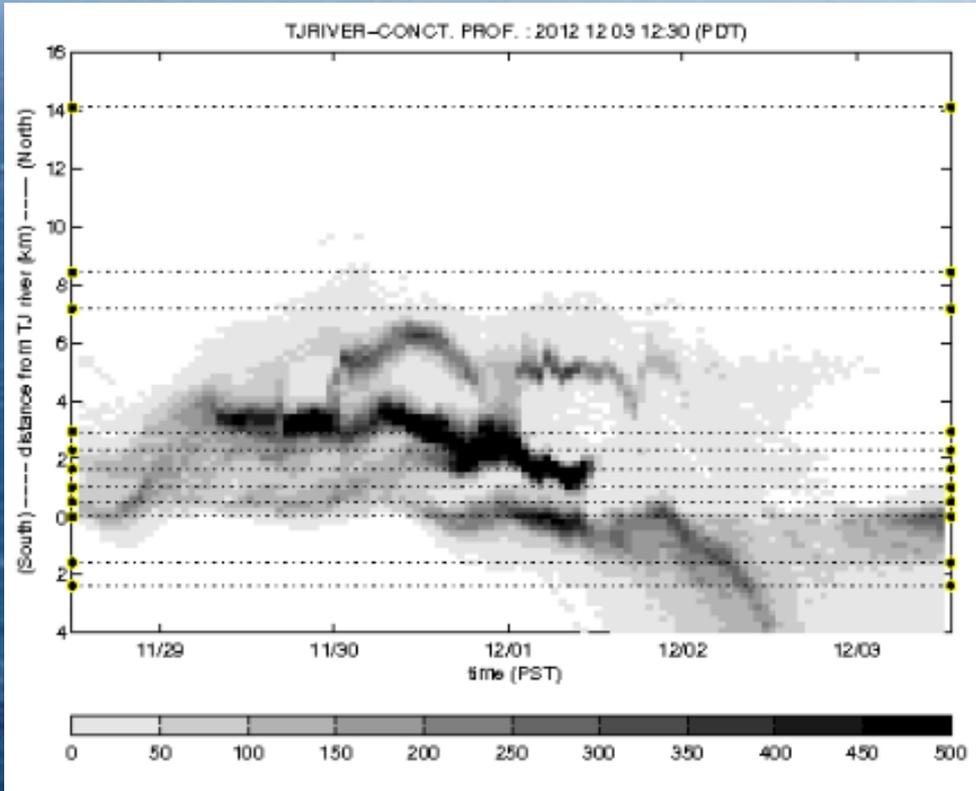
REMUS Mission Track

2007/12/13
Salinity



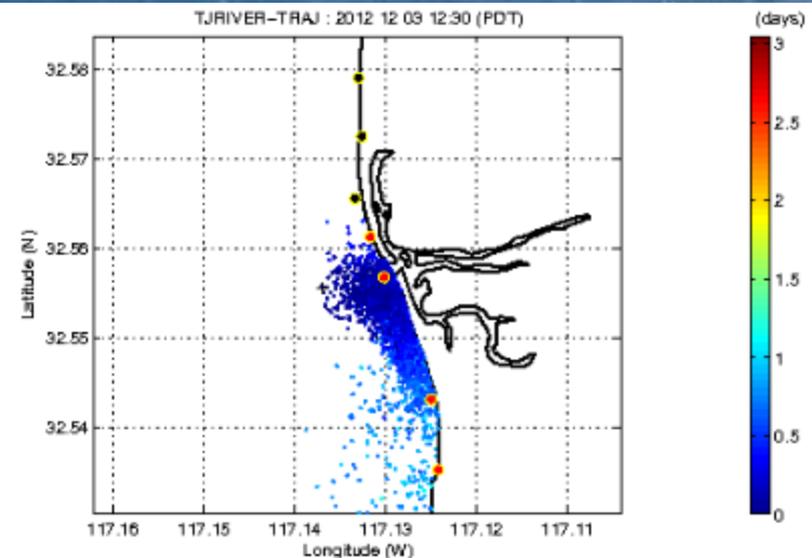
Please take this moment to go to...

<http://www.sccoos.org/data/tracking/IB/>



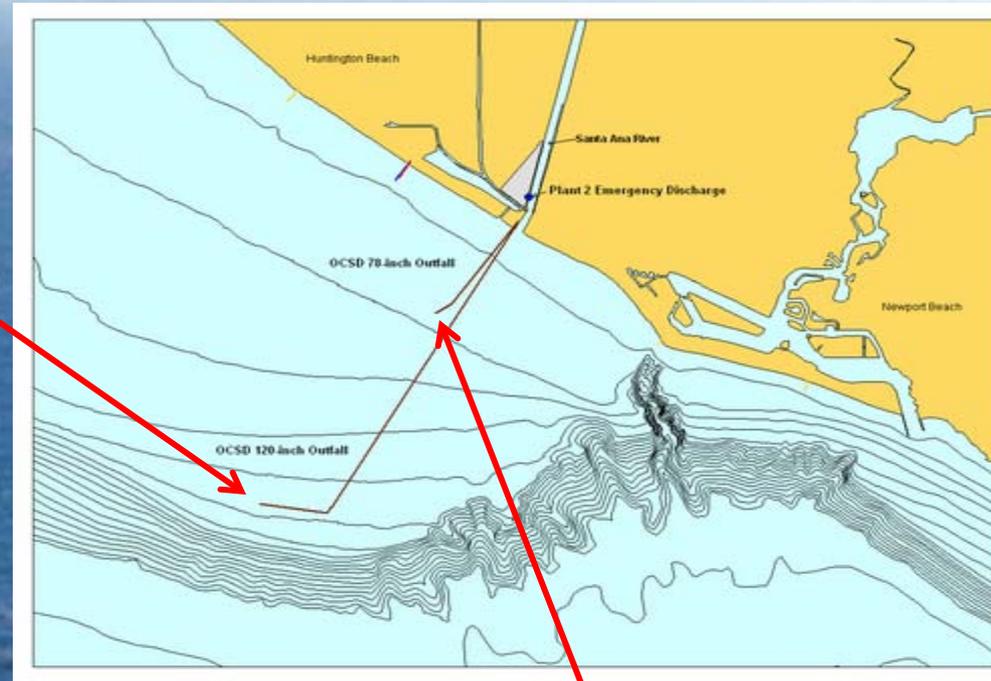
Date: 2012-12-03 19:30 GMT (2012-12-03 11:30 PST)

| Station ID | Station Name | Particle Count | Plume Potential |
|------------|------------------------------|----------------|-----------------|
| 1 | Coronado (North Island) | 0 | NO |
| 2 | Silver Strand | 0 | NO |
| 3 | Silver Strand Beach | 0 | NO |
| 4 | Carnation Ave. | 0 | NO |
| 5 | Imperial Beach Pier | 0 | NO |
| 6 | Cortez Ave. | 0 | NO |
| 7 | End of Seacoast Dr. | 0 | NO |
| 8 | 3/4 mi. N. of TJ River Mouth | 31 | YES |
| 9 | Tijuana River Mouth | 283 | YES |
| 10 | Monument Rd. | 74 | YES |
| 11 | Board Fence | 27 | YES |



2012 Orange County Sanitation District (OCSD) Ocean Outfall Diversion

The Orange County Sanitation District (OCSD) discharges its treated effluent from a 120-inch ocean outfall that terminates in 200 feet of water, approximately 4.5 miles offshore Newport Beach and Huntington Beach.

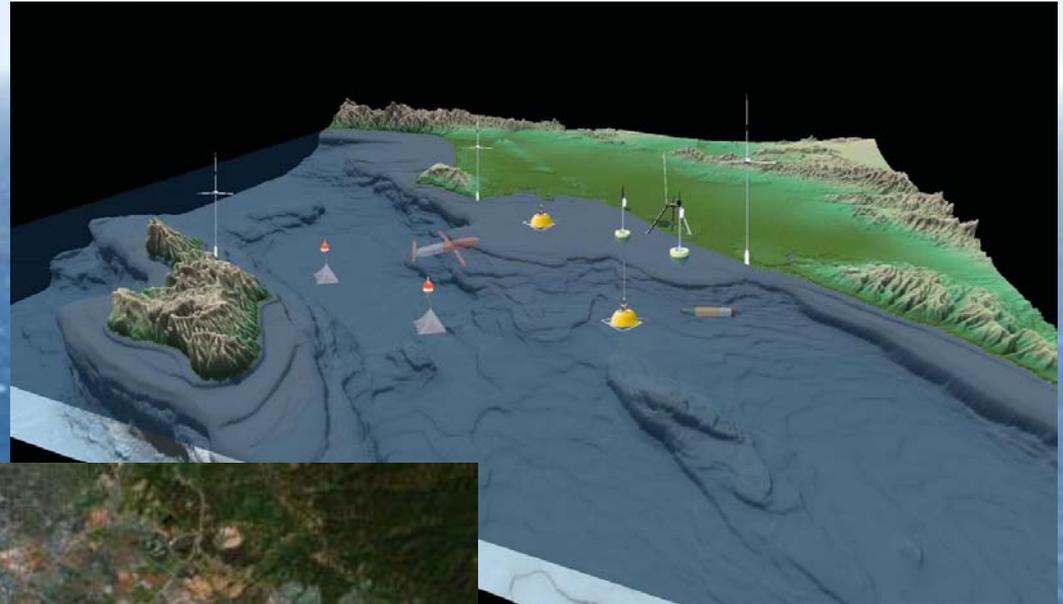


September 14 – October 2 OCSD diverted the flow from the 120-inch outfall to the 78-inch outfall as part of a project to inspect, assess, and rehabilitate the Outfall Land Section and Ocean Outfall Booster Pump Station Piping.

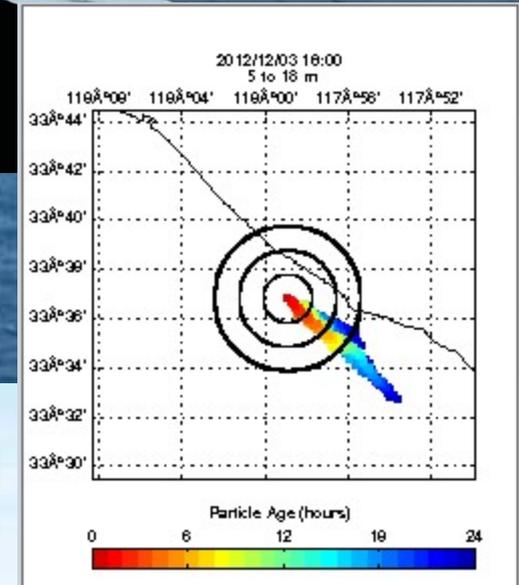
The District has a secondary, 78-inch outfall located in about 60 feet of water, 1 mile off the coast. Periodically, OCSD request special permits to divert effluent from the 120-inch pipe to the 78-inch pipe for emergency purposes and planned maintenance projects

2012 OCSD Ocean Outfall Diversion

Asset map and
visualization
moorings, gliders, HF
radar, casts, samples

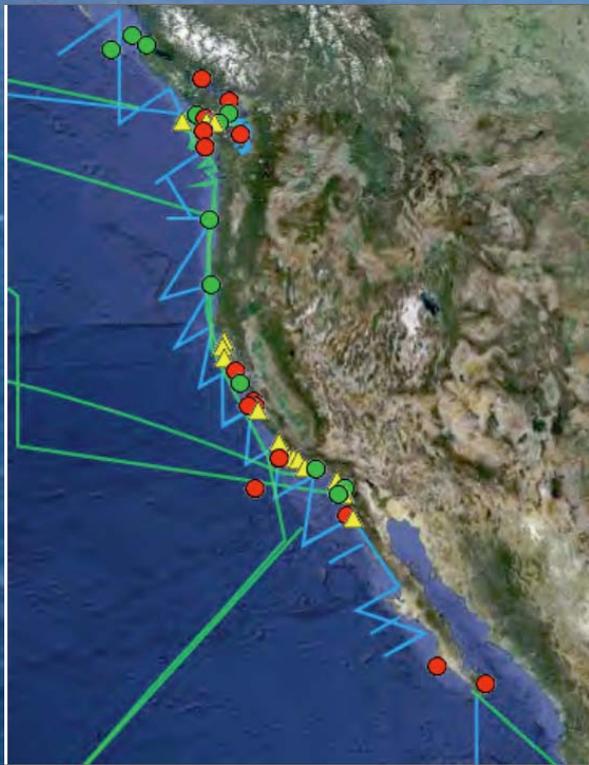


<http://www.sccoos.org/projects/ocsd-diversion/>



Case Study 3: Ocean Acidification Efforts

It is important to note that OA efforts are in a preliminary stage



OA related time series along the west coast from NOAA Observing workshop in June 2012

Much of current carbon chemistry along the US west coast are unsuitable for needs of C-CAN stakeholders

SCCOOS & CeNCOOS Ocean Acidification Projects



Oyster Conditions

(Humboldt Bay)



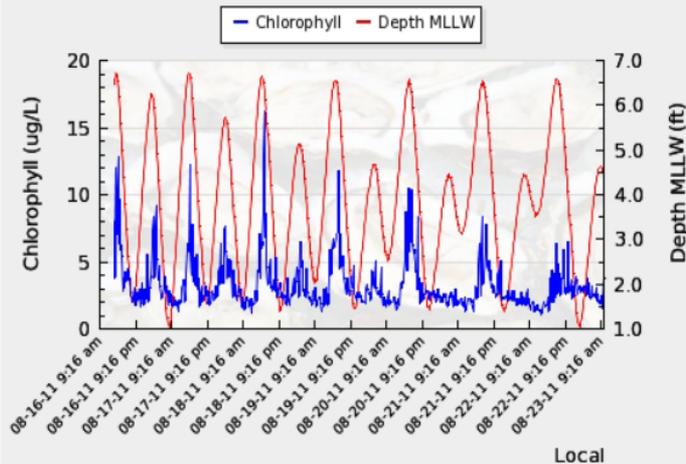
DockB Buoy 46022-Eel River Buoy 46212-South Spit Upwelling Index

Latest Observation: 2011-08-23 10:01:49 Local (PST/LDT)

| | Temp (C) | Chlorophyll (ug/L) | Salinity (ppt) | pH | Precip (in) | Depth (ft) |
|-----------------|----------|--------------------|----------------|-------|-------------|------------|
| Current Value | 14.521 | 3.810 | 33.840 | 8.101 | 0.00 | 4.482 |
| 12 Hour Average | 16.52 | 2.86 | 33.95 | 8.06 | 0.00 | 2.90 |
| Graph: | | | | | | |

Humboldt Bay Dock B (real-time)

CeNCOOS at Humboldt State University



2012 OCEAN ACIDIFICATION

As the ocean absorbs increasing levels of carbon dioxide (CO₂) from the atmosphere, it causes changes in ocean chemistry. When carbon dioxide reacts with water, it creates carbonic acid, decreasing pH and carbonate ion concentration. Lower levels of pH in the ocean result in higher levels of acidity, causing "ocean acidification."



Disclaimer: This data is presented "as is", with no warranty, expressed or implied, of the data quality or consistency, and should not be used for navigation. It is provided without support or obligation on the part of IOOS, to assist in its use, collection, modification, or enhancement. For use in publications, authors should obtain written permission from the director of IOOS, and acknowledge IOOS as the data source in their publications. The Alliance for Coastal Technologies (ACT) does not own, manufacture, or endorse any of the technologies and/or equipment used in the collection of technology used for this application.

Ocean Acidification Focus

- Raise awareness: OOSes can connect community to academics for expertise
- Shore Station Sensors – initially
- ID & test available technology for suitability
- Document best practices for instrumentation
- Integrate data handling and dissemination
- Provide education and training for participants

Please take this moment to go to...

SCCOOS OA project page:

<http://www.sccoos.org/projects/2012OA/>

CeNCOOS Oysters Conditions in Humboldt Bay:

http://cencoos.humboldt.edu/?content=data_oyster_main

OA related time series along the west coast from
NOAA Observing workshop in June 2012:

<http://www.pmel.noaa.gov/co2/OA2012Workshop/>

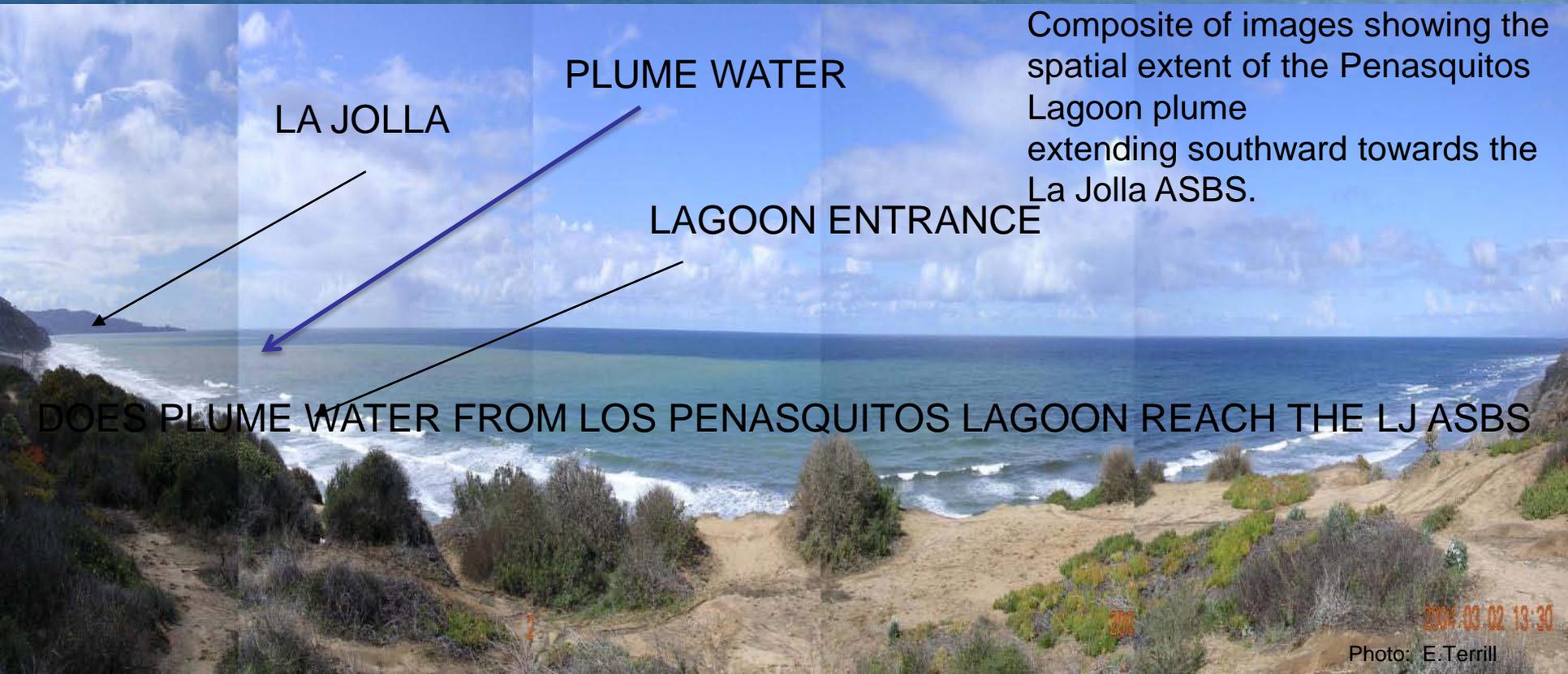
California Current Acidification Network (C-CAN):

<http://c-can.msi.ucsb.edu/>

Case Study 4: Areas of Special Biological Significance



Lagoon discharge after rainfall.



Composite of images showing the spatial extent of the Penasquitos Lagoon plume extending southward towards the La Jolla ASBS.

LA JOLLA

PLUME WATER

LAGOON ENTRANCE

DOES PLUME WATER FROM LOS PENASQUITOS LAGOON REACH THE LJ ASBS

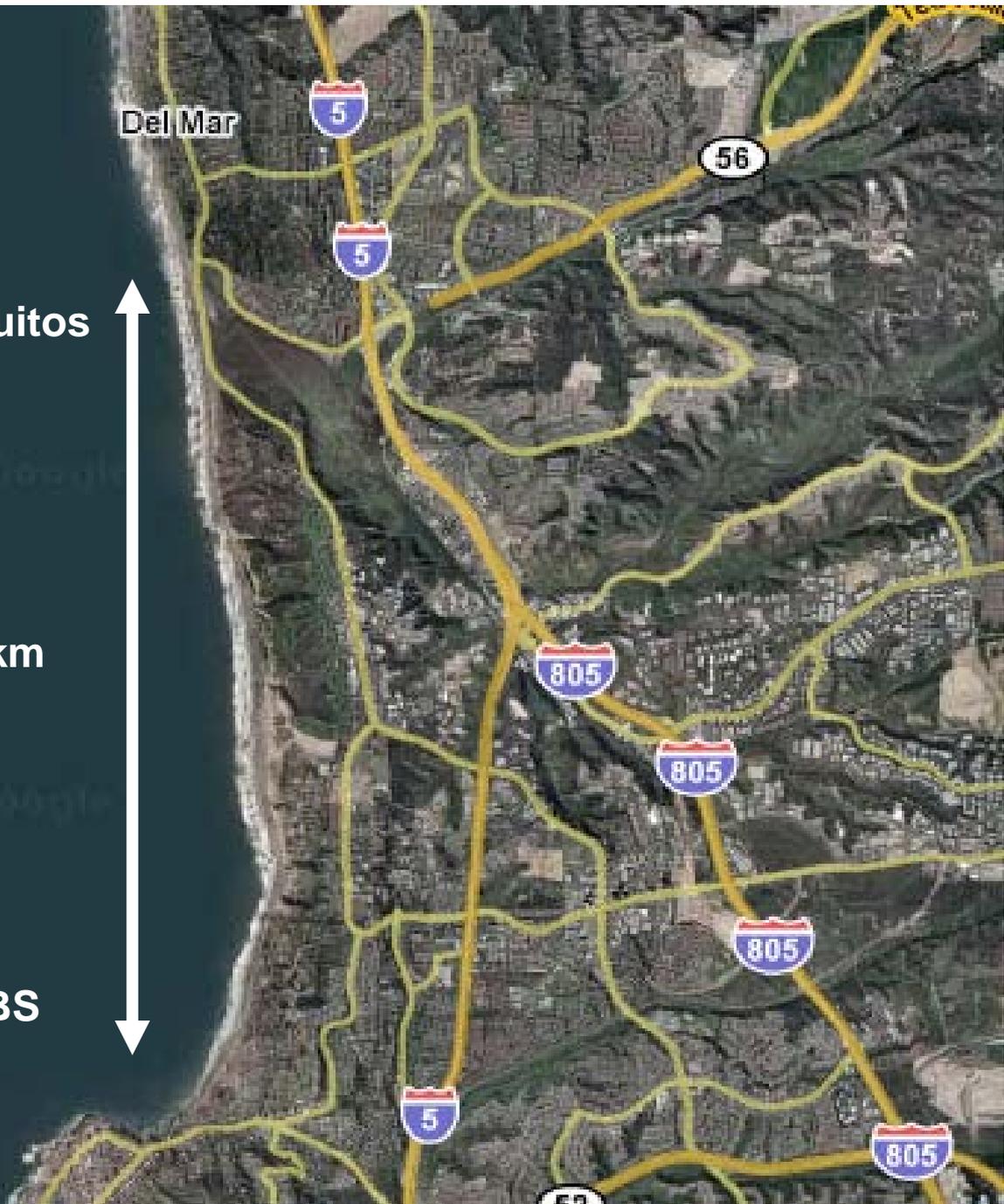
Problem Statement:

Does plume water from Los Penasquitos Lagoon reach the La Jolla ASBS?

Los Penasquitos

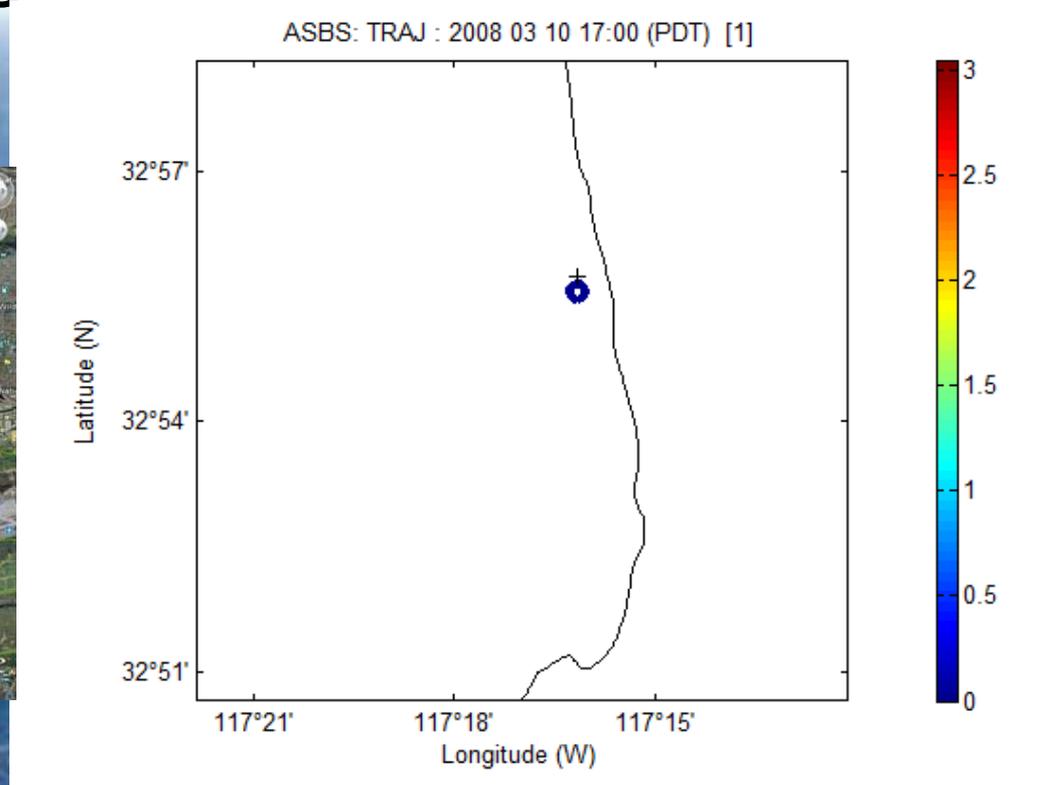
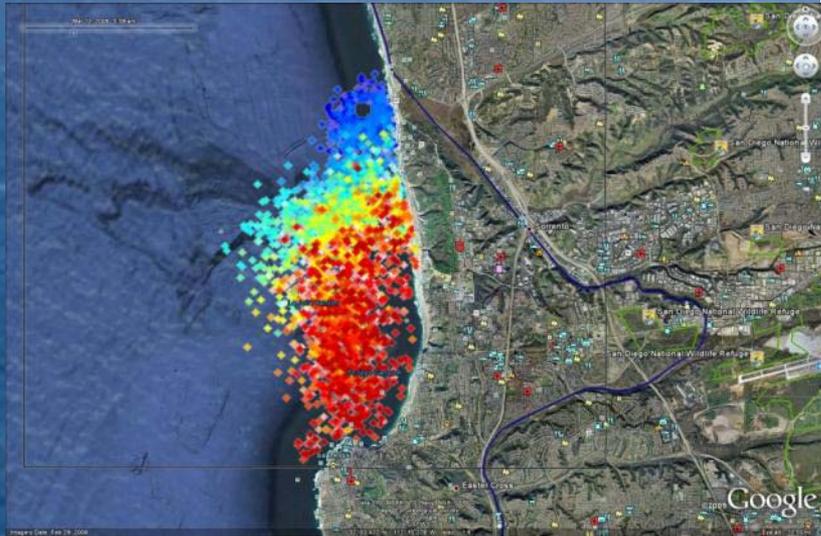
8 km

ASBS



Case Study 4: Areas of Special Biological Significance

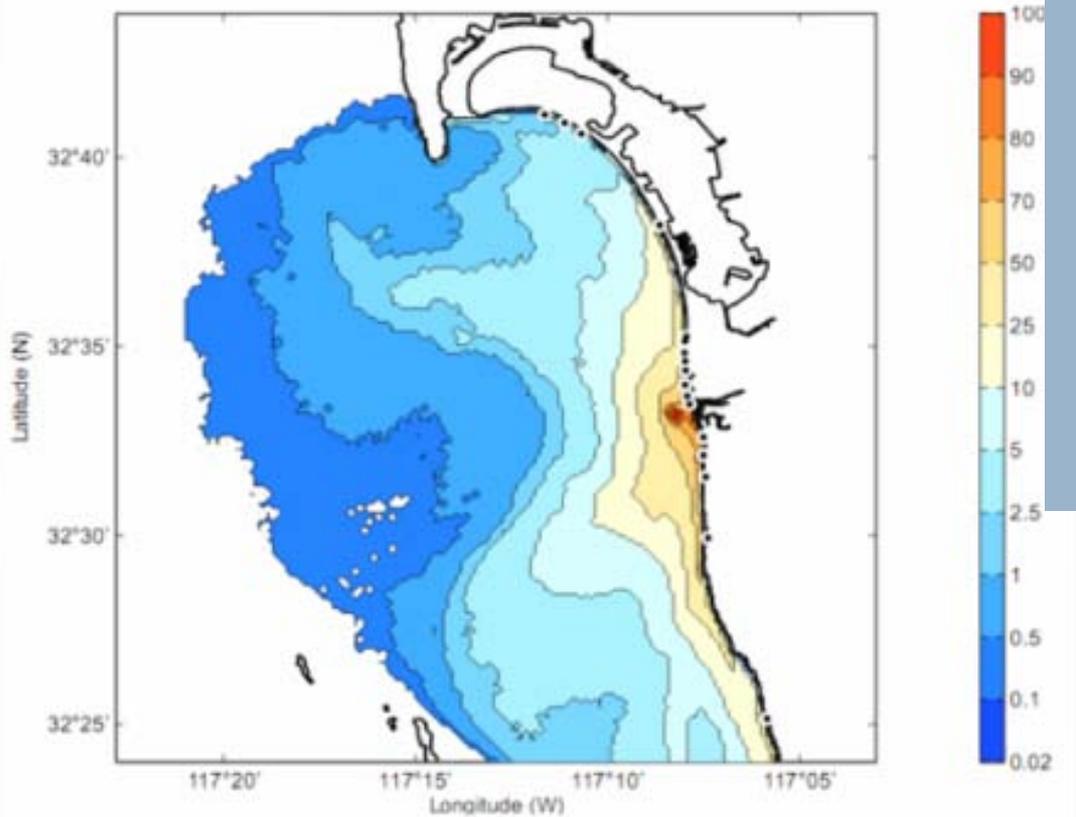
3 day lifetime used to replicate efficacy of FIB



Trajectories from Los Penasquitos River Inlet. 5-day discharge.

Products available for permit holders within or near an ASBS

Probability Exposure Maps for Specific Areas



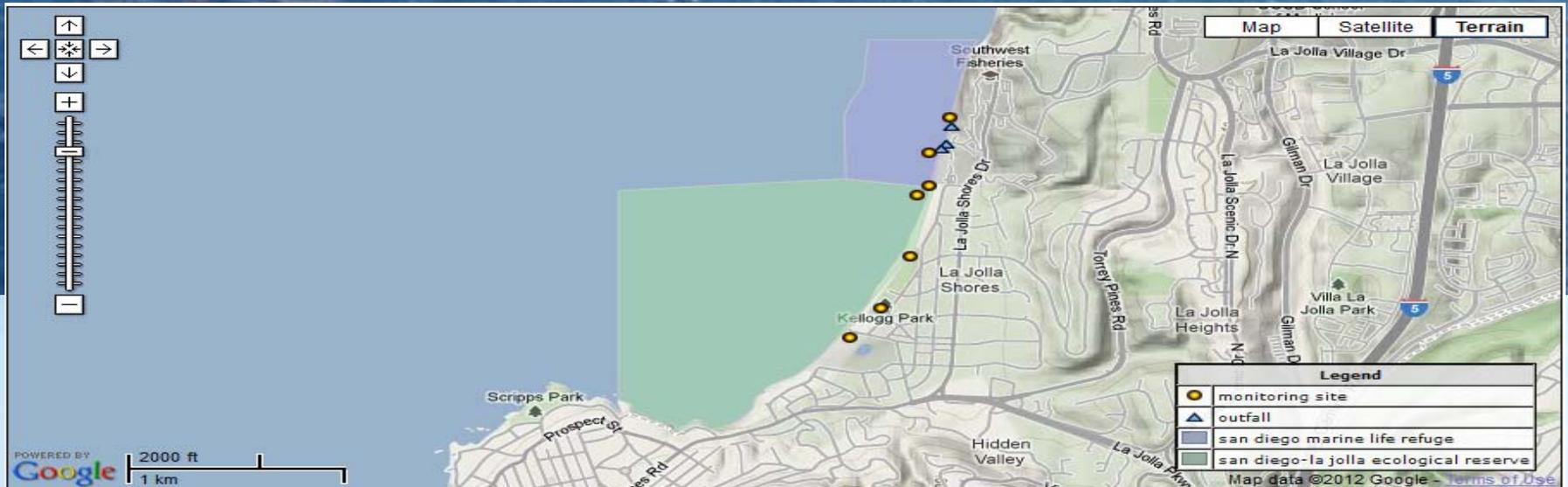
Please take this moment to go to...

SCCOOS ASBS:

<http://www.sccoos.org/data/asbs/?p=20>

CORDC San Diego ASBS Sampling Locations:

http://cordc.ucsd.edu/projects/asbs/sampling_locations.php



SWRCB Water Quality Data Mgmt

- **CEDEN** - California Environmental Data Exchange Network - *"is a central location to find and share information about California's water bodies, including streams, lakes, rivers, and the coastal ocean. CEDEN aggregates this data and makes it accessible to environmental managers and the public."*
- **SWAMP** - California Surface Water Ambient Monitoring Program (SWAMP) - *" was created to fulfill the State Legislature's mandate for a unifying program that would coordinate all water quality monitoring conducted by the State and Regional Water Boards."*
- **CIWQS** - California Integrated Water Quality System (CIWQS) - *" is a computer system used by the State and Regional Water Quality Control Boards to track information about places of environmental interest, manage permits and other orders, track inspections, and manage violations and enforcement activities. CIWQS also allows online submittal of information by Permittees within certain programs and makes data available to the public through reports."*

SWAMP 2.5 Chemistry

- **Required**
- (White background) Fill in rows before you run the transformer - Most of this information will be provided in the Chain of Custody and/or Analysis Authorization form
- **Fill in rows before you run the transformer**
- **Double check or fill in after you run the transformers**

| | |
|-----------------------------|---------------------|
| LabSampleID | DigestExtractMethod |
| StationCode | DigestExtractDate |
| EventCode | LabBatch |
| ProtocolCode | AnalysisDate |
| LocationCode | LabReplicate |
| SampleDate | MatrixName |
| CollectionTime | MethodName |
| CollectionMethodCode | AnalyteName |
| SampleTypeCode | FractionName |
| Replicate | Unit |
| CollectionDepth | DIIFactor |
| UnitCollectionDepth | Result |
| ProjectCode | ResultQualCode |
| AgencyCode | MDL |
| CollectionComments | RL |
| SampleID | QACode |
| PreparationPreservation | ExpectedValue |
| PreparationPreservationDate | LabResultComments |

CEDEN and CIWQS

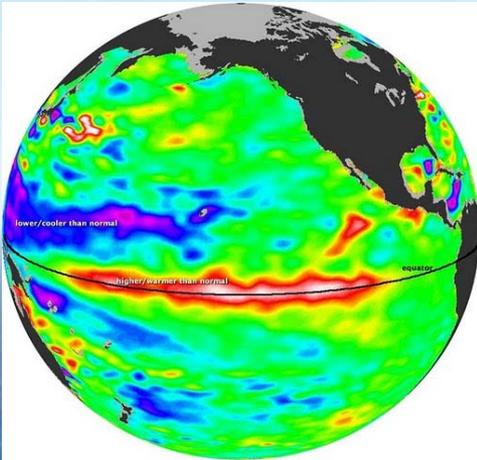
Black bolded text indicates Requested/Desired field

Bolded Green text indicates a Minimum/Required field necessary for loading data into CEDEN.

Grey highlighted cells indicate an extra field used for additional information and completeness purposes.

How to streamline?

| | | |
|-----------------------------|-----------------------------|--------------------------|
| StationCode | | Monitoring Point |
| SampleDate | | Parameter |
| ProjectCode | MatrixName | Data Type |
| EventCode | MethodName | Sample Medium |
| ProtocolCode | AnalyteName | Analytical Method |
| AgencyCode | FractionName | Collection Date |
| SampleComments | UnitName | Collection Time |
| LocationCode | LabReplicate | Analysis Date |
| GeometryShape | Result | Qualifier |
| CollectionTime | ResQualCode | Result |
| CollectionMethodCode | MDL | Units |
| SampleTypeCode | RL | MDL |
| Replicate | QACode | ML |
| CollectionDeviceName | ComplianceCode | RL |
| CollectionDepth | DilutionFactor | Scenario ID |
| UnitCollectionDepth | ExpectedValue | QA Code |
| PositionWaterColumn | PrepPreservationName | Priority Review |
| LabCollectionComment | PrepPreservationDate | Comment |
| LabBatch | DigestExtractMethod | |
| AnalysisDate | DigestExtractDate | |
| | SampleID | |
| | LabSampleID | |
| | LabResultComments | |



Thank You!

