

CeNCOOS Classroom Series: Module 2: Supplemental Guide for Teachers



Developed for CeNCOOS
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An Oil Tanker Runs Aground Off the California Coast; Plan and Execute an Appropriate Warning and Cleanup Response.

Description of Lesson (what students will do):

- Review and respond to online EPA emergency guidelines (Part 1)
- Determine component vectors and make specific calculations of average direction and speed of sea surface currents (Part 2)
- Predict the eventual location of the hypothetical off-shore oil spill (Part 3)
- Present their team's strategic response plan to the class for peer review (Part 4)

Part 1: Oil Spill Response Research

Using the EPA online resource link, students will complete the “Oil Spill Research Profile”

The screenshot shows a Windows Internet Explorer browser window displaying the EPA's Emergency Management website. The address bar shows the URL: <http://www.epa.gov/emergencies/content/learning/oiltech.htm>. The page title is "Response Techniques | Emergency Management | U.S. EPA". The main content area is titled "Oil Spill Response Techniques" and contains the following text:

A number of advanced response mechanisms are available for controlling oil spills and minimizing their impacts on human health and the environment. The key to effectively combating spills is careful selection and proper use of the equipment and materials best suited to the type of oil and the conditions at the spill site. Most spill response equipment and materials are greatly affected by such factors as conditions at sea, water currents, and wind. Damage to spill-contaminated shorelines and dangers to other threatened areas can be reduced by timely and proper use of containment and recovery equipment.

Mechanical containment or recovery is the primary line of defense against oil spills in the United States. Containment and recovery equipment includes a variety of [booms](#), barriers, and [skimmers](#), as well as natural and synthetic [sorbent materials](#). Mechanical containment is used to capture and store the spilled oil until it can be disposed of properly.

Chemical and biological methods can be used in conjunction with mechanical means for containing and cleaning up oil spills. [Dispersing agents](#) and [dolloing agents](#) are most useful in helping to keep oil from reaching shorelines and other sensitive habitats. [Biological agents](#) have the potential to assist recovery in sensitive areas such as shorelines, marshes, and wetlands. Research into these technologies continues to improve oil spill cleanup. Subpart 1 of the National Contingency Plan (NCP) establishes the process for authorizing the use of dispersants and other chemical response agents, which includes the [NCP Product Schedule](#), which is the federal government's listing of chemical countermeasures that are available for use during or after an oil spill response.

Physical methods are used to clean up shorelines. Natural processes such as evaporation, oxidation, and biodegradation can start the cleanup process, but are generally too slow to provide adequate environmental recovery. Physical methods, such as wiping with sorbent materials, pressure washing, and raking and bulldozing can be used to assist these natural processes.

Scare tactics are used to protect birds and animals by keeping them away from oil spill areas. Devices such as propane scare-cans, floating dummies, and helium-filled balloons are often used, particularly to keep away birds.

On the right side of the page, there is a "Quickfinder" section with a list of links:

- Border Programs
- CANCO
- EPCRA
- Facility Response Plan
- Freshwater Spills Symposia
- Hurricanes Katrina/Rita
- LEPCs
- List of Lists
- Local Governments
- Reimbursement
- National Response System
- NCP Product Schedule
- Natural Disasters
- Regional Contacts
- Risk Management Plan
- RERCs
- SPCC Rule
- Tier2 Submit
- More...

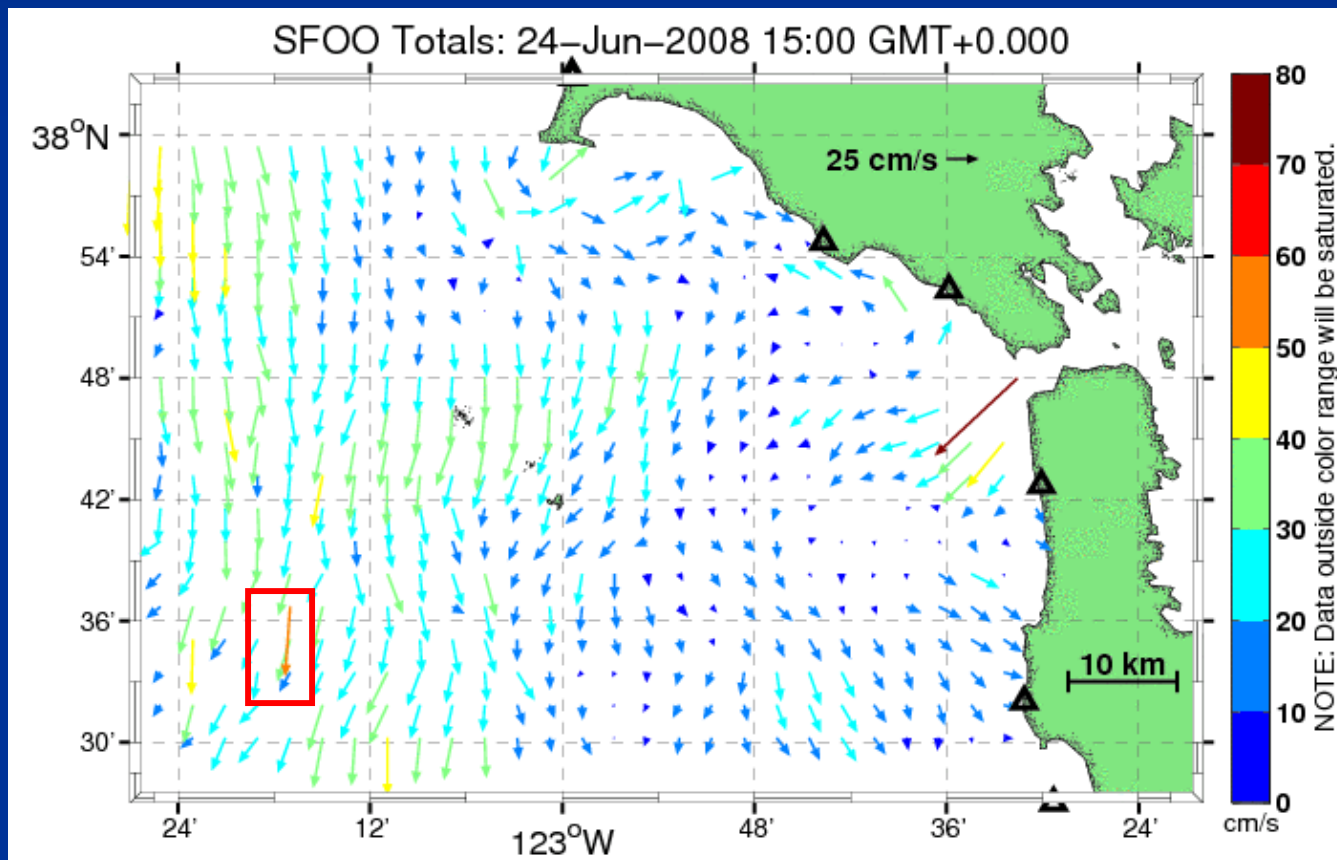
At the bottom of the page, there is a footer with the following text:

EPA Home | Privacy and Security Notice | Contact Us

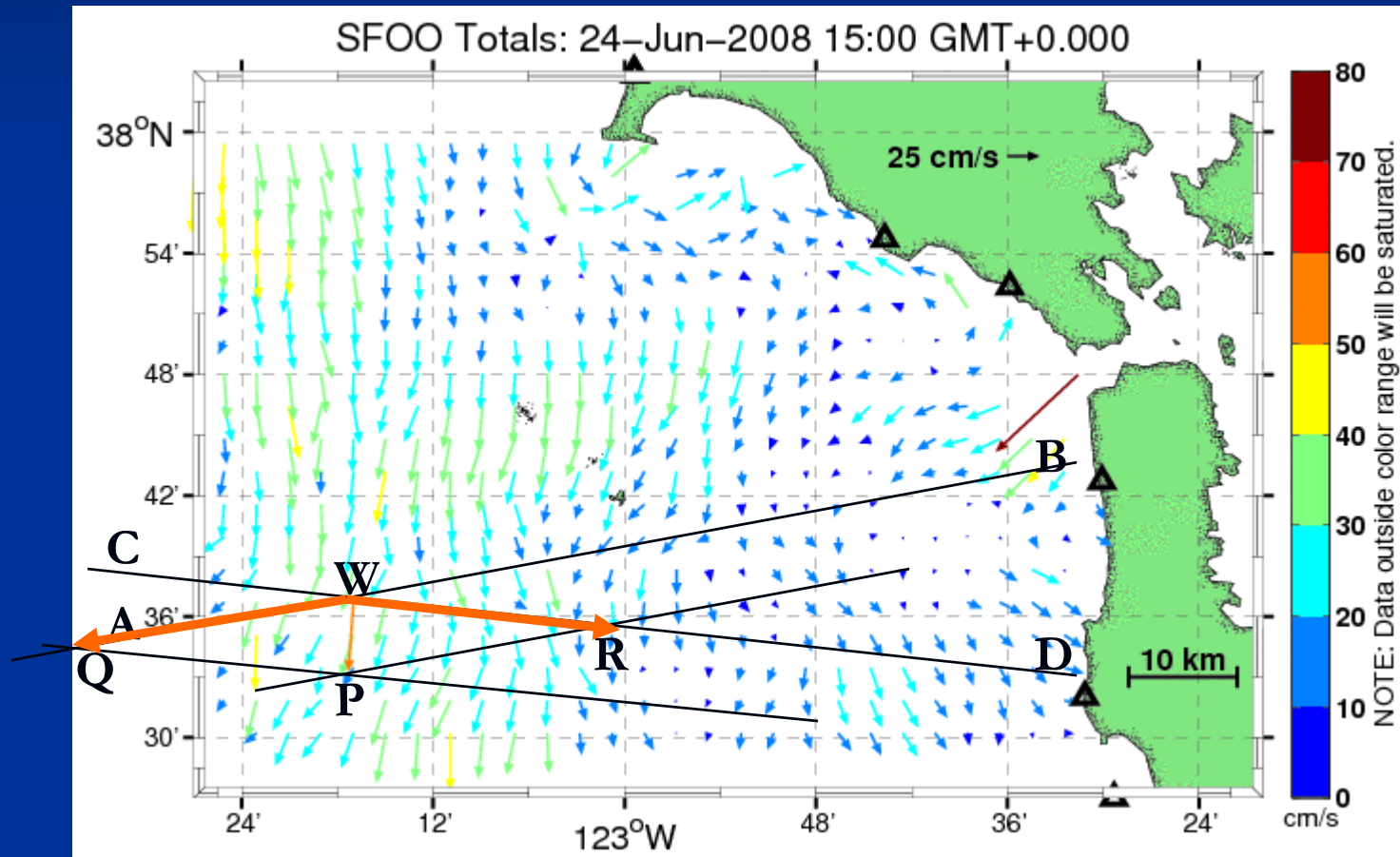
Last updated on Tuesday, June 24th, 2008.
<http://www.epa.gov/emergencies/content/learning/oiltech.htm>
[Print Page](#)

Part 2: Vector Analysis

Using the printable "Sea Surface Vector Field for San Francisco Bay, CA", students will derive component vectors from an identified resultant vector (see red box).



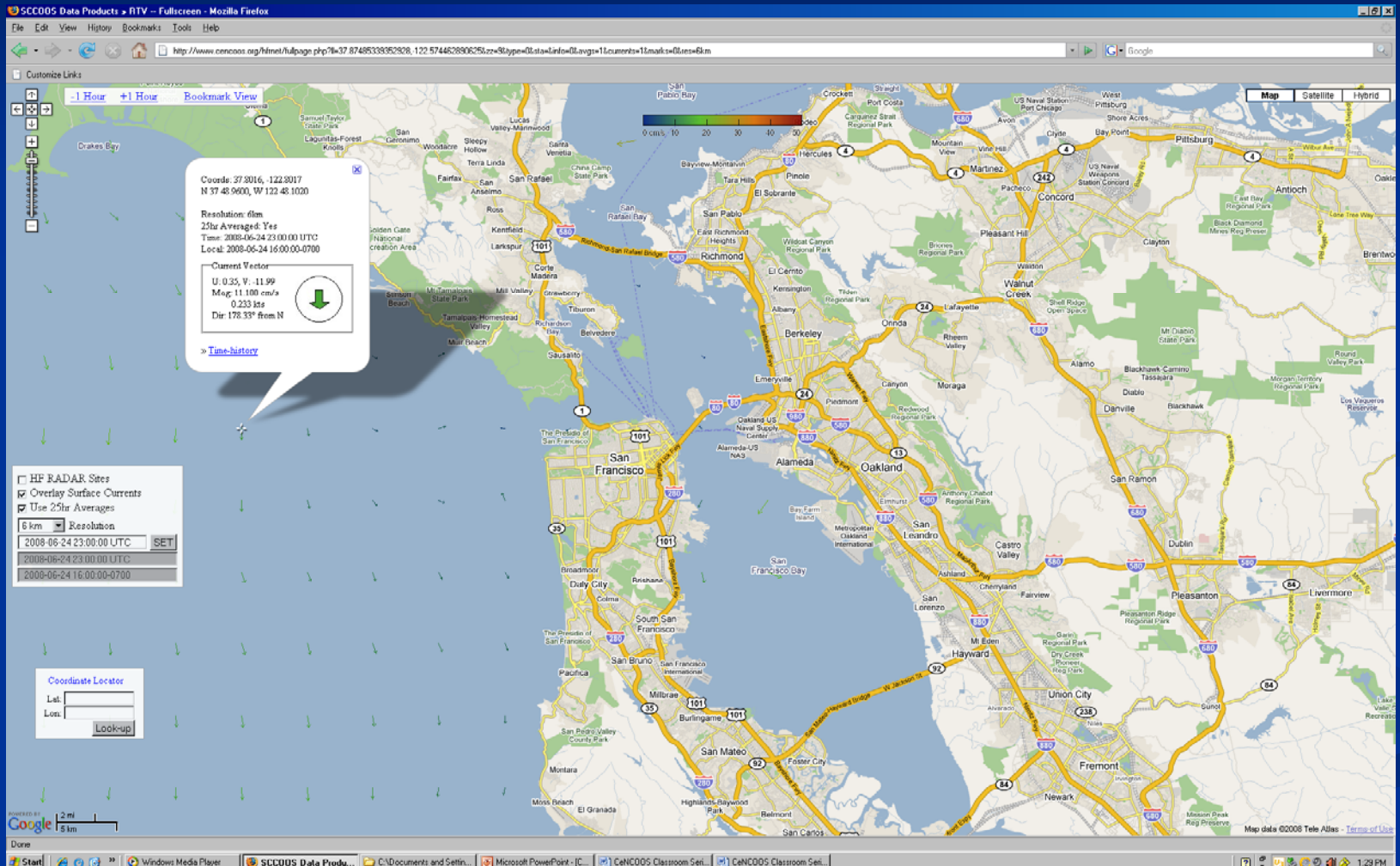
If done correctly, the results of the student's vector analysis should resemble the diagram below (component vectors indicated in dark orange).



Students are directed to this page for accessing real-time data. Red Square indicates generalized location of hypothetical oil spill.



Zooming in and clicking on individual vectors reveals their numeric features (speed and direction).

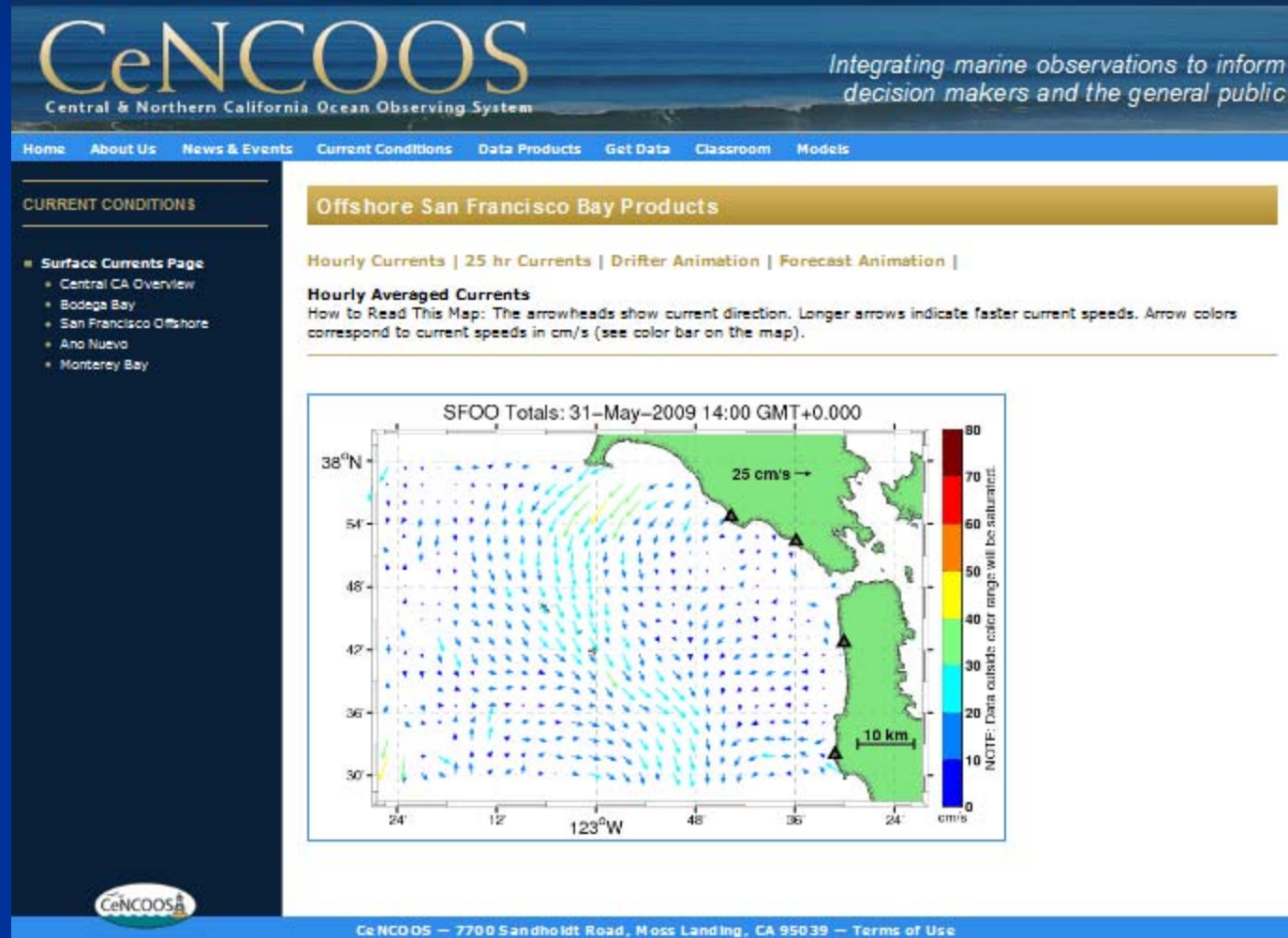


Part 3: Using Real-Time Data from CeNCOOS to Predict the Movement of the Oil Spill

Students choose four different vectors from the Google map at: http://www.cencoos.org/sections/conditions/Google_currents/ that are in the general vicinity of the oil spill (40 km West of Drakes Bay) and record the magnitude and direction (Dir.) for each in the data table:

| Vector | 1st | 2nd | 3rd | 4th |
|-----------|----------|----------|----------|----------|
| Magnitude | cm/sec | cm/sec | cm/sec | cm/sec |
| Direction | ° from N | ° from N | ° from N | ° from N |

After finding the average speed, direction, and distance travelled in 24 hours of the oil spill, students examine the following Offshore San Francisco Bay Products: "**Hourly Currents**", "**25 hr Currents**", "**Drifter Animation**", and "**Forecast Animation**" to confirm the validity of their original predictions. (Part 3, Step 7)



Part 4: Presenting Your Team's Strategic Response Plan

Students will present their findings and predictions to their peers in a Strategic response Plan that conveys how they will contain and clean-up the oil spill (techniques, equipment, and specific targeted location) supported by the evidence they gathered during the previous parts of this lesson (Parts 1-3). Their plan can be in any of the following formats:

- Formal written report
- PowerPoint Presentation
- Poster Presentation
- Public Service Announcement (PSA)

Acknowledgements:

CenCOOS Classroom Series – Module #2 was inspired and adapted for www.cencoos.org from the Rutgers Marine and Coastal Cool Classroom and Projects page. Retrieved on June 25, 2008 from: http://www.coolclassroom.org/cool_projects/coolprojects.html

References:

Presentation Images (Slides 1-8) retrieved on June 25, 2008 from: <http://www.cencoos.org/>