WHAT'S NEW

NOAA Cruise to Study Ocean Acidification on the West Coast

Follow along with NOAA this summer as we conduct an in-depth ocean acidification investigation along the U.S. West Coast! Sailing from Seattle, WA to San Diego, CA, chemists and biologists on board NOAA Ship *Fairweather* will sample and analyze water, alga and plankton in an effort to better understand how the marine ecosystem is responding to corrosive effects caused by changing ocean chemistry.

Acidification, which is driven by increases in human-caused fossil fuel burning, is particularly threatening West Coast waters given the region's unique hydrology and large biological communities. Data from this cruise may help America's fishing industry and state and local officials can plan, prepare and protect its commercially-valuable ecosystems.

Check back in August for blog posts from the ship, and follow us on Facebook and Twitter for latest updates from the ship!

When:

- *August 2*: The NOAA ship *Fairweather* departed Seattle, WA for first leg of the cruise
- August 12th: Due to mechanical issues, the NOAA ship *Fairweather* is temporarily out of service. An updated schedule will be posted as soon as it is available

Why:

- The purpose of this cruise is to better understand ocean acidification and how this change in ocean chemistry may affect certain marine organisms important to fisheries and aquaculture along the U.S. West Coast.

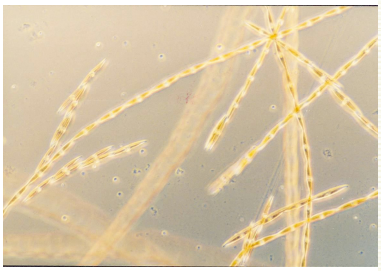
NOAA ship *Fairweather* leaves the NOAA Western Regional Center pier on August 2nd. Photo credit: James Anderson, Pacific Marine Environmental Laboratory.

The Facts:

- Ocean acidification (OA) is a change in ocean chemistry resulting from the ocean's uptake of excess carbon dioxide (CO_2) due to increasing levels of this gas in the atmosphere caused by the burning of fossil fuels, land use change, and cement production. Increased levels of CO_2 cause an increase in acidity (or decrease in pH) and an array of other chemical changes that can affect a variety of organisms, particularly those with calcium carbonate shells or skeletons (i.e. shellfish, corals, plankton). Although recent studies have shown that fish and phytoplankton can be affected as well.

- On the west coast, upwelling occurs along the California Current that runs from British Columbia to Baja, California. This upwelling causes deep, cold water to rise toward the surface near the coast. These waters are naturally rich in carbon dioxide (CO_2) and nutrients, lower in oxygen (O_2) and lower in pH than the waters they replace near the coast. Because this water interacts with the surface water that is already high in the CO_2 absorbed from the atmosphere, these waters and the creatures within it are particularly vulnerable to OA.

- Phytoplankton species, *Pseudo-nitzschia*, blooms in west coast waters. This diatom can produce a toxin, domoic acid, which can be concentrated in shellfish and planktivorous fish through filter-feeding. When marine mammals (e.g. sea lions, sea otters, sea birds) and humans ingest these shellfish or fish, they can suffer from amnesic shellfish poisoning, also called domoic acid poisoning. If this size of the bloom or toxicity of this species reaches a certain point shellfish fisheries have to be closed.
- Laboratory research has shown *Pseudo-nitzchia* produces more domoic acid in a low pH environment.



Light microscope image of chains of *Pseudo-nitzchia*, which cause amnesic shellfish poisoning. Photo courtesy of Brian Bill, NWFSC

- A closure of the razor clam fishery in 2002-2003 is estimated to have represented a loss of $10.4 million to Washington state's small coastal communities

- These changes have the potential to increasingly impact the marine food web, our fishing economy and our food security as atmospheric CO_2 continues to rise

UPDATES

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Tweets Follow @OA_NOAA

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West Coast OA Cruise: Due to mechanical issues, NOAA Ship Fairweather is temporarily out of service.Will update as soon as info is available

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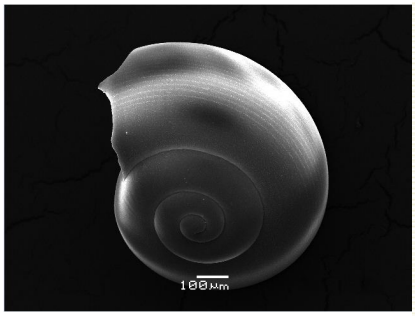
•In the Pacific Northwest, the shellfish industry injects an estimated $111 million (of $270 million nationally) a year into the region's economy, bringing jobs to over 3,200 people, primarily in coastal communities.

- Ocean acidification is a top research priority for NOAA and better understanding its corrosive effects on shellfish and other marine creatures is helping our nations' fishing and aquaculture industries understand, prepare for and adapt to the changing ocean chemistry.

What:

- NOAA researchers and their academic colleagues on board the *Fairweather* will visit a number of "mooring" sites where ocean circulation and chemistry are monitored. During the stop they will collect and analyze water and plankton samples.
- Scientists will be doing a survey of impacts of ocean acidification on pteropods, a planktonic snail that is a key food source for many commercially and economically important fisheries in the Pacific Northwest like salmon.
- Scientists will sample known "hot-spots" for *Pseudo-nitzschia*, a harmful algal species, along the U.S. West coast to determine whether natural populations of these cells respond to low pH waters by increasing their toxin production.
- This will be a rare opportunity for biologists and chemists on board for a few reasons. Biologists will be able to look at the response of these organisms in the natural environment, while chemists simultaneously look at the ocean chemistry. They will be using the same samples, as opposed to performing experiments in an isolated laboratory setting.



Scanning electron micrograph of a healthy pteropod shell. Photo courtesy of Nina Bednarsek, PMEL

- Data from this cruise will be made available later this year. It will compare this year's data with that of a mission which followed the same cruise track in 2007.

Mission Leaders & Scientists:

- Dr. Richard A. Feely, mission co-chief scientist (Leg 1), NOAA's Pacific Marine Environmental Laboratory (Biography)
- Dr. Simone Alin, mission-co-chief scientist (Leg 2), NOAA's Pacific Marine Environmental Laboratory (Biography)
- Dr. Erica Hudson-Ombres, mission scientist (Leg 1), NOAA's Ocean Acidification Program (Biography)

Additional Resources

NOAA Ocean Acidification Program: http://www.oceanacidification.noaa.gov/
NOAA Pacific Environmental Marine Laboratory: http://www.pmel.noaa.gov/co2/story/Ocean+Acidification