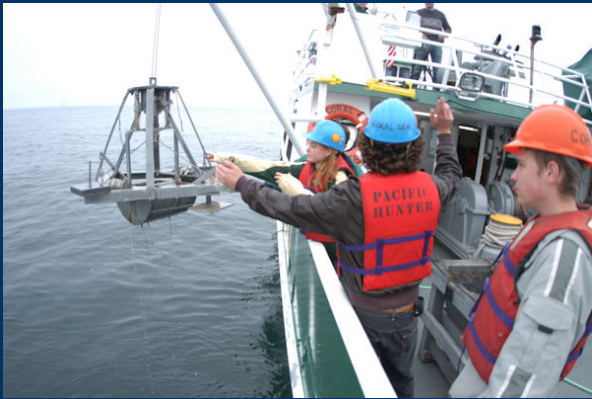


HSU OCEANOGRAPHY NEWSLETTER

2008 Edition



Students use a Smith-Mac grab sampler to see what's on the bottom of the ocean

What's new:

- Jeff Borgeld chases Eel River sediments and organic carbon
- Sarah Goldthwait gets published in **Science**
- New gear! Thanks to alumni, CNRS, and NSF
- HSU at Ocean Sciences, Orlando, FL, March 2-7, 2008!

"So where are we going to put all this new stuff?"

Scott Martin, Captain, R/V Coral Sea (on HSU's successful bid for a NSF Major Equipment Grant)

New Gear! Thanks to Alumni, the College, and NSF

The Department had two remarkable windfalls this past year.

A New Sontek Current Profiler

Thanks to the generous donations of alumni, along with a sizable contribution from our college Dean, the Department purchased a portable, 500kHz Sontek acoustic current profiler! Thank you! Our first trials will take place in Spring 2008 in Humboldt Bay, using our pontoon boat.

Major Instrument Grant from NSF

HSU was awarded more than \$200K from NSF for some major additions to the R/V Coral Sea. These include a real-time CTD/winch system, a vessel-mounted current profiler; a hull flow-through system (to measure surface water characteristics as we move through the water), a weather station, and a fish egg sampler.

The gear will be installed in summer '08. It will be a boon to research and education here at HSU. Watch us now!

Oceanography Seniors Present Research at 2008 Ocean Sciences Conference

Iron is an important nutrient for phytoplankton. It's only needed in small amounts, but it has to be available in a chemical form that can be used. We refer to it as "bioavailable iron." In some parts of the ocean, a lack of bioavailable iron is the only thing limiting phytoplankton productivity (the base of the ocean food web).

Coastal rivers can deposit iron-rich sediments along the continental shelf. It has been suggested that some of this iron might become biologically available for phytoplankton growth (primary productivity).

Last year's cohort of senior oceanography students decided to test this hypothesis in their own 'local' waters. With help from Professors Jeff Abell and Sarah Goldthwait, they measured bioavailable iron in the sediments deposited along the continental shelf during Eel River flood events. The project was a success.

The students got to present their results ('Bioavailable iron deposition along the northern California continental shelf following an Eel River flood event') to the oceanographic community at the 2008 Ocean Sciences Meeting in Orlando, Florida in early March, 2008. Congratulations, folks!



Who's there? A student has a quick look at a plankton sample on the R/V Coral Sea. We'll do a more detailed analysis when we get back to the lab.



Greg Crawford, Physical Oceanographer and Department Chair



At last, another HSU Oceanography newsletter!

As you can tell by reading this, we continue to be busy. There are so many exciting and important opportunities these days! And we love to involve students in what we're doing.

Check out our real-time water quality measurements in Humboldt Bay and at Trinidad : <http://cicore.humboldt.edu> .

We're also installing 4 surface current radar (CODAR) systems between Fort Bragg and Crescent City, California. This is part of an effort to map and monitor ocean surface currents along the California coast every hour.

We're almost ready to go realtime with a couple of the radars. Keep an eye on the department webpage for updates. For now, you can get a sense of what we can do from the plot below, which shows a map of offshore surface currents west of Crescent City and Trinidad. We created this image

from a trial run last year.

How muddy is Humboldt Bay? We started looking at the spatial variability of turbidity in the bay last year. These sediments are important because they can make the water too dark for many marine plants, algae, and animals to live.

We were surprised to see some pretty substantial variability in space and time, just in one day. We're just starting to look at what controls the bay's turbidity. Tides are clearly important, but there's still a lot more to do.

What else? I continue, off and on, to do work on Crater Lake, Oregon, one of the clearest and deepest lakes in the world (last year we published two papers on the lake); I've also got a grad student, Rey Urbach, who's developed a 3D model of the lake. What's the big deal? The short answer: deep lakes have some very unusual physics that can influence the lake ecosystem!

Greg

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Ecosystem-Based Management for Humboldt Bay?

Ecosystem-based management is a concept where we use science to inform and support good environmental management.

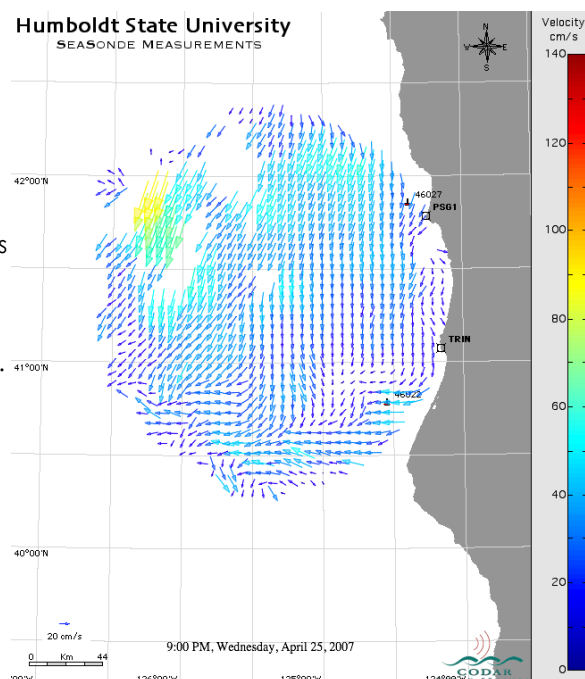
We've been working, for about 9 months, on how this concept might be applied to Humboldt Bay. The planning effort involves broad representation from local, state, and federal government agencies.

HSU is also well-represented at the table: (myself; Scott Quackenbush, Associate Dean for Marine Sciences; Frank Shaughnessy, Biology; Steve Hackett, Economics).

We're learning as we go, but have identified our four top priorities: bay ecosystem monitoring, a better understanding of sediment dynamics in Humboldt Bay, conceptual tools (for managers to assess consequences of decisions), and a socioeconomic cost-benefit analysis.

It's been interesting (and challenging) to participate in such broad discussions and help plan for the future. We hope, by next year, to get a start on implementing these efforts. Hopefully I'll be able to tell you more in next year's newsletter!

Greg



Map of ocean currents from first test run of
CODAR systems along California's "true north" coast

Jeff Abell, Chemical Oceanographer

This past year has been exciting and challenging for me as I made the transition from lecturer to assistant professor here in the Department of Oceanography. Teaching still remains my primary focus as I endeavor to develop more engaging and interactive curriculum in our introductory oceanography, chemical oceanography and field courses.

In addition, I have taught our sophomore and senior field courses this past year. This has kept me very busy on the R/V Coral Sea and I have enjoyed seeing just how much of an impact a field-based education can have on students.

On the research front, I am working on a project with my former colleagues from Utrecht University, the Netherlands, to study the kinetics of microbial reactions that have important ecological and geochemical significance. This project involves determining the relative reaction rates of denitrification and sulfate reduction in marine and freshwater sediments. The goal is to

quantify these reaction rates of these important biogeochemical processes and to determine the factors that control them. This project has already led to two publications and I am busy finalizing the manuscript for a third.

I also began sample collection and reactor runs for "local" sediments from Humboldt Bay and from offshore in the Eel River flood deposit layer on the continental shelf. I will be analyzing the data this year and hope to do more sampling in our local bays and lagoons.

Finally, I was busy over the winter break installing and testing a state-of-the-art Bran and Leubbe nutrient autoanalyzer. This wonderful new tool will be capable of analyzing several hundred samples per day for nitrate, nitrite, phosphate, ammonia, silicate and other seawater components.

This will be invaluable for my own research and it will provide a highly



modern, hands-on teaching tool for my chemical oceanography course. Later this semester after further testing, it will also be made available to the university and the water quality community at large. My hope is to encourage outside use of the instrument and to generate a funding base that can ultimately establish HSU as the premier ocean water chemistry center along the North Coast.

Jeff
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Sarah Goldthwait, Biological Oceanographer

This last year has been an exciting one in many different arenas of my life. On the research front I was a coauthor on a *Science* paper published in May 2007. This was a compilation paper highlighting some of the research that I was involved in prior to arriving at HSU. The project focused on physical, chemical, and biological processes in mesoscale eddies in the Sargasso Sea.

My component of this large, interdisciplinary effort was to characterize the zooplankton community and their response to the phytoplankton blooms that resulted from the enhanced nutrient availability within these features. We were thrilled to find the highest chlorophyll concentration ever documented in the vicinity and enhanced zooplankton biomass!

A paper detailing my results will be published in an upcoming special issue of *Deep Sea Research* dedicated to eddies in the Sargasso Sea and in the lee of the Hawaiian Islands.

On the local research front, in the summer of 2007 I conducted a project with Dr. Megan Donahue (HSU-Biology) to investigate the effects of a headland feature on larval settlement. We focused primarily on crab and barnacle larvae comparing their distribution and abundance in the plankton and on settling plates.

Recent alumnus Kevin Siwicke was critical to this research effort as he collected (on Trinidad Pier and by kayak) and processed the samples. We were excited to see pulses of different larval taxa as the summer progressed. I hope that this will serve as baseline data for future projects investigating benthic-pelagic coupling in nearshore environments.

I am also becoming involved with the Trinidad Transect of the PaCOOS project run by Dr. Eric Bjorkstedt (NOAA). We are working to identify and



count a couple of key zooplankton groups (chaetognaths and krill!) in the samples that he has been collecting quarterly since the beginning of 2005. I am guessing that my goal of identifying every last copepod is many senior projects away!

My most thrilling news has been on the personal front. My husband and I welcomed into the world our wonderful son Phineas Owen Stone on June 18th. With Phineas every day really does feel like a new and most welcome adventure. He is a delight and is avidly trying to say his first word. I am pretty sure that it is going to be "copepod"!

Sarah
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Jeff Borgeld, Geological Oceanographer

My students and I are currently sampling the Eel River during rainfall events. Later we expect to do some sediment coring on the river floodplain and offshore, to look at what gets buried.

I also continue to oversee the atmospheric observatory on Trinidad Head (NOAA baseline observatory site THD), where we have made measurements of atmospheric aerosols, surface ozone, radiation, and flask sampling for halocarbons and carbon cycle gases since 2002. The data provide a continuous baseline of pollution and climate forcing agents in air entering the U.S. from across the Pacific Ocean.

The observatory continues to be operated primarily by the Station Chief (Michael Ives) and current and former HSU oceanography students. You can explore more about the project and data at:

<http://www.esrl.noaa.gov/gmd/obop/thd/index.html>.

Greg Crawford, Sean Craig (Biology), and I recently completed an Assessment of Coastal and Marine Resources and Watershed Conditions at Redwood National and State Parks (RNSP), California. We had a lot of help from two HSU grad students (BryAnna David and Emily Morris), along with staff from RNSP. The report was designed to help the National Park Service better understand the current conditions in the park and to contribute to future management strategies.

Jeff

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Having had a long-standing interest in the fate of sedimentary material in the coastal ocean, my latest project is a collaborative effort, with colleagues from Oregon State University, UC Davis, and UC Santa Cruz, to look at particulate organic carbon (POC) that gets carried to the ocean by rivers. The project is sponsored by the National Science Foundation.

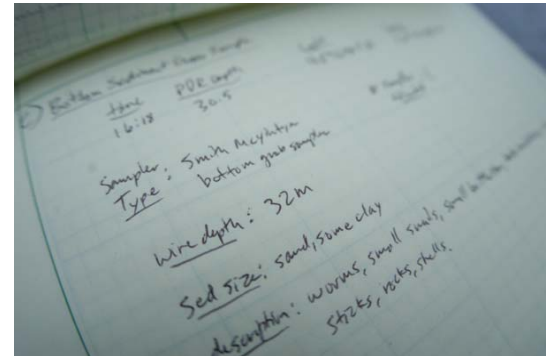
This is a potentially important part of the carbon cycle, but little is known about the amount of POC transported by rivers, nor about its fate once it reaches the ocean. Does it get buried? Does it re-enter the global carbon cycle?

Keep in Touch!

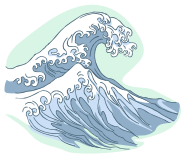
Are you an alumnus? Let us know how to stay in touch with you! An email address or postal address would be great! Both would be even better. We will not sell your information, although we would like to share it with the HSU Alumni Association (they also help us to find you, so there is some advantage in sharing this kind of information). Tell us what you're up to. We'd really like to know.

Are you interested in learning more about the Oceanography program?

Call us, drop us a line or send us an email (ocn@humboldt.edu). We'd be happy to answer questions and tell you more about our program!



Always take good notes.



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