



# Making Waves

## Course XIII- The Legacy

*Contributed by Bridget Downey ('06) and Lauren Cooney ('06, ME)*

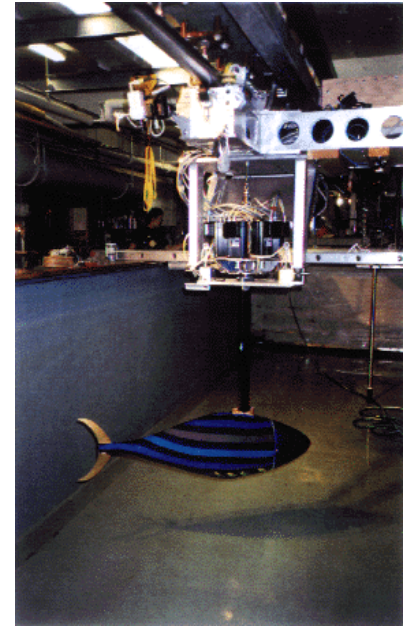
As of January 1<sup>st</sup>, 2005, the Department of Ocean Engineering at MIT is merged with the Department of Mechanical Engineering. After a process that was begun in September of 2003, a committee that included OE Prof. Kim Vandiver, and Chair of the committee, EECS Prof. Alan Oppenheim, concluded in December of 2004 that the most positive future for the department was to merge with Course II.

Ocean Engineering's ties with the Mechanical Engineering department date back to 1890, just twenty-seven years after the Institute was founded. In that year, naval architecture became an option available through Course II. Three years later, Course XIII was created.

The former Department of Naval Architecture and Marine Engineering adopted the current name of the Department of Ocean Engineering in 1971. Almost 35 years later, the department is returning to its first home, under the realm of Mechanical Engineering.

Through the years, the Department of Ocean Engineering has revolutionized the world's knowledge and utilization of the oceans. The department has been a pioneer of research in areas including acoustics, hydrodynamics, and underwater vehicles.

Plans for a "Center for Ocean Engineering" at MIT are underway. The center, according to newly appointed Director, Prof. Michael Triantafyllou, "now has a web page describing its role, and hopefully providing a positive image to the outside world of ocean engineering research and educational activities within the Department of Mechanical Engineering at MIT. We all hope the Center will preserve the identity of Ocean Engineering and expand the opportunities for work in the ocean. Please visit the web page at: <http://oe.mit.edu>."



**MIT's Towing Tank (est. 1950) and the RoboTuna (1994).**



**Most recent & pronounced MIT Hack; the mast of a sinking pirate ship in Kresge Oval. A testament to all passers-bys on Spring '05 Registration Day (Courtesy of Tadd Truscot)**

Sources: MIT Libraries (History of Course XIII) and *The Tech*, "Committee Debates Fate of Course XIII" (Marissa Vogt)

- SNAME paper night on February 17<sup>th</sup> at MIT !
- Check out the new OE website at <http://oe.mit.edu>
- Congratulations Award and Scholarship Winners!

### Highlights:

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## The Annual OE Holiday Party



**Prof. and Acting Dept Head, Henrik Schmidt, Mr. Steve Malley, and others look on (Photos courtesy of Carolyn Brooke).**

*Contributed by Mary Mallowney (OE Staff)*

Ocean Engineering colleagues gathered again this year to celebrate the holidays at Polcari's Italian restaurant in Kendall Square. The party was held Friday afternoon, December 17, at the end of the fall semester. This gathering was significant in that it marked one of the last Department events before the merger with Mechanical Engineering on January 1<sup>st</sup>, 2005.

Barbara Smith, Administrative Assistant in the Department of Ocean Engineering, coordinated the event with the Polcari restaurant management, and she made several visits to Polcari's to personally assure that the food and event would be excellent. The food, beverages, and service were well-received by the faculty, staff, and students. All Ocean Engineering students, faculty and staff were invited, and members from each group attended.



**Joshua Wilson & Susan Brown enjoying the good company, and good food, at Polcari's.**

## OCEANS 2004 - Japan

### Five MIT Students Compete in OTO-04 Poster Competition

*Contributed by Jordan Stanway ('06)*

MIT students Matt Greytak (OE '05), Stephen Licht (OE '05), Jordan Stanway (OE '06), Dan Walker (ME '05), and Kate Wasserman (OE '04) went to Kobe, Japan in November to present posters at OCEANS-TechnoOcean 2004. The conference featured technical sessions, company booths, award luncheons for MTS and IEEE/OES, and a final "Kobe Cruise Night," where student awards were presented. Graduate student Stephen Licht was awarded Second Prize for his poster entitled "A Biomimetic Flapping Foil Underwater Vehicle." Jordan Stanway, 13SEAS Undergraduate Representative, accepted the MTS Outstanding Student Section Award on behalf of 13SEAS. Students networked with marine professionals, explained their research to conference attendees, and experienced a little Japanese culture through trips to the city and surrounding area, as well as visits to the conference's "Culture Corner." The long trip was well worth it, and helped build "Bridges Across the Oceans."

OCEANS 2005 is scheduled for September 19-23 in Washington DC ([www.oceans2005.org](http://www.oceans2005.org)). The theme of the conference will be "One Ocean," with the focus particularly on homeland security, global observation and exploration, emerging ocean science, ocean education and outreach, and more.

For those students interested in participating in the 2005 conference, the following dates apply: abstract submission (March 1), notification of acceptance (April 1), and full paper deadline (June 1).



**Stanway (five from left) at the Student Awards for OCEANS in Kobe, Japan this past fall (Courtesy of Jordan Stanway).**

## SNAME NE Meeting

The annual paper presentations was held on February 17<sup>th</sup> at the MIT Faculty Club! Read more about it in the next issue of Making Waves.

## Find out more...

about *this* year's ROV Team. Visit <http://web.mit.edu/rov>. If you, or your company, would be interested in sponsoring the team, please email Team Treasurer, Bridget Downey [bridget1@mit.edu](mailto:bridget1@mit.edu)

## A Warm Welcome...

to all of our new, fellow colleagues in the Department of Mechanical Engineering. If you'd like to receive this seasonal newsletter, please email [bridget1@mit.edu](mailto:bridget1@mit.edu).

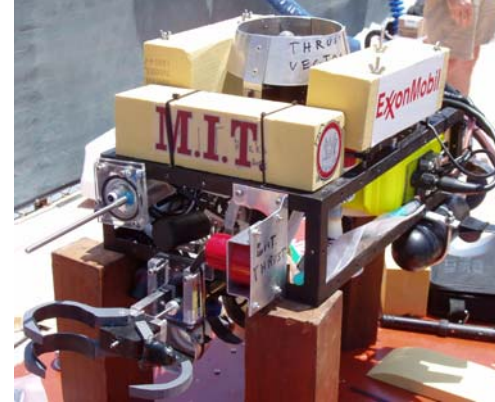
## Looking for speakers...

to give a talk for the spring lunch seminar series. Email [squall@mit.edu](mailto:squall@mit.edu) if you would be interested in presenting a talk to the OE department! Or, if you know of anyone outside of MIT who would be interested in giving a talk, feel free to invite!

## 13SEAs ROV Luncheon

*Contributed by Jordan Stanway ('06)*

The MIT ROV Team, led this year by OE Junior Heather Brundage, gave a slideshow presentation on its history and the new challenges it faces this year. The team was started in spring 2003 and introduces students to system design early and in a hands-on way. It welcomes members of all experience levels, especially those with no experience at all. The team competes in the annual Marine Advanced Technology Education Center's (MATE) ROV Competition against teams from other schools. In the 2004 competition, the team placed first in the mission scoring, and a close second overall.



**ROV Castor, the 2004 entry of MIT to the MATE Competition in Santa Barbara, CA (Courtesy of Thaddeus Stefanov-Wagner, ME).**

The ROV will be vastly redesigned for the 2005 competition, with a more modular layout and more robust control system. The competition venue this year is NASA's Neutral Buoyancy Lab, with a 40-foot pool that makes waterproofing and tether power loss more substantial concerns than in previous years. The team has already begun brainstorming ways to cope with these and other challenges in the multifaceted mission scenario they have been given.

If you would like to give a lunch talk this spring, please contact Jordan Stanway ([squall@mit.edu](mailto:squall@mit.edu)). Look for some upcoming luncheons including alumnus Justin Manley, Mitretek Systems & NOAA on "Ocean Exploration," and Susan Swithenbank (Graduate Student), on "VIV Experiments."

## Santa Claus visits Building 5

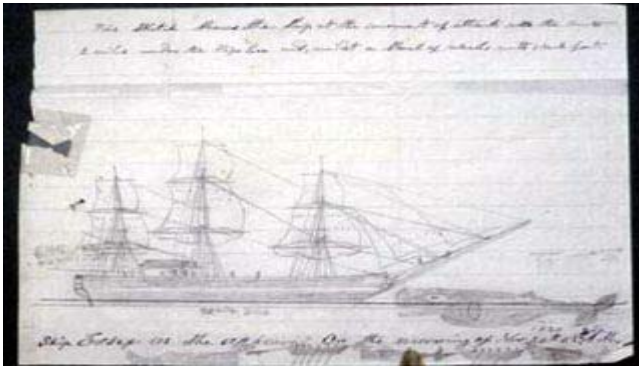
The graduate students of this class (pictured at right) were handed candy canes and brought holiday cheer from the visit of Santa Claus and Boston's well preserved Snowman. Mr. Steve Malley (OE Staff) helped to coordinate such visits this December, including one to the Mechanical Engineering and Ocean Engineering Holiday Party Mixer. The students hope the visit will become an annual event.



## Book Watch

### Review: *Revenge of the Whale: The True Story of the Whaleship Essex*, By Nathaniel Philbrick

Contributed by Tadd Truscott (Grad Student)



Thomas Nickerson's sketch of the whale attacking the *Essex*. Nickerson was a cabin boy, 15, the first to spot the whale. Source, PBS online.

By 1821 everyone in America had heard of the *Whaleship Essex*. Perhaps the most well known marine disaster of the 19<sup>th</sup> century, Nathaniel Philbrick re-tells the story of the *Essex* with the help of recently uncovered documents, and a survivor's first hand account finally released in 1984. Philbrick tells the story so well I read the book cover to cover in less than a day. It reads like a novel but is factual in its presentation. I personally found it more exciting than *Moby Dick*, which was partially based on the *Essex* story. On November 20, 1820, the *Whaleship Essex* was the first ship ever to be attacked by a sperm whale. Three leaky rowboats filled with the twenty men and little to eat or drink set sail for shore with little hope of making the 4500-mile journey. Along the way they find fear, beauty, cannibals, death, and the essence of humanity (survival).

#### Excerpt from *Whaleship Essex*:

Chase had ordered Lawrence, the ex-harpooner, to steer the boat in close to the whale. Lawrence did so, so close that as soon as the harpoon sliced into it, the panicked animal whacked the already battered craft with its tail, opening up a hole in the boat's side. As water poured in, Chase cut the harpoon line with a hatchet and ordered the men to stuff their coats and shirts into the jagged opening. While one man bailed, they rowed back to the ship. Then they pulled the boat up onto the *Essex's* deck.

## Tadd's Trivia on *Treasure Island*

Test your memory on the classic novel by Robert Louis Stevenson

Contributed by Tadd Truscott (Grad Student)

1. Was the pirate's name Long John....?
  - (a) Gold
  - (b) Silver
  - (c) Bronze
2. What was the Captain's name?
  - (a) Bart
  - (b) Billy
  - (c) Bob
3. Who was the first man to visit the captain?
  - (a) Dr Livesey
  - (b) Pew
  - (c) Black Dog
4. Which pirate was blind?
  - (a) Pew
  - (b) Long John Silver
  - (c) Jim
5. Who had one leg?
  - (a) Jim
  - (b) Captain
  - (c) John Silver
6. What were the pirates looking for in the inn?
  - (a) a map
  - (b) gold
  - (c) clothes
7. Who found the treasure?
  - (a) Jim
  - (b) Ben Gunn
  - (c) John Silver
8. Who had a bad habit of drinking too much rum?
  - (a) Billy Bones
  - (b) Captain Smollet
  - (c) Long John Silver
9. How many people visited the captain?
  - (a) 100
  - (b) 3
  - (c) 2
10. Who didn't like the crew?
  - (a) Captain Smollet
  - (b) Doctor Livesey
  - (c) Jim Hawkins

#### Answers

1. B
2. B
3. C
4. A
5. C
6. A
7. B
8. A
9. B
10. A

## Successful Student Program at the 2004 SMTC&E

Contributed by Matthew Unger (Grad Student)

This year's SNAME Maritime Technology Conference and Expo (SMTC&E) was held in Washington D.C. between September 30 and October 1, 2004, and featured an expanded program specifically designed to foster and emphasize student membership and participation. The Student Program included a student paper track, the Student Congress and Student Design Competition, and a job fair.

On Thursday, September 30th five student papers were presented during a dedicated student paper track. Unlike last year's student program in which the presentations were a separate entity from the technical presentations, this year the conference's technical presentations were put on hold, and the student presenters were given the center stage in each of the technical presentation rooms. This new format gave all SMTC&E attendees the opportunity to sit in on one student presentation. Below is a list of the student presentations:

- Graduate Student Award Paper *Transverse Versus Longitudinal Framing – A Comparison Based On Equivalent Design, Productivity, And Cost* by Ying Mei, The University of Michigan
- ISODC 1st Place Winner *Design of a Floating Storage and Regasification Unit (FSRU) for Offshore West Africa* by Texas A&M University Team West Africa - Regan Miller, Rolla Wattering, April Van Valkenburg, Flor Foreman, Steven Schaefer and Jennifer Dupalo
- ISODC 2nd Place Winner *Conceptual Design of Itapoa Platform* by University of Sao Paulo - Felipe Cruz Rodrigues de Campos, Ricardo Akira Koga, Bruno Madella Rodrigues dos Santos, Fabiano Pinheiro Rampazzo and Edgard Borges Malta
- LISNYK 1st Place Winner *Agile Surface Combatant (ASC)* by Virginia Tech -David Cash, Gerritt Lang, Dorothy McDowell, Cory McGraw, Scott Patten, and Joshua Staubs
- LISNYK 3rd Place Winner *SES - Container Ship* by Norwegian University of Science and Technology - Egil Rokstad, Hakon Solvsberg, Jahn Helge Bjornestad, and Thor Oyvind Hansen

The morning of Friday, October 1st featured the annual Student Congress and Student Design Competition, which was the keynote event of the Student Program. This year's competition required students to build a vessel that would hold as many full soda cans as possible.

Teams were judged on vessel design, teamwork ability, presentation, and ultimate soda can carrying capability. The winning team's vessel had a carrying capacity of approximately 115 full cans of soda!



*Students test the capacity of their design in the testing pool.*

Immediately following the Student Congress, the annual Student Steering Committee (SSC) meeting was called to order, and new officers were elected. The SSC board is tasked with representing students and student interests in SNAME. Additionally, its officers run the Student Program at the SMTC&E. The newly elected 2004-2005 SSC officers are:

Matthew Unger (MIT)	<i>Chairman</i>
Kristen Scheibach (U Mich.)	<i>Vice-Chair</i>
Lauren Daly (UNO)	<i>Communications Chair</i>
Marcos Picolo (UNO)	<i>Electronic Media Chair</i>
Kurt Sacks (U Mich.)	<i>Secretary/Treasurer</i>

Please mark your calendars for the 2005 SMTC&E to be held October 19 – 22 in Houston, TX, where we promise at the very least, an equally exciting Student Program.



*Students presented and tested their designs to a standing room only crowd during the Student Congress (Photos courtesy of Matthew Unger).*

## Professor Spotlight in Her Own Words: Prof. Alexandra Techet

### What is the current focus of your research?

My current research is in the area of experimental marine hydrodynamics and focuses on high Reynolds number unsteady flows about ocean vehicles and offshore structures. I was recently awarded the ONR Young Investigator's award to pursue the experimental study of chaotic, near-surface hydrodynamics of high speed surface piercing vessels. Other ongoing research efforts include work on drag reduction through fish-like swimming motion, flapping foil propulsion, live-fish swimming hydrodynamics, vortex-induced vibrations from offshore risers, and complex free-surface hydrodynamics, including the impact of objects on a water surface. I am also involved in the development of quantitative experimental flow diagnostic techniques such as Particle Image Velocimetry (PIV), in planar and stereo-planar configurations, and shear stress measurement methods.

In addition to research I'm advisor to the 13SEAS group, involved with the MIT/WHOI joint program, and advise the OE ROV team. One of the best parts of being a professor at MIT is working with the students. I really enjoy my interactions with students both in and out of the classroom – their energy and enthusiasm can really be contagious. I teach undergraduate hydrodynamics (was 13.012, is now 2.016) in the fall and a graduate course in design of ocean vehicles in the spring.

### Who are your current students?

I am director of the Experimental Hydrodynamics Laboratory Group and have four graduate and four undergraduate students working on thesis projects with me and have several UROP students in lab. The students are working on projects ranging from impact of objects on the free surface, small scale breaking waves, flapping whale fins, and flow-structure interactions.

### Why did you choose to pursue Ocean Engineering?

My love for all things "ocean"... As a kid I spent my summers on the coast of North Carolina sailing and boating. I worked several summers in high-school and college fixing small outboard boats. I started SCUBA diving around sophomore year in high school and never looked back. I was always a "water-baby" in that I was an avid swimmer, sailor, diver and water-polo player – so the jump to studying hydrodynamics made total sense. At age 17, I earned my US Coast Guard "six-pack" license and captained a great antique 36' wooden inboard vessel for several summer teaching kids (mainly girls ages 10-16) about boat handling, engine maintenance, navigation, weather and oceanography.

### How I ended up an engineer...

As early as junior high, I knew I wanted to do something

"hands-on" for a living and at the end of high school, engineering seemed like the perfect fit. At that point, I had no idea what Ocean Engineering was or even that it existed, so when I applied to Princeton University, I declared my major in Mechanical and Aerospace engineering with a minor in Applied Mathematics. Through college I continued to play water polo at the collegiate and national level and spent most of my summers in North Carolina boating. Academically, I was always drawn to fluid mechanics and took every course I could possibly find related to fluids, while at Princeton. Towards the end of college I started looking into graduate schools and was psyched to see that such a field as "Ocean Engineering" existed! The decision was a no-brainer, and I headed to MIT.

### Where I was before becoming a Prof. at MIT...

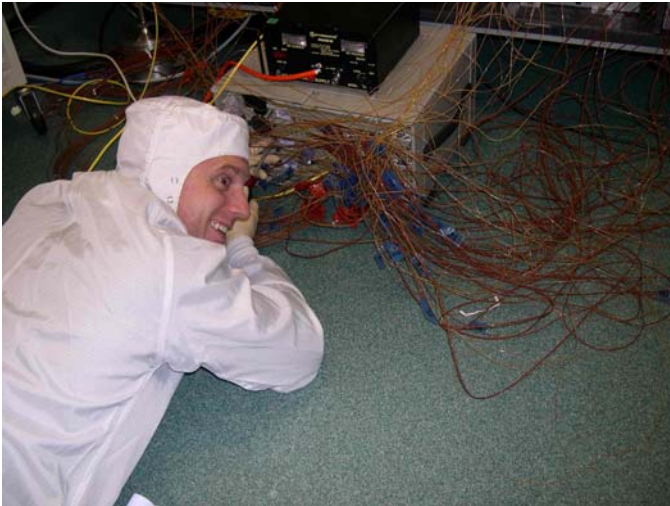
In graduate school I was a student in the MIT/WHOI Joint Program. I was lucky to have been involved with several cool projects: my master's work looked at the flow patterns behind tapered cylinders to model the effects of sheared flow on oscillating offshore risers, and my doctoral research transitioned to fish-like swimming hydrodynamics for underwater vehicle design. Between graduation in 2001 and starting back at MIT on faculty in 2002, I worked on a project for the offshore industry investigating high Reynolds number vortex-induced vibrations and spent a year back at Princeton University investigating the energy extraction from flow using piezoelectric "eels".

### What do you like to do for fun?

In the summer I spend any extra time exploring Boston harbor and the outer islands by boat and occasionally do a little fishing. In the winter I "chill" out by swimming or doing yoga – which I highly recommend for anyone looking to release a little stress. Of course, no one at MIT ever stresses out, do we?



*Prof. Techet scuba diving; note the octopus on top of her head (Courtesy of Alexandra Techet).*

**Alumnus Spotlight in His Own Words: Joshua Davis**

*Joshua Davis '01 hard at work.*

I received my Course 13 master's in 2001. Working in the subterranean warmth of the Towing Tank, I assisted in hydrodynamic research of cylinders and cables used in the offshore environment. As my department has done recently, I turned into a mechanical engineer shortly thereafter. I am now a test engineer with ATA Engineering, Inc. (<http://www.ata-e.com>) in San Diego, CA. ATA is an engineering consulting company that provides test and analysis services to the aerospace, amusement (roller coaster), electronic, and other industries. I started as an analyst; developing finite-element models and dynamic simulations. Nowadays, I travel across the country to conduct modal, strain, and other operating tests at customer facilities. I've been lucky enough to work on some famous amusement attractions and sophisticated air/spacecraft. The data acquisition, processing, and analysis skills I learned at MIT come in handy every day. When I am home, I devote most of my off-time to cross-country mountain bike racing and training. I recently won the 2004 Amateur Cup series championship for the Southern California region (beginner class). The aggressive riding style I developed while trying to survive as a bicyclist in Boston fits racing well. With respect to the merger of the ocean engineering department...I am quite disappointed. A department whose research was recently on the cover of "Science" deserves better. My hope is that the superb professors and students of Course 13 can maintain their identity in the new department and Ocean Engineering will remain a strong part of MIT.



*Davis, at the start of a mountain bike racing competition (Photos courtesy of Joshua Davis).*



*Davis is sometimes cited by friends to look like the character Mike TV from Willy Wonka & the Chocolate Factory.*

## Student Spotlight: Heather Brundage '06

### *Life At Sea, Far From MIT*

Now that 2004 is over, I can't help but look back and wonder if it ever really happened. I was lucky enough to have so many sea-faring adventures; I almost can't believe it was real.

To start off with, I spent spring semester participating in Sea Education Association's (SEA) semester at sea. Though the first 6 weeks took place on land at their Woods Hole campus, the second six weeks was spent on-board the SSV *Robert C. Seamans*, a 134' steel brigantine sail boat. We left Honolulu and headed towards the equator, relying solely on our abilities to pilot the coastal waters of Hawaii and our skills with a sextant and celestial navigation. After we were all christened shellbacks, we headed back north, stopping by the island paradise called Palmyra, a small atoll owned by the Nature Conservatory. Popularized in the 1970-ies after a couple was murdered and their sail boat stolen, it boasts some of the most pristine reefs in the world. With an average population of less than ten people, a dog, and an army of coconut crabs it isn't hard to see why.

During our voyage, we were split into watches and became completely responsible for the operation of the ship and the almost 40 souls aboard. Whether standing bow watch during mid-watch (the 11pm-3am shift), being steward for the day, or deploying the CTD carousel, each member of the crew trusted his life and the success of the trip to working together. Each student worked on their own oceanographic research project, with everyone helping to deploy the host of instruments and collect data. Though the program was aimed more at science than engineering, I was able to create a project that peaked my interest – studying the effect of sail boat heel on the accuracy of a hull-mounted ADCP (Acoustic Doppler Current Profiler).



**Heather at the helm of SEA's newest ship: *Seamans*, Spring 2004.**

When we returned to Hawaii, I didn't want to leave. My small bunk had become home, the crew my family. Chores I may have scoffed at while on land were a matter of pride at sea, and I hardly noticed how cut off I was from the world since there were so many things to keep my busy on the ship. Though I missed the excitement, stress and cold weather that is spring term at MIT and get to make up for it now, I wouldn't have it any other way.

Little did I know, when I finally said goodbye to the *Seamans*, that another adventure awaited me. Over the summer I was able to join the science crew of the *Nathaniel B. Palmer* on its transit from Cape Town, South Africa to Auckland, New Zealand. The *Palmer* is a 308' long ice-breaking research vessel and works for the US Antarctic program. Compared to the *Seamans*, the *Palmer* is a cruise boat – I had my own cabin, with private bathroom/shower, TV/VCR, and CD player; there was a TV lounge with a formidable VHS collection; washing machines/driers; and 4 meals a day, plus never ending sweets and snacks. I had it pretty easy as part of the science crew, standing watch during two 2.5-hour shifts a day. Watch consisted of editing multi-beam sonar data and watching the wall of screens to make sure all instruments were operating properly. The other four scientists were mostly students from Cal Tech, whose professor, Dr. Joann Stock (MIT SB, MS, and PhD in course 12), has a partnership with the US Antarctic program to do science of opportunity research on the ship's transit cruises. During the cruise, we collected marine geophysical data using multi-beam sonar and a towed magnetometer. Dr. Stock was especially interested in sea-floor spreading at undersea ridges.

Sadly, when the cruise ended in Auckland I had to rush back to MIT for fall term and was not able to explore New Zealand as much as I would have liked. I am thankful for the opportunities I had, though. I'm glad I was able to gain experience working on different types of research vessels, as I hope to spend a lot more time at sea. I've come to appreciate the community that forms on-board vessels, the sun rising and setting on a horizon of water, and the constant rolling and pitching that can make normal, day to day tasks a challenge.

Now that I know about the US Antarctic program, I'd love to work as a technician on the *Palmer* and head down to 'the ice' for a season, or work on other research vessels. Though right now I don't have any plans to head back out to sea, I'm always looking for adventures. My next will be working for Exxon this summer. Who knows? Maybe I'll get a chance to visit an oil platform.



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**Looking Ahead...**

Date	What's going on?
Feb. 7	Spring Term Begins
Feb. 17	SNAME Paper Night, MIT Faculty Club
Feb. 17	UROP Direct Funding Deadline
Feb. 22	Monday Schedule of Classes
Feb. 23	Women of OE Luncheon
March 10	MTS NE Meeting, Boston
March 17	UROP Deadline (Supervisor sponsored, Credit, Volunteer)

**Highlights in the next Making Waves...**

- MIT Women's Initiative
- SNAME Paper Night
- OE Women's Luncheon
- And as always... spotlights on Ocean Engineering professors, students, and alums!

**Look for the next Making Waves in April!**

