



The Anchor

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Lidar at CCOM/JHC: Shedding New Light on Ocean and Coastal Mapping

By David Sims

Light detection and ranging, or lidar, is an optical remote sensing technology that uses pulses of light from a laser to measure position, elevation, and other characteristics of illuminated surfaces.

Airborne lidar systems use thousands to hundreds of thousands of these pulses per second from a laser mounted in an airplane to scan the landscape or water body. Sensors detect the travel time of reflected energy from each laser pulse, and that information is used with the speed of light to calculate the distance from the aircraft to targets below.

These range measurements are combined with position and orientation data to obtain accurate, 3D spatial coordinates (e.g., latitudes, longitudes, and heights) of points on Earth's surface, as well as elevated features, such as forest canopy and buildings. In the case of bathymetric lidar, where the distance of the water surface to the seafloor is measured, green laser beams are employed for ranging through the water column in order to map the bathymetry of shallow coastal waters.

Lidar is proving to be increasingly beneficial in a variety of ocean and coastal mapping applications, and CCOM/JHC researchers—most prominently research assistant professor Shachak Pe'eri and affiliate professor Chris Parrish of NOAA—are active in both the application and hardware development side of the technology.

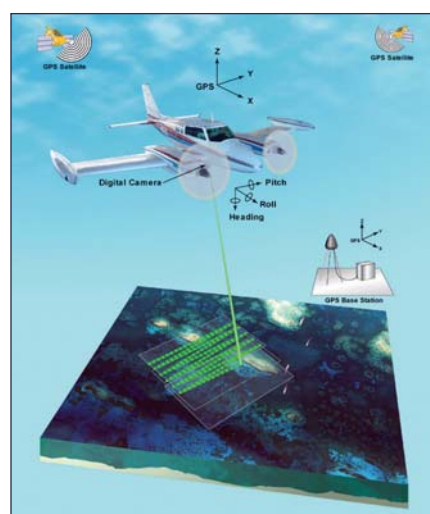
Pe'eri's lidar-based interests are in optical remote sensing in the littoral (nearshore) zone with a focus on experimental and theoretical studies of lidar—including airborne lidar bathymetry, topographic lidar, and terrestrial laser scanning.

"My research goal is to understand the capabilities, limitations, and issues with optical remote sensing technology and how it can be utilized to its fullest potential," says Pe'eri.

As part of this goal, and in addition to fieldwork using lidar systems, Pe'eri is conducting lidar hardware tests using a lidar simulator he and students constructed in the basement of the Chase Ocean Engineering Laboratory.



Dr. Shachak Pe'eri poses with part of his lidar simulator.



At CCOM/JHC, Parrish, who maintains his position as lead physical scientist in the Remote Sensing Division of NOAA's National Geodetic Survey, is working to take remote sensing data collected in support of NOAA programs—in particular, navigation services, or nautical charting—and using that to meet the needs of other NOAA projects and programs, including coastal management.

Says Parrish, "One of my current research focus areas is working with coastal lidar data collected for shoreline mapping and calibrating it so you can produce benthic habitat maps that support the NOAA groups doing coral reef mapping and monitoring, coastal zone management, and ocean planning. This multi-use aspect of the lidar data ties into the central theme of NOAA's Integrated Ocean and Coastal Mapping initiative."

This lidar radiometric calibration process, Parrish points out, is very similar to the calibration of acoustic backscatter data from multibeam sonar systems, which also creates additional products that support a wider range of customers. "In other words, not just the people producing nautical charts but those doing environmental studies, for example."

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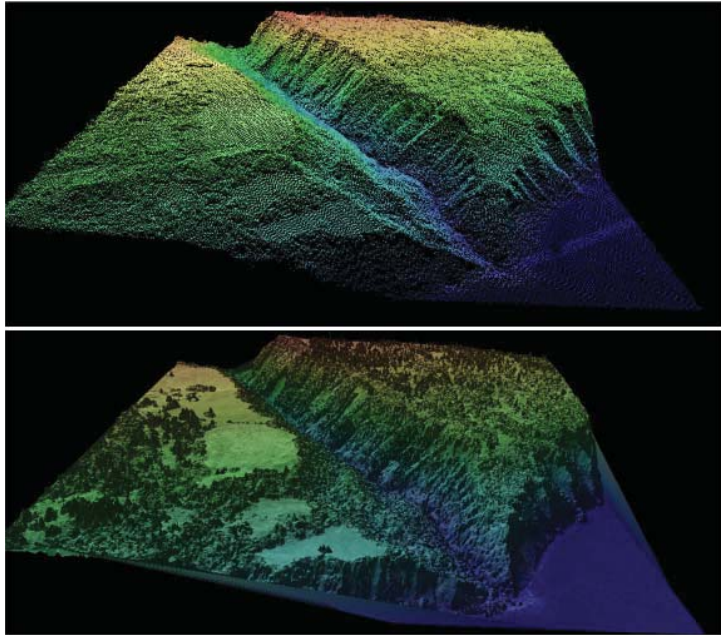
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Lidar at CCOM/JHC (continued)

Airborne Lidar Bathymetry

Airborne lidar bathymetry, or ALB, is the most common lidar application for coastal mapping and underwater, nearshore surveying. According to Pe'eri, ALB is an important sensor from NOAA's perspective with respect to ship navigation because it



A lidar point cloud (top) and derived digital surface model (DSM) (bottom) in Kachemak Bay, Alaska.

allows for a rapid collection of the bathymetry over large areas of shallow water. Shallow water areas are typically hazardous for ship navigation; thus, an aerial survey is also a safer means of mapping these areas.

For ALB sensors (and the same can be said for hyperspectral remote sensing), the task is to quantify the value of illumination via the energy return to the sensor. Notes Pe'eri, "This provides control on the data so that it can be analyzed and aid NOAA and other government organizations we collaborate with to utilize the data for verifications, such as shoreline mapping and habitat analysis."

Pe'eri's hardware-based lidar research using a lidar simulator is, in part, aimed at unraveling some open questions about the ALB system.

"As we try to understand the value of ALB-derived data for a number of hydrographic applications, it is increasingly apparent that there are many uncertainties associated with the system that are not well understood," Pe'eri says. "And most critical among these are the questions of what happens to an ALB laser beam once it strikes the sea and enters the water column."

The lidar simulator provides a tool that can be set in laboratory conditions or in the field (from a pier or a vessel) to measure the ray-path geometry of a laser pulse through the water column, and to conduct beam diagnostics of the laser pulse at different water depths.

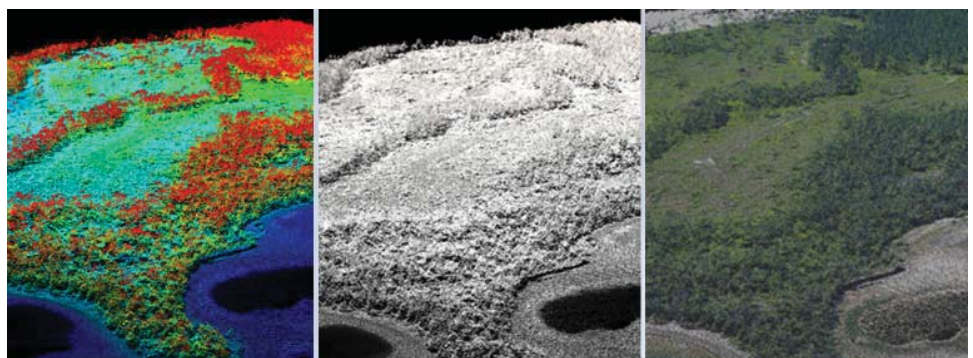
"Understanding the hardware allows you to compare between different sensors. My goal is not to mimic one type of lidar system but a family of lidar sensors, in this case bathymetric lidar, and see how they operate," Pe'eri says. "Because lidar is laser, you can't change too much about that, you can add more or less filters and other optic elements, but the concept of geometrical, spectral behavior will be similar—that's beyond the hardware, that's physics controlled by an environment."

Getting more bang from the lidar buck

Parrish, too, is working towards improving lidar technology, but not on the hardware side. Rather, he's developing new lidar waveform processing techniques in an effort to do a better job of mapping coastal vegetation and resolving very shallow water depths. Of the latter, Parrish notes, "You really need good data spanning the land-water interface because it's important for shoreline mapping and for a lot of other applications, like sea level rise analysis, storm surge inundation modeling, that type of thing."

In a nutshell, the end result of lidar waveform processing is more detailed information about vertical structure and surface characteristics from the received lidar signal—being able, for example, to distinguish between the tops of marsh grasses, the intermediate vegetation layers, and the ground surface below.

"With bathymetric lidar, where you're ranging through the water column, it could be that the things you want to distinguish between are the returns from the water surface and from the seafloor," says Parrish. "As the water gets shallow, those two surfaces get closer and closer together. The idea is that through advanced waveform processing techniques, you can individually resolve those surfaces, even as they start to blur together in the received signal. On the dry side of the land-water interface,"



A coastal lidar point cloud color-coded by elevation (left), intensity (middle), and RGB (red, green, blue) pixel values from concurrently-collected aerial imagery (right).

Lidar at CCOM/JHC (continued)

Parrish adds, “we want to be able to resolve different coastal vegetation layers and, on the wet side, we want to resolve the sea surface and seafloor in the received signal.”

Parrish notes that a new generation of a topographic bathymetric lidar system called the Experimental Advanced Airborne Research Lidar, or EAARL for short, holds promise for furthering this “wet side/dry side” resolution from a swath of a lidar. Currently, NOAA has an active partnership with the United States Geological Survey that is leading an effort to build the new EAARL system known as the EAARL-B. As *The Anchor* goes to press, the EAARL-B is undergoing its first test flights.

Says Parrish, “The idea is we’d like to be able to fly a coastal area once and get good, continuous, high resolution data across the entire intertidal zone and across the land-water interface—both the wet side and the dry side in a single swath.”

This will also be a boon to NOAA in that it will fill in the data gap that exists in very shallow water where the NOAA Office of Coast Survey simply stops surveying at the Navigable Area Limit Line. Known as the NALL line for short, it’s a zone defined at four meters depth to protect survey launches from running aground.

“So you’ve got this area of no data that exists between the shoreline and the NALL line, and while it might not be significant for marine navigation,” Parrish says, “it’s very significant with respect to doing environmental studies—habitat analysis, sea level rise studies, storm surge, etcetera. People need that combined topography and bathymetry and we can use the lidar to fill in that area.” ⚓



Meet Dr. Rochelle Wigley

A recent addition to CCOM, Roxy is the Project Director for the new Indian Ocean Project. We asked her a few questions to help us get to know her better.

Tell us about your background and research interests.

I have a mixed hard rock/soft rock background with a Master’s degree in Igneous Geochemistry (focusing on dolerite dyke swarms) and a Ph.D. in sedimentology/sediment chemistry, where I integrated geochemistry and geochronology into marine

sequence stratigraphic studies of a condensed sediment record in order to improve the understanding of continental shelf evolution along the western margin of southern Africa. Phosphorites and glauconite have remained a research interest where these marine authigenic minerals are increasingly the focus of offshore mineral exploration programs. Following my year at CCOM as a GEBCO scholar, I concentrated on understanding the needs and requirements of all end-users within the South African marine sectors as we developed a plan for a national offshore mapping program. This has all led towards an interest in deep ocean bathymetry and its uses. I am now starting work on the development of a updated bathymetric grid for the Indian Ocean and will also be helping Dave Monahan out with the GEBCO program wherever I can.

Where are you originally from?

I come from East London, one of the major cities of the Eastern Cape along the Indian Ocean coast of South Africa, with beautiful beaches, lots of estuaries, mountains, indigenous forests, plenty of dolerite and about 30% unemployment. I then spent about 20 years in Cape Town—so a tough life really!

What did you want to be when you grew up?

A fireman—although there might have been some gender issues there that I did not quite understand.

What is your favorite holiday and why?

Any road trip will do—although I think my partiality to South Africa may be hard to beat since the both the geology and natural beauty are outstanding.

Favorite vacation spot?

Difficult to pick any ONE spot—but possibly Dublin as I get to hang out with my brother (with free accommodation), enjoy the weather (I do), and can get Guinness on tap at every single pub (and there are many of those). Also, there are many other touristy things to do too.

A place in the world you’ve never visited but would like to see some day...

Iceland—I think, as a geologist, I should stand with a metaphorical foot on either side of the Mid-Atlantic Ridge just once.

Favorite ice cream flavor?

At the moment—any Ben and Jerry’s will do as I hadn’t had any for a while (although that has changed recently I have to admit), but think I might be leaning towards “Late Night Snack” as my preferred indulgence.

Favorite movie or TV show when you were a kid?

There was no TV in South Africa when I was a kid (does that mean I am old or TV came to South Africa late?) and then I wasn’t allowed to watch much anyway—my parents made my brother and me play outside or read books or talk to each other!! Horrors! ⚓

Meet Dr. Seojeong Lee

CCOM has the privilege of hosting Visiting Scholars from around the world. Seojeong left South Korea to come to CCOM in February 2012 and will be here until January 2013. We asked her some questions to help us get to know her better.



Tell us about your background and research interests.

In recent years, I have been trying to apply software engineering topics to maritime e-navigation. In 2005, when I moved to Korea Maritime University, new trials for safe navigation in IMO (International Maritime Organization) had just begun. Based on information technology, harmonized and seamless service was required between vessels, vessel to shore, and shore

to shore. IMO defined that concept as 'e-navigation' and was about to develop how to implement it. From a software engineering point of view, I was interested in maritime domain and have kept on that track with lecturing in software subjects, such as programming languages and software engineering.

Before getting involved in maritime field, from 1998 to 2003, I participated in several software projects ordered by the Samsung Data Service company or research institutes, being affiliated with a university in Seoul after my Ph.D. from Sookmyung Womens' University. The thesis is about software development methodology and software analysis/design technique. In 2003, I had a good chance to enlarge my specialty, achieving software quality assessment related certificates at Carnegie Mellon University. This program was conducted by an agreement between the Korean Ministry of IT and CMU. (It was similar to the GEBCO program in supporting tuition, accommodations, and so on.)

With this software engineering background, I have conducted interdisciplinary projects and authored articles in recent years related to defining software architecture, refactoring source code, displaying vessel AIS (Automatic Identification System) on Google Maps, and figuring out software issues to integrate e-navigation equipment.

Participating in the IMO NAV sub-committee and IALA (International Association Lighthouse Authorities) e-NAV committee has become a major part of my social activities. I joined Dr. Lee Alexander at a working group of IALA e-NAV in 2009, which is for e-navigation portrayal. Finding that software quality related considerations could be needed in this working group, he and I have been collaborating on several e-navigation issues as well.

I am very pleased to have a chance to stay in New Hampshire and drive along Route 1A. Forest, beaches, clean air and warm hearted people are what I and my family are thoroughly enjoying.

Where are you originally from?

Seoul, South Korea.

What did you want to be when you grew up?

I wanted to be a biologist to work with a microscope, or a scientist to have invisibility cloaks. Even though my awesome plans to play with a microscope and to travel everywhere in the world for free would not come true, I love the memory itself.

What is your favorite holiday and why?

I like every holiday because I can have good time with my family.

Favorite vacation spot?

I used to visit several cities in Asia with my family during vacation. This year, it might be several cities in America.

A place in the world you've never visited but would like to see some day...

Taking photos with the Himalayas in the background and a national safari in Kenya have been on my bucket list.

Favorite ice cream flavor?

Cherry, but I would like to try something new.

Favorite movie or TV show when you were a kid?

As a girl who loved SciFi novels, the *Six Million Dollar Man*, *The Bionic Woman* and *Wonder Woman* were my favorite TV series. ⚓



Thanks to Abby, Mau, Linda, and Roxy for filling the planters in the courtyard with flowers and tomato plants, and for keeping up with the sometimes arduous task of daily watering. It looks like a bumper crop!

Meet Dr. Gideon Tibor

A Visiting Scholar from Israel, Gideon arrived at CCOM in May 2012 and will be here until November 2012. We asked him some questions to help us get to know him better.



Tell us about your background and research interests.

After graduating from high school in Haifa, I joined the Naval Academy and served in the Israeli Navy for about six years. Unlike the US Navy where you “join the navy and see the world,” we spent most of our time in the Eastern Mediterranean Sea. During that time, the most memorable cruise which I can talk about without ending up in prison was after the peace accord with Egypt was signed in 1979 and two

Israeli missile boats sailed for an official visit in Alexandria (the major naval port of Egypt) after so many years of war. I don't think such a visit is possible today.

I received my M.S. and Ph.D. in marine geophysics from Tel-Aviv University. Both my theses dealt with phenomena that are related to the Messinian Event (see explanation below). After graduation, I understood that waiting for a position in the academy required early retirement (or early death) of most of the faculty, so I decided to turn to the private sector. I joined a young company that worked in remote sensing for environmental studies, agriculture, and mineral exploration in many projects around the world. This was the place where I learned the secrets of remote sensing and understood its limitations.

In the year 2000, I joined the Israel Oceanographic & Limnological Research Institute as a researcher in the department of marine geology and coastal processes. My general research interests are the development and use of high resolution marine geophysics and innovative remote sensing methods in the study of phenomena that influence the marine environment and natural resources. Specific fields of interest are:

The Messinian Event – during the Messinian (~5my ago), the Mediterranean dried up and thick salt layers were deposited offshore. These salt layers were and still are one of the main causes that shape the evolution of the Levant continental margin. Many geomorphologic processes that occur today, such as slumping, are related to the movement of these salt layers.

Ocean color remote sensing – developing an innovative way to monitor water quality in near real time. The first step was the development of SISCAL (www.siscal.net) which gives a more regional view of water quality using satellite images. We are currently developing a stationary solution for real time mapping of water quality near marine facilities. In the near future, we plan to utilize AUVs for water quality mapping.

Holocene evolution of the Sea of Galilee – since 2002 I have been studying the Holocene evolution of the Sea of Galilee using multi-disciplinary research methods that involve high resolution geophysical, geochemical and geological techniques.

Holocene evolution of the Gulf of Eilat/Aqaba – this is a MERC-USAID multi-disciplinary research program that started in 2006 and continues today. It aims to map the active faults submerged in the northern gulf that lie immediately offshore, and the faults that lie onshore beneath the cities of Aqaba and Eilat, in order to adequately characterize the seismic potential and to understand the dynamic behavior of the Dead Sea Transform fault system and its earthquake cycle.

In 2008 I joined the new Leon H. Charney School of Marine Sciences in the University of Haifa as part-time staff where I am responsible for introducing the students to work at sea by means of a multi-disciplinary training cruise.

Where are you originally from?

I was born in Haifa, a lovely city that is built on the Carmel Mountains and faces the Eastern Mediterranean sea from the southwest to the northeast. Until recent years, it was the main port city in Israel with a lot of activities that are related to the sea. As a kid I remember that all our free time, and also some school hours, was spent in the deserted beaches of Haifa windsurfing, diving, swimming and learning to appreciate the strength of the sea. Probably this was the first time when salt water entered my veins and led me to serve in the Navy and eventually study marine geophysics.

What did you want to be when you grew up?

When I was a kid we did not have TV in Israel so I spent a lot of time reading books in the public library. I remember that Jules Verne's books attracted me a lot so sometimes I wanted to be a treasure hunter and explorer and other times an astronaut on the way to the moon.

Favorite holiday and why?

I like holidays! Whether they are the ones that you decide to take because you understand that time is not in our favor or even our Jewish ones like Rosh Hashanah (new year), Passover and even Yom Kippur when no traffic is allowed and the silence reminds me of a typical day in New Hampshire.

Favorite vacation spot?

For culture we like to spend time in Europe (e.g., Italy, France, England), for nature the Rocky Mountains in Canada and the islands of Hawaii (when I was a kid I had decided to retire in Hawaii, but there is still time to decide).


What is a place in the world you haven't visited but would like to see some day?

High on the list of places that I would like to visit is Chile which I plan to visit after my stay in CCOM ends (fall in my 1st category of holidays).

Favorite ice cream flavor?

Tiramisu! But lately I find myself calculating how many more lap swim in the pools I will need to do after eating it.

Favorite movie or TV show when you were a kid?

I don't remember, but I love going to the movies even now... 

Student Profile - Monica Wolfson

Ph.D. student Monica Wolfson was aboard the D/V CHIKYU off the coast of Japan from April 1 to May 25. She served as a sedimentologist/seismologist for the science crew of the Japan Trench Fast Drilling Project. To learn more about the project, visit www.jamstec.go.jp/chikyuu/exp343/e.

Monica, you were aboard the D/V CHIKYU for an Integrated Ocean Drilling Program (IODP) Expedition. What were you doing out there?

I participated in the Japan Trench Fast Drilling Project (JFAST). The goal of the expedition was to drill through the plate boundary fault zone at the Japan Trench, near where the March 11, 2011 Tohoku earthquake nucleated. The magnitude 9.0 earthquake did not do much damage itself, but it generated a devastating tsunami. The plate boundary fault zone near the toe of the accretionary wedge has been traditionally viewed as a frictionally-weak zone that is incapable of accumulating large stress, and consequently does not undergo large displacement during great earthquakes. Geophysical evidence suggests that the fault zone slipped roughly 50 meters in the region of the accretionary wedge near the trench. The overall objective of JFAST is to understand how such a large slip in this region is possible.



A JFAST group picture (scientists, lab technicians, and drillers) taken right after the retrieval of the final core. Monica is the second standing green overall from the left.

How does this research fit into your research here at CCOM?

My current research is focused on the morphologic controls of seismicity along oceanic transform faults. Specifically, I am interested in how the fault's earthquake behavior is affected by the physical structure of multi-segment transform faults (fault systems comprised of two or more adjacent fault segments laterally offset from each other).

The JFAST expedition is also looking at how fault structure can affect earthquake behavior, it is just focused on a different type of plate boundary fault.

What is your favorite thing about being at sea?

When you are in the middle of the sea, far from the light and smog pollution of land, you see some spectacular sunsets and sunrises. I also managed to snag some amazing pictures of the eclipse on May 21.



How about your least favorite thing?

After a while you start to feel a little cooped up. You cannot just go for a walk around the block, or head to your favorite coffee shop for a nice espresso. It was a great two months, and I was at sea with a great group of people, but it is certainly nice to be able to eat somewhere else besides the ship's galley.

What happens now? Will you be working with any of the core samples at all? What are your academic plans over the next year?

IODP requires that all participants publish at least one peer-reviewed article using data obtained during the expedition. I will be working with a fellow expedition member, a scientist from the University of Leicester in the UK, to correlate geophysical data obtained from instruments we deployed in the borehole with direct observations from the core we collected. During the expedition I helped collect and process the data from the borehole and I was a member of the core description team that conducted all the lithologic and structural analyses on the core.

Over the next year, aside from working on the IODP data, I will be wrapping up my own research here at CCOM. I hope to finish by the end of Summer 2013, so I need to keep my nose to the grindstone. ⚓



Welcome Benjamin!

Welcome to the world **Benjamin Henry Chadwick!** Benjamin was born at 2:01 in the morning on June 11, 2012. He weighed 8 lbs. 9 oz. and measured 21 inches at birth.

Congratulations to dad Jordan, mom Mary, and big sister Molly!

Outreach Updates

SeaPerch ROV Competition

The first annual UNH SeaPerch Competition was held on Saturday, May 12th, 2012 in the Swasey Pool in the UNH Field House. Eight teams from four local schools competed in this ROV challenge, using ROVs that they built themselves.

There were two events in the challenge, an obstacle course and a salvage operation. In the timed obstacle course event, teams had to maneuver their ROVs through a series of underwater hoops, and then trace their steps back. In the salvage operation, teams had to remove "debris" in the form of weighted buckets from the bottom of the pool and then retrieve them.

Thank you to the CCOM folks who helped out and congratulations to everyone who participated!



Know the Coast Day
 Student Open House
 Chase Ocean Engineering Laboratory
 University of New Hampshire
 Durham, NH
SAVE THE DATE!
 Friday, October 19, 2012

SAVE THE DATE for Know the Coast Day 2012

Save the Date! The 2012 "Know the Coast Day" will be held on both Friday, October 19th and Saturday, October 20th. The Friday event will be directed at schools and will be held only at the Chase Ocean Engineering Lab.

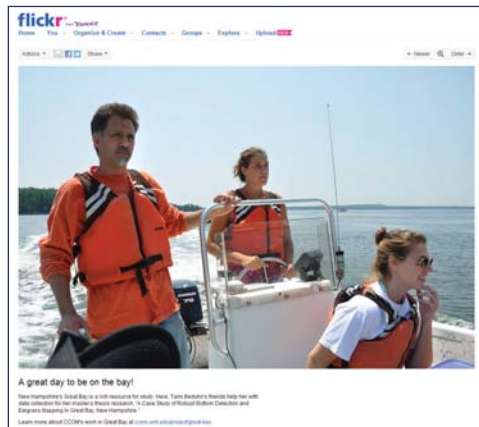
Schools have already started to register for the event so we're hoping that everyone can help in some way, either by hosting a demonstration or exhibit, or by volunteering with one of our activities.

Thanks in advance for your support of this worthwhile event. Be on the lookout for more information over the coming months.

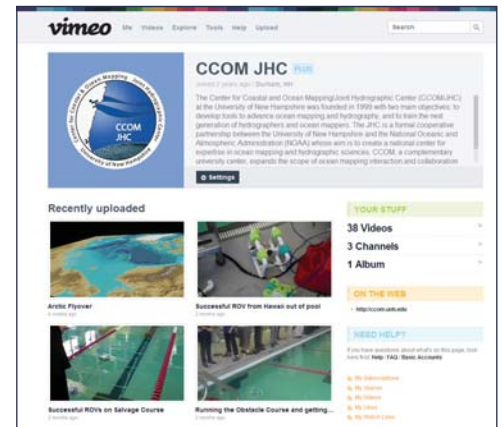
Social Media



Follow us on Facebook
facebook.com/CCOMJHC



Check us out on Flickr
flickr.com/photos/ccom_jhc



Catch us on Vimeo
vimeo.com/ccomjhc

IT Updates

This past February, the Center purchased a new Storage Area Network (SAN) to augment/replace the current network storage. The newly acquired NetApp 3420 clustered solution will host

nearly 100TB of storage space, providing enhanced data security, performance, and ease of access. The new hardware's installation was completed in March. With the deployment of CCOM's new backup software, CommVault Simpana, in May, the IT Group plans to begin hosting data in the third quarter of 2012.

Additionally, plans to migrate existing datasets from legacy storage systems are in place, and it is expected that these datasets will be migrated to the new hardware by the end of the year. For more information on network data storage, contact a member of the IT staff, or email helpdesk@ccom.unh.edu.

On the night of May 18th, the IT group replaced the network switch in the primary server room with a new network switch from Dell/Force10. The new switch provides 192 gigabit Ethernet ports for workstations in the South Wing, 48 of which are Power over Ethernet ports, as well as 24 ten-gigabit Ethernet ports, to be used for bandwidth intensive technologies such as virtualization and the new NetApp Storage Area Network.

Sustainability

Maureen Claussen, Chase Sustainability Steward

This past May, as rain drenched the campus and temperatures struggled to climb out of the 50s, nearly 40 UNH employees challenged themselves to commute without the convenience and climate-controlled comfort of their cars. In total, participants in UNH's first-ever Wildcat Commuter Challenge, coordinated by the Sustainability Stewards, avoided 1,050 single-occupant vehicle trips to campus by walking, cycling, taking the bus, or carpooling.

We are excited to announce that our own **Abby Pagan-Allis** was one of the top five winners at UNH, having made more than 40 commuting trips. It's worth noting that many of these rides were alongside other members of our CCOM family, so a big "well done" to all who participated.

"All the participants in this first Wildcat Commuter Challenge deserve a big pat on the back for rethinking their commutes and creating some new habits, and special congratulations go to these winners," says Jackie Furlone, program support assistant in the Sustainability Academy, which supports the Sustainability Stewards. "This was a great start to what we hope is a growing annual challenge. We'd love to see even more faculty and staff take the challenge next May."



Will Fessenden installs rack rails for the new storage area network (SAN).

High Bay Updates

Andy McLeod, King of the High Bay

Phoenix

The tow carriage rebuild is well on its way to testing level. If you have any questions about the rebuild or schedule then talk to Ken Baldwin or Pete Bachant.

High Speed Flume

The high speed flume is also nearing operational status. Martin Wosnik is your guy for that.

Administrative Notes

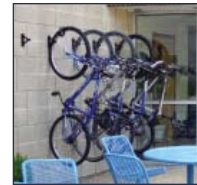
Out of Office

All students, faculty and staff should notify their supervisors if they will be out of the office. Also, please notify the admin staff by emailing admin@ccom.unh.edu. This admin email address can also be used to request visitor parking spaces and meeting room reservations.



CCOM Bikes

Briana Sullivan has generously donated a bike to be used by anyone who might need to run an errand around campus. The bike is kept in the high bay (it has a "CCOM/JHC" license plate) and has a bike lock for you to use. No sign out is required but, if you use it, please be considerate and leave the bike where you found it.



In other bike-related news, nifty new wall-mounted bike holders have been installed in the high bay and the courtyard!

New Awards at CCOM

The following grants were recently awarded.

Jonathan Beaudoin - Schmidt Ocean Institute, "Evaluations and Assessment of Acoustic Sensors Onboard R/V *Falkor*"

Semme Dijkstra - NOAA CoastSurvey Development Lab, "Hydrographic Training"

Tom Lippmann - NH Department of Environmental Services, "Bathymetric Surveying of Little Bay Estuary, NH"

Larry Mayer - General Bathymetric Chart of the Oceans (GEBCO), "GEBCO 9th Year"

Larry Mayer - University Corporation for Atmospheric Research, "Machine Services for *Okeanos Explorer*"

Larry Mayer - Office of Naval Research, "Bedform Parameterization and Object Detection from Sonar Data Application of Fingerprint Algorithms"

Student News

Departing

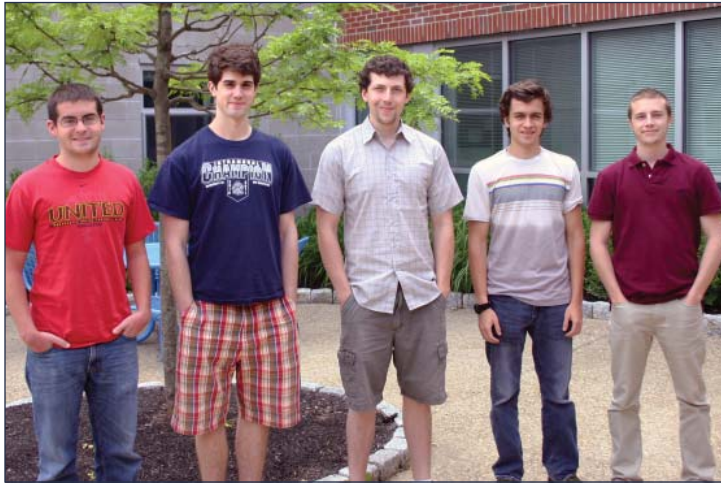
Congratulations to our Spring 2012 graduates, **David Pilar**, **Sean Denney**, and **Anna Berry**! On May 14th, David Pilar defended his Master's thesis, "Visualizing Magnitude and Direction in Flow Fields." Sean Denney defended his Master's thesis on March 30th, "A Tidal Study of Great Bay, New Hampshire." Anna Berry completed the Certificate in Ocean Mapping program.

Incoming

Four new students will begin their studies in the Fall semester. **John Heaton**, **Quan Yin**, and **Joshua Humberston** will be Masters students and **Ashley Norton** will be a doctoral student. The fall will also see the return of **Ashton Flinders**!

SURF Interns

Five interns are taking part in CCOM's first Summer Undergraduate Research Fellowship (SURF) program. The students began their internships on June 4th and will be here until August 10th.



From left: Nick Parrillo, Eric Escobar, John Heaton, David Baryudin, Kurt Murphy.

Nick Parrillo and Eric Escobar are working on lidar with **Dr. Shachak Pe'eri**. John Heaton, who will be a CCOM grad student this fall, is working with **Dr. Tom Weber** on acoustics. David Baryudin is working on methane seeps with Dr. Weber and Kurt Murphy is working on GIS with **Dr. Larry Ward**.

Nick has since accepted a position in industry. Good luck Nick!

New GEBCO Scholars

After a rigorous selection process, the Nippon Foundation/GEBCO scholars for the 2012-2013 program year have been chosen. These six individuals will arrive at CCOM in just a few short weeks!

Htike Htike, Myanmar

Htike is an Assistant Lecturer in the River and Coastal Engineering Department of Myanmar Maritime University. She earned her Ph.D. in Engineering from the Department of Engineering Mechanics, Hohai University, China.

Karolina Chorzewska, Poland

Karolina is the Communications Department Head and Officer of the Watch of the crew of the Polish Navy training vessel. She is also part of the Hydrographic Support Squadron of the Polish Navy. She is currently pursuing a Ph.D. at the University of Gdansk in Earth Sciences and Technical Sciences.

Le Sy Xinh, Vietnam

Xinh is currently a Senior Lecturer in the Maritime Navigation Safety Section, Faculty of Hydraulic Engineering at the Vietnam Maritime University. He has a Master's degree in Hydraulic Engineering from the Vietnam Maritime University and was awarded a Category B for Hydrographic Survey from JICA/JHOD, Tokyo, Japan.

Lim Siong Hui, Malaysia

Lim is a Lieutenant Commander of Royal Malaysian Navy based in the Hydrographic Department of the National Hydrographic Centre. He holds a Bachelor of Science (Nautical) from the Universiti Teknologi Malaysia in Skudai, Johor, Malaysia. He was awarded a CAT B Hydrographic Survey from Universiti Teknologi Malaysia, Skudai, Johor.

Takafumi Hashimoto, Japan

Takafumi comes to us from the Hydrographic Survey Division, Hydrographic and Oceanographic Department of the Japan Coast Guard (JHOD). Takafumi has a Master's degree in Earth Sciences from the Graduate School of Science at Kumamoto University.

Tetteh Eunice Nuerkie, Ghana

Eunice is the Data Manager for the Ghana National Oceanographic Data Center at the Ocean Data and Information Network in Africa (ODINAFRICA) in the Marine Fisheries Research Division. She has a Master's degree in Oceanography from the University of Ghana, Legon.

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We welcome comments and suggestions.