



The Anchor

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Professor Puts Science on a Sphere in New Smithsonian Hall

By Beth Potier, UNH Media Relations

When the Smithsonian Institution opened its eagerly anticipated Sant Ocean Hall at the Museum of Natural History in Washington, D.C. earlier this fall, the work of University of New Hampshire professor Colin Ware made a splash.

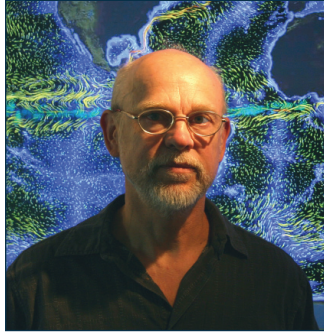
Ware, who directs the Data Visualization Research Lab at UNH's Center for Coastal and Ocean Mapping (CCOM), created the global ocean currents animation that appears on the room-sized Science on a Sphere exhibit, one of the major attractions of the Sant Ocean Hall. Ware's work helps museum visitors better understand how ocean waters flow around the planet.

"It's not really a system of currents, it's a system of processes," says Ware, adding that the visualization aims to debunk the misleading "global ocean conveyor belt" image of a ribbon of ocean currents wrapping the globe. By layering moving swirls of color atop each other, Ware's narrated animation shows the movement

of surface currents, which are driven by winds; then coherent currents like the Gulf Stream, 100 meters below the surface; then the lugubrious waters at 2500 meters, which have not seen the surface for between ten (at the Arctic) and 1800 (in the southern Pacific) years.

Ware color-codes the currents and adds "virtual dyepots" to areas such as the Antarctic circumpolar current, to further aid visitors' visualization of the complex processes of ocean currents. As colors and currents fill the globe, the effect recalls Van Gogh. "It is like painting in this fluid medium," Ware says, "which is fun to do."

Science on a Sphere, developed by the National Oceanic and Atmospheric Administration (NOAA), suspends a white sphere six feet in diameter from the ceiling onto which data can be projected. At the Sant Ocean Hall, Ware's ocean currents animation is one of four programs that highlight complex aspects of the



Professor Colin Ware, director of CCOM's Data Visualization Research Lab.

systems for ocean mapping. "My job is to push the bounds of what ocean mapping is," he says; he uses color, texture and form to turn points on a graph or lines on a map into stunning visual representations that imbue data with life and easily-grasped meaning.

Ware's Ph.D. is not in oceanography or computer science but the psychology of perception; specifically, he applies principles of human perception (how we see and perceive color, texture, images and motion) to data visualization. He's written two books that translate concepts from the modern science of perception to be easily understood by designers and ap-



Colin Ware created the global ocean currents animation for the Science on a Sphere exhibit at the Smithsonian Museum of Natural History's new Sant Ocean Hall. Photo courtesy of Chip Clark, Smithsonian Institution.

ocean. Although his four-minute animation provides only a basic introduction to ocean currents, "currents are fundamental to all sorts of life in the ocean," he says.

Ware's animation for Science on a Sphere extends his work designing three-dimensional interactive visualization

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plied to the effective display of scientific data. He has also published more than 120 scientific articles and has developed software for data visualization that is used around the world.

For his next project, Ware ascends from ocean depths to the atmosphere for a weather exhibit he's developing for the planetarium company Sky-Skan. With funding from a Granite State Technology Innovation Grant, he's created an interactive Weather Now display where viewers can interact, via a touch screen, with ground-level winds, the jet stream, and atmospheric pressure. The display will upload real-time data from the National Weather Service, giving display viewers an opportunity to interact with weather as it's happening.

For more information about Colin Ware and the Data Visualization Research Lab, go to www.ccom.unh.edu/vislab/. To learn more about Science on a Sphere and the Sant Ocean Hall at the Smithsonian Museum of Natural History, go to http://ocean.si.edu/ocean_hall/. ↴

Dr. Lee Alexander was invited to write an OpEd editorial on "E-Navigation" in the March issue of Sea Technology.

E-Navigation: Concept vs. Reality

By Dr. Lee Alexander

E-Navigation is the latest buzzword as maritime navigation transitions into the digital era. Defined by the International Maritime Organization (IMO) as "the harmonized collection, integration, exchange, presentation and analysis of maritime information on board and ashore by electronic means to enhance berth-to-berth navigation and related services for safety and security at sea and protection of the marine environment," e-Navigation is not a new system but an

operational concept. The letter "e" can be assumed to relate to "electronic" or "enhanced."

First proposed in 2005, IMO recently agreed on a draft development and implementation strategy. Three significant outcomes are envisioned. First, shipboard navigation systems will benefit from the integration of ownship sensors, supporting information, standard user interface and a comprehensive system for managing guard zones and alerts. Core elements include high-integrity electronic positioning, use of electronic navigational charts and an analysis capability to reduce human error. This should occur by actively engaging the mariner in the process of navigation while preventing distraction and overburdening. Second, the management of vessel traffic and related services from ashore will be enhanced through better provision, coordination and exchange of comprehensive data in formats that will be easily understood and utilized. Lastly, a communications infrastructure should be designed to enable authorized seamless information transfer on board ships, between ships, between ship and shore, and between shore authorities. Most would regard these as desirable outcomes.

But making it happen will not be easy. The two primary goals for e-Navigation can also be considered major challenges: the first is to ensure the availability of all components and using them effectively so as to simplify the display of crucial navigation information, and the second is to incorporate new technologies in a structured manner while ensuring that their use is compliant with existing technologies and services. A major complicating factor is that two main groups are involved, each with a different perspective: those responsible for providing necessary e-Navigation services and those who will actually use them. While IMO wants e-Navigation to be user-driven, most of

those currently involved in developing/ implementing e-Navigation are from the technology or government sector.

The potential of e-Navigation is great, but there could be some undesirable results: Integrating more components into a system often leads to increased complexity and less reliability; with an increasing amount and availability of information, the tendency will be to try and display more—not less—information; the fact that someone else wants to provide what they consider to be "useful" information does not necessarily make it so; and trying to integrate "new" technologies with existing services often causes more problems than it solves. For example, what will be the impact of e-Navigation on existing aids-to-navigation (ATON) or vessel traffic services? Will it lead to more, less or different information? Terms such as "virtual ATON" and "pseudo-automatic identification system targets" give me pause.

E-Navigation should be regarded as an evolutionary—not revolutionary—change. When change impacts tried-and-true maritime navigational systems or practices, the transition process may be a bumpy ride. On the other hand, e-Navigation could be similar to visual or instrument flight that occurred in the aviation community. If so, what would be the implications? Would mariners be required to take e-Navigation training and become e-Navigation certified? Would there be e-Navigation modes of operation whereby vessels are given preferential treatment over those that are not e-Navigation capable? If the government has crucial navigation safety-related information, will they take full responsibility to provide it in a timely, reliable manner in a format that can be used with existing shipboard navigation systems?

I am all for the e-Navigation concept, but I hope that the outcome leads to improvement. In the final analysis, any system is only as good as who is using it and what it is being used for. Ideally, this will occur with e-Navigation. ↴



New CCOM Projects

Dr. Tom Lippmann has been awarded an ONR grant titled, "Africa Partnership Station: Video Imaging Workshop." The overall goals of the program are to assist emerging West African countries in obtaining knowledge of and skills working in shallow coastal environments, and creating a partnership where education and capacity building exercises are implemented in the host African countries. Tom's research will build on ONR-sponsored activities conducted in Ghana in 2008, including an initial nearshore processes workshop. The 10-day video imaging workshop, a collaborative effort with the University of Ghana, will include both hands-on classroom instruction and field work and analysis involving deployment of a digital video system capable of long-term data collection.

Dr. Tom Weber has been awarded an ONR grant titled "The Effect of Clustered Scatterers on Volume Reverberation." Reverberation from scatterers of sound (i.e., schools of fish, bubbles created by oceanic breaking waves) can mask targets of interest for active sonar systems, significantly changing the acoustic field characteristics. Accurate predictions of reverberation serve the community of scientists and engineers tasked with developing active sonar systems, increasing

their ability to design hardware, develop signal processing algorithms, estimate system performance, and design realistic sonar simulations. ⚓

Faculty News

Research faculty member **Lee Alexander** was in Germany and France in early March, attending a series of international standards meetings. They included the International Association of Lighthouse Authorities (IALA) e-Navigation Committee meeting in Paris. Lee chairs the Maritime Information Systems Task Group that is dealing with harmonizing data and display standards for shore-based and shipborne maritime information systems.

Jim Irish, Ocean Engineering Research Professor and CCOM affiliate, was recently appointed the Chairman of the Marine Technology Society's Instrumentation Committee.

Research faculty member **Kurt Schwehr** presented "Google's Spatial Tools in the Marine Environment—Decision Support" at the Fall AGU meeting in San Francisco in December. The talk was recorded as part of the Google Tech Talks program and can be viewed at www.youtube.com/watch?v=Szw2mkqicos. ⚓

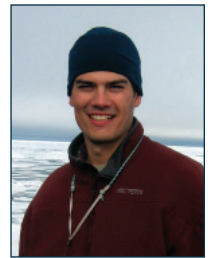
June through October 2008, in the position of software engineer.

Ed Sweeney's new position is with the Desktop Study Group at Tyco Telecommunications. Ed plans routes for fiber optic cable systems that lie at the bottom of the ocean and allow internet connections between countries. He uses seafloor maps to determine the least hazardous route, and what type of cable to use. He is currently working on plans for a cable system that will go from two locations in Haiti (Cape Haitien and Port-de-Paix) to Matthew Town in the Bahamas.

Nathan Wardwell

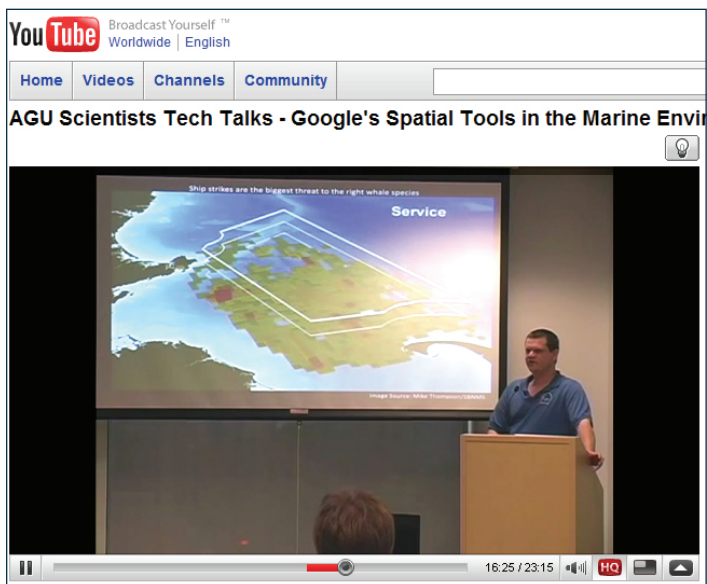
began working with JOA Surveys, LLC in the beginning of December 2008.

Since then, he has worked on a proposal for providing tide support in Unimak Pass, in the Aleutians near Dutch Harbor. He was recently in Virginia removing and performing maintenance on some of JOA Surveys' tide gauges that are installed on the Rappahannock and James Rivers, in support of a National Geodetic Survey shoreline mapping project. He also visited NOAA's Office of Coast Survey in Silver Spring and had the opportunity to give a short presentation about the work that JOA Surveys and Terrasond have been doing in Cook Inlet, where they have been working on PPK surveying and GPS tides. Nathan hopes to co-present their work at the US HYDRO conference in 2009. His company was contracted by CO-OPS to install a bottom mounted pressure sensor offshore of Barrow, Alaska, and is also involved with surveying a gas pipeline in Alaska.



Nathan Wardwell.

Nathan reported that he recently had the pleasure of having dinner with Capt. Andy Armstrong in Anchorage. Nathan also shared the news that he will be getting married on July 4th in Homer, Alaska and that he and his fiancé are in the process of purchasing their first house. ⚓



Kurt Schwehr on YouTube.

CCOM Alumni News

Fan Gu has accepted a software engineer position with Cisco Systems in North Carolina. After finishing up at CCOM/JHC in 2006, she received another Masters degree in Electrical and Computer Engineering with a concentration in Complex Systems from Cornell University. She was with Teradyne in Massachusetts from



Our newest staff member, Trey Sullivan, gets ready for another meeting.

Congratulations!

Marc Moser successfully defended his thesis "Bathymetric Uncertainty Model for the L-3 Klein 5410 Sidescan Sonar" on February 13th. He is now serving as Executive Officer on the NOAA ship *Rainier*. We wish him the best in his future endeavors.

On May 8th, **Abby Pagan-Allis** will be recognized for her ten years of service at UNH during the Staff Recognition Program in the Granite State room of the MUB. Abby began her career at UNH in the Office of Public Programs and Events, and joined CCOM/JHC in 2001.

Matt Plumlee, CCOM Research Assistant, and his wife Melissa are expecting their first child in May. ⚓

Administrative Notes

Responsible Conduct of Research Training Modules

Did you know that the UNH Office of Sponsored Research, in partnership with the Instructional Development Center, offers a web-based study guide for Responsible Conduct of Research? Topics include the following: Use of human subjects, use of hazardous materials, peer review, authorship and publication, conflicts of interest and commitment, collaborative research, and data management. The training modules can be accessed at <http://www.unh.edu/rcr>.

Student Time Off

If you will be taking any time off during the summer, i.e., working less than 40

hours per week and not making up that time, please seek approval from your advisor by May 1st.

Tax-exempt Auto Rentals for USNH Business Purposes

The NH Department of Revenue Administration has recently determined that UNH is exempt from paying the Meals and Rentals tax when renting a vehicle in NH. Our contracted vendors (Enterprise, Merchants, and U-Save) have been notified and have stopped charging the tax for vehicle rentals. The exemption applies only to vehicles rented for USNH business purposes. If you notice a tax charge on future rental agreements, you are advised to work directly with the rental company to have the charge removed. Note: Rentals paid for by an employee and later reimbursed are not tax exempt.

Day Trip Meal Reimbursements

We have received clarification from Business Services about the day trip per diem policy. If you are on non-overnight travel you can claim a maximum of \$10.00 per day for meals (not \$10.00 per meal). You cannot claim the per diem rate. However, if part of your travel includes a business meeting at a restaurant, you can submit your restaurant receipt, excluding alcohol, for reimbursement. Please include the names of the persons attending the meeting and the business purpose. If you have any questions, please see Linda Prescott.

Purchasing and Travel

When filling out a purchase or travel pre-authorization, please be as specific as possible regarding the business purpose. The more specific you can be, the less likely it will be that Business Services will need to contact us for clarification. If you are attending a conference, please print a page from the conference website showing the conference purpose and/or topics. Please go to the travel section of the CCOM wiki for more information about CCOM/UNH purchasing and travel policies and procedures.

Payroll – Direct Deposit

Did you know that you can have a fixed amount deducted from your pay check

and deposited into a separate bank account? The net balance will continue to go into the account that you currently use. See Linda Prescott for a Fixed Amount Direct Deposit form.

Grants.gov

The Grants.gov system used to submit proposals to federal funding agencies is experiencing problems that threaten the timely submission of grant applications. These problems appear to relate to the Grant.gov server's inability to effectively process the large number of proposal submissions being submitted at the same time. Issues related to the conversion to Adobe Acrobat proposal preparation software are also creating difficulties. In some cases proposals are not making it to the target agency in time to be accepted and reviewed. Please submit proposals to OSR at least five days prior in case there are delays with the submission process.

CCOM News Items Sought

If you have CCOM news to share for *The Anchor* newsletter, please submit it to: CCOMNews@ccom.unh.edu. We'd like to hear about your latest research projects, conferences you've attended, papers that you've presented, awards you've received, etc. For research-related news, please include:

1. What inspired this research to be done? (Does it solve a problem?)
2. What does it contribute to a specific research project?
3. Why is it important? ⚓



Aerial view of Chase with the new addition. Photo courtesy of Rob Roseen, UNH Stormwater Center.