UNOLS Early Career Investigator Chief Scientist Training Program

Clare Reimers

Report to FIC

June 5, 2012

Program Goals

- teach early career marine scientists how to effectively plan for, acquire, utilize and report on time at sea for multi-disciplinary research and education
- demystify the process of ship operations and fulfill the intent of UNOLS to improve access to existing and future facilities
- offer new investigators opportunities to test compelling research ideas, work collaboratively and acquire samples critical for developing future oceanographic field programs

NSF Support

Two NSF OCE Ship Operations Program Grants

Title	RAPID: Training Chief Scientists for the Ocean Research of Tomorrow	EAGER: Training Chief Scientists for the Ocean Research of Tomorrow
PI	Clare Reimers, OSU	Clare Reimers, OSU
Duration	Mar 15, 2011 - Feb 29, 2012	Mar 1, 2012 - Feb 28, 2014
Total Support	$99,971	$151,626
Ship Support	20 days *R/V Wecoma* 2011 (W1106A, W1109C)	10 days *R/V New Horizon* 2012 10 days *R/V Endeavor* 2013
Participant #	28	28
Science Mentors	Patricia Wheeler (OSU) Maureen Conte (BIOS)	David Checkley (SIO) David Ullman (URI)

2011 Participants

Gender

16 female

12 male

Positions

1 Assist. Director of Science

1 Assoc. Prof.

10 Assist. Prof.

1 Res. Assoc.

7 Post-docs

8 Graduate Students

Disciplines

Chemical Oceanography

Biological Oceanography

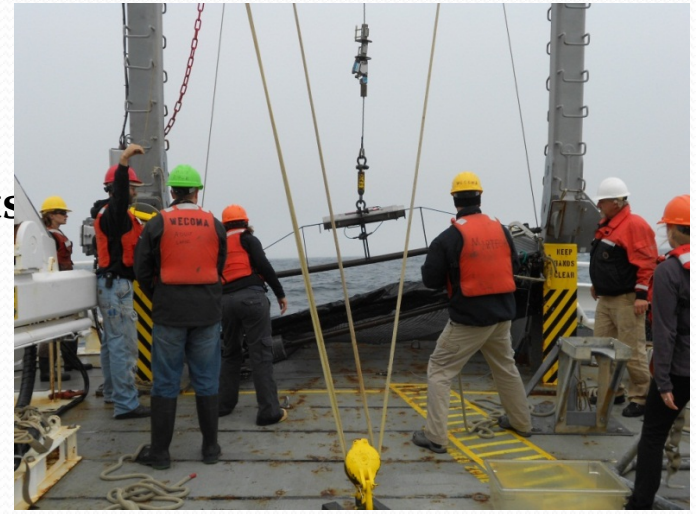
Atmospheric Chemistry

Marine Geology and Geophysics

Physical Oceanography

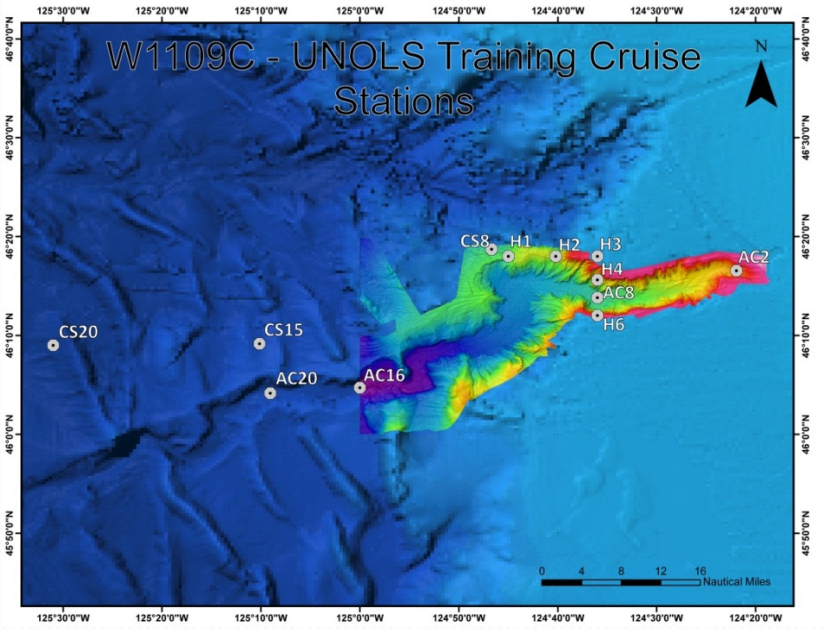
Ocean Engineering

Science operations and ship science systems utilized



<u>Cruise 1</u>: 14 stations along 4 cross margin transects
CTD/Rosette casts (38)
RHIB ops
Plankton tows
Damped gravity corer
Surface flow through system and surface pumping
Meteorological data-atmospheric sampling
ADCP

<u>Cruise 2</u>: 12 stations around Astoria Canyon
CTD/Rosette casts
ADCP
Large and Small Tucker trawls
Box, gravity and multi-corer sampling
Surface flow through system
12 and 4 kHz echo sounder



2011 Participant-Follow up

Voluntary Reporting:

William Browne (U. Miami) - manuscript submitted to *Molecular Phylogenetics and Evolution*
Amy Maas (WHOI)- taking part in *New Horizon* cruise out of Newport in August asked for logistics assistance
Heather Beem (MIT) – poster for departmental display and conference
Zoltan Szuts (Max Planck) - co-chief on the Clivar repeat hydrography cruise A22 (66W) in the North Atlantic (Mar 24 - Apr 17, 2012) on the R/V Atlantis, chief scientist Ruth Curry (WHOI)
Chandranath Basak (U. Florida) – moved to Germany for 2 year post-doc, sent data report on Nd isotope measurements
Dan Thornton (TAMU) – poster at Ocean Sciences, manuscript in preparation
Alyson Santoro (UMCES) – applied for shiptime for first time February 2012 NSF submission

UNOLS Outreach- *International Innovation*

April 2012

Science at sea

Dr Clare Reimers, current Chair of the University-National Oceanography Laboratory System Fleet Improvement Committee, offers an illuminating account of a multidisciplinary project that teaches early stage scientists how to better utilise ships and equipment for oceanography research

DR CLARE REIMERS

First, could you explain the context from which this project emerged? What challenges do Chief Scientists on research vessels face and how does the project help to overcome present shortcomings in training for these roles?

I regularly participate in meetings between federal agency representatives, ship operators and members of the scientific community. During these collaborations we review utilisation trends, the number, mix and overall effectiveness of ships in the UNOLS fleet, and whether there is a match between the science requirements of academic oceanography in the U.S. and the capabilities of the UNOLS Fleet. We have gathered data which highlights that the number of proposals requesting UNOLS facilities has declined sharply over the past five years and new investigators are rarely proposing projects that use ship time. These trends and their impact on long-term planning and funding for design, construction, or renovation of vessels in the fleet were reasons to take action.

What is the University National Oceanographic Laboratory System (UNOLS) and what role does it play in providing a platform for your work?

UNOLS is solely an advisory body, formed in the 1970s to coordinate and review access to and exercising of federally supported ships, among other seagoing facilities for academic oceanographic research in the U.S. There are currently 61 academic institutions and National Laboratory members (of which 15 operate 20 ships of a variety of sizes and capabilities) within UNOLS. Seagoing scientists, vessel operators and marine technicians from these institutions volunteer time through a governing structure established in the UNOLS Charter and work with staff from the UNOLS Office, curre at the University of Rhode Islan School of Oceanography.

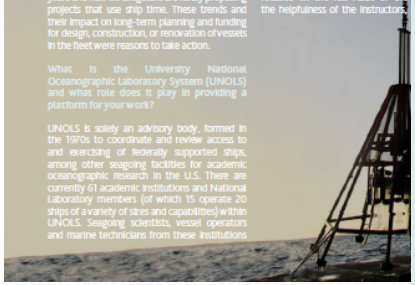
Could you elaborate on the level the National Science Foundation h the project?

Support from the NSF has been m and financial. When the Fleet Im Committee (FIC) began discus for engaging new investigators, r Program Director of NSF's Ship Linda Goad, strongly encouraged m ahead with the project and direc NSF's RAPID programme as an funding mechanism. In 2011 I re under US $100,000 from the NSF the project and 28 participants on t cruises. However, this figure does the funds that supported the ship o

What has been the single greate of the project and by what mea measuring the success of the proje

The biggest success of the projec watching the enthusiasm grow participants as they successf through challenges at sea, build c relationships, collect unique samp and realise they are up to leadership

After each cruise a questionnaire available online and all participants to complete it anonymously. This q focused on the full value of the the helpfulness of the instructors



amongst the science party, interactions between the science party and crew, and suggestions for

DR CLARE REIMERS

Cruise control

The University-National Oceanographic Laboratory System is an organisation of academic institutions working with federal agencies in the U.S. to ensure broad access to modern research vessels and facilities. A forward thinking NSF-funded project is increasing awareness of the great opportunities the System offers

THE UNIVERSITY-NATIONAL OCEANOGRAPHY LABORATORY SYSTEM (UNOLS) is an advisory organisation to U.S. federal funding agencies, influencing the execution and safety of research cruises around the world. The organisation was officially launched in 1971 during a charter meeting, although its roots date back to the 1960s – a revolutionary decade for oceanographic research. Its aim has remained constant; ensuring the efficient scheduling of scientific cruises aboard, what today number, 20 research vessels located at 15 operating institutions in the UNOLS organisation; and improving the technological services and accessibility of the UNOLS Fleet. The organisation functions primarily with volunteers representing 61 member academic institutions and National Laboratories, all engaged with oceanographic research. However, a dedicated UNOLS office is responsible for coordinating day-to-day UNOLS activities. Since 2009, the UNOLS office has been located at the University of Rhode Island Graduate School of Oceanography, Narragansett, Rhode Island.

ACCESS TO SHIPS

Recent data, which emerged through UNOLS meetings between oceanographic researchers and specialists, ship operators and federal agency representatives, shows that requested ship time for oceanographic research had declined dramatically over the last five years. A few concerns included observations that new researchers lacked knowledge about gaining access to ship time, investigators were unfamiliar with what the ships offer for specific types of research, a successful cruise required investigators with prior leadership training, and that young investigators held misconceptions about the availability and funding of UNOLS facilities.

The result of this information led Professor Clare Reimers from Oregon State University and current Chair of the UNOLS Fleet Improvement Committee, to set up the Training Chief Scientists for the Ocean Research of Tomorrow programme. The programme has since flourished and trains early career participants in all of the 'cradle to grave' phases of expeditionary oceanography, from the initial proposal, to science and cruise logistics planning, to cruise execution and post-cruise reporting. "Participants experience firsthand the science and education capabilities of state-of-the-art research vessels outfitted with equipment that is modern, multi-purpose, efficiently run and safely operated", explains Reimers, who received U.S. $100,000 funding from the National Science Foundation (NSF) to support the creation and maintenance of the programme.

UNOLS TRAINING AT SEA

In 2011, two training short-courses/cruises designed to educate the participants in the basics of organising and managing research at sea took place at Oregon State University facilities in Newport, Oregon and on the *RV Wecoma* – one of the ships in the UNOLS fleet. Reimers comments that *RV Wecoma* was chosen due to its ideal size, the quality of its science equipment and the reliability of its technicians, officers and onboard crew, all of which aided the programme's success. *RV Wecoma* regularly operated in the Northeast Pacific, just off the coast of Oregon, an area with a range of diverse marine habitats and processes; a perfect environment to begin oceanographic research projects. The *RV Wecoma* retired from UNOLS services in early 2012 due to fleet down-sizing and the time-worn condition of the vessel's hull.

14 participants were chosen from a pool of applicants for each training cruise, based on their passion for oceanography, the quality of a research project they would bring to the cruise, and long-term research aims, among other criteria. Equipped to complete a wide range of science operations, the ship sailed in July 2011 for the first cruise. This cruise mainly sampled the sea surface, water column and underlying sediments, with samples shared among the researchers, including microbiologists, atmospheric chemists and chemical oceanographers. One research objective was to assess regional rates of transfer between the atmosphere and the ocean waters of three greenhouse gases: carbon dioxide, methane, and nitrous oxide.

RV WECOMA © LINDSEY KOREN

MID-WATER WONDERS © KAREN OSBORN

Recent data shows that requested ship time for oceanographic research had declined dramatically over the last five years

Another activity determined concentrations of greasy organic surfactants in films over the sea surface and in marine aerosols.

During the second cruise, a different range of activities took place. A group of the researchers focused on sites in and around the Astoria submarine canyon. Armed with special trawl nets, these biological and chemical marine scientists honed in on capturing a range of elusive, fragile organisms, with the intent of analysing their metabolism, phylogeny, isotopic chemistry and bioluminescence. Others examined the affects the canyon had on benthic biodiversity and the off-shore and down-canyon transportation of organic carbon. In addition, two physical oceanographers used measurements of currents and water properties to study how waves internal to the water column are propagated up canyon and how fronts form at the boundaries of the Columbia River plume.

MAKING WAVES

Although the coordinating team have had some great successes over the past year, there have been a few challenges for them and the participants along the way: "The researchers who were already assistant professors or postdocs were most concerned about the challenges of turning their research ideas into a successful proposal," explains Reimers. "While at sea, all participants were challenged by time management on a platform that works 24 hours a day, adjusting a work plan to unforeseen events (such as bad weather, broken equipment, or not finding target organisms), interpersonal friction, and getting adequate rest."

While resources and funding are finite for UNOLS facilities, Reimers remains enthusiastic about the continuance of the training programme and its effect. She intends to maintain her current role as programme Director, which will allow her to concentrate on moving the project to different research vessels in the UNOLS fleet, take part in the candidate selection, work as one of the onboard instructors, and report on the results and programme impacts. To anyone performing oceanographic research in the future, Reimers suggests that preparation is the key to success: "Advanced planning, assembling a synergistic science team, communicating, being familiar with your equipment and environment, establishing and maintaining a cruise plan and priorities, and following rules of safety and appropriate conduct". By working together, many involved in the UNOLS community have enabled the programme's success. Each of the participants who engaged on the training cruises has ensured the effectiveness and enjoyment of these efforts and ensured their contributions to oceanographic research long into the future.

INTELLIGENCE

TRAINING CHIEF SCIENTISTS FOR THE OCEAN RESEARCH OF TOMORROW

OBJECTIVES

To instruct new investigators in the duties of an oceanographic chief scientist; while presenting a talented cohort of scientists with an unique opportunity to test compelling research ideas, engage in collaborative work, become familiar with equipment, and gain experience in acquiring samples that are critical for developing future oceanographic field programmes.

KEY COLLABORATORS

Daryl Swenson, Oregon State University • **Patricia Wheeler,** Oregon State University • **Jeff Crews,** Oregon State University Ship Operations • **Demian Bailey,** Oregon State University Ship Operations • **Jon Alberts,** UNOLS Executive Secretary • **Annette DeSilva,** UNOLS Assistant Executive Secretary • **Maureen Conte,** Bermuda Institute of Ocean Sciences • **Vicki Ferrini,** Lamont-Doherty Earth Observatory • **George W Luther III,** University of Delaware • **Robert Embley,** NOAA Pacific Marine Environmental Laboratory • **Waldo Wakefield,** NOAA Northwest Fisheries Science Center

FUNDING

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DR CLARE E REIMERS is a Professor of chemical oceanography in the College of Earth, Ocean and Atmospheric Sciences of Oregon State University. As the current Chair of the Fleet Improvement Committee of the U.S. University-National Oceanographic System (UNOLS), Reimers works to optimise the capabilities and utilisation of the U.S. fleet for academic oceanographic research and education.

2012 Program

Applications closed June 1, 2012

39 applications received from
24 institutions,
soon to be reviewed……

November 7-16, 2012
Scripps Institution of
Oceanography Marine
Operation Facilities &
R/V New Horizon

Science and Education Return

- Very high science return on investment
- Seed data for future proposals
- Complementary data for current projects (new sites)
- Discoveries: new species, climate records, instrument and methods development
- Establishment of collaborations and newly inspired science questions
- New appreciation for other marine science disciplines and sampling techniques
- Development of leadership skills, understanding of cruise planning
- Understanding of want UNOLS is and how UNOLS staff and marine technicians can serve future projects
- Especially for graduate students-broader mentoring exposure from other participants and “mentors”