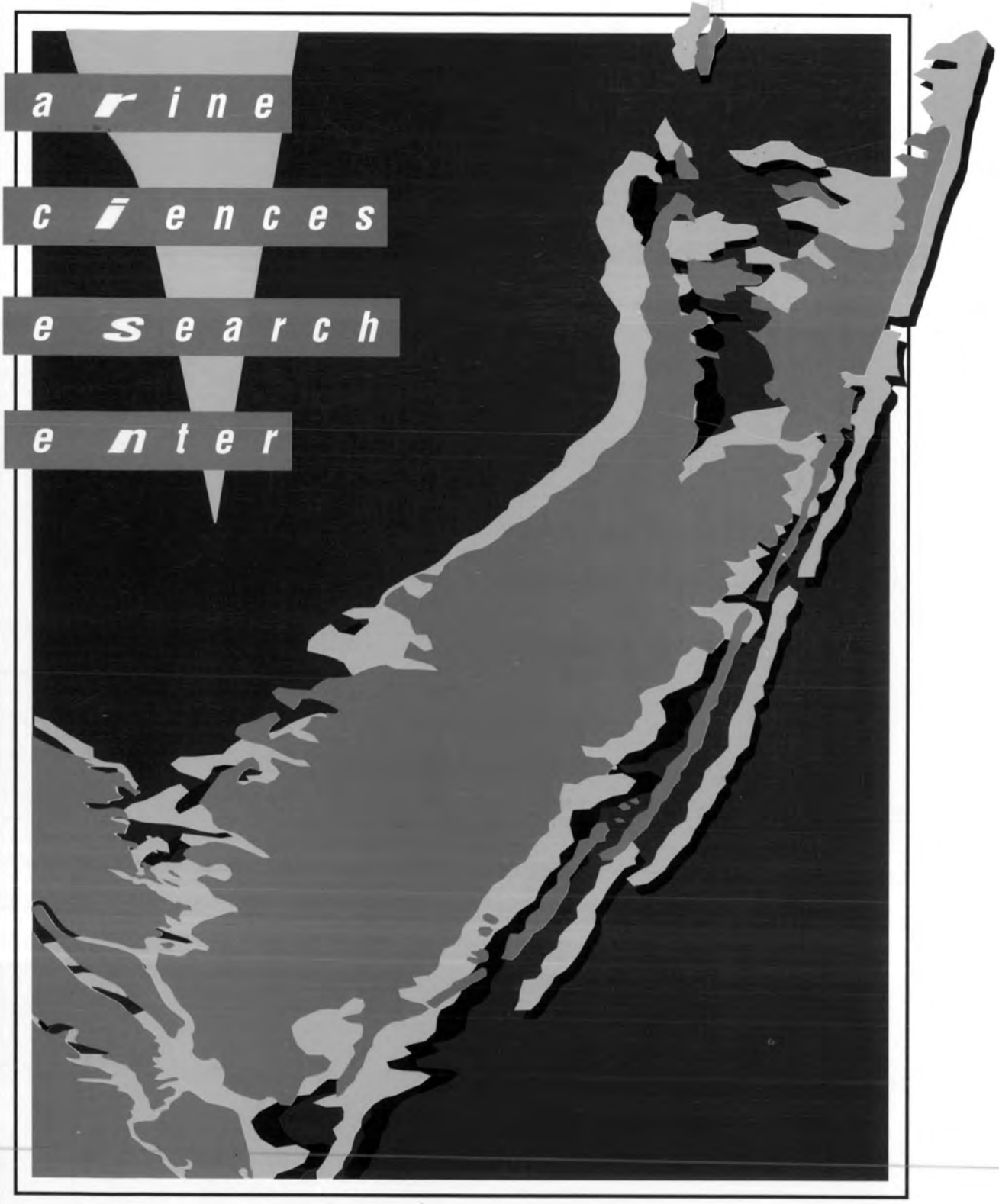
MSRC

Marine Sciences Research Center



The University at Stony Brook

GRADUATE STUDY

Graduate Study

MARINE SCIENCES RESEARCH CENTER

The University at Stony Brook

Printed in 1995 on Recycled Paper

Floundering

by Heather McHugh*

Because I am lucky, I'm a glutton
for sea punishment this summer:
for the discipline of the current
backlash, bondage

of the temporary. Underwater
every air is heavy, every somersault
a motion slowed. The sun's
a warp, aware

as any sidewise eye with fins.
I sink past reckon's isle and past
the lace of debt and past the shell of
work, wreck

of pleasures. Under pressure
I cannot tell green from blacking
out, or greed from sacrifice, from
kisser killer,

sense from sense. The vessels lie
inside and out, belying
interface. The eye directly
feels, filled

with how it looks. I dive
to prove this place, to know
how deep in my luck is the loving
hook.

*She is the daughter of MSRC's Professor Emeritus Dr. J. L. McHugh

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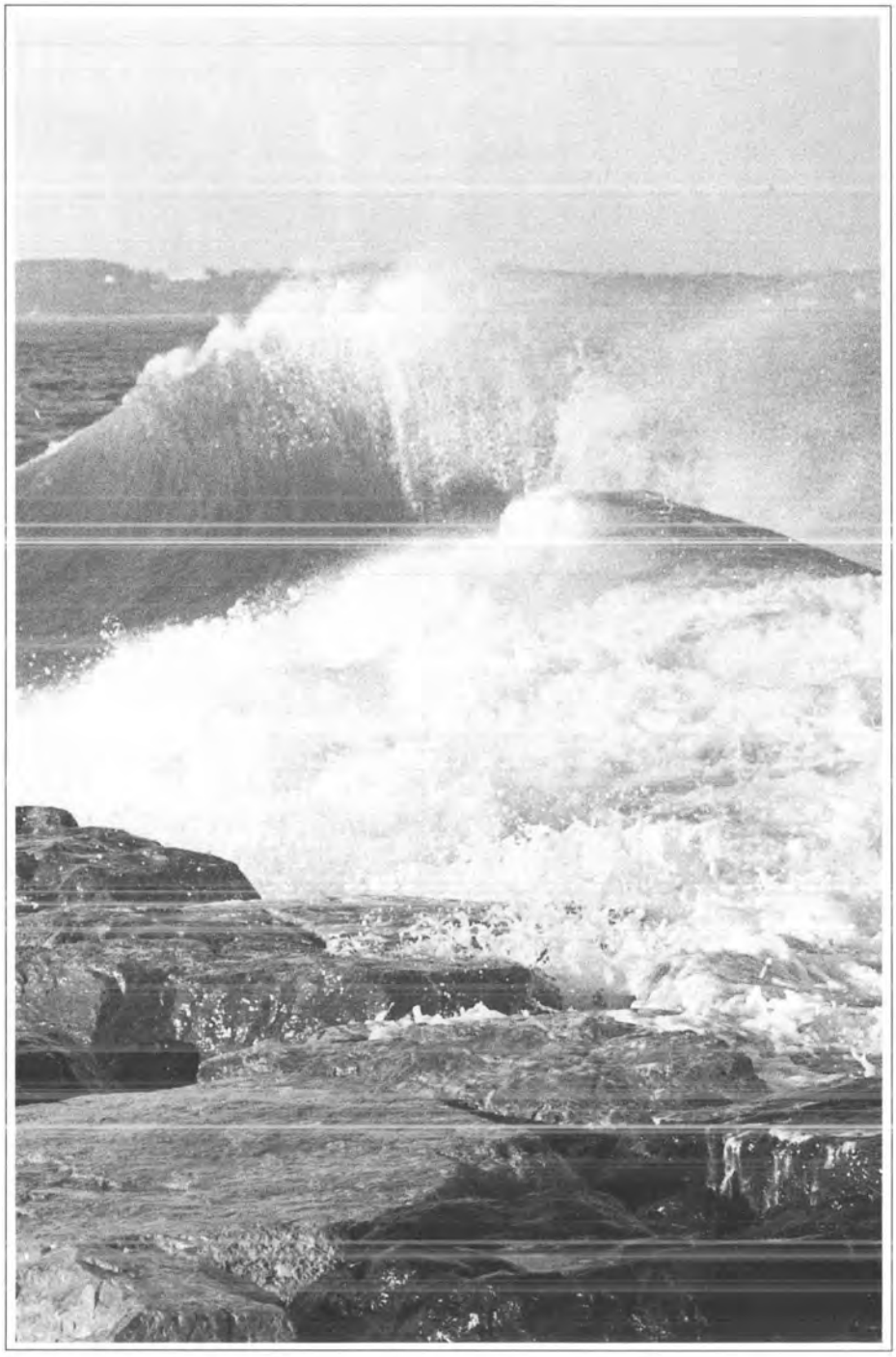


The choice for graduate studies

In New York, on Long Island at Stony Brook, surrounded by a multitude of diverse marine habitats is...

The Marine Sciences Research Center (MSRC)

MSRC is the State University of New York's center for marine research, graduate education, and public service. MSRC is also the University at Stony Brook's center for research, education, and public service in the atmospheric sciences.

The Faculty and Students at MSRC

Approximately 123 students from 19 different nations currently work and study at MSRC. The Center's students study coastal oceanographic processes and atmospheric sciences in a natural and academic setting that offers abundant opportunities for conducting field work, solving real problems in both local and distant environments, and learning to express their opinions in the weekly seminars, such as Friday Discussion Group and Graduate Seminar in Atmospheric Sciences.

Oceanographic Problem Solving—a popular course with the community as well as the students—requires students, working as a team, to design and conduct a study, integrating all the disciplines, to find causes for an existing problem in the local marine environment and to suggest solutions. Recent classes examined the environmental consequences of pier placement in a nearby wetland and dredging a local harbor.

The MSRC faculty are internationally known for their leadership in research in both the atmospheric sciences and all the major disciplines of oceanography—biological, chemical, geological, and physical. In 1994, for example, they were awarded research grants totalling $6.0 million, including more than $1.7 million from the National Science Foundation alone. This placed MSRC in the top 20 recipients of NSF ocean science awards in the nation, and first among all coastal institutions.

The expertise of MSRC's faculty places them in the forefront in addressing and answering questions about immediate regional problems, as well as long-term problems relating to the global oceans and atmosphere. The primary focus of the MSRC faculty and students is on fundamental research designed to increase understanding of the processes that characterize the coastal ocean and the atmosphere. But the Marine Sciences Research Center is also committed to the use of the results of research to solve problems that result from society's uses and misuses of the environment.

Features of the Region

MSRC is situated on the north shore of Long Island, five miles from Long Island Sound and nearly 50 miles from New York City, in one of the world's greatest natural coastal laboratories. The diversity of coastal environments within an hour's drive of the Center is greater than any comparable region in the world: Long Island Sound, a deep estuary modified by glacial processes; Great South Bay, a bar-built estuary; Hudson River Estuary, a drowned river valley estuary; Peconics-Flanders Bay estuary system; Fire Island, a barrier island with a national seashore; New York-New Jersey Harbor; fresh and salt water tidal wetlands; and open continental shelf waters.

The Long Island region now has three of the nation's 21 estuaries designated as nationally significant and included in the U.S. Environmental Protection Agency's National Estuary Program: Long Island Sound, Peconics-Flanders Bay estuary system, and the New York-New Jersey harbor estuary.

Nearly 10% of the entire population of the United States lives within 100 miles of MSRC. This large population, unmatched in any other area of comparable size, makes varied, intensive, and competitive demands on these marine environments and the atmosphere. The regional environmental stresses are characterized by a sharp west to east gradient. Coastal waters of New York Harbor and western Long Island Sound are seriously degraded, yet farther to the east, the waters of the central and eastern Sound and the Peconic Bay system are among the most pristine coastal environments in the United States.

The MSRC really is a center for coastal marine research. Environmental issues and the associated socio-economic problems may be more important at the coast, because of the large concentration of people living there. Other institutions focus on the deep ocean, which presents different problems.

— Robert Chant
Ph.D. Student

Regional Research and Career Opportunities

The combination of diversity of environments, their importance to society, and the stresses caused by society offer students studying the environment on Long Island ample opportunity to apply their knowledge of basic sciences to real-world problems. Students are able to pursue careers emphasizing fundamental research on coastal processes or those involving the applications of research to improve environmental management.

Located on the Stony Brook campus are Region I offices of the New York State Department of Environmental Conservation, and located at the MSRC are New York Sea Grant, a New York State Department of State office, and the Long Island Sound Study Office. Proximity to the New York metropolitan area provides opportunities to work on an array of important problems with a variety of local, regional, and national environmental and planning agencies. Most of the Island's 13 town governments are actively involved with natural resources conservation at some level, and all are of necessity involved with pollution control and waste management.

Access to these organizations during the student's graduate program offers the chance to test potential career opportunities in environmental management, consulting, and planning agencies, as well as to have access to the organizations' staffs. Many of our graduates now hold jobs in nearly all such agencies, located from the East End of Long Island to Metropolitan New York, and beyond, in Federal regional offices, such as Washington, D.C. and in almost every coastal state.

Global Research Opportunities

Marine Sciences

While there is no shortage of local and regional coastal marine problems to study, our faculty and students also work on problems in all parts of the world's atmosphere and oceans—in environments as far away as South America, Africa, Asia, the Antarctic, the Caribbean, the Mediterranean and Scandinavia. Their research spans the spectrum of novel research to solve one piece of a long unanswered, larger question about an oceanic or climate system to understanding the impacts of severely degraded habitats on living systems, including humans.

One new avenue of opportunity for both research and policy studies is the heavily polluted Eastern European countries, where decades of environmental neglect have resulted in some of the worst polluted bodies of seawater in the world. Scientists at MSRC are establishing an East-West research and academic study program. Cooperative programs are being developed with Bulgaria, Romania, Hungary, Poland, Russia, and the Ukraine.

Another base for future MSRC research is the eastern coast of Africa. The focus of this upcoming research program will be to study coastal erosion and sea level rise.

Atmospheric Sciences

Students specializing in atmospheric sciences have the opportunity to conduct research on a wide range of problems, including atmospheric chemistry; climate change; radiation transfer; planetary atmospheres of Earth, Venus, Mars, and the outer planets and their satellites; and spectroscopy of radiatively active molecules.

For nearly a decade, atmospheric scientists at MSRC have conducted research in atmospheric chemistry to measure stratospheric ozone and those chemicals that catalyze its destruction. Using the most sophisticated remote-sensing equipment and global climate models to better understand past climate changes, as well as to predict the future climate, they are studying the influence of latent heat release in the tropics and cloud-radiative effects on global climate.

The Basics

Whether studying the coastal sea, the deep oceans, or the atmosphere, the MSRC graduate student is given a comprehensive education across the disciplines that will enable him or her to work effectively on complex research problems in all types of settings. We at MSRC invite you to visit us to personally discover the excitement and challenge of our Center, our University, and our diversity of marine environments.

Graduate Study at MSRC

Interdisciplinary Approach

MSRC prides itself on the interdisciplinary emphasis it places on research and education. Our faculty and students are making fundamental scientific breakthroughs across the breadth of disciplines representing marine and atmospheric sciences:

- biological oceanography
- fisheries sciences
- chemical oceanography
- geological oceanography
- physical oceanography
- atmospheric chemistry
- climate dynamics
- planetary atmospheres

One of our current interdisciplinary research projects, for example, is a study to understand fish egg and larval dispersal and recruitment around the island of Barbados. The research required the collaboration of one of our fisheries biologists and his students, who will contribute information on fish reproduction and larval behavior, with one of our physical oceanographers and his students, who are needed to determine the currents and eddies that might influence larval fish movements.

MSRC's Institutes

Over the past few years, MSRC created four institutes and recently incorporated the University at Stony Brook's Institute for Terrestrial and Planetary Atmospheres (ITPA) to

For an appointment, call or write to

Graduate Programs Office
Marine Sciences Research Center
State University of New York
Stony Brook, New York 11794-5000
(516)-632-8681.

MSRC offers a rare opportunity to interact with students and faculty from all over the world, in many disciplines, and of all ages. This diversity is a form of learning experience that no oceanography textbook can ever give.

—Shino Tanikawa Oglesby
M.S. Student

facilitate more timely and effective responses to emerging problems and opportunities:

- The Living Marine Resources Institute (LIMRI)
- The Waste Management Institute (WMI)
- The Coastal Ocean Action Strategies (COAST) Institute
- The Institute for Urban Ports and Harbors.
- The Institute for Terrestrial and Planetary Atmospheres (ITPA)

Besides having basic research goals which overlap with those of many of our faculty, the institutes are valuable resources for students interested in coastal zone management, policy studies, and the translation of the results of research into usable forms for managers and decision makers.

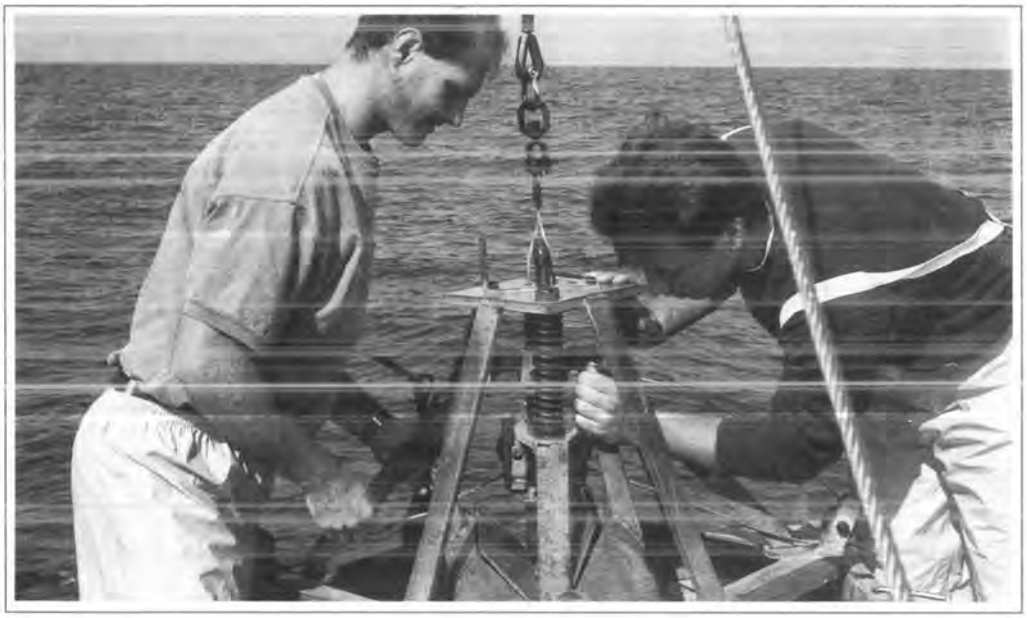
WMI's focus is research that addresses the impacts of waste in our coastal marine environment and on policy development for waste management.

LIMRI's focus, along with that of the Fisheries Biology Group, is research that increases knowledge for better management of marine resources such as fish, shellfish, and seaweeds and on related policy development.

The COAST Institute's focus is working with policy makers on problems in the management of the coastal zone to develop strategies for taking action on the pressing issues affecting our coastal environment.

The focus of the Institute for Urban Ports and Harbors is on developing the information and the strategies needed to balance competing uses in the nation's ports and harbors.

In 1991, atmospheric scientists on the faculty of the University at Stony Brook joined the MSRC in the Institute for Terrestrial and Planetary Atmospheres (ITPA). The ITPA, the largest of MSRC's institutes, carries out research programs in the physics, chemistry, and dynamics of the atmospheres of the Earth and other planets.



The Graduate Programs

MSRC offers both a Master's degree (M.S.) in Marine Environmental Science and a Ph.D. degree in Coastal Oceanography. Both programs are flexible and allow students to acquire a broad understanding of oceanic and atmospheric processes. Our program requires a solid foundation in the basic sciences: physics, chemistry, biology, and geology. The graduate student must also undertake original research. This research could be in an area of oceanography, in coastal zone management, ocean policy, waste management, in some facet of atmospheric sciences, or a combination of these disciplines.

The Master's Degree

The Master's degree program is designed not only to provide students with the training required for successful pursuit of more advanced degrees, but also to equip them with the background needed for effective careers in coastal oceanography or meteorology without additional training.

A research thesis is required, which must be an original work of publishable quality. The thesis may take any one of several forms. Most often it is based on laboratory and field research, but mathematical modeling and remote sensing are also routine approaches. The Master's thesis may also reflect the application of existing knowledge to develop a management strategy for an environmental problem; or it may be a critical assessment of the effectiveness of technologies, policies, approaches or strategies used in managing our natural resources.

The Ph.D. Degree

The doctoral program is designed to give students a professional command of oceanography and atmospheric sciences at the highest level, and to provide them with the means to develop their capacity for creative research. Students must demonstrate the ability to formulate an important original problem and to address the problem effectively. Although oceanography and atmospheric sciences require an interdisciplinary course of study, the Ph.D. student must also achieve a profound knowledge of at least one basic science.

The doctoral program is designed for students who already have a Master's degree, but exceptional scholars in the Marine Environmental Science Program can have the requirement of a Master's degree waived. A doctoral dissertation is required of all candidates.

Coastal Marine Management and Policy Option

Graduate students who wish to pursue careers in management and policy can now enroll in a rich array of management courses offered by MSRC and the University's Center for Regional Policy Studies and Harriman School of Management and Policy. Students in this option take the four, one-semester core courses in biological, chemical, geological, and physical oceanography. Beyond these courses, graduate students are free to choose from marine-related management courses, such as Environment and Public Health, Fisheries Management, and Regional Planning Applied to Marine Sciences. Students pursuing the Management and Policy Option have a wide range of opportunities to conduct their M.S. or Ph.D. research on management and policy problems and issues of local, state, regional, national and international importance.

MSRC is at the vanguard of a new public awarness of the importance and fragility of the coastal zone. I cannot imagine a more exciting opportunity for prospective students seeking to make a meaningful contribution to important issues, while at the same time receiving a high quality education.

— Mead Allison Ph.D., 1993

Admission to the Programs

Admission to MSRC's graduate programs is highly competitive. Minimum entrance requirements normally include a B.A. or B.S. degree; mathematics course work through calculus; physics; and introductory courses in at least two of the following areas: chemistry, biology, and earth sciences, with advanced work in at least one of these areas. An overall B (3.0) average is required with significantly better performance in the student's major field. Students must have taken the GREs and foreign students must take the TOEFL examination to complete admission requirements.

Because the program is both interdisciplinary and innovative, applicants who are exceptionally well qualified by experience or training, but lack certain undergraduate preparation, may be admitted on the condition that they complete some preliminary courses after admission.

Special Programs

Five-year BS/MS Option

ESS and MSRC

MSRC and Stony Brook's Department of Earth and Space Sciences (ESS) offer a cooperative undergraduate/graduate course of study in Geological Oceanography leading to the B.S. and M.S. degrees. Students enter the Geological Oceanography track in the ESS department to obtain the B.S. degree. In their senior year, students may, with approval, begin to take graduate courses offered by MSRC. Students doing well in the undergraduate program may be considered for admittance to an accelerated Master's program offered by MSRC. Most students in this program obtain their B.S. and M.S. degrees in five years.

Five-year BE/MS Option

CEAS and MSRC

A joint program with the College of Engineering and Applied Sciences (CEAS) and MSRC enables a student majoring in Engineering Science to specialize in Marine Environmental Science and to obtain both an undergraduate engineering B.E. degree and a Master's degree in an additional 14 months. The student must include in their curriculum several of the MSRC core courses.

Dillard University Articulation Agreement

MSRC is committed to increasing the number of African-Americans and other groups under-represented in the environmental field and, particularly, in the marine and atmospheric sciences. MSRC has created a cooperative agreement with Dillard University, a historically African-American institution in New Orleans. All students in the Dillard Program are provided financial support both as undergraduates and as graduate students.

Financial Assistance

MSRC provides more than 95% of our students with complete funding through university graduate and teaching assistantships (GA/TA) and research project assistantships (RPA). The starting amount of these assistantships for the 1994-95 nine-month academic year was typically $9,204, with annual increases anticipated. Most students are supported through sponsored research projects over the summer. Full tuition scholarships can accompany the award of a fellowship, or a full GA/TA.

Special Awards

MSRC has a variety of special awards available to graduate students. Increased stipends are available to the most outstanding students in recognition of their excellence. Special awards are available to assist students in completing their research and for travel to national and international meetings to present the results of their research.

Minorities Research Awards for Stony Brook Students

The Minorities in Oceanography Program provides limited funds to offer promising minority undergraduate students, who are matriculated at Stony Brook, an opportunity to actively participate in oceanographic or atmospheric research with an MSRC faculty member. The goal of these awards is to increase the students' awareness of marine and atmospheric sciences and to encourage them to pursue graduate education at MSRC.

Alumni Award

The MSRC Alumni Association annually provides a financial award for the best Master's degree student thesis project.

Special Fellowships

The M.P. O'Brien Fellowship

This fellowship program acknowledges the manifold contributions of Professor O'Brien and is intended to stimulate interest in graduate studies at MSRC in beach and nearshore processes and coastal engineering. Fellowships are awarded for two years and may be renewed. Each fellowship carries a stipend of $10,000 for the nine-month academic year and a full tuition scholarship. The stipend may be supplemented by up to $3,885 for the summer.

J. L. McHugh Fellowship

This fellowship is awarded each year to an outstanding first year student interested in fisheries or fisheries management.

Donald W. Pritchard Fellowship

This fellowship is awarded each year to an outstanding first year physical oceanography student interested in the physics of estuaries and nearshore waters.

Life at MSRC

The MSRC provides excellent opportunites to explore the means by which hard science can be incorporated into government management decisions. Upon graduation, I found myself equally qualifed to pursue a career as a researcher or a career in environmental policy.

— Cynthia Decker
Ph.D., 1992
Coordinator,
NY State Peconics Estuary Program/
Bureau of Marine Habitat Protection/
New York State Department of Environmental Protection.

Student-Faculty Interactions

MSRC's faculty have traditionally established personal, supportive relationships with the students. The breadth of expertise represented by our faculty allows students a great amount of flexibility in choosing a graduate advisor and also provides a large pool of resources for solving multidisciplinary research problems.

MSRC's graduate students are considered colleagues, as professionals who participate fully in the intellectual life of the Center. Graduate students serve on almost every committee, having a voice in such activities as hiring of new faculty and decisions about the graduate programs.

Sponsored Activities

Many activities exist to keep the graduate student active on south campus, where the Center is located, and an additional wealth of sponsored activities exists on main campus within each science department. MSRC sponsors several programs that bring visiting scholars to the Center for either one day to give a seminar, or for extended stays. These longer visits give students ample opportunity to ask questions, exchange ideas, and get to know outstanding scientists from institutions around the world, who offer different perspectives.

Coastal Marine Scholar Program

This program brings an outstanding recent Ph.D. scholar to the Center each year. These scholars, who spend two years at the Center, are sought through an international search and have backgrounds in oceanography, atmospheric sciences, engineering, or mathematics. Coastal Marine Scholars play an important role in fostering interactions and collaborations with MSRC faculty and students on problems of common interest.

Lawrence Distinguished Visiting Scholar Program

Each year a committee of faculty, staff, and students select four to six of the world's most outstanding scientists to spend a week at MSRC. During their week's stay, these scholars, who are world leaders in their own fields, present seminars, one public lecture, and interact extensively with the graduate students, discussing problems of common interest.

Graduate Seminar Program

This program brings more than a dozen of the most renowned marine and atmospheric scientists from all over the world each year to the Center to speak about their exciting research and latest discoveries at a weekly seminar. These seminars attract faculty, students, and staff to interact with outside researchers. Speakers include experts on topics ranging from sediment discharge by rivers of the world to ozone depletion in the Antarctic.

Friday Discussion Group

A more casual forum to exchange ideas and information is the Friday Discussion Group, a weekly ritual that brings faculty and students together over coffee, tea, and cookies. Speakers are usually drawn from the Stony Brook community, and presentations include works-in-progress, reports of meetings, practice talks for students, and slide shows of exotic field work.

With a subject as vast as contemporary marine sciences, each discovery generates as many questions as answers. Yet, for those prepared to rise to the challenge, MSRC is a unique place to work at the boundaries between disciplines, where discovery and identification of trends are most likely. My marine remote sensing research progress, starting at MSRC, attests to our ability to meet the challenges of marine science's new frontier and to MSRC's commitment to educating a new generation of marine scientists.

— Xiao-Hai Yan
Ph.D. 1989
Associate Professor, Applied Ocean Sciences;
Associate Director, The Center for Remote Sensing
University of Delaware
Graduate College of Marine Sciences

Extracurricular Activities

Besides academic activities, a number of events draw MSRC students, faculty and staff together socially. Several events have become a tradition at MSRC. One is the annual international dinner, when faculty, students, and staff prepare and share dishes from all nations. Another is the annual Flax to VAX race, when students compete with the faculty in a five-mile race from Flax Pond to the Center. Everyone wins at the pot-luck festivities that follow the race. Every fall, the Graduate Programs Office sponsors a welcoming picnic for new students. Other events are more impromptu, such as softball games and volleyball at the sand court by Discovery Hall.

Resources and Facilities

MSRC is housed in five single-story buildings on south campus, one-half mile south of Stony Brook's main campus and just five miles from the Flax Pond Marine Environmental Laboratory and wetlands. South campus buildings are designed with laboratories, classrooms, seminar rooms, and other group spaces in the central core; and faculty, staff, and student offices located along the perimeter.

Flax Pond Marine Environmental Laboratory

Located approximately five miles from the Center, on a tidal salt marsh preserve flushed by Long Island Sound, is the Flax Pond Marine Laboratory. This 8,000-square-foot research facility is equipped with running seawater circulating through more than 20 sea tables and aquaria and an 800-square-foot greenhouse.

With funds provided through a research facilities improvement grant from the National Science Foundation, critical improvements to the laboratory's seawater system have been or will be undertaken. These include construction of a pier to support the intake lines, installation of units to provide heated seawater to the finfish and shellfish labs, replacement of the emergency back-up generator, and development of a microalgae culture facility. Additional improvements to the research and instructional support facilities at the Flax Pond Laboratory will be made over the next decade.

Equipment and instrumentation

Occupying over 1600 square feet of space in Discovery Hall, the Electronics and Ocean Instrument Facility employs an engineer, a technician, and several student assistants. Its major functions are as a design shop, an instrument calibration facility, a central equipment pool, and a cruise support team. The facility typically completes over 100 different commissioned projects for over 40 clients each year.

Oceanographic instrumentation in general is highly specialized, and equipment needed for research is often not readily available from commercial

sources. The facility has the capacity to design and construct complex and specialized equipment to fill almost any research requirements. Capabilities include mechanical design, electronic design, printed circuit board design, machine and carpentry work, welding, electronic circuit fabrication, and software/firmware design. Equipment designed by the facility has ranged from a specialized coring sampler for salt marsh peats to a computerized sediment-water interface monitor deployed at 5000 meters depth by the research submersible *Alvin*.

The calibration facility enhances the reliability of data obtained from field instruments in use at the MSRC, as well as provides services to other institutions. The centerpiece of this facility is a custom-built 1700-liter seawater bath for the calibration of salinity and temperature sensors. The temperature of the bath can be controlled to +/- 0.0015 degrees centigrade over the oceanographic temperature range of 0 to 40° C. Primary standard measurements are obtained through the use of a Thermometrics thermistor as the temperature standard and a Guildline salinometer as the conductivity/salinity standard. The facility also has primary standards for calibrating pressure sensors and a compass field for calibrating direction sensors.

The central equipment pool provides field instrumentation to researchers at MSRC and other institutions. Present inventory includes recording and direct reading current meters, General Oceanics rosette sampler, Applied Microsystems CTD, fluorometers, transmissometers, tide gauges, portable salinometers, Martek multi-parameter analyzers (CTD, DO, pH), MiniRanger microwave positioning system, EG&G Uniboom seismic profiler, Scripps-Davis Lagrangian drifters, oxygen meters, and miscellaneous small equipment. In addition to maintaining the central equipment pool, the personnel provide support for equipment owned by individual faculty members, notably the broadband ADCP and the advanced microstructure profiler.

The facility has over 10 years' experience interfacing shipboard equipment with small computers, both for automatic recording and real time display of data. The central equipment pool has several portable computers with suitable interface hardware for connection to multiple hydrographic instruments. Software developed by the facility enables computers and instruments to be integrated into custom portable data systems and reconfigured quickly as required.

Personnel are available to provide at-sea expertise on cruises with complex technical support requirements or those of long duration. Cruise support has taken our personnel to Antarctica, the Mediterranean, the Caribbean, as well as all over the Northeast US.

Research Vessels

At the head of our fleet of research vessels is the 60-foot steel-hulled *ONRUST* (Dutch for "restless"). Built in 1974 specifically for coastal oceanographic research, the R/V *ONRUST* features a 170-square foot wet lab with 20 linear feet of bench and sink space. A hydraulic stern gantry with a one-ton lift capacity and a 1,000 pound cargo boom are located on the vessel's 340 square-foot aft work deck. Recent enhancements to *ONRUST* include installation of a "thru-hull" mounting for an Acoustic Doppler Current Profiler (ADCP) and addition of a sophisticated new radar system with a detection radius of more than 70 miles.

The *ONRUST* has effectively met the Center's research needs for nearly 20 years. But the demands of sea-going coastal oceanographic research are changing. Cruises of the future will be longer, involve multiple units of major sampling equipment, and make increasing use of on-board electronic data acquisition and analysis instrumentation. To ensure that the Center is capable of supporting these research needs, plans are underway to replace the *ONRUST* with a 21st century coastal oceanographic research vessel.

The Center's ships committee is working with personnel of the Webb Institute of Naval Architecture to develop preliminary design drawings and capability parameters of the new vessel. We anticipate having the this vessel ready by Spring, 1996.

The Center also maintains several small boats and tow vehicles for field research in sheltered waters around Long Island. These include the R/V *Siome*, a 23-foot shallow draft cabin cruiser; a 24-foot open work boat, and two 17-foot Boston Whalers.

Computer Facilities

The Center maintains two micro-computing laboratories with IBM PCs and Apple Macintoshes for student use, a remote sensing laboratory with a VAXstation II/GPX, and a graphic lab with a Calcomp 910/563 and Calcomp 907/1051. There is also a terminal lab with four VT100 CRT terminals and two LA120 hardcopy terminals; a workstation lab with six VAXstation 2000s, VAX 8530, VAX 6310, and VAX 6510; and VAX 11/730 minicomputers.

Graphic Arts Facilities

The Center's Graphic Arts Department is a full service photography, drafting, and desktop publishing facility available to both faculty and students on a year-round basis. Recent advancements include digital photography, video-frame capture, multimedia and animation capabilities. It is also home to one of the University's most comprehensive slide collections documenting Long Island's diverse coastal environment.

Information Center (MASIC)

The Marine and Atmospheric Sciences Information Center is making the transition from a local reference room to a modern, technologically advanced prototype of the knowledge center of the future. The holdings include important marine and atmospheric science core journals, beginning and advanced monographs and texts, key reprints, MSRC Master's theses and doctoral dissertations, MSRC special reports, nautical charts and maps, and a general science reference collection.

Current computer capabilities include access to STARS (the on-line NOTIS catalog for all campus libraries); the Aquatic Sciences and Fisheries Abstract database and the Regional Serials database (LLRC) on CD-ROM; and access to over 400 international databases through Dialog Information Services.

Planned expansion of these facilities includes obtaining required journal articles via high-speed facsimile equipment from campus branch libraries and other research facilities; access to other indexing services and SUNY campus library collections (via the main library); the expansion of CD-ROM databases online; and access to other collections via Internet.

The State University of New York at Stony Brook

MSRC is a part of the University at Stony Brook, which has been designated by the Carnegie Foundation as a Type I Research Institution, a ranking based on academic excellence and research funding awards, among other criteria. Since its establishment in 1957, Stony Brook has grown to occupy 103 buildings on an 1,100-acre campus set amid fields, orchards, woods, and a 26-acre nature preserve. Stony Brook's faculty have grown from 175 to 1,500 and the student body from 1,000 to 17,000, 6,000 of whom are graduate students.

One of the University's 103 buildings, the Staller Center for the Arts, is a modern concert hall-art gallery-office building that hosts national and international performances and exhibits. The campus recently added a new field house for larger sports matches and performances, with arena seating of 4,100 and a five-lane indoor track.

Research at Stony Brook pervades all disciplines, attesting to the diversity and vitality of its faculty. The annual research budget at Stony Brook currently exceeds $70 million. Stony Brook now ranks among the top 25 institutions receiving funding from the National Science Foundation. Graduate departments exist in all disciplines, with most of our science departments ranked among the nation's top 30 and several ranked among the top 20.

The presence on our campus of the many other fine departments, research institutes and centers, graduate school of business, college of engineering, and tertiary care facility hospital-health sciences center complex offers MSRC graduate students a wealth of additional resources for research, education, and personal opportunities to augment and expand their marine sciences experience.

The Faculty at MSRC

Josephine Y. Aller

Associate Research Professor
Ph.D., 1975
University of Southern California

The activities of bottom-dwelling organisms modify the physical and chemical properties of sediments very near the sediment-water interface and thereby influence a variety of ecological processes. My research interests concern (1) the importance of macrofauna and meiofauna on microbial metabolism and the decomposition of organic matter in marine sediments and (2) the impact of physical disturbance on the structure and functioning of benthic communities in marine environments.

One of the areas of current research in my laboratory involves the study of the structure and dynamics (recruitment, growth, survival, and activities) of the benthic community on one of the most physically active continental shelf environments in the world—the Amazon. This research is part of a multidisciplinary project to understand the impact of seasonal variability in the discharge conditions of the Amazon River on shelf processes. We are interested in elucidating the major physical, chemical, and biological factors controlling diagenetic and benthic community patterns and evaluating the importance of biological activities to sedimentary and geochemical processes on the shelf.

Other active research areas include (1) the examination of spatial and seasonal variability in biomass and abundance of bottom infauna in relation to oxygen demand and nutrient fluxes from the sediments in Long Island Sound; (2) an investigation into the impact of chronic low oxygen on survival, growth, metabolic rate, and reworking activities of benthic infauna; (3) a study of the bottom dwelling fauna in a deep-sea habitat, which is periodically disturbed by strong near-bottom currents; and (4) understanding the role of meiofauna in influencing nutrient exchange near the sediment-water interface.

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Aller, J.Y. Quantifying sediment disturbance by bottom currents and its effect on benthic communities in a deep-sea western boundary zone. Deep-Sea Research; 36(6):901-934; 1989.

Aller, J.Y.; Aller, R.C. General characteristics of benthic faunas on the Amazon inner continental shelf with comparison to the shelf off the Changjiang River, East China Sea. Continental Shelf Research; 6:291-310; 1986.

Robert C. Aller

Professor
Ph.D., 1977
Yale University

I am interested in diagenetic reactions involving the decomposition of organic matter and dissolution, mobilization, and reprecipitation of metals sensitive to oxidation-reduction reactions. These reactions are most intense and rapid in the upper meter, and especially in the upper 10 centimeters, of marine sediment. It is in this upper zone where most benthic organisms live and interact with sediments and where exchange of material between sediment and overlying water is largely determined. Knowledge of diagenetic processes occurring in this zone is, therefore, essential for understanding the chemistry of sediments and of water overlying the sediment, certain ecological interactions and adaptations of marine organisms, and long-term recording of historical information in marine deposits such as fossil preservation.

My students and I are currently studying selected aspects of sediment diagenesis and exchange rates of dissolved material across the sediment-water interface in a variety of coastal and deep-sea marine areas, including Long Island Sound, Florida Bay, the Amazon shelf, and Panama Basin. Our research places particular emphasis on the way macrobenthic organisms influence these processes and how to quantitatively model them. Large scale diagenetic patterns related to sedimentary facies and authigenic mineral formation are also emphasized. We have several collaborative projects with other MSRC faculty, including Josephine Aller, J. Kirk Cochran, Cindy Lee, Charles Nittrouer and James Mackin. Several of our research projects are listed here:

1) Interstitial water and sediment chemistry Fe, Mn, Al, F, chloropigments and products of SO_4 reduction are of special interest.
2) Rates and kinetics of authigenic mineral dissolution-precipitation reactions (e.g., $CaCO_3$) near the sediment-water interface. Rates are obtained by diagenetic modeling as well as by direct laboratory measurements.
3) Animal-sediment interactions, particularly biogeochemical, of macrobenthos living in soft-bottom regions of the sea floor.
4) Studies of diffusion coefficients in fine-grained sediments.
5) Effects of macrobenthic organisms on microbial metabolic activity and on the rate and distribution of biogenic and abiogenic reactions in the bioturbated zone of sediments.
6) The distribution of natural radionuclides of the U-Th series, particularly U-238, U-234, Th-234, and Pb-210 in bioturbated near-shore and deep-sea marine sediments.

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Edward Beltrami

Professor
Department of Applied Mathematics
Joint with MSRC
Ph.D., 1962
Adelphi University

My career has spanned a number of research areas, from theoretical work in operator theory and mathematical programming to more applications-oriented research in network optimization, stochastic processes, and differential equations. Much of this work has been in connection with models of urban and public sector operations and, most recently, with dynamical models in biomathematics, especially marine ecosystems. I have been a consultant to several planning agencies and municipal governments on problems ranging from refuse collection to coastal zone management.

My previous work has included the use of simple and transparent mathematical models to assess the impact of abatement schemes on coastal pollutions from runoff and wastewater disposal, and to estimate the susceptibility of coastal waters, such as those about Long Island and the Adriatic, to eutrophication. This work included the link to land use activities, and the design of an optimal configuration of treatment facilities.

Concurrent with this is my interest in the dynamics of harmful algal blooms in coastal waters, using mathematical models to determine thresholds that trigger and sustain these explosive growths of cells which have serious health and economic consequences. The models are also used to predict the temporal and spatial distribution of bloom episodes.

Beltrami, E.; Carroll, O. Modeling the role of viral disease in recurrent phytoplankton blooms. Journal of Mathematical Biology (in press, 1994).

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Beltrami, E. A mathematical model of the 'brown tide.' Estuaries 12: 13-17; 1989.

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Beltrami , E. Mathematics for Dynamic Modeling. Boston: Academic Press; 277 pp.; 1989.

Henry Bokuniewicz

Professor,
Associate Dean for Education,
Director of Graduate Studies
Ph.D., 1976
Yale University

My research is concerned primarily with the behavior of coastal sedimentary systems and especially the fate of fine-grained sediment particles. My students and I are doing field work to study the transportation of fine-grained sediments in rivers and estuaries, shore changes and the partitioning of sediment particles at the shoreline, and the deposition of sediments and sedimentary evolution in coastal environments. Research into elements of coastal hydrology and the character of changes in relative sea level are included in these studies. For example, we are studying the evolution of Long Island Sound, the coastal processes at the south shore of Long Island, and the processes of resuspension and deposition of fine-grained sediments.

Much of this research is directly applicable to problems of coastal zone management. I am interested in applying my research to the problems of shore erosion, the dispersion of contaminants, siltation, dredging and disposal of the dredged sediments, and marine mining.

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Gayes, P.T.; Bokuniewicz, H.J. Estuarine paleoshorelines in Long Island Sound, NY. Journal of Coastal Research 11:39-54; 1992.

Kim, B.H.; Bokuniewicz, H.J. Estimates of sediment fluxes in Long Island Sound Estuaries 14:237-247; 1991.

Bokuniewicz, H.J.; Pavik, B. Groundwater seepage along a barrier island. Biogeochemistry 10:257-276; 1990.

Bokuniewicz, H.J. Sand mining in New York Harbor. Marine Mining 7:7-18; 1988.

Malcolm J. Bowman

Professor
Ph.D., 1970
University of Saskatchewan

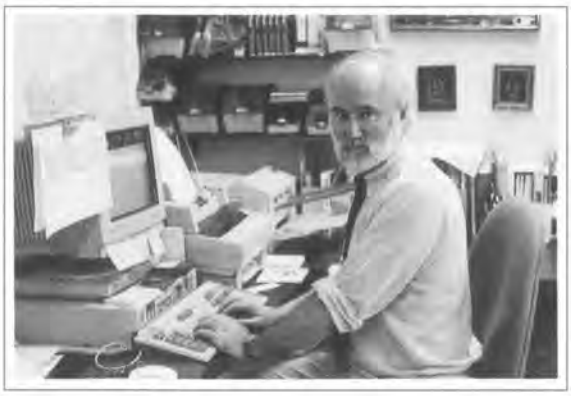
My current research interests focus on the dynamics of coastal fronts, eddies, river plumes, island wakes, and coastal sea straits.

I am presently collaborating with Drs. Robert Cowen and Kamazima Lwiza on an interdisciplinary study in the coastal seas of Barbados, West Indies to study island wake eddies and circulation and their roles in the life cycle of tropical reef fish.

A Second project in collaboration with Drs. Lwiza and Sam Wainright of Rutgers University is directed towards understanding the interactions and recirculation of the Hudson River plume as it flows into the New York Bight.

Most recently, I have begun a joint study with scientists at the University of Otago, New Zealand on the oceanography of Doubtful Sound, a major fjord on the southwestern coast of New Zealand.

Another recent project is modeling the circulation around the Hikurangi Eddy, a major mesoscale anticyclone located on the east coast of central New Zealand. This work is in collaboration with Ross Vennell at Otago University and David Dietrich of Mississippi State University.



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Visser, A.W.; Bowman, M.J.; Crawford, W. R. Dynamics of tidally forced basin-wide coastal eddies. In: Cheng, R., ed. Residual Currents and Long-term Processes in Shallow Estuaries and Bays. Coastal and Estuarine Studies; New York: Springer-Verlag; 1989.

Vincent T. Breslin

Assistant Professor
Ph.D., 1986
Florida Institute of Technology

As an environmental chemist, I am primarily interested in contaminant metals associated with particles and examining the mechanisms which influence the transport and leachability of these metals under different environmental conditions. I have developed several research programs examining chemical behavior of contaminant metals associated with solid wastes, soils, marine sediments, and suspended particulate matter.

My research activities primarily focus on understanding the chemical behavior of both particulate and stabilized combustion residues in the coastal ocean. My colleagues and I have been working to identify mechanisms that influence the ability of metals to leach from combustion residues in seawater. Our research has shown that the release of contaminant metals from combustion residues may be controlled through the process of stabilization using portland cement to form solid blocks. These blocks were used to form artificial habitats in Conscience Bay, Long Island Sound. By understanding the chemical behavior of combustion residues in seawater, we can better assess the potential impacts of these wastes in the ocean.

Along with other Waste Management Institute researchers, I have developed research programs evaluating various solid waste treatment technologies. My students and I recently completed a two-year study examining the rate and extent of deterioration of starch-plastic composites, so called "biodegradable plastics," in marine and terrestrial environments. Results of engineering and chemical testing of the films, along with the environmental conditions within an exposure site, were used to identify factors important for the rapid deterioration of these composites following disposal. In addition, we are also conducting research examining the chemical behavior of contaminant metals in municipal solid waste compost. My research interests are in identifying sources and variability of contaminant metals in MSW compost and examining the potential for the transport of contaminant metals in soils following compost application.

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V. Monica Bricelj

Associate Professor
Ph.D., 1984
State University of New York
at Stony Brook

My research interests lie in the areas of physiological ecology, bioenergetics, population biology and aquaculture of benthic macrofauna, especially commercially exploited bivalve molluscs. In recent years, my research efforts have been directed towards (1) investigating the interactions between phytoplankton (microalgae) and filter feeding herbivores such as mussels and clams and (2) studying factors that influence survival and growth of post-settlement bivalves in seagrasses.

Noxious algal blooms exert a major impact on the production of filter feeding shellfish populations. In turn, their grazing may contribute towards regulating phytoplankton populations in shallow coastal bays. "Brown tides" experienced in Long Island waters since the mid-1980s, and "red tides," which affect coastal shellfisheries worldwide, are only two well-publicized examples of such blooms. Using cultured dinoflagellates of varying cell toxicity, we are examining mechanisms of toxin detection in bivalves, modeling the kinetics of toxin uptake and depuration by shellfish, and investigating the transfer of toxins through the food chain.

Recently, the impact of paralytic shellfish poisoning has extended to the offshore fishery for surf clams on Georges Bank. We are currently studying the transfer and metabolic transformations of dinoflagellate toxins in surf clams, which retain toxins for extended periods.

"Brown tides" have decimated the bay scallop fishery on Long Island and reduced the biomass and extent of eelgrass cover, which provides an important nursery habitat for many benthic organisms. In turn, predation is the single most important source of natural mortality of juvenile bivalves. We are currently investigating the role of eelgrass in providing post-settlement scallops with a refuge from benthic predators (primarily crab species) in Long Island bays. This research will be applied towards the optimization of reseeding programs required to rehabilitate the bay scallop fishery in several east coast states.

Bivalves experience high mortalities during larval and postlarval development, especially following metamorphosis, during transition from a planktonic to benthic mode of life. We are conducting a collaborative study with the Universidad Autonoma de Baja California, Mexico to determine the relative vulnerability of early life history stages of oysters to nutritional stress and their use of catabolic substrates during development.

Bricelj, V.M.; Greene, M.; Cembella, A.D. Growth of mussels, *Mytilus edulis*, on toxic *Alexandrium fundyense*, and fate of dinoflagellate cells following gut passage. In: Smayda, T.J.; Shimizu, Y., eds. Phytoplankton Blooms in the Sea; New York: Elsevier; pp. 371-376; 1993.

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Bricelj, V.M.; Shumway, S. Physiology: energy acquisition and utilization. In: Shumway, S., ed. Scallops: biology, ecology and aquaculture. New York: Elsevier; pp. 305-337; 1991.

Bruce Brownawell

Assistant Professor
Ph.D., 1986
Massachusetts Institute of Technology/
Woods Hole Oceanographic Institution

I am interested in biogeochemical processes that affect the transport and fate of organic compounds in coastal, estuarine, and groundwater environments. I have been particularly interested in the aquatic chemistry of hydrophobic pollutant compounds. Understanding the biogeochemistry of pollutant compounds is important for managing coastal zone and groundwater resources and for remediating already contaminated sites.

Anthropogenically derived compounds can also provide valuable analogs for understanding the cycling of naturally produced organic compounds in the ocean. My research has focused on the behavior and transport of a variety of neutral, ionizable, and ionic compounds. In these studies I have been concerned with elucidating adsorption mechanisms of various compound classes with either sediments, soils, aquifer materials, or dissolved organic matter. Development of methods for determining activities of organic compounds in natural waters has been an important aspect of my work.

The questions that I am interested in addressing center around how the physical and chemical form of organic compounds (i.e., dissolved, bound, or complexed) affects their transport, availability to organisms, and the rates at which they are transformed chemically or by bacteria. I have interests in selected research topics in several additional areas, including atmospheric deposition of organic chemicals, aquatic photochemistry, and the biogeochemistry of surface sediments and groundwater environments.

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Schuytema, G.S.; Krawczk, D. F.; Griffis, W. L.; Nebecker, A.V.; Robideaux, M.L.; Brownawell, B.J.; Westall; J.C. Comparative uptake of hexachlorobenzene by fathead minnows, amphipods, and oligochaete worms from water and sediment. Environmental Toxicology and Chemistry 7:1035-1045; 1988.

Brownawell, B.J. The role of colloidal organic matter in the marine geochemistry of PCBs. Ph.D. Thesis, Woods Hole Oceanographic Institute/Massachusetts Institute of Technology Joint Program in Oceanography; 1986.

Brownawell, B.J.; Farrington, J. W. Biogeochemistry of PCBs in interstitial waters of a coastal marine sediment. Geochimica et Cosmochimica Acta 50:157-169; 1986.

Edward J. Carpenter

Professor
Ph.D., 1969
North Carolina State University

Our group has two major interests. One concerns nitrogen fixation in the sea. We work in tropical and subtropical waters on the biology and ecology of nitrogen fixation in the cyanobacterium *Trichodesmium*. Recently we have begun to use remote sensing techniques to study its distribution and factors affecting bloom phenomena.

Our second major interest centers on the measurement of species-specific growth rates of phytoplankton in the sea. We are attempting to determine factors that limit phytoplankton growth, as well as to understand the role of a species as a primary producer. This research requires a field program to collect phytoplankton and environmental data, and laboratory measurements on the samples using markers of various stages in the cell cycle, and epifluorescence and video microscopy to determine growth rates.

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Ben-Porath, J.; Carpenter, E.J.; Zehr, J. Genotypic relationships in the genus *Trichodesmium* based on nifH sequence comparisons. Journal of Phycology 29:806-810; 1993.

Roenneberg, T.; Carpenter, E.J. Daily rhythm of O_2 evolution in the cyanobacterium *Trichodesmium thiebautii* under natural and constant conditions. Marine Biology 117:693-697; 1993.

Carpenter, E.J. Nitrogen fixation in the epiphyllae and root nodules of trees in the lowland tropical rainforest of Costa Rica. Acta Œcologica 13(2): 153-160; 1992.

Carpenter, E.J.; Capone, D.G. Significance of *Trichodesmium* blooms in the marine nitrogen cycle. In: Carpenter, E.J.; Capone, D.G.; Rueter, J., eds. Marine Pelagic Cyanobacteria: *Trichodesmium* and other Diazotrophs. Dordrecht: Kluwer Academic Publishers; pp. 211-217; 1992.

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Chang, J.; Carpenter, E.J. Species-specific phytoplankton growth rates via diel DNA synthesis cycles. IV. Evaluation of the magnitude of error with computer simulated cell populations. Marine Ecology Progress Series 65:293-304; 1990.

Robert M. Cerrato

Associate Professor
Ph.D., 1980
Yale University

My research centers primarily around population and community dynamics of benthic animals. My students and I have been using information preserved as structural and morphological features in bivalve shells in a number of population studies.

Recent and ongoing work includes studies of the population dynamics of three species (*Mya arenaria, Mercenaria mercenaria* and *Spisula solidissima*); an investigation of growth line periodicity in larval and postlarval bivalve shells; development of statistical approaches useful in bivalve population studies; and, using shell remains from middens, the reconstruction of shellfish seasonal harvesting patterns by prehistoric hunter-gatherers. In the future, I plan to examine more closely the relationship between shell microgrowth patterns and physiological rate processes in bivalves.

With other MSRC faculty, I have also been studying the feasibility and environmental effects of several alternatives proposed for the disposal of dredged material in New York Harbor. As part of this research program, we have completed an extensive regional study of the benthos in Lower Bay of New York Harbor. This study was specifically designed to match the disparate sampling methods used in prior surveys of the bay conducted over the past 35 years. Analysis on this data base is allowing us to examine for the first time the detailed spatial and temporal structure of the benthos in Lower Bay.

Lightfoot, K.G.; Cerrato, R.M.; Wallace, H.V.E. Prehistoric shellfish-harvesting strategies: implications from the growth patterns of soft-shell clams (*Mya arenaria*). Antiquity 67:358-369; 1993.

Cerrato, R.M.; Keith, D.L. Age structure, growth and morphometric variations in the Atlantic surf clam, *Spisula solidissima*, from estuarine and inshore waters. Marine Biology 114:581-593; 1992.

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Cerrato, R.M. Interpretable statistical tests for growth comparisons using parameters in the von Bertalanffy equation. Canadian Journal of Fisheries and Aquatic Sciences 47:1416-1426; 1990.

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Robert D. Cess

Distinguished Professor
Ph.D., 1959
University of Pittsburgh

My research concentrates on two areas. One concerns theoretical and modeling studies of climate feedback mechanisms that can either amplify or diminish global climate change. A quantitative understanding of such mechanisms is a prerequisite to being able to project climate change caused by anthropogenic factors such as increasing greenhouse gases.

The second research area augments the first and concerns the acquisition and interpretation of both surface and satellite radiometric data. Thus, I have been involved with NASA's Earth Radiation Budget Experiment; their subsequent Clouds and the Earth's Radiant Energy System, which is part of the Earth Observing System; and DOE's Atmospheric Radiation Measurements Program. The focus of these observational programs is to obtain a better understanding of how clouds impact the present climate, so as to improve our capability of predicting how clouds impact climate change.

R. D. Cess; Zhang, M.-H.; Potter, G.L.; Barker, H.W.; Colman, R.A.; Dazlich, D.A.; Del Genio, A. D.; Esch, M.; Fraser, J. R.; Galin, V.; Gated, W.L.; Hack, J.J.; Kiehl, J. T.; Lacis, A. A.;Liang, X.-Z.; Mahfouf, J.-F.; McAvaney, B. J.; Meleshko, V. P.; Morcrette, J.-J.; Randall, D. A.; Roeckner, E.; Royer, J.-F.; Sheinin, D. A.; Sokolov, A. P.; Taylor, K. E.; Wang, W.-C.; Wetherald, R.T. Intercomparison of CO_2 radiative forcing in atmospheric general circulation models. Science 262: 252-1255; 1993.

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Andrei Y. Chistoserdov

Assistant Professor
Ph.D., 1985
Institute of Genetics and
Selection of Industrial Microorganisms
Moscow, Russia

My broad areas of interests are marine bacteriology and metabolism of amines in nature. Amines participate in a variety of fundamental cellular processes such as mRNA translation, secretion, neural and hormonal response, tissue differentiation, oncogenesis and, most importantly, they serve as osmolytes. Considerable amounts of carbon and nitrogen in the marine environment are sequestered in the form of amines released there by live organisms or *post mortem*.

One group of bacteria, which participates in metabolism of methylated amines draws my particular attention. These are methylotrophic bacteria. On the one hand, I am interested in molecular and cellular mechanisms which enable these bacteria to grow on Cl compounds, and on the other hand, I am interested in understanding the role of these bacteria in the marine environment.

Currently, I am extending my research to marine methylotrophs, because it is in the marine environment where methylotrophs play the most important ecological role. I am planning to survey systems of methylated amine metabolism (including not only methylotrophs but also methanogens) in marine isolates, to develop quantitative environmental probing methods (including quantitative PCR) of these systems in environmental samples and, thus, to study dynamics of methylotrophic populations and their role in methylated amine sinks. The problem of methylated amine sinks is, of course, tightly linked to the problem of sources in nature, and I am also planning to address this issue in the future.

Practical applications of methylotrophs are connected with the presence of a series of unique enzymes in these bacteria. I am interested in application of amine oxidizing enzymes to develop biosensors and in application of methylotrophic bacteria for developing microbial sensors. Another promising application of one of the groups of methylotrophs (methanotrophs) is the cleanup of aquifers which are contaminated with low molecular weight halogenated hydrocarbons, such as chloroform, dichloroethylenes, trichloroethylene, and trichloroethanes.

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J. Kirk Cochran

Professor
Acting Dean and Director
Ph.D., 1979
Yale University

My research group and I are using natural radionuclides, as well as those produced by activities such as atomic weapons testing, to study earth surface processes. The fact that different chemical elements are represented in the suite of radioactive nuclides permits studies of chemical behavior, and the property of radioactivity provides a clock with which to measure rates. Research Scientist David Hirschberg and I are using naturally occurring thorium isotopes to determine rates of particle cycling in the open ocean. This work, part of the Joint Global Ocean Flux Study, has as its goal an understanding of the fate of carbon in the ocean. The thorium isotopes provide a means of determining particle (and carbon) fluxes from the upper ocean. In coastal waters and estuaries like Long Island Sound, naturally occurring radionuclides provide tracers to determine rates of removal of contaminants from the water column.

We are also evaluating the importance of the atmosphere as a pathway for trace metals and organic contaminants to the Long Island Sound by using salt marshes as a recorder of the atmospheric inputs of metals to the estuary. Our results show that most of the lead, and significant amounts of copper and zinc in the sediments of the Sound are supplied by the atmosphere.

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Daniel Conley

Assistant Professor
Ph.D., 1993
University of California at San Diego/ Scripps Institution of Oceanography

My research interests relate to nearshore physical and geological oceanographic processes. I am particularly interested in interactions between fluids and sediments and how such interactions control nearshore morphology. My research into such interactions occurs over spatial scales ranging from individual sand grains to entire barrier island systems.

On the small scale, I am working on wave and current driven bottom boundary layers and studying how the presence of a loose granular material affects these layers. I am also looking at the basic mechanics of sediment mobilization by fluid and determining the parameters of importance in this process. My approach to studying these problems is to combine laboratory and field measurements in order to gain the greatest understanding of naturally occurring systems.

A recent area of investigation on the large scale concerns the dynamics of barrier island inlets. I am looking at how the development of new inlets affects the circulation and tidal characteristics of the back bays behind the islands and what feedback these changes provide towards the maintenance/shoaling of the old and new inlets. I am also interested in what role these inlets might play in the presence of nutrients and contaminants in the back bay regions. Long Island provides a unique natural laboratory for performing such studies.

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David O. Conover

Professor
Ph.D., 1982
University of Massachusetts

My research interests involve the ecology and evolutionary biology of fishes and fisheries science. I seek to understand the adaptive significance of reproductive, behavioral, physiological, or life history traits in fishes and to extend this knowledge to fundamental problems in resource management.

One interest of mine is to understand how the sex ratio evolves. I have been the first to show that sex determination in fishes is influenced by temperature during larval development. Most of this work has involved the Atlantic silverside, *Menidia menidia*, but the phenomenon is probably widespread. These findings are important not only in designing approaches to sex ratio manipulation in aquaculture, but also to understanding the causes of fluctuations in sex ratio among natural populations.

Another project concerns the recruitment of juvenile bluefish *(Pomatomus saltatrix)* to estuaries along the U.S. East Coast. My students and I are testing the hypothesis that young bluefish acquire a predatory size advantage over their principal prey by virtue of being spawned offshore early in the year and invading estuaries of the Middle Atlantic Bight at an advanced size, just as the growing season of the local prey species is beginning.

A new area of investigation concerns how growth rate is adapted to differences in seasonality that occur with latitude. In several species distributed along the east coast of North America, the length of the growing season declines with increasing latitude by a factor of about three. Yet body size at the end of the growing season is independent of latitude. Experimental studies on laboratory-reared fish explain this paradox: high-latitude fish have a higher genetic capacity for growth and grow two to three times faster within the growing season than do low-latitude fish.

This "countergradient variation" in growth rate appears to be widespread and may provide a general model for choosing natural stocks to be used in aquaculture: natural populations with the highest capacity for growth may be found where the growing season is shortest.

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Alessandra Conversi

Research Assistant Professor
Ph.D., 1992
University of California at San Diego/
Scripps Institution of Oceanography

I have been involved for a long time with various approaches to the evaluation of anthropogenic impacts on marine systems.

Originally I investigated the uptake and loss in the crab *Pachigraspsus marmoratus* of a radionuclide (technetium), which has been introduced into the ocean by human activities.

I later expanded the scale of my interest and focused on a problem which I consider central to the evaluation of pollution impact in the field: the distinction between human-induced variability from the natural variability of ocean properties.

This generated my interest in time-series. I studied the variability of four water quality parameters (temperature, oxygen, transmissivity, Secchi disk transparency) collected over 15 years in the Southern California Bight, around three major sewage outfalls. I found that some signals were common to the entire Bight and could not be related to discharge.

More recently I have become involved in the processes that translate science into governmental policy. At this time, I intend to pursue my two main interests: monitoring the water column, with particular emphasis on the detection of human pollution, and analysis of long (decadal) time series of oceanographic and environmental data.

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Conversi A. Time series studies, and the distinction of anthropogenic from natural variability. In: Proceedings of the U.S. - C.I.S. Arabian Sea Workshop, Sevastopol, Crimea, Ukraine, 20-25 September, 1993 (in press).

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Elizabeth M. Cosper

Research Associate Professor
Ph.D., 1981
City University of New York
City College

I am generally interested in the physiological ecology of marine phytoplankton. My research mainly involves the use of experimental laboratory systems to address environmental problems that are difficult to assess under field conditions.

In the past my research has involved a study of the effects on the production of a common marine diatom of fluctuation in light on natural time scales of variability. More recently, my research has centered on the factors affecting the ability of marine phytoplankton to develop resistance to toxic chemical pollutants and the ecological consequences of the development of this resistance. Concomitantly, one of my students and I have conducted studies of the significance of resting states of diatoms to their population dynamics and adjustment to stressful conditions, both natural and anthropogenic in origin.

Most recently, several of my students and I have become involved in both field and laboratory research into the causes of the "brown tide" blooms which have plagued Long Island embayments since 1985. I have isolated this microalga into culture and, along with other researchers at MSRC, we are conducting studies of its growth physiology to better explain its explosive growth during the summer months in local bay waters. We are also investigating any environmental conditions that could have contributed to the blooming of this previously undescribed phytoplankton species.

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Robert K. Cowen

Associate Professor
Ph.D., 1985
University of California at San Diego/
Scripps Institution of Oceanography

Recruitment variability in marine species is a major topic of research for fishery scientists and marine ecologists. Current interest in this topic has placed a premium on the early life history stages of marine organisms. The need to understand the biological and physical mechanisms that regulate the distribution and abundance of marine populations has forced us to peer into the "black box" of larval biology and ecology with a particular emphasis on how the larvae are adapted to the physical aspects of their pelagic realm.

An area ripe for such work is the coastal ocean. Not only is there strong interest in the coastal oceans, especially in terms of understanding their role in and response to global processes, but most of our fishery resources are closely tied to these waters. Most of my work to date has been conducted within two distinct systems, the shelf and slope waters of the Middle Atlantic Bight (MAB) and isolated, oceanic islands in the tropics (notably Barbados and, to a lesser extent, Bermuda). This work involves an interdisciplinary approach whereby the biology and behavior of larvae are examined in light of physical oceanographic processes.

Along the east coast, we are interested in both cross-shelf transport and larger scale processes involving the transport of fish from south of Cape Hatteras (South Atlantic Bite – SAB) into the local New York waters. The emerging view is that within-year and among-year variability in recruitment success of a variety of commercially and recreationally important fish species is driven by Bight-wide fluctuations in currents including the Gulf Stream, shelf and slope waters of the MAB, and, importantly, the exchange of water between the MAB and SAB.

My other project concerns recruitment processes of coral reef fish within Caribbean waters. In this ongoing study, we have been examining how the larvae of coral reef fish are retained and eventually returned to this isolated island. We are also examining the extent to which offshore supply of larvae (coupled with the physical processes responsible for their concentration) is important in contributing to successful settlement and recruitment to reef populations.

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Hare, J.A.; Cowen, R.K. Expatriation of *Xyrichtys novacula* (Pisces: Labridae) larvae: evidence of rapid cross-slope exchange. Journal of Marine Research 49:801-823; 1991.

Robert G. Currie

Research Associate Professor
Ph.D., 1966
University of California at Los Angeles

Although formally trained in solid earth geophysics, most of my work has involved signal processing of diverse sets of time sampled data. Signal processing involves spectrum analysis, convolution, deconvolution, etc. and is a discipline in electrical and electronic engineering.

In the past my research has involved analysis of geomagnetic and aeromagnetic survey data, reflection seismic records for oil exploration, as well as astronomical, earthquake, and other geophysical time series. Such series contain both narrow band (line spectra) and broad band signals.

More recently I have been working on time series simulated in Global Circulation Models (GCM) of the atmosphere, as well as diverse sets of measured climate parameters (air pressure, air temperature, rainfall, height of sea level, etc.). Surprisingly, it was found that spectra of GCM-simulated air pressure are extremely rich in lines. Aside from the seasonal term at 12 months and its first five harmonics (6, 4, 3, 2.4, 2 months), the well known quasi-biennial oscillation of period approximately 26 months, a less well known line at approximately 40 months, and a signal with period of approximately months, corresponding to the Chandler wobble of the solid earth were found. These latter three signals interact with the seasonal term and its harmonics to produce a rich spectrum of tones which can be explained in terms of elementary physics, the only requirement being that the atmosphere is weakly non-linear.

I have investigated existing methods of adjusting climate records such as rainfall to correct for changes in site, changes in instruments, etc., and found that the problem is model-dependent and more problematic than was recognized. I have also investigated the spectrum of climate from two to 20 years.

Currie, R.G. Luni-solar 18.6- and 10-11 year solar cycle signals in H.H. Lamb's Dust Veil Index. International Journal of Climatology (in press, 1994).

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Currie, R.G., Wyatt, T.; O'Brien, D.P. Deterministic signals in European fish catches, wine harvests, sea level, and further experiments. International Journal of Climatology 13:665-688; 1993.

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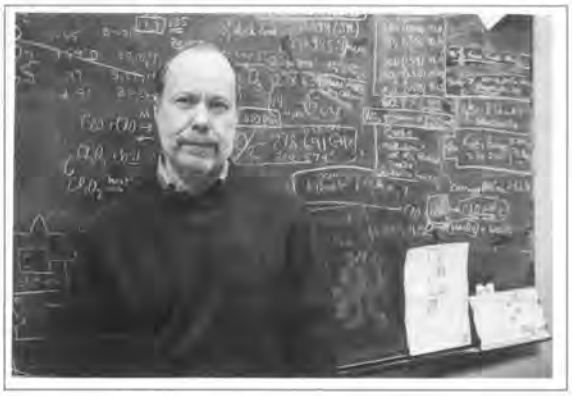
Robert L. de Zafra

Professor
Physics Department
Joint with MSRC
Ph.D., 1958
University of Maryland

I am a physicist who has been concerned with measuring chemical depletion of the stratospheric ozone layer for well over a decade. I and colleagues at Stony Brook developed a unique ground-based remote sensing spectrometer, able to identify and quantitatively measure molecular rotational emission spectra from stratospheric trace gases present in as little as a few tenths of a part per billion of ambient air pressure. With this instrument, we have been measuring and monitoring the destructive effects of chlorofluorocarbons on stratospheric ozone since 1981.

In 1986, we obtained the first proof, from data we collected in Antarctica, that the seasonal "Ozone Hole" discovered over that continent was caused by chlorine from chlorofluorocarbons, rather than other suggested reasons. Since 1986, I have returned four times to Antarctica (1987, 1991, 1992, and 1993) and have gone twice (1992 and 1993) to the Arctic with members of my research group to make further measurements and comparative studies of stratospheric chemistry and dynamics in the two polar regions.

I also have an ongoing concern with instrumentation, and much of the time between field trips is spent by me and my students in expanding the capabilities and improving the sensitivity of our two remote-sensing spectrometers. We are incorporating state-of-the-art technology in mm-wave receivers and other aspects of our instrumentation. The multidisciplinary requirements of our research give students a wide range of topics to work on.



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Nicholas S. Fisher

Professor
Ph.D., 1974
State University of
New York at Stony Brook

My research is concerned with the interactions of marine organisms with toxic chemicals. Most of these biogeochemically oriented studies focus on marine plankton and their interactions with select metals and long-lived radionuclides emanating from the nuclear fuel cycle. I explore the bioaccumulation and trophic transfer of chemicals, their impacts on the organisms, and the roles that the organisms play in mediating the cycling and vertical transport of these chemicals in the ocean. Experimentation generally employs radiotracer methodology, which enables working with environmentally realistic metal concentrations.

My research group and I are conducting experiments to determine the accumulation and cellular localization of metals in marine phytoplankton cells, the assimilation of metals in herbivorous animals, the gut pH of different types of planktonic herbivores, the bacterial degradation rate of different forms of biogenic debris, and the influence of these processes on the retention of metals in this debris. I am also currently trying to incorporate new production models to quantitatively assess the influence of different forms of sinking biogenic debris in vertically transporting metals in different water columns.

My other research interests include phytoplankton physiology and ecology, phytoplankton-herbivore interactions, the nature of element binding to particle surfaces, marine colloids, and metal geochemistry.

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Luoma, S.N.; Johns, C; Fisher, N.S.; Steinberg, N.A.; Oremland, R.S.; Reinfelder, J.R. Absorption of organo-selenium and elemental selenium via ingestion in the bivalve *Macoma balthica*. Environmental Science and Technology 26: 485-491; 1992.

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Roger D. Flood

Associate Professor
Ph.D., 1978
Massachusetts Institute of Technology/
Woods Hole Oceanographic Institution

I am presently studying sedimentation in several marine and fresh water environments. I am particularly interested in the use of high-resolution methods, including geophysical techniques (side-scan sonar, seismic profiling, shear-wave analysis, and bathymetry); photography; submersible and diver sampling; and sediment analysis, to provide new insights into sedimentary processes. My current research interests focus on processes in active sedimentary environments (including the deep sea, continental margins, large lakes, and estuaries) and with the study of bedforms in cohesive sediment.

My students and I have also been studying the structure and development of submarine fans on the continental margin. These major sediment bodies contain much of the sediment eroded from continents during sea level lowstands. Our intensive geophysical and sedimentological studies have demonstrated some of the complexity of these systems and helped to clarify processes responsible for fan development. A drilling program on the Amazon Fan in 1994 will study this important deposit.

Also, recent bedform studies have been conducted in the deep sea along the U.S. continental margin and in the Argentine Basin, in the Great Lakes, and in the Hudson River. Bedforms created by flowing waters can be used to understand both local and regional sediment transport and depositional patterns and distribution of contaminants. Our studies help to understand both the complex flow-sediment interactions that cause and maintain bedforms in cohesive sediments, bedform-animal interactions, and contaminant distribution patterns.

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Jane L. Fox

Professor
Ph.D., 1978
Harvard University

My research group is involved with numerical modeling of the chemical and thermal structures, luminosity, and evolution of the thermospheres-ionospheres of the Earth and planets. Recently, an important focus has been the nightside ionosphere of Venus and the ultraviolet "auroral" emissions observed there by the Pioneer Venus spacecraft. We have suggested that the emissions are produced by impact of soft electrons that have been observed in the umbra of the planet, and we are modeling the electron-energy deposition to determine their spectrum. Using a combination of modeling and analysis of ion composition data from Pioneer Venus, we hope to elucidate the relative roles of electron impact and ion transport in producing the nightside ionosphere.

We are also investigating the ionospheric structure, odd nitrogen chemistry, and evolution of the Martian atmosphere. The increased knowledge of the ionosphere of Venus gained from Pioneer Venus has enabled us to better understand the Martian ionosphere, which has a similar composition, but for which there are fewer measurements. The $^{15}N/^{14}N$ ratio measured by the Viking spacecraft showed that the ratio is enhanced over that found in the terrestrial atmosphere, presumably due to selective escape of ^{14}N. We have modeled the non-thermal escape processes over the age of the solar system to determine the initial nitrogen inventory.

The Jovian ionosphere has also been a focus of our research, especially the hydrocarbon ion chemistry, H_3^+ densities and vibrational distributions. Infrared emissions, which have been attributed to vibrational transitions of H_3^+, have been observed from the Jovian polar regions in the 2 - 4 μm range. We have modeled the vibrational distribution of H_3^+ in order to identify the production mechanisms, and predicted the emission rates. In collaboration with Dr. Roger Yelle at the University of Arizona, we are studying the ionospheric composition and structure, odd nitrogen chemistry, and heating efficiencies in the thermospheres of Titan and Triton, which are satellites of Saturn and Neptune, respectively.

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Marvin A. Geller

Professor
Ph.D., 1969
Massachusetts Institute of Technology

I first became fascinated with the study of atmospheric dynamics in graduate school. Since that time, my main research has been on the dynamics of the middle atmosphere, the stratosphere and mesosphere, and how these motions transport such constituents as ozone. I do theoretical modeling work and also observational analysis on these topics. It is important to be very cognizant of observational results when doing theory and being equally as cognizant of theoretical results when analyzing observations.

My work on upper atmosphere dynamics leads me to use satellite data, since much of the middle atmosphere lies above the reach of conventional weather balloon data. In particular, a great deal of my present effort is focused on the analysis of data from NASA's Upper Atmosphere Research Satellite (UARS). UARS data on solar radiation and energetic particle flux, atmospheric composition, and winds are available on the UARS Remote Access Computer at Stony Brook. To me, the availability of new data coupled with the use of state-of-the-art models on a topic as interesting and important as stratospheric ozone represents a rare scientific opportunity.

Another facet of my research involves the interaction of the atmospheric water cycle with dynamics. Solar heating of the oceans leads to intense precipitation in the tropics. The liberation of the latent heat of condensation connected with this tropical precipitation represents the principal energy source for atmospheric motions. As an investigator on the joint Japanese/NASA Tropical Rainfall Measuring Mission (TRMM) to be launched in 1997, I am looking into ways to use this new data source to better understand these interactions between the water cycle and atmospheric dynamics.

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Valrie A. Gerard

Associate Professor
Ph.D., 1976
University of California, Santa Cruz

My research interests focus on the ecology and physiology of seaweeds, particularly species which are important as primary producers in marine ecosystems or as commercial aquaculture crops. Much of my recent research examines genetic variation among populations of the common kelp, *Laminaria saccharina*, which occurs throughout the northern hemisphere. The wide geographic range of this species is partly due to its ability to adapt genetically to different environmental conditions.

I have identified several genetic varieties, or ecotypes, of *L. saccharina*. These ecotypes show different responses to light, nutrients, and temperature conditions, and genetic differences are expressed in both the large, spore-producing phase and the microscopic, sexual phase of the life-cycle.

My current research utilizes ecotypes from Long Island Sound, the New England coast, and the Arctic to examine mechanisms of temperature adaptation in algae. By comparing temperature effects on carbon-metabolism and on activities of key metabolic enzymes for these populations, I hope to discover the physiological and biochemical basis of high-temperature tolerance.

Other recent research in my laboratory included a study of effects of environmental stress imposed during early development. Microscopic kelp plants exposed to low light, low nutrients, or high temperature for several weeks recovered rapidly when returned to optimal growth conditions. These results indicate that plants germinated during seasons with unfavorable environmental conditions do not suffer long-term effects.

My newest research is aimed in a new direction – saltmarsh ecology. Preliminary work during the past several summers suggested that small marshes, mainly remnants of coastal development, function somewhat differently than large marshes, few of which remain on Long Island. An ongoing study will examine those differences.

Burgman, M.A.; Gerard, V.A. A stage-structured, stochastic population model of the giant kelp *Macrocystis pyrifera*. Marine Biology 105:15-23; 1990.

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Gerard, V.A.; Dunham, S.; Rosenberg, G. Nitrogen-fixation by cyanobacteria associated with *Codium fragile* (Chlorophyta): environmental effects and transfer of fixed nitrogen. Marine Biology 105:1-8; 1990.

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Gerard, V.A. Hydrodynamic streamlining of *Laminaria saccharina* Lamour in response to mechanical stress. Journal of Experimental Marine Biology and Ecology 107:237-244; 1987.

Theodore D. Goldfarb

Professor
Department of Chemistry,
Joint with MSRC
Ph.D., 1959
University of California, Berkeley

In recent years my research interests have shifted from physical chemical investigations of the structure and reactivity of molecules to the application of physical chemical methods to real world environmental problems. The pollution problems resulting from the use of agricultural chemicals, the production of energy, and the disposal of waste encompass the range of issues that I have joined with scientists in other disciplines to explore.

Our present activities are focused on the environmental consequences of alternative means of addressing the need to dispose of both municipal and industrial waste, including incineration, waste reduction, reuse, composting, and recycling. Related to this work is my interest in the interactions between science and public policy.

Goldfarb, T.D.; Malloy, T.A.; Surico, M.T.J. PCDDs, PCDFs, PCBs, Chlorophenols (CPs) and Chlorobenzenes (CBzs) in samples from various types of composting facilities in the United States. Chemosphere 27:325-334; 1993.

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William H. Greene

Clinical Associate Professor of Medicine,
Division of Infection Control
Health Sciences Center,
Joint with MSRC
M.D., 1968
State University of New York Downstate

My research interests have evolved from that of infectious complications in patients with neoplastic disease to the more general area of infectious complications of hospitalized patients. This latter field, hospital-acquired infections, has traditionally also included infection prevention methods for health-care workers and visitors, as well as patients.

In turn, recent priorities in society have brought to the fore the management of medical waste, particularly the minimization of infectious hazards in its generation, transport, and disposal. My current research interests revolve around the clinical investigation of experimental antibiotics; the prevention of hospital-acquired infection, particularly of the respiratory tract; and the medical implications of waste handling for health-care workers, solid waste personnel, and communities surrounding landfills.

Donelan, S.; Singh, F.; Green, W. A staphylococcal nursery outbreak in circumcised males possibly related to photography by volunteers. Proceedings of the 2nd Annual Meeting of the Society for Hospital Epidemiology of America; Baltimore; 1992.

Marchese, J.T.; Marshall, G.B.; LaValle, R.F.; Greene, W.H. Regulated medical waste disposal at a university and university hospital: future implications. Preceedings, 3rd International Conference on Nosocomial Infections; Atlanta; August, 1990.

Sultan Hameed

Professor
Ph.D., 1968
University of Manchester

My research interests focus on understanding the nature and causes of climatic changes. At this time, I am pursuing the following approaches:

1) Analysis of large scale climatic oscillations: multi-year simulations of climate by coupled ocean-atmosphere General Circulation Models have been analyzed to identify the signatures of Southern Oscillation, the North Atlantic Oscillation, the North Pacific Oscillation, the Quasi-Biennial Oscillation, and the Chandler Wobble as natural oscillations of the system. Present work is directed at diagnosing the physical processes underlying these phenomena.

2) Deterministic signals vs. noise in climate: contributions of the seasonal cycle in generating deterministic signals on the interannual and intra-annual time scales have been analyzed in multi-year GCM simulations and in observations. Current research aims to quantify the contributions of noise and deterministic influences on the fluctuations of a range of climatic variables.

3) Study of regional climates: global climate models have been found to be useful in the analysis of seasonal and interannual variation of precipitation in several regions of interest such as Northeast Brazil, Sahel, and Eastern China. Our present efforts are aimed at deciphering the physical processes that contribute to climate variations in these regions and identifying additional regions where presently available global models can be useful in the study of regional climatology.

4) Reconstruction of past climates by the use of proxy data in Chinese historical documents: histories of precipitation and temperature in Eastern China extending to 2,000 years ago have been analyzed. The role of the drought of 1627-1642 in the downfall of the Ming Dynasty was illustrated. Currently we are analyzing the impact of climatic changes on the historical development of China.

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Hameed, S.; Pittalwala, I. The North Pacific oscillation: observations compared with simulations in a General Circulation Model. Climate Dynamics 6:113-122; 1991.

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Currie, R.G.; Hameed, S. Atmospheric signals at high latitudes in a coupled ocean-atmosphere general circulation model. Geophysical Research Letters 17:945-948; 1990.

Hameed S.; Currie, R.G. Simulation of the 14 month Chandler Wobble in a global climate model. Geophysical Research Letters 16:247-250; 1989.

Stewart Harris

Professor
College of Engineering and Applied Sciences
Joint with MSRC
Ph.D., 1965
Northwestern University

I am interested in transport processes that occur in a variety of situations of topical interest. Mainly, I study the diffusion of gases through some complex medium as occurs when the methane created in a solid waste landfill migrates into the surrounding neighborhood.

On a much finer scale, I am also concerned with the diffusion processes that are the basis for fabricating microelectronic circuits.

Harris, S. Microscopic theory of epitaxial growth on vicinal surfaces. Physical Review B 47:10738; 1993.

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Harris, S. Interface motion for mass redistribution at small supersaturation. Journal of Chemical Physics 93:9031; 1990.

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Harris, S. Steady 2-D Brownian motion with an absorbing boundary. Physical Review A 39:307; 1989.

Herbert Herman

Professor
Department of Materials Science
Joint with MSRC
Ph.D., 1961
Northwestern University

My research activities in ocean engineering involve principally marine materials. We have a long-term program underway aimed at the protection of materials at sea. Our work, much of which is supported by the U.S. Navy, involves the thermal spray metallization of structural steel, yielding long-term corrosion protection in a wide range of industrial and marine environments.

We also have a joint program with the New York and New Jersey Port Authority on corrosion protection of marine-related structures. Research and testing programs, with use of the above and related corrosion control techniques, are being carried out cooperatively with industrial and government organizations.

Herman, H. A structural investigation of plasma sprayed Ni-Cr based alloy coatings. Journal of Materials Research (in press).

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Spanne, P.; Jones, K.W.; Herman, H.; Riggs, W. Measurement of imperfections in thermal-sprayed coatings using synchrotron-computed microtomography. Jouranl of Thermal Spray Technology (in press).

Varacalle, D.J.; Jacox, M.G.; Hartenstine, J.R.; Herman, H.; Bancke, G.A. Fabrication of tungsten coating and monoliths using vacuum plasma spray process. Surface Coating and Technology (in press).

Varacalle, D.J.; Herman, H.; Bancke, G.A.; Riggs, W.L. Vacuum-plasma sprayed alumina-titania coatings. Surface and Coatings Technology (in press)

Chen, Z.J.; Herman, H.; Tiwari, R.; Huang, C.C.; Cohen, R. Vacuum plasma sprayed mechanofused Ni-Al composite powders and their intermetallics. Proc. Intern. Thermal Spray Conf. Orlando; pp. 355-361; 1992.

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Wang, H.; Gudmundsson, B; Neiser, R.A.; Herman, H. The effects of argon pre-annealing on the superconductive properties of plasma-sprayed Y-Ba-Cu-oxide coatings. In: Whang, S.H.; DasGupta, A; Laibowitz, R., eds. High temperature superconducting compounds II. The Minerals, Metals & Materials Society; pp. 141-150; 1990.

L. E. Koppelman

Professor
Center for Regional Policy Studies
Joint with MSRC
Ph.D., 1970
New York University

My major research over the past decade and a half generally has been concerned with the environmental policy aspects of regional planning and has been specifically directed towards coastal zone management. This has included being project manager over almost $20 million in directed research, including coastal regional planning, comprehensive water management, shoreline erosion practices, and related studies.

In addition to the development of legislation related to coastal zone management and the design of administrative mechanisms for policy implementation, I am particularly involved in the development of synthesis techniques for relating coastal zone science into the regional planning process.

In October 1988 I was appointed Director of the Center for Regional Policy Studies, which currently is carrying out a number of research projects dealing with governmental productivity, strategic economic planning, and environmental planning. I also serve as Executive Director of the Long Island Regional Planning Board and, beginning April 1991, undertook staff responsibility for the Bicounty Temporary State Commission on Tax Relief for Long Island.

Koppelman, L.E.; Kunz, A.; Kamer, P.; Davies, D.; Junor, T. Airport joint use feasibility study: Calverton Airport. Long Island Regional Planning Board; Hauppauge, NY; 248 pp; 1993.

Koppelman, L.; Kunz, A.; Rosenberg, F. Financing government on Long Island. New York State Temporary Commission for Tax Relief on Long Island. Working paper and final report; 1992.

Koppelman, L. Jurisdiction. In: Schubel, J.R.; Bell, T.M.; Carter, H.H., eds. The Great South Bay. Albany, NY: State University of New York Press; pp. 75-82; 1991.

Koppelman, L. Uses, misuses and abuses of the bay. In: Schubel, J.R.; Bell, T.M.; Carter, H.H., eds. The Great South Bay. Albany, NY: State University of New York Press; pp. 83-88; 1991.

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Koppelman, L.; DeChiara, J. Time saver standards for site planning. New York: McGraw Hill; 1982.

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Koppelman, L.; Kunz, A.; Tannenbaum, E. Special Ground-water Protection Area Plan. Hauppauge, NY: Long Island Regional Planning Board; 425 pp.; 1991.

Cindy Lee

Professor
Ph.D., 1975
University of California at San Diego/
Scripps Institution of Oceanography

My research is concerned with the distribution and behavior of biogenic organic compounds in the marine environment. Understanding how organic compounds behave requires knowledge of the biological, geological, and physical processes in the sea. Most biogenic organic compounds are produced in surface waters by phytoplankton as a result of photosynthesis. These compounds can enter the marine food chain by acting as food for bacteria or zooplankton. Organic compounds can also be affected by chemical and physical processes such as adsorption, photochemical degradation, and transport by currents. I am interested in the rates and mechanisms of the transformation reactions which occur as organic compounds are affected by these processes. To study transformation reactions, my students and I use radiolabeled compounds as tracers to simulate the behavior of naturally occurring compounds. We also identify and measure the amount of individual organic compounds present in the environment with analytical techniques like gas chromatography, mass spectrometry, and high performance liquid chromatography (HPLC).

I am interested in the behavior of organic compounds in all environments, particularly, sediments and waters of open ocean and coastal areas, salt marshes, and lakes, as well as the atmosphere above these areas. A knowledge of the behavior of biogenic organic compounds in the environment will help us in practical ways. For example, we can better understand the formation of coal and oil deposits if we know how organic matter is produced, decomposed, and preserved. We may also be able to use the behavior of naturally occurring organic compounds as models in predicting the behavior of organic pollutants in the environment.

Lee, C.; Henrichs, S.M. How the nature of dissolved organic matter might affect the analysis of dissolved organic carbon. Marine Chemistry 41:105-120; 1993.

Hedges, J.I.; Lee, C.; Wakeham, S.G.; Hernes, P.J.; Peterson, M.L.. Effect of poisons and preservatives on the fluxes and elemental composition of sediment trap materials. Journal of Marine Research 51:651-668; 1993.

Pantoja, S.; Lee, C.; Marecek, J.F.; Palenik, B.P. Synthesis and use of fluorescent molecular probes for measuring cell-surface enzymatic oxidation of amino acids and amines in seawater. Analytical Biochemistry 211:210-218; 1993.

Sun, M.; Lee, C.; Aller, R.C. Laboratory studies of oxic and anoxic degradation of chlorophyll-a in Long Island Sound sediments. Geochimica et Cosmochimica Acta 57:147-157; 1993.

Wakeham, S.G.; Hedges, J.I.; Lee, C.; Pease, T. Effect of poisons and preservatives on the composition of organic matter in a sediment trap experiment. Journal of Marine Research 51:669-696; 1993.

Yang, X.-H.; Lee, C.; Scranton, M.I. Determination of nanomolar amounts of individual dissolved low molecular weight amines and organic acids in seawater. Analytical Chemistry 64:572-576; 1993.

Lee, C. Controls on organic carbon preservation: the use of stratified water bodies to compare intrinsic rates of decomposition in oxic and anoxic systems. Geochimica et Cosmochimica Acta 56:3323-3335; 1992.

Lee, C.; Wakeham, S.G. Organic matter in the water column: future research challenges. Marine Chemistry 39:95-118; 1992.

Jeffrey S. Levinton

Professor
Department of Ecology and Evolution
Joint with MSRC
Ph.D., 1971
Yale University

I am interested in a broad range of topics, all relating to marine benthic ecology and evolutionary biology. Most of my research has centered around the biology of deposit feeding marine invertebrates, including: the role of microbial and particulate organic food sources in their nutrition; the mechanics of deposit feeding and response to flow by bivalve mollusks; the role of depositing organic matter in the subsidy of deposit feeding populations.

I have recently initiated a study of the biomechanics, morphometrics, and molecular evolution of fiddler crabs of the genus *Uca* (Ocypodidae). The objective is to see how sexual selection and natural selection influence morphological evolution, particularly of the chelipeds. This research involves comparative study of the over 60 species of *Uca*, biomechanical studies of claw closing force, and DNA sequencing of slowly evolving genes, to establish order of divergence and associations between evolutionary rate and timing with the evolution of behavioral traits.

Finally, I am working on the evolution of metal resistance, with particular emphasis on the cadmium polluted Foundry Cove in the Hudson River. We are now investigating the physiological and molecular aspects of metallothionein evolution and are also using other molecular markers to study the degree of differentiation between metal-adapted and normal populations. With Drs. Nicholas Fisher and Glenn Lopez, I am also studying the cycle of release of metals from the cove and export to the Hudson River, especially with regard to biological influences.

Martinez, D.; Levinton, J. Asexual metazoans undergo senescence. Proceedings of the National Academy of Science 89: 9920-9923; 1992.

Levinton, J.S. The big bang of animal evolution. Scientific American pp. 84-91;1992.

Levinton, J.S. Variable feeding behavior in three species of *Macoma* (Bivalvia: Tellinacca) as a response to water flow and sediment transport. Marine Biology 110: 375-383; 1991.

Klerks, P.L.; Levinton, J.S. Rapid evolution of resistance to extreme metal pollution in a benthic oligochaete. Biological Bulletin 176:135-141; 1989.

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Levinton, J.S. Genetics, Paleontology, and Macroevolution; Cambridge University Press; 637 pp.; 1988.

Levinton, J.S. Marine Ecology; Englewood Cliffs; Prentice Hall; 526 pp.; 1982.

Darcy J. Lonsdale

Associate Professor
Ph.D., 1979
University of Maryland

My research addresses ecological and evolutionary problems related to marine invertebrates, especially copepods. I have focused on measuring and understanding the significance of variations in life history and physiology among estuarine copepod populations; e.g. as adaptive responses to age-specific mortality and water temperature. To understand the selective forces that may drive life-history variation, I have investigated planktonic trophic interactions, and have demonstrated the importance of predation in zooplankton feeding and population dynamics. I have used both laboratory studies showing the genetic basis of phenotypic variation among copepod populations, and field and modeling studies suggesting environmental factors that influence copepod fitness, to illustrate the significance of life-history variation.
An exciting aspect of the Marine Sciences Research Center is the opportunity to develop interdisciplinary projects with other faculty. These collaborations have resulted in new approaches (e.g., a biological-physical model to address the effect of physical parameters on copepod recruitment, Gupta et al., in press), and research that addresses broader ecological problems pertaining to coastal environments (e.g., the effects of the "brown tide" on microbial food web processes with Dr. G.T. Taylor).

My most recent work on life-history variation has focused on the unusual ability of fertilized adult female copepods to enter a "reproductive-resting" stage during the late fall that would allow them to overwinter and produce nauplii (larvae) in early spring. An overwintering strategy would increase copepod fitness by delaying reproduction until harsh winter conditions have ameliorated. Laboratory studies show that the environment-triggered switch is under tight genetic control, and that population differences in day length necessary to trigger the stage likely reflect latitudinal variation in the period over which environmental conditions are conducive to population growth.

Another current investigation builds on my previous study on reproductive compatibility among genetically distinct populations of an harpacticoid copepod. Identifying the barriers to gene exchange, such as the biological mechanisms of reproductive isolation (pre- and post-mating) among populations, is essential for understanding the process of speciation. Currently, Dr. Terry Snell (Georgia Institute of Technology) and I are conducting a pilot study that suggests that certain molecules are involved in mate recognition of this copepod. Ultimately, we would like to determine if chemical differences have evolved among copepod populations that contribute to pre-mating barriers.

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Lonsdale, D.J.; Jonasdottir, S.H. Geographic variation in naupliar growth and survival in a harpacticoid copepod. Biological Bulletin 179:113-120; 1990.

Lonsdale, D.J.; Levinton, J.S. Energy budgets of latitudinally separated *Scottolana canadensis* (Copepoda: Harpacticoida). Limnology and Oceanography 34(2):324-331; 1989.

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Glenn R. Lopez

Professor
Ph.D., 1976
State University of
New York at Stony Brook

I am a benthic ecologist interested in many aspects of life in sediment. My students and I are exploring the enigmatic nature of head-down deposit feeders. These animals are subjected to condtions of low organic carbon for food, low oxygen for respiration, and high levels of toxic sulfide. We are investigating several strategies animals use to live and thrive under these conditions. This work integrates approaches from several fields, including physiology, geochemistry, and ecology. We are also studying how deposit-feeding animals grow, shrink, and regrow, and the biological meaning of allometric shifts.

I am working with geological oceanographer Charles Nittrouer on the roles of physical and biological forces in controlling the development of sediment structure. Finally, I am involved in research on the roles of benthic animals on degradation and trophic transport of sediment-bound pollutants.

Lopez, G.R. Absorption of microbes by benthic macrofauna by the C-14:Cr-51 dual labelling method. In: Kemp, P.; et al., eds. Current Methods in Aquatic Microbial Ecology; Boca Raton, Fl: Lewis Publishers; pp.: 739-744; 1993.

Clough, L.M.; Lopez, G. Potential carbon sources for the head-down deposit feeding polychaete *Heteromastus filiformis*. Journal of Marine Research 31:1-22; 1993.

Ahn, I.-Y.; Lopez, G.; Malouf, R. The effects of the gem clam, *Gemma gemma*, on early post-settlement emigration, growth and survival of the hard clam, *Mercenaria mercenaria*. Marine Ecology Progress Series 99:61-70; 1993.

Cheng, I-J.; Lopez, G.R. Contributions of bacteria and sedimentary organic matter to the diet of *Nucula proxima*, a deposit-feeding protobranchiate bivalve. Ophelia 34:157-170; 1991.

Lopez, G; Elmgren, R. Feeding depths and organic absorption by *Pontoporeia femorata* and *Pontoporeia affinis*. Ann. Zool. Fennici 27:305; 1991.

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Forbes, V.E.; Lopez, G.R. The role of sediment type in growth and fecundity of mud snails (Hydrobiidae). Ecologia (Berlin) 83:53-61; 1990.

Lopez, G; Elmgren, R. Feeding depths and organic absorption for the deposit-feeding benthic amphipods *Pontoporeia affinis* and *Pontoporeia femorata*. Limnology and Oceanography 34:982-991; 1989.

Lopez, G.R.; Taghon, G.; Levinton, J., eds. Ecology of marine deposit feeders. New York: Springer-Verlag; 322 pp.; 1989.

Lopez, G.R. Comparative ecology of the macrofauna of freshwater and marine muds. Limnology and Oceanography; 33:946- 962; 1988.

Lopez, G.R.; Levinton, J.S. Ecology of deposit-feeding animals in marine sediments. Quarterly Review of Biology 62:235-260; 1987.

Kamazima M.M.Lwiza

Assistant Professor
Ph.D., 1990
University of Wales

My research interests are the structure and dynamics of the shelf-seas and remote sensing oceanography. With colleagues from the United Kingdom, I conducted a study of the dynamics of shelf-sea fronts in the North Sea. For the study we developed a technique capable of removing tides from ship-borne acoustic Doppler current profiler (ADCP) measurements.

In 1991 I worked on a project in the North Sea to map the sea bottom topography (with sand waves of up to 4 m high). We used a helicopter-born scatterometer (HELISCAT) to measure the sea surface roughness backscatter, complemented by ship and aircraft measurements. The aircraft took sunglint images with an Airborne Thematic Mapper (ATM), while the ship measured physical water properties and the near-surface current modulation.

Results show that accurate interpretation of radar images of sea surface roughness related to bottom topography, requires calm weather and non-stratified conditions. If the water is stratified, internal waves tend to develop and consequently phase-shift the location of the peaks of the backscattered signal.

Recently, I have been working with Dr. Steve Morgan, a larval ecologist at MSRC, to study the physical and behavioral regulation of larval transport between the New York Bight apex and the Hudson River estuary.

Bowers, D.G.; Lwiza, K.M.M. The temperature minimum at tidal fronts (submitted, 1994).

Matthews, J.P.; Wissmann, V.R.; Lwiza, K.M.M.; Romeiser, R.; Hennings, I. de Loor, G.P. A study of frontal boundaries near the Rhine plume by radar scatterometer, airborne thematic mapper and in-situ techniques (submitted, 1994).

Hill, A.E.; James, I.D.; Linden, P.F.; Matthews, J.P.; Prandle, D.; Simpson, J.H.; Gmitrowicz, E.M.; Smeed, D.A.; Lwiza, K.M.M.; Durazo-Arivizu, R.; Fox, A.D.; Bowers, D.G. Dynamics of tidal mixing fronts in the North Sea. Philosophical Transactions of the Royal Society of London 343: 431-446, 1993.

Lwiza, K.M.M.; Bowers; D.G.; Simpson, J.H. Residual and tidal flow at a tidal mixing front in the North Sea. Continental Shelf Research 11(11):1379-1375; 1991.

Lwiza, K.M.M.; Bigendako, P.R. Kunduchi tides. Tanzania Journal of Science 14:65-76; 1988.

Iaversen, S.A., Myklevoll, S., Lwiza, K.M.M.; Yonazi, J. Tanzania marine fish resources in the depth region 10-500 m invstigated by R/V *'Dr Fridtjof Nansen'*. The proceedings of the NORAD-Tanzania seminar to review the marine fish stocks and fisheries in Tanzania. Mgegani, Tanzania, March 1984.

James E. Mackin

Associate Professor,
Ph.D., 1983
University of Chicago

My research emphasizes theoretical and practical aspects of organic matter and clay mineral diagenesis in marine sediments. The goal of this research is to determine the influence of reactions involving major phases of sediments on both present day ocean chemistry and sedimentary rock chemistry and mineralogy. I am, therefore, interested in solid-solid transformations as well as the behavior of solutes during early diagenesis in sediments. Field and laboratory experimental work are essential components of this research.

Mackin, J.E. Relationships between Si, Al, and Fe deposited on filter-covered glass substrates in marine sediments and in suspensions of sediments and standard clays. Marine Chemistry 26: 101-117, 1989.

Mackin, J.E.; Aller, R.C. The nearshore marine and estuarine chemistry of dissolved aluminum and rapid authigenic mineral precipitation. Reviews of Aquatic Science 1:537-554; 1989.

Mackin, J.E.; Swider, K.T. Organic matter decomposition pathways and oxygen consumption in coastal marine sediments. Journal of Marine Research 47: 681-716; 1989.

Michelson, A.R.; Jacobson, M.E.; Scranton, M.I.; Mackin, J. Factors controlling the distribution of acetate in anoxic marine and estuarine sediments. Limnology and Oceanography 34:747-757; 1989.

Mackin, J.E.; Aller, R.C.; Ullman, W.J. The effects of iron reduction and nonsteady-state diagenesis on iodine, ammonium, and boron distribution in sediments from the Amazon continental shelf. Continental Shelf Research 8:363-386; 1988.

John E. Mak

Assistant Professor
Ph.D., 1992
Scripps Institution of Oceanography/
University of California, San Diego

I like to study trace gases in the earth's atmos-phere to determine the sources, sinks, and chemistry of important species such as carbon monoxide, methane, and carbon dioxide. I use the stable and radio-isotopes along with concentration measurements to constrain relative source strengths, and to then deduce the importance of human activities on those species.

In the past I have focused on measurements of the isotopes of atmospheric carbon monoxide (^{13}CO, $C^{18}O$, ^{14}CO), from the south pole to northern Europe, and in the future I plan to participate in a number of US and Europe-based flight campaigns for further sample collection.

Isotopic analysis of trace gases provides unique information which can be used to evaluate the accuracy of atmospheric models, and so I am also involved in seeing how model results compare with these data. It is important to continually compare theoretical output with observations.

As a new faculty member at Stony Brook, I plan to build a stable isotope research facility, which will be accessible to MSRC faculty, and may result in a wide range of multidisciplinary research opportunities, such as trace gas fluxes from the coastal margin and research on the importance of marine production to the budgets of certain trace gas species.

Mak, J.E.; Brenninkmeijer, C.A.M. Compressed air sample technology for isotopic analysis of atmospheric carbon monoxide, Journal of Atmospheric and Oceanic Technology, April; 1994.

Mak, J.E., C.A.M. Brenninkmeijer; Manning, M.R. Evidence for a missing sink of atmospheric carbon monoxide based on tropospheric measurements of ^{14}CO, Geophysical Research Letters, 19, 14:1467-1471, 1992.

Mak, J.E., Determination of the isotopes of atmospheric carbon monoxide and their implications to tropospheric chemistry, Ph.D. Thesis, Scripps Institution of Oceanography, University of California, San Diego, 1992.

Anne E. McElroy

Associate Professor
Director, New York Sea Grant
Ph.D., 1985
Massachusetts Institute of Technology/
Woods Hole Oceanographic Institution

My research interests concern how aquatic organisms interact with chemicals in their environment. To date most of my work has focused on how benthic organisms influence and are influenced by hydrophobic organic contaminants. Specifically I have been addressing: 1) *in vivo* metabolism and trophic transfer of polycyclic aromatic hydrocarbons (PAH) and their metabolites; 2) biological and chemical factors controlling bioaccumulation and release of PAH and polychlorinated biphenyls (PCBs) from sediments; and 3) biochemical and physiological responses of marine organisms to pollutant exposure.

I am currently involved in three projects. As part of a joint project with Margaret James at the University of Florida and Kevin Kleinow at Louisiana State University, funded by the National Institutes of Environmental Health Sciences, Adria Elskus (also at MSRC) and I are examining how metabolites of the carcinogenic PAH benzo[a]pyrene are absorbed and metabolized by benthic fish. Of primary focus is the role of the gastrointestinal tract in modifying dietary carcinogens. Most of the work is being done on catfish, but some of this work is or will be repeated in winter founder and lobster. In my laboratory we are looking at *in vivo* metabolism and macromolecular (DNA, RNA, and protein) binding in liver and intestine.

The two other projects I'm involved in investigate effects of chlorinated hydrocarbons (PCBs and dioxins) on reproduction in fish. With funding from NOAA's Coastal Ocean Program, Dianne Black at the EPA Environmental Research Laboratory in Narragansett, Rhode Island and I are looking at effects of PCBs on the mummichog in the laboratory and in New Bedford Harbor, and with funding from the Hudson River Foundation, Adria Elskus, Emily Monosson (also at MSRC), and I are looking at bioaccumulation, and reproductive effects in the mummichog of PCBs and dioxins in Newark Bay and lower Hudson River marshes.

Kimball, D.M.; McElroy, A.E. Characterizing the annual reproductive cycle of *Mytilus edulis* from Boston Harbor and Cape Cod Bay - a comparison by means of stereology and condition indices. Marine Environmental Research 35:189-196;1993.

McElroy, A.E.; Kleinow, K.M. *In vitro* metabolism of benzo[a]pyrene and benzo[a]pyrene-7,8-dihydrodiol by liver and intestinal mucosa homogenates from the winter flounder (*Pseudopleuronectes americanus*). Marine Environmental Research 34:279-285; 1992.

McElroy, A.E.; Cahill, J.M.; Sisson, J.D.; Kleinow, K.M. Relative bioavailability and DNA adduct formation of benzo[a]pyrene and metabolites in the diet of the winter flounder. Comparative Biochemistry and Physiology 100C:29-32; 1991.

McElroy, A.E. Aquatic toxicology: degradation of organic xenobiotics. In: Coleman, D.C.; Fry, B., eds. Carbon Isotope Techniques in the Biological Sciences; New York: Academic Press, Inc. pp.109-124; 1991.

McElroy; A.E. Polycyclic aromatic hydrocarbon metabolism in the polychaete *Nereis virens*. Aquatic Toxicology 18:35-50; 1990.

McElroy, A.E.; Farrington, J.W.; Teal, J.M. The influence of mode of exposure and the presence of a tubiculous polychaete on the fate of benz(a)anthracene in benthic microcosms. Environmental Science and Technology 24:1648-1655; 1990.

W. J. Meyers

Professor
Department of Earth and Space Sciences
Joint with MSRC
Ph.D., 1973
Rice University

The main focus of my research is the deposition and diagenesis of carbonate rocks and sediments. Through integrated field, petrographic, and geochemical studies, my students and I are investigating regional dolomitization, cementation, and compaction in a wide range of shallow-water reefal, platform, and peri-platform carbonate rocks from a range of ages and tectono-sedimentary settings. The main goals are to reconstruct the diagenetic histories of the rocks and to reconstruct the chemistry, sources, and dynamics of the diagenetic fluids that caused large-scale cementation and dolomitization. To this end we are applying standard and cathodoluminescent petrography, fluid inclusion studies, stable and radiogenic isotopes (C, O, Sr, Pb, B); trace elements (Mg, Fe, Mn, B, Sr, Pb, Na, Zn, REE, and others); and quantitative water-rock interaction modeling. The geochemical work is in close collaboration with Professor Gilbert Hanson and Martin Schoonen, an effort resulting in development of innovative analytical and modeling approaches to studying diagenetic carbonates.

Current projects include studies of facies, stratigraphy, and diagenesis of carbonate sequences from the U.S. Midwest (Mississippian); Spain (Miocene); Netherlands Antilles (Mio-Pliocene); and Western Australia (Devonian).

Douthit, T.; Meyers, W.J.; Hanson, G.N. Non-monotonic variations of seawater $^{87}Sr/^{86}Sr$ across the Ivorian/Chadian boundary (Mississippian, Osagean): evidence from marine cements within the Irish Waulsortian Limestone. Journal of Sedimentary Petrology 63:539-549; 1993.

Choquette, P.; Cox, A.; Meyers, W. Characteristics, distribution and origin of porosity in shelf dolomite: Burlington-Keokuk Formation (Mississippian), U.S. Midcontinent: Journal of Sedimentary Petrology 62:167-189;1992.

Kaufman, J.; Hanson, G.; Meyers, W.J. Dolomitization of the Devonian Swan Hills Formation, Rosevear Field, Alberta, Canada: Sedimentology 38:41-66; 1991.

Meyers, W.J. Calcite cement stratigraphy: an overview. In: Barker, C.; Kapp, O., eds., Luminescence microscopy and spectroscopy, SEPM Shortcourse #25; pp. 133-148; 1991.

Kaufman, J.; Meyers, W.; Hanson, G. Burial cementation in the Swan Hills Formation (Devonian), Rosevear Field, Alberta Canada: Journal of Sedimentary Petrology 60:918-939; 1990.

Meyers, W.J. Trace element and isotope geochemistry of zoned calcite cements, Lake Valley Formation (Mississippian, New Mexico): insights from water-rock interaction modelling. Sedimentary Geology 65:355-370; 1989.

Cander, H.S.; Kaufman, J.; Daniels, L.; Meyers, W.J. Regional dolomitization of shelf carbonates in the Burlington Keokuk Formations (Mississippian) Illinois and Missouri: constraints from cathodoluminescent zonal stratigraphy. In: Baker, P.; Shukla, V., eds. Sedimentary and Geochemistry of Dolostones, SEPM Spec. Pub. 43:129-144; 1988.

Steven G. Morgan

Assistant Professor
Ph.D., 1986
University of Maryland at College Park

One of the most salient features of the life histories of marine animals is that they produce dispersing larvae. A single adult typically hatches thousands or millions of microscopic larvae that disperse from the adult habitat, feed and develop in the plankton and then return to adult habitats where they metamorphose. Most larvae suffer great mortality from starvation, predation, or advection into areas which are unsuitable for survival of adults. Fisheries biologists and ecologists have long been interested in explaining underlying causes of variation in larval recruitment in order to forecast harvests of commercially important species and to model fundamental ecological processes that regulate the abundance of marine populations.

What intrigues me is how adult and larval phases of life cycles have evolved in concert to reduce mortality of larvae and ensure successful recruitment to adult populations. Specifically, I examine (1) physical, chemical, and biological processes that regulate the timing of reproduction, larval dispersal, and larval settlement; (2) selective forces in the plankton that shape life histories; and (3) ecological and evolutionary consequences of complex life cycles. I work on different ecological scales with invertebrate and vertebrate animals, in several tidal regimes and in various habitats including coral reefs, mangroves, salt marshes, estuaries, marine bays, exposed coasts and continental shelves.

For example, I have studied the impact of planktivory and physical factors on the timing of larval release, dispersal patterns and larval morphologies of crabs. I also have studied the hatching rhythms of populations of crabs from various tidal regimes in the Caribbean, Pacific, Atlantic, and Gulf of Mexico to demonstrate that these rhythms are highly plastic and entrained by local environmental cues.

Furthermore, I have investigated adaptations of pigmented larvae that enable them to survive countervailing selective forces of ultraviolet radiation and visually-feeding fishes in illuminated surface waters. Another aspect of my research program examines the intersection of physical processes and behavior on larval transport and recruitment of fishes, crustaceans and bivalves in areas ranging from continental shelves to estuaries. Lastly, I have evaluated and ranked the relative importance of nursery habitats for blue crabs by determining settlement rates of postlarvae and postsettlement growth and mortality of juveniles in each.

Morgan, S.G. Predation by planktonic and benthic invertebrates on larvae of estuarine crabs. Journal of Experimental Marine Biology and Ecology 163:91-110; 1992.

Morgan, S.G. Impact of planktivorous fishes on the dispersal, hatching and morphology of estuarine crab larvae. Ecology 71:1639-1652; 1990.

Morgan, S.G. The adaptive significance of spination in estuarine crab zoeae. Ecology 70:464-482; 1989.

Morgan, S.G. Selection on hatching rhythms and dispersal patterns of estuarine crab larvae: avoidance of physiological stress by larval export? Journal of Experimental Marine Biology and Ecology 113: 71-78; 1987.

Morgan S.G. Behavioral and morphological antipredatory adaptations of decapod zoeae. Ecologia 73:321-480; 1987.

Charles Nittrouer

Professor
Ph.D., 1978
University of Washington, Seattle

My research interests deal with understanding the formation of sedimentary strata in continental margin environments. The primary effort of my research group has been to examine environments of the continental shelf, but our work also extends to shallower (lagoon, tidal flat) and deeper (continental slope and rise) environments. An underlying philosophy is that emphasis should be placed on understanding strata formation where large amounts of sediment are accumulating in modern environments and where large amounts of sediment have accumulated in ancient environments. This has led much of our research effort toward fine-grained siliciclastic sediments tied to dispersal systems of rivers (e.g., Amazon, Columbia, Yangtze, Huanghe, Ebro, Po). In addition to these mid- and low-latitude studies, we have been working in Antarctic (in particular, the Ross Sea and the peninsula area) and Alaskan coastal areas to examine the contrasting character of glacial-marine sedimentation.

I am interested in documenting, within modern strata, sedimentary characteristics which will reach the geological record (e.g., grain size, mineralogy, sedimentary structure, seismic stratigraphy) and in examining how these characteristics are affected by physical and biological oceanic processes. A critical factor is the ability to evaluate temporal aspects of strata formation such as rates of accumulation, frequency of physical erosion, and rates of biological reworking. These parameters can be measured on time scales commensurate with oceanic processes by using several short-lived radioisotopes (Th-234, Pb-210, C-14) found in marine sediments.

The inclusion of geochemical, physical, and biological observations within sedimentological studies causes much of my research to be interdisciplinary in nature. Hopefully, the range of information

obtained provides a more general understanding of strata formation and allows development of fundamental concepts that can be applied to other modern and ancient continental margins.

Nittrouer, C.A., et al., The coastal area of the wet tropics: gateway for terrestrial material entering the global ocean. EOS (in press).

Nittrouer, C.A.; Wright, L.D. Transport of particles across continental shelves. Reviews in Geophysics 31 (in press).

Nittrouer, C.A. Controlling the ingredients that flow to the sea: oceanic processes near river mouths. Oceans 36:12-18; 1993.

Alexander, C.R.; Nittrouer, C.A.; DeMaster, D.J.; Park, Y.A.; Park, S.C. Macrotidal mudflats of the southwestern Korean coast: a model for interpretation of intertidal deposits. Journal of Sedimentary Petrology 61:805-824; 1991.

Nittrouer, C.A., et al. Sedimentology and stratigraphy on the Amazon continental shelf. Oceanography 4:33-38; 1991.

Kuehl, D.A.; Nittrouer, C.A.; DeMaster, D.J. Microfabric study of fine-grained sediments: observations from the Amazon subaqueous delta. Journal of Sedimentary Petrology 58:12-23; 1988.

Nittrouer, C.A.; Bergenback, B.E.; DeMaster, D.J.; Kuehl, S.A. Accumulation of mixed carbonate and siliciclastic muds on the continental shelf of eastern Spain. In: Doyle, L.; Roberts, H. eds. Carbonate-clastic transitions. Amsterdam: Elsevier; pp. 251-269; 1988.

Akira Okubo

Professor
Ph.D., 1963
The Johns Hopkins University

One of my major research interests is dispersion—the spread and mixing of substances—in the sea. Dispersion (or diffusion) plays an important role in pollution in marine environments, in particular, coastal environments. Those pollutants include such substances as oil, toxic chemicals, sewage and sludge, and plastics.

Since oceanic motions are inherently nonlinear and three-dimensional, they are potentially capable of generating chaotic motion. Substances embedded in the ocean flow are subject to the chaotic motion that tends to spread substances in the environment. Another interesting manifestation of chaos is the fractal nature of the motion of particles in the sea. Thus, the fractal dimension of drifters in the sea is used to characterize the complex nature of their trajectories. Oceanic motions also have an important effect on marine organisms. The transport of fish eggs and larvae are mostly passive and, hence, the oceanic currents, turbulence, and waves can contribute to larval transport and recruitment.

Timm, U.; Okubo, A. Diffusion-driven instability in a predator-prey system with time varying diffusivities. Journal of Mathematical Biology 30:307-320; 1992.

Yan, H-H.; Okubo, A; Schubel, J.R.; Pritchard, D.W. An analytical model for remote sensing determination of the mixed layer depth. Deep-Sea Research 38:267-286; 1991.

Craig, C.L.; Okubo, A. Physical constraints on the evolution of ctenophore size and shape. Evolutionary Ecology 4:115-129; 1990.

Mitchell, J.G.; Okubo, A.; Fuhrman, J.A. Gyrotaxis as a new mechanism for generating spatial heterogeneity and migration in microplankton. Limnology and Oceanography 35:123-130; 1990.

Okubo, A. Crecimiento de al organizacion biologica en ambientes turbulentos (Growth of biological organization in turbulent environments). In: Wagensberg, J., ed. Sobre la Imaginacion Cientifica. Barcelona: Tesquets Editiors; pp. 121-137; 1990.

Sanderson, B.G.; Goulding, A.; Okubo, A. The fractal dimension of relative Lagrangian motion. Tellus 42A:550-556; 1990.

Okubo, A.; Levin, S. A. A theoretical framework for data analysis of wind dispersal of seeds and pollen. Ecology 70:329-338; 1989.

Okubo, A.; Maini, P.K.; Williamson, M.H.; Murray, J.D. On the spatial spread of the grey squirrel in Britain. Proceedings of the Royal Society of London; B 238:113-125; 1989.

Okubo, A. Biological vortex rings: fertilization and dispersal of fish eggs. In: Hallam, T.G.; Gross, L.J.; Levin, S.A., eds. Mathematical ecology. New Jersey: World Scientific; pp. 270-283; 1988.

Okubo, A. Biological-physical interactions in the sea. In: Wolff, W.; Soeder, C.J.; Drepper, F.R., eds. Ecodynamics. New York: Springer-Verlag; pp.102-112; 1988.

Sanderson, B.G.; Okubo, A. Diffusion by internal waves. Journal of Geophysical Research 93:3570-3582; 1988.

Hartmut Peters

Assistant Professor
Ph.D., 1981
University of Kiel, Germany

Since my Ph.D. work, I have been interested in oceanic processes of small scales, in turbulent mixing, and internal waves. I am continuing to analyze observations from the Equatorial Undercurrent of the Pacific, and I have begun work in the Hudson River.

Measurements of velocity and temperature with a spatial resolution of a centimeter allow a quantification of turbulent mixing; the vertical turbulent fluxes of momentum, heat, and nutrients can be estimated. The analysis is thus focused on the role of mixing in the flow dynamics and in the biogeochemical environment; it will also enable an improved representation of small-scale processes in numerical circulation models of tropical as well as coastal areas.

With funding from the National Science Foundation (NSF), a microstructure profiler, its own dedicated hydraulic winch, and a PC for data acquisition have been purchased at a cost of almost $100,000. On another NSF grant, we obtained an acoustic Doppler current profiler with differential Global Positioning navigation receiver. Together with imaging echosounders and meterological equipment, state-of-the-art observations of small-scale processes in shallow water can be carried out from MSRC's R/V *ONRUST*. Tests will be done in February 1994, and serious field work began in April.

The field work will encompass measurements of the basic flow, using our ADCP, as well as the small-scale turbulence, using the microstructure profiler, presently being developed. Imaging echo soundings make turbulent overturning, as well as internal wave activity, visible. This work will help to improve our understanding of the estuarine dynamics and the environmental effect of the physical conditions.

Peters, H.; Gregg, M.C.; Sanford, T.B. The diurnal cycle of the upper equatorial ocean: turbulence, finescale shear and mean shear. Journal of Geophysical Research 100 (in press, 1994).

McPhaden, M.J.; Peters, H. On the diurnal cycle of internal wave variability in the equatorial Pacific Ocean: results from moored observations. Journal of Physical Oceanography 22: 1317-1329; 1992.

Peters, H.; Gregg, M.C.; Sanford, T.B. Equatorial and off-equatorial fine-scale and large-scale shear variability at 140° W. Journal of Geophysical Research 96:16,913-16, 928; 1991.

Peters, H.; Gregg, M.C.; Toole, J.M. Meridional variability of turbulence through the undercurrent. Journal of Geophysical Research 94: 18,003-18,009; 1989.

Peters, H.; Gregg, M.C.; Toole, J.M. On the parameterization of equatorial turbulence. Journal of Geophysical Research 93:1199-1218; 1988.

Siedler, G.; Peters, H. Physical properties (general) of sea water. In: Sundermann, J., ed.. LANDOLT-BORNSTEIN--Numerical Data and Functional Relationships in Science and Technology, New Series, Oceanography; Berlin; Springer-Verlag; vol. V/3a; 233-264; 1986.

Peters, H. The kinematics of a stochastic field of internal waves modified by a mean shear current. Deep-Sea Research; 30:119-148; 1983.

Sheldon Reaven

Associate Professor
Department of Technology and Society
Joint with MSRC
Ph.D., 1975
University of California at Berkeley

I have been working mostly in two areas of waste management: what to do with garbage, especially plastics, and what to do with nuclear wastes. My approach to these problems might be called "technology assessment." This means working on problems from both the scientific end (assessing expert disagreement over the relevant scientific theories, mathematical models, and methods of analysis) and from the ethical and policy end (focusing on fairness issues, competing values of interested parties, risk analysis, facility siting, and overall policy evaluation). My experience has been that all of the complex environmental problems we face today are characterized by thoroughgoing scientific and nonscientific disagreement, and I have tried to help both scientists and lay citizens untangle the web of conflicting evidence and argumentation surrounding these problems.

Current research projects include (1) a study with Drs. Vincent Breslin and R. Lawrence Swanson of the breakdown and environmental impacts of degradable plastics in landfills, seawater, and other environments; (2) a project to develop a recycling "audit service" (a walk-through, on-site list of options for reducing waste generation, increasing recycling, and using more recycled materials) for restaurants, including fast-food establishments; (3) a study of the energy impacts of recycled plastic "lumber" and construction blocks made from incinerator ash. I also work with towns and cities to develop recycling and waste management programs.

Reaven, S.J.; Tonjes, D.J. Waste avoidance in the restaurant industry. Waste Management Research Report: News from State University of New York at Buffalo and Stony Brook, and Cornell University; 3(1):15-16; 1991.

Breslin, V.T.; Swanson, R.L.; Reaven, S. Investigations of the degradability of a cornstarch-based plastic. Interim Report for Archer Daniels Midland Company, Decatur, IL; May 1990.

Reaven, S.J. Choosing among risk management alternatives for mitigating groundwater pollution. In: McTernan, W., ed. Groundwater risk assessment for pollution control. New York: American Society of Civil Engineers; pp. 225-245; 1989.

Reaven, S.J. Using science and technology news issues to develop scientific and quantitative literacy. Bulletin of Science, Technology, and Society 8:265-268; 1988.

Reaven, S.J. The methodology of probabilistic risk assessment: completeness, subjective probability, and the "Lewis Report." Explorations in Knowledge; V(1):11-3; 1988.

Reaven, S. One person's opinion: we need a model professional recycling curriculum. Resource Recycling, September/October; pp. 36-37, 66; 1988.

Reaven, S.J. New frontiers: science and technology at the fair. In: Bletter, R; Dickstein, M.; Miller, M.; Reaven, S., eds. Remembering the future: the New York World's Fair from 1939 to 1964. New York: Rizzoli Press; pp. 75-103; 1989.

Frank J. Roethel

Lecturer
Ph.D., 1982
State University of
New York at Stony Brook

My research group and I are investigating environmental issues associated with combustion by-products, including ash from the incineration of garbage and trash. In both marine and terrestrial systems, our research group is examining a diverse array of environmental issues including leaching behavior, particulate exposure pathways, and beneficial utilization strategies.

These investigations have resulted in the construction of the first artificial reef in the coastal waters of the United States fabricated from blocks of stabilized incineration ash. In addition, to evaluate the potential for using combustion by-products in construction applications, a boathouse was built on campus using incineration ash as an aggregate substitute. This novel recycling option brings my students to diverse locations including salt mines, where investigations focusing on the use of waste products in mine closure applications are being assessed, and Italy, where solid waste management strategies are now being developed.

Financial support for these investigations has been received from federal, state and private industry. US Environmental Protection Agency funds support our boathouse investigation while the New York State Energy and Research Authority has funded our research on the use of ash as a highway material.

Chris Stein, a graduate student investigating exposure pathways associated with using incineration ash, recently presented his research findings at the Sixth International MSW Combustion Symposium in Washington, DC. Andrew Parrella, who recently graduated after investigating potential phytoplankton toxicity following exposure to ash residues, is now working as a research technician at Stony Brook.

Roethel, F. J.; Chesner, W. H.; Aldous, K.. Laboratory ash-handling evaluation results of fugitive dust and volatilizationsStudies. In: Proceedings of the Fifth International Conference on MSW Combustor Ash Utilization. pp. 79-97; 1993.

Wente, M.; Roethel, F. J. Mobility of Dioxins and Furans from Stabilized Incineration Residue in Seawater. In: Waste Management Research Report, Volume 5, No. 1 State University of New York Press; 1993.

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Roethel, F. J.; Breslin, V. T. Recycling incineration ash residues to create solid masonry cinder blocks. New York Construction News. Section II, June 1992.

van der Sloot H. A.; Woodhead, P.M.J.; Hockley, D.; Roethel, F.J. The long-term behavior of stabilized coal ash in the sea. Proceedings of American Coal Ash Association's 9th International Coal Ash Symposium, January 22-25, Orlando, FL; 1991.

Goldfard, T.D.; Maertz, M.; Roethel, F. J.; Iden, C.R.; Rieger, R. PCDDs and PCDFs in incineration ash from several types of facilities in the Northeastern United States. Chemosphere 20:1833; 1990.

Roethel, F.J.; Breslin, V.T. Stony Brook's MSW combustor ash demonstration programs. In: Proceedings of the 3rd International Conference on Ash Utilization and Stabilization. November 13-14; Arlington, VA; 1990.

Sergio Sañudo-Wilhelmy

Assistant Professor
Ph.D., 1993
University of California, Santa Cruz

My current research is focused on the natural biogeochemical cycles of trace elements in the environment and the perturbations of those cycles by anthropogenic processes. I am interested in the dynamics of metal transport and the major processes controlling metal contamination in rivers, lakes, estuaries, coastal and open ocean waters. In addition, I am trying to determine how natural physical oceanographic processes such as upwelling can enhance trace metal levels and cross-shelf exchange.

My research is also oriented to chemical speciation, particularly the effect of colloids on trace metal biogeochemistry. Colloidal particles have large surface areas per unit volume, and therefore have an important effect on dissolved-particle interactions and the transport of natural and anthropogenic chemicals in aquatic environments.

Sañudo-Wilhelmy, S.A. and A.R. Flegal. The fate of trace metals in the Southern California Bight. (submitted 1994).

Flegal, A.R.; Sañudo-Wilhelmy, S.A.; Scelfo, G.M. Silver in the eastern Atlantic Ocean. Marine Chemistry (in press, 1994).

Ritson, P.R.; Sañudo-Wilhelmy, S.A.; Flegal, A.R. Stable lead isotopic tracers of produced water discharges from an ocean outfall. Environmental Geochemistry and Health (in press, 1994).

Sañudo-Wilhelmy, S.A.; Flegal, A.R. Temporal variations in lead concentrations and isotopic composition in the Southern California Bight. Geochimica et Cosmochimica Acta (in press, 1994).

Flegal, A.R.; Sañudo-Wilhelmy, S.A. Comparable levels of trace metal contamination in two semi-enclosed embayments: San Diego Bay and South San Francisco Bay. Environmental Science and Technology 27:1934-1936; 1993.

Sañudo-Wilhelmy, S.A.; Flegal, A.R. Anthropogenic silver in the Southern California Bight: a new tracer of sewage in coastal waters. Environmental Science and Technology 26: 2147-2151; 1992.

Sañudo-Wilhelmy, S.A.; Flegal, A.R. Trace element distributions in coastal waters along the US-Mexican boundary: relative contributions of natural processes vs. anthropogenic inputs. Marine Chemistry 33:371-392; 1991.

Flegal, A.R.; Sañudo-Wilhelmy, S.A.; Fitzwater, S.E. Particulate thallium fluxes in the northeast Pacific. Marine Chemistry 28:61-75; 1989.

Flegal, A.R., Smith, G.J.; Gill,G.A.; Sañudo-Wilhelmy, S.A.; Anderson, L.C.D. Dissolved trace element cycles in the San Francisco Bay estuary. Marine Chemistry 36: 329-363; 1991.

J. R. Schubel

Professor Emeritus
Ph.D., 1968
The Johns Hopkins University

My current research is concentrated in two general areas — coastal zone management in the broadest sense and marine policy. For many years, I have been frustrated by the long lag between advances in our understanding of processes, phenomena, and problems in the coastal ocean, and the translation and incorporation of that new knowledge into management policies and practices to conserve and, when necessary, to rehabilitate important coastal environments and their living resources. In an effort to shorten this lag, we created the Coastal Ocean Action Strategies (COAST) Institute.

Each year, the COAST Institute brings leading scientists together with important regional leaders to interact in an intensive one-to three-week session to produce a comprehensive short-term and long-term plan of action for a specific problem. The Coast Institute also takes on other activities and has been a pioneer in an emerging field known as information engineering — structuring information into forms and strategies to attack specific problems of the coastal ocean. COAST has been called upon to assist in resolving coastal problems throughout the U.S. and in many parts of the world. There are exciting opportunities for MSRC graduate students who are interested in working at the interfaces of science policy and management to be involved in most COAST projects.

On 1 November 1994 I joined the New England Aquarium. In my capacity as President of the Aquarium I can offer a number of new and exciting opportunities to MSRC students to work on problems and opportunities related to marine mammals, marine birds, marine conservation, informal science education, and marine environmental policy. I look forward to my continuing association with MSRC.

Schubel, J.R.; Chin, P.A.; Pollice, A. "The not just another dredging and disposal of contaminated sediments workshop." Report by the COAST Institute, Marine Sciences Research Center, SUNY at Stony Brook, NY and the Institute of Marine and Coastal Sciences, Rutgers University; 1994.

Schubel, J.R.; Larocca, J. Long Island coastal conference scenario planning and the future of Long Island's coastline and near-coastal environments. Special Report No. 105, Ref. 93-3 of the Marine Sciences Research Center, SUNY at Stony Brook, NY; 1993.

Schubel J.R. On refinement of the use of salinity as the basis for a standard to use in conjunction with flow to protect important living resources of the San Francisco estuary. Working Paper No. 96., Ref. 92-1 of the Marine Sciences Research Center, SUNY at Stony Brook, NY; 1992.

Schubel, J.R. The second phase of an assessment of alternatives to biological nutrient removal at sewage treatment plants for alleviating hypoxia in western Long Island Sound. Working Paper No. 56, Ref. 91-19 of the Marine Sciences Research Center, SUNY at Stony Brook, NY; 1991.

Schubel J.R.; Pritchard, D.W. Some possible futures of Long Island Sound. Working Paper No. 55, Ref. 91-17 of the Marine Sciences Research Center, SUNY at Stony Brook, NY; 1991.

Mary I. Scranton

Professor
Ph.D., 1977
Massachusetts Institute of Technolnogy
Woods Hole Oceanographic Institution

I am very interested in the factors controlling the cycling of organic compounds in sediments and in the water column. Since fatty acids and hydrogen are important intermediates in the anaerobic decomposition of organic macromolecules, we began by studying the processes controlling the cycling of these compounds in sediments. At present we are carrying out a study of the controls on turnover of hydrogen, low molecular weight fatty acids and methylamines in the oxic and anoxic portions of a coastal anoxic basin.

This study, which has been a collaborative effort with scientists at the University of Rhode Island, and which has involved MSRC students Xiaohua Yang and Hanguo Wu, focuses on the effects of light and oxygen on rates of transformation of the relevant species. We have found major differences in the patterns of cycling of amines and fatty acids with depth, with time of day and with oxygen concentration which seem to be closely related to variations in biological populations. We also have preliminary evidence for variations in methane producing and consuming activity within the water column. Finally we have obtained some of the earliest data for concentrations of amines and fatty acids within the water column.

As an extension of this work, a student, Hanguo Wu, recently measured acetate concentrations and turnover rates in Long Island Sound sediments as a part of the PULSE program (with principal investigators Robert Aller, Cindy Lee and Kirk Cochran) whose goal was to study the effect of the spring bloom on sediment geochemistry. Acetate concentrations and uptake rate constants increased dramatically and rapidly with increases in temperature and in carbon flux to the bottom.

I am also interested in studying aspects of the methane cycle in marine systems which are related to "global change" issues. Methane is an important "greenhouse gas" so it is important to understand sources and sinks of the compound in nature. Together with Marie de Angelis, my group recently carried out a study of the methane cycle in the Hudson River in which we discovered that methane oxidation can effectively remove methane from freshwater but that oxidation is suppressed (and thus methane flux to the atmosphere is enhanced) from saline waters. More recently we have been investigating the importance of oxidation of methane and other hydrocarbons in controlling the fluxes of these gasses from gas vents and decomposing hydrates (ice-like structures containing large amounts of methane found in shallow sediments in the Gulf of Mexico).

Wu, H.; Scranton, M.I. Cycling of acetate and propionate in the waters of a permanently anoxic estuarine basin. Marine Chemistry (in press, 1994).

Wu, H.; Scranton, M.I. Seasonal variations in acetate and acetate turnover rates in Long Island Sound sediments. To be submitted to Limnology and Oceanography (in preparation, 1994).

Yang, X.; Scranton, M.I.; Lee, C. Seasonal variations in concentrations and microbial uptake of methylamines in estuarine waters. Marine Ecology Progress Series (in press, 1994).

DeAngelis, M.A.; Scranton, M.I.. Fate of methane in the Hudson River and Estuary. Global Biogeochemical Cycles 7:509-523; 1993.

Monetti, M.; Scranton, M.I.Fatty acid oxidation in anoxic marine sediments: the importance of hydrogen sensitive reactions. Biogeochemistry 17:23-47; 1992.

Lawrence B. Slobodkin

Professor
Department of Ecology and Evolution
Joint with MSRC
Ph.D., 1951
Yale University

Organisms are complex and combinations of organisms as studied by ecologists are even more complex. I continue to be concerned with *simplicity and complexity*, as such, and also the biology of the "simplest" of metazoans, Hydra, in the context of the most complex of sciences.

After extensive study of size, color, and laboratory population dynamics, we built a mathematical model based on individual physiology which predicts features of hydra field biology. I am currently studying hydra and zooplankton of Swan Pond. Sampling from the time of ice melt in March to freezing in December suggests that there are at least two species of brown hydra present — one in cold water immediately prior to icing over and the other during spring and fall periods of moderate temperature. Hydra seem absent or elusive during the heat of summer when water temperature exceeds 25° C.

The cladoceran species change rapidly as a function of pond temperature. Cladoceran species differ strongly in their susceptibility to being eaten by hydra and there is one that seems to feed on hydra. The cladocerans and the hydra themselves seem to be emerging from an "animal seed bank." The Cladocerans found at the height of summer on Long Island seem to be those that occur throughout the year in southern states.

Future work involves field sampling and laboratory experiments on edibility and temperature effects. Also I hope to study emergence from the "seed bank" and the theoretical implications of large "animal seed banks."

Slobodkin, L.B. Simplicity and Complexity in Games of the Intellect. Harvard Paperback, Harvard University Press, Cambridge 266 pp. (Selection of Science Book Club and Readers' Subscription) 1993.

Slobodkin,L.B. Scientific goals require literal empirical assumptions. Ecological Applications. 3/4:571- 573, 1993.

Slobodkin, L.B.; Hutchinson, G.E. An appreciation. J. Animal Ecology. 62:390-394; 1993.

Slobodkin, L. B.; Bossert, P. The Coelenterates, Chapter 5. In: Thorpe, J. H.; Covich, A.P., eds. Ecology and Classification of Freshwater Invertebrates. Academic Press; pp.125-144; 1991.

Slobodkin, L.B.; Bossert, P.; Matessi, C.; Gatto, M. A review of some physiological and evolutionary aspects of body size and bud size of *Hydra*. Hydrobiologia, 216/217: 377-382; 1991.

Slobodkin, L.B.Looking again at blooms — The null case of the paradox of the plankton. In: Cosper , E.M.; Carpenter, E.J.; Bricelj, V.M., eds. Novel phytoplankton blooms: causes and impacts of recurrent brown tides and other unusual blooms. Coastal and Estuarine Studies, Vol 35. Berlin: Springer-Verlag; pp. 341-348; 1989.

Gatto,M.; Matessi, C.; Slobodkin, L.B. A physiological approach to ecology and evolution of simple organisms. Evolutionary Ecology 3:1-30; 1989.

Slobodkin, L.B.Intellectual problems of applied ecology. Bioscience 35:337-342 (Reprinted in South African Institute of Ecologists Bulletin, 7:7-18; 1988. December, 1988).

R. Lawrence Swanson

Adjunct Professor
Ph.D., 1971
Oregon State University

My broad research interests concern reducing the impact of waste generation on society. In the context of the ocean, this translates to understanding and identifying the appropriate use of the ocean as part of a comprehensive waste management strategy.

I have been interested in the consequences of urban population centers and their infrastructure and waste management practices on coastal waters. Sewage, storm water, and municipal solid waste all have pronounced impacts. In some cases, near-field, short-term effects of these polluting activities have been reduced with advancing technologies; but the far-field, long-term effects are not well understood. Hypoxia, floatable wastes, and cycling of contaminants are major causes of impaired economic and societal uses of coastal resources. My interests have been in using scientific understanding of these issues, within the context of societal costs, to help influence and formulate sound public policy.

The development of secondary materials – materials made from post-consumer waste into new products that have different forms and uses than the original products – is a promising and growing means of reusing waste materials. Understanding the engineering properties, environmental, and public health effects, and the economic and social barriers associated with these materials is important. It is my desire to expand the work that the WMI has been doing in this area so that we might help create cost-effective, beneficial markets for society's residue.

Swanson, R.L. The incongruity of policies regulating New York City's sewage sludge: lessons for coastal management. Coastal Management 21:299-312; 1993.

Swanson, R.L.; West-Valle, A.S.; Decker, C.J. Recreation vs. waste disposal: the use and management of Jamaica Bay. The Long Island Historical Journal 5(1): 21–41; 1992.

Tonjes, D.J; Swanson, R.L. Where does it all go? The size and methods of disposal of Long Island's solid waste, 1986 and 1991. Special Report 103, Marine Sciences Research Center, The State University of New York at Stony Brook, 1992.

Swanson, R.L.; Bell, T.M.; Kahn, J.; Olha, J. Use impairments and ecosystem impacts of the New York Bight. Chemistry and Ecology 5:99-127; 1991.

Valle-Levinson, A.; Swanson, R.L. Wind-induced scattering of medically-related and sewage-related floatables. Marine Technology Society Journal 25(2):49-56; 1991.

Swanson, R.L.; Zimmer, R.L. Meteorological conditions leading to the 1987 and 1988 washups of floatable wastes on New York and New Jersey beaches and comparison of these conditions with the historical record. Estuarine, Coastal and Shelf Science 30:59-78; 1990.

Gordon T. Taylor

Assistant Professor
Ph.D., 1983
University of Southern California

My broad area of interest is marine microbial ecology. My research activities have been concentrated in three major areas: microbial mediation of biogeochemical processes; microbial biofouling; and trophic interactions among microorganisms (bacteria, protozoans, and algae). I am particularly interested in microbiological and exchange processes at interfaces, such as particle-water and air-water. I am also interested in novel applications of optical techniques, such as Raman scattering spectrometry, infrared spectrometry, and fiber optic probes, to problems in marine biogeochemistry.

Most recently, my research group has been examining marine biofouling and the fate of particle-reactive organics from molecular and microbiological perspectives. We have been investigating the ways in which surface chemistry of inert materials determines the character of the dissolved organic matter adsorbed to its surface, as well as its influence on microbial biofilm dynamics. These research projects are applied, but also have broader implications on problems in biogeochemistry, epibiosis, and environmental microbiology.

Another ongoing research interest is the decomposition and microbial ecology of organic debris as it sinks from surface to deeper waters. The flux and decomposition of this material in the ocean has important implications on nutrient regeneration, ocean productivity, transport of pollutants, and the ocean's capacity to utilize excess atmospheric CO_2. I have been studying the complex taxonomic composition of microorganisms (algae, bacteria, protozoa, and zooplankton); their trophic interactions; and the biogeochemical processes associated with sinking particles to better understand the role of microorganisms in processing this material.

Taylor, G.T.; Troy, P.J.; Nullet, M.; Sharma, S.K.; Liebert, B.E. Protein adsorption from seawater onto solid substrata:II. Behavior of bound protein and its influence on interfacial properties. Marine Chemistry 45 (in press, 1994).

Zheng, D.; Taylor, G.T.; Gyananath, G. Influence of nutrient concentration and flow velocity on the attachment of marine bacteria in continuous culture. Biofouling (in press, 1994).

Taylor, G.T.; Troy, P.J.; Sharma, S.K. Protein adsorption from seawater onto solid substrata: I. Influence of substratum surface properties and bulk concentration. Marine Chemistry 45:15-30; 1994.

Taylor, G.T.; Troy, P.J.; Nullet, M.; Sharma, S.K.; Leibert, B.E.; Mower, H.F. Spectroscopic examination of protein adsorption onto titanium from seawater. Applied Spectroscopy 47:1140-1151; 1993.

Taylor, G.T.; Karl, D.M. Vertical fluxes of biogenic particles and associated biota in the eastern North Pacific: implications for biogeochemical cycling and productivity. Global Biogeochemical Cycles 5:289-303; 1991.

Taylor, G.T. Variability in the vertical flux of microorganisms and biogenic material in the epipelagic zone of a North Pacific central gyre station. Deep-Sea Research 36:1287-1308; 1989.

Taylor, G.T.; Pace, M.L. Validity of eukaryote inhibitors for assessing production and grazing mortality of marine bacterioplankton. Applied Environmental Microbiology; 53:119-128; 1987.

Taylor, G.T.; Karl, D.M.; Pace, M.L. Impact of bacteria and zooflagellates on the composition of sinking particles: an *in situ* experiment. Marine Ecology Progress Series 29:141-155; 1986.

Prasad Varanasi

Professor
Ph.D., 1967
University of California, San Diego

The research in my laboratory is related to atmospheric remote sensing, global warming, and solar system exploration. Under research support from the National Aeronautics and Space Administration and the Department of Energy, we perform infrared spectroscopic measurements on molecular constituents of the terrestrial and planetary atmospheres.

One of the pivotal research problems associated with global warming, especially in connection with the water vapor feedback mechanism, is the enigmatic water vapor continuum, of which I was a co-discoverer as a Ph.D. student at the University of California, San Diego in 1966.

Our laboratory houses one of the world's finest commercial Fourier transform spectrometers, a tunable diode laser spectrometer, and several cryogenically coolable absorption cells (sample chambers) of our unique and original design.

Kratz, D.P.; Varanasi, P. A reexamination of the greenhouse effect due to CFC-11 and CFC-12. Journal of Quantitative Spectroscopy and Radiative Transfer 48:245-254; 1992.

Varanasi, P. Absorption coefficients of CFC-11 and CFC-12 needed for atmospheric remote sensing and global warming studies. Journal of Quantitative Spectroscopy and Ratiative Transfer 48:205-219; 1992.

Varanasi, P. Absorption spectra of HCFC-22 around 829 cm^{-1} at atmospheric conditions. Journal of Quantitative Spectroscopy and Ratiative Transfer 47:252-255; 1992.

Varanasi, P.; Gopalan, A.; Brannon, J.F. Jr. Infrared absorptio-coefficient data on SF6 applicable to atmospheric remote sensing. Journal of Quantitative Spectroscopy and Radiative Transfer 48:141-145; 1992.

Varanasi, P. Infrared absorption by water vapor in the atmospheric window. Society of Photooptical Instrumentation Engineering, Modeling of the Atmosphere 928:213-230; 1988.

Varanasi, P. Infrared line widths at planetary atmospheric temperatures. Journal of Quantitative Spectroscopy and Radiative Transfer 39: 13-25; 1988.

Varanasi, P.; Chudamani, S. Infrared intensities of some chlorofluorocarbons capable of perturbing the global climate. Journal of Geophysical Research 93(D2):1666-1668; 1988.

Duane E. Waliser

Assistant Professor
Ph.D., 1992
University of California, San Diego/
Scripps Institution of Oceanography

My research emphasizes observational and theoretical aspects of ocean-atmosphere coupling in the tropics. This includes large-scale aspects, such as the latitude preference of the Intertropical Convergence Zone, and small-scale interactions, such as the boundary-layer heat and moisture exchange associated with tropical deep convection.

I am presently studying the observed upper limits on tropical sea surface temperatures, and the processes important in determining those limits. In conjunction with this investigation, I am developing improved evaporative and shortwave heat flux parameterizations for forced ocean and hybrid coupled ocean-atmosphere general circulation experiments. The goals of these numerical experiments are to extend our understanding of the seasonal cycle, the El Niño / Southern Oscillation (ENSO) and interdecadal variability, and provide operational predictions of ENSO.

In almost all cases of my research, the use of synoptic and time-averaged satellite data is exploited where possible. My background in this area begins with the real-time acquisition of the telemetry stream and extends to the application of geophysical algorithms to multi-sensor satellite data.

Waliser, D.E.; Somerville, R.C.J. The preferred latitudes of the intertropical convergence zone. Journal of Atmospheric Science.(in press).

Waliser, D.E.; Gautier, C. A global climatology of the ITCZ. Journal of Climate 6:2162-2174; 1993.

Waliser, D.E.; Graham, N.E. Convective cloud systems and warm-pool SSTs: coupled interactions and self-regulation. J. Geophysical Research 98(D7):12881-12893; 1993.

Waliser, D.E.; Graham, N.E.; Gautier, C. Comparison of the highly reflective cloud and outgoing longwave data sets for use in estimating tropical deep convection. Journal of Climate 6:331-353; 1993.

Jury, M.R.; Pathack, B.; Waliser, D.E. Satellite OLR and microwave data as a proxy for rainfall in the Southern Africa Madagascar region. International Journal of Climatology 13:257269; 1993.

VanWoert, M.L.; Whritner, R.H.; Waliser, D.E. Bromwich, D.H.; Comiso, J.C. The Antarctic Research Center: a source of multi-sensor satellite data for polar science; Transactions of the American Geophysical Union 73(6): 65; 1992.

Jury, M.R.; Waliser, D.E. Satellite microwave measurements of atmospheric water vapour and marine wind speed: case study application; South African Journal of Marine Science 9:309-316; 1990.

Dong-Ping Wang

Professor
Ph.D., 1975
University of Miami

My research focuses on modeling and analysis of physical processes in estuaries and over continental shelves and slopes. My students and I are studying internal tides in the Gibraltar Strait, in the Gulf of California, and on the Celtic Sea slope. We also are investigating the generation of mesoscale inertial variability on the continental shelf off northeast Spain. We have developed sophisticated numerical models for process-oriented studies and used extensive data bases for model verification.

In addition to coastal process studies, we are collaborating with the Applied Mathematics and Statistics Department at Stony Brook on the massively parallel computing. Our long-term goal is to take advantage of the recent development in supercomputing to solve large-scale coastal ocean problems. We also are collaborating with the Naval Undersea System Center (NUSC) to explore the feasibility of predicting the acoustic variability in the coastal ocean. We plan to interface the NUSC acoustic model with our general circulation model to study shallow water acoustics.

Wang, D.-P. The Strait of Gibraltar model: internal tide, diurnal inequality, and fortnightly modulation. Deep Sea Research (in press).

Salat, J.; Tintore, J.; Font, J.; Wang, D.-P.; Vieira, M. Near-inertial motion on the shelf-slope front off northeast Spain. Journal of Geophysical Research 97:7277-7282; 1992.

Wang, D.-P. Generation and propagation of inertial waves in the Subtropical Front. Journal of Marine Research 49:619-633; 1991.

Park, M.J.; Wang, D.P. Transient tidal vorticity over a hollow. In: Parker, B.B., eds. Tidal Hydro- dynamics. New York: John Wiley; pp.419-436; 1991.

Wang, D.P. Prediction of coastal ocean thermal variability. In: Potter, J.; Warn-Varnas, A., eds. Ocean Variability and Acoustic Propagation; Bordrecht, Holland: Kluwer Academic Pub.; pp. 251-260; 1991.

Chen, D.; Wang, D.-P. Simulating the time-variable coastal upwelling during CODE 2. Journal of Marine Research 48:335-358; 1990.

Chern, C.-S.; Wang, J.; Wang, D.-P. The exchange of Kuroshio and East China Sea shelf water. J. Geophysical Research 95:16017-16024; 1990.

Tintore, J.; Wang, D.-P.; Laviolette, P. Eddies and thermohaline intrusions on the shelf-slope front off the northeast Spanish coast. J. Geophysical Research 95:1627-1633; 1990.

Wang, D.-P. Models of mean and tidal flows in the Strait of Gibraltar. Deep-Sea Research 36:1535-1548; 1990.

Wang, D.-P.; Chen, D.; Sherwin, T.J. Coupling between mixing and advection in shallow sea fronts. Continental Shelf Research 10:123-136; 1990.

Chen, D.; Horrigan, S.G.; Wang, D.-P. The late summer vertical nutrient mixing in Long Island Sound. Journal of Marine Research 46:753-770; 1988.

Tintore, J.; Gomis, D.; Alonso, S; Wang, D.-P. A theoretical study of large sea level oscillations in the western Mediterranean. Journal of Geophysical Research 93:10797-10804; 1988.

Wang, D.-P. Transport model for water exchange between coastal inlet and the open ocean. American Fisheries Society Symposium 3:9-15; 1988.

Robert E. Wilson

Associate Professor
Ph.D., 1974
The Johns Hopkins University

My current research interests relate to transport processes in estuaries. They include specifically the description of time-dependent mixing processes in partially stratified estuaries, tidally induced residual currents in estuarine basins, and the interaction of buoyancy forced and tidally induced residual currents in estuaries.

I currently have projects related to the internal hydraulics in the Hudson River estuary, which involve both numerical simulations and acoustic observations of the internal density structure.

Wilson, R.E.; Vieira, M.E.C. Residual currents in the Peconic Bays estuary. In: Neilson, B, ed. Circulation Patterns in Estuaries. New York: Humana Press; pp. 87-95; 1989.

Peter M.J. Woodhead

Research Professor
B.Sc. Hon. 1 cl., 1953
Durham University, England

I have long-standing interests in fishes and fisheries in many waters. I study migrations and movements of fishes in relation to their internal, endocrine, and external physical environment. Hydroacoustic methods are used to make quantitative assessments of fish abundance and behavior. Present studies are in the Barents Sea, North Sea, and the Benguela upwelling system.

In local waters, present research concerns the communities of fishes inhabiting the estuary system of the Hudson River, New York Harbor, Long Island Sound, and the New York Bight—their composition, distribution, and changes in space and time. The local estuaries and nearshore waters, which are being studied, are often very contaminated and stressed. Summertime hypoxia is commen. Pollution has pronounced effects on behavior and abundance distributions of fish and benthic invertebrate populations. The influences of natural (climate) changes on fish populations of the northeast region are also of great interest.

Woodhead, P.M.J.; Zahn, S.M. Oriented swimming by midwater fish at night, related to tidal currents. Nature (in press, 1994).

Wood head, P.M.J. Effects of tide gates on the fish community of the East River. Annals of the New York Academy of Science (in press, 1994).

Woodhead, P.M.J.; McEnroe, M.; Monteleone, D.M.; Lonsdale, D.J.; Cerrato, R.M.; Peterson, W.T. Characterization and assessment of potential impacts of hypoxia on forage species in Long Island Sound. Report in 6 sections to U.S. EPA's Long Island Sound Study; 379 pp.; 1992.

Woodhead, P.M.J. The fish community of New York Harbor, spatial and temporal distributions of major species. Conference Report, Impacts of New York Harbor Development on Aquatic Resources; 1987. New York: Hudson River Foundation; pp. 123-143; 1991.

Woodhead, P.M.J. Inventory and characterizations of habitat and fish resources, and assessment of information on toxic effects in the New York-New Jersey Harbor Estuary. Report in 6 sections to U.S. EPA, concerning Tasks 3.2, 5.1 and 5.3 of the Harbor Estuary Program; 199 pp.; 1991.

van der Sloot, H.A.; Hoede, D.; Wijkstra, J.; Bijker, J.; Wesseling, J.W.; Woodhead, P.M.J. Milieuhygienische consequenties bij de toepassing van gestabiliseerde reststofproduketn in kuntsmatige riffen en fij het opvullen van zandivinputte. Energieonderzoek Centrum Nederland, Petten ZG Netherlands; Report No. ECN-89-86; 81pp.; 1989.

Woodhead, P.M.J. The Hudson River artificial reef study program. Report in 6 sections to New York City Public Development Corporation; 391 pp.; 1989.

Woodhead, P.M.J. An analysis of data on the fish community and fishing resources of the Lower Bay of the New York Harbor. Report to New York State Executive Office; OGS/DLU; 153 pp.; 1988.

Woodhead, P.M.J.; McCafferty, S.S.; O'Hare, M.A. Assesments of the fish community of the lower Hudson-Raritan estuary complex. A report to U.S. Army Corps Engineers, NYD, including evaluations of an alternate site; 348 pp.; 1988.

Charles F. Wurster

Professor Emeritus
Ph.D., 1957
Stanford University

My research has been concerned with the effects of stable chlorinated hydrocarbon pollutants on marine plankton communities. Focusing on those chemicals found regularly in the environment (polychlorinated biphenyls, DDT, DDE, and dieldrin), we have studied the effects on individual species, mixed cultures, and natural phytoplankton and zooplankton communities in an attempt to understand the impact of these chemicals on aquatic ecosystems.

The growth of some species of algae is inhibited by chlorinated hydrocarbon concentrations as low as the parts per trillion range. This sensitivity varies greatly with the species, the supply of nutrients, the temperature, light intensity, and the site of origin of the clone. Selective toxicity may alter the species composition within the community.

I am currently interested in various aspects of ornithology, and with the integration of scientific information into environmental public policy.

Cohen, M.K.; West, A.S.; Cosper, E.M.; Wurster, C.F. Mechanisms of resistance to polychlorinated biphenyls (PCB) in two species of marine diatoms. Journal of Marine Biology Association, U.K. 71: 247-263; 1991.

Ruben, H.J.; Cosper, E.M.; Wurster, C.F. Influence of light intensity and photo-adaptation on the toxicity of PCB to a marine diatom. Environmental Toxicology and Chemistry 9:777-784; 1990.

Cosper, E.; Wurster, C.F.; Bautista, M.F. PCB-resistant diatoms in the Hudson River estuary. Estuarine and Coastal Shelf Science 26:215-226; 1988.

Jeannette Yen

Associate Professor
Ph.D., 1982
University of Washington

Presently I am doing research on sensory perception by zooplankton and on the reproductive ecology of an antarctic copepod. We use state-of-the-art methodology in laser-illuminated video-imaging to visualize the microstructure of the flow field generated by copepods and other plankton. We are examining the mechanoreceptive ability of copepods to remotely detect fluid deformations produced by escaping prey, lunging predators, and attractive mates. This involves both target recognition by the predator as well as three dimensional spatial localization of hydrodynamically conspicuous signals.

To further examine sensory perception by copepods, we have developed a neurophysiological technique for recording extracellular afferent nerve impulse discharges occurring within the first antennae of copepods. We find that the antennal receptors are extremely sensitive to mechanical stimuli. A model of hydrodynamic stimulation of zooplankton will be constructed to integrate the information on copepod behavioral responses, sensory neurophysiology, and morphology, with information on their species ecology.

For the research on polar zooplankton ecology, I have spent three seasons—spring, summer and winter—on the Antarctic peninsula at Palmer Station sampling the zooplankton populations in a 1200 meter basin. We are studying the seasonal cycles in the reproductive ecology and lipid metabolism of the copepod *Euchaeta antarctica* and the interactions with their physiology, feeding ecology, and vertical migratory activity. I wish to characterize the life history traits that led to the evolution and success of this large, carnivorous marine copepod in this low temperature habitat.

Yen, J.; Fields, D.M. Escape responses of *Acartia hudsonica* nauplii from the flow field of *Temora longicornis*. Arch. Hydrobiol. Beih. 36:123-134; 1992.

Yen, J.; Lenz, P.H.; Gassie, D.V.; Hartline, D.K. Mechanoreception in marine copepods: Electrophysiological studies on the first antennae. Journal of Plankton Research 14(4):495-512;1992.

Yen, J. Predatory feeding behavior of an Antarctic marine copepod, *Euchaeta antarctica*. In: Sakshaug, E.; Hopkins, C.C.E.; Øritsland, N.A., eds. Proceedings of the Pro Mare Symposium on Polar Marine Ecology. Polar Research 10(2):433-442; 1991.

Yen, J.; Sanderson, B.G.; Strickler, J.R.; Okubo, A. Feeding currents and energy dissipation by *Euchaeta rimana*, a subtropical pelagic copepod. Limnology and Oceanography 36(2):362-369; 1991.

Yen, J.; Nicoll, N.T. Setal array on the first antennae of a carnivorous marine copepod *Euchaeta norvegica*. Journal of Crustacean Biology 10(2):327-340; 1990.

Yen, J. Predation by *Euchaeta norvegica* Boeck on eggs and larvae of the North Atlantic cod *Gadus morbua* L. Journal of Experimental Marine Biology and Ecology 112:283-296; 1987.

Yen, J. Selective predation by the carnivorous marine copepod *Euchaeta elongata*: laboratory measurements of predation rates verified by field observations of temporal/spatial feeding patterns. Limnology and Oceanography 30:577-595; 1985.

Minghua Zhang

Assistant Professor
Ph.D., 1987
Institute of Atmospheric Physics
Academia Sinica

My research interest is in the area of numerical modelling of climate and climate change. The earth's climate system is composed of the atmosphere, the hydrosphere, the biosphere and the lithosphere. Complicated interactions exist among these components and between various physical and dynamical processes inside them.

To quantitatively study why the earth's climate changed in the past and how it will change in the future, for example, in response to the increasing concentration of carbon dioxide in the atmosphere, we incorporate these components and the important processes, such as atmospheric circulation, clouds, radiation, precipitation, ocean currents etc., in numerical models based on physical principles or empirically obtained relationships. I use these climate models to study the interactive feedback in the climate system, to validate the current model treatments of physical processes against satellite and other observations, and to improve the model description of these processes.

I am also interested in the study of the dynamics of large-scale atmospheric waves. We study the excitation, propagation, dissipation of atmospheric waves and their influences on the variability of atmospheric circulation. A better knowledge of the behavior of these waves will improve our understanding of the weather and short-term climate variations.

Zhang, M. H.; Hack, J. J.; Kiehl, J. T.; Cess, R. D. A diagnostic study of climate feedback processes in atmospheric general circulation models. Journal of Geophysical Research Vol. 99, D3; 5525-5537; 1994.

Zhang, M. H.; Geller, M. A. Selective excitation of tropical atmospheric waves in wave-CISK: effects of zonal wind shear. Journal of the Atmospheric Sciences 51:353-368; 1994.

Zhang, M. H.; Cess, R. D.; Kwon, T. Y.; Chen, M. H. Approaches to compare clear-sky radiative fluxes in general circulation models with Earth Radiation Budget Experiment data. Journal of Geophysical Research Vol. 99, D3; 5515-5523; 1994.

Cess, R. D.; Zhang, M. H.; Potter, G. L.; et al. Uncertainties in carbon dioxide radiative forcing in atmospheric general circulation models. Science; Vol. 262, 1252-1255; 1993.

Randall, D.; Cess, R.D.; et al.; and Zhang, M.H. Intercomparison and interpretation of surface energy fluxes in atmospheric general circulation models. Journal of Geophysical Research Vol. 97, D4; 3711-3724; 1992.

Cess, R.D.; Potter, G.L.; Zhang, M.H.; et.al. Interpretation of snow-climate feedback as produced by 17 general circulation models. Science 253:888-892; 1991.

Cess, R.D.; Potter, G.L.; et al.; and Zhang, M.H. Intercomparison and interpretation of climate feedback processes in 19 in atmospheric general circulation models. Journal of Geophysical Research Vol. 95, D10; 16601-16615; 1990.

Zhang, M.H. Dynamic effect of Tibet Plateau on the rainy season atmospheric circulation in East Asia and its numerical simulation. Journal of Nanjing Institute of Meteorology 10:253-267; 1987.

Zeng, Q.C.; Liang, X.Z; Zhang, M.H. Seasonal abrupt changes of the general circulation of atmosphere and their numerical simulations. Scientia Atmospherica Sinica; Special Issue, 22-42. 1988.

Zhang, M.H. Computation and analysis of the atmospheric spectra from the linearized barotropic geostrophic model. Proceedings of International Conference on Fluid Mechanics, Beijing University Press; pp. 1-5; 1987.

Sampling of Courses Offered

SPRING 1994 CLASS SCHEDULE

MAR 503 Chemical Oceanography

MAR 506 Geological Oceanography

MAR 508 Marine Pollution Monitoring

MAR 510 Geochemical Modeling

MAR 515 Phytoplankton Ecology

MAR 519 Geochemistry Seminar

MAR 520 New Productions and Geochemical Cycles

MAR 526 Turbulence in Coastal and Ocean Waters

MAR 528 Large-scale Ocean-Atmosphere Interactions

MAR 534 Aquaculture

MAR 540/ MAR 302 Marine Microbial Ecology

MAR 548 Marine Geophysics

MAR 550 Special Topics

Sec. 1: Fisheries Ecology Seminar
Sec. 2: Seminar-Life History/Evolution

MAR 552 Directed Study

MAR 572/ ESC 555 Numerical Simulations in the Atmospheric Sciences

MAR 573 Special Topics in Chemical Ocean.

Sec.1: Radioisotope Techniques in Biological & Chemical Oceanography

MAR 574 Special Topics in Physical Oceanography

Sec. 1: Numerical Recipes

MAR 576 Spec.Topics in Biological Oceanography

Sec. 1: Zooplankton Communities

Sec.2: Marine Biofluid Mechanics

MAR 580 Seminar

MAR 590 Research

MAR 594 Theoretical Meteorology II

OCN 650 Research

OCN 655 Directed Study

OCN 670 Teaching Practicum

OCN 694 Graduate Seminar

Adjunct Faculty

Randall Alberte, University of California at Los Angeles, Department of Biology. Primary production, environmental regulation of plant and algal adaptation.

Harold Berger, Professor, part time. Region I Director (Retired), New York Department of Environmental Conservation. Solid waste disposal; groundwater quantity and quality; air emissions; wetland formation and protection.

William Crawford, Institute of Ocean Sciences, Canada. Continental shelf and slope dynamics microstructure; tidal dynamics.

William Eichbaum, The Conservation Foundation/World Wildlife Fund. Coastal zone policy and management; environmental conservation.

Falkowski, Paul, Brookhaven National Laboratory. Marine phytoplankton ecology; phytoplankton physiology.

Feldman, Gene, National Aeronautics and Space Administration, Goddard Space Flight Center. Remote sensing of phytoplankton; satellite oceanography.

Charles Flagg, Brookhaven National Laboratory. Continental shelf dynamics, acoustical oceanography.

Martin Garrell, Department of Physics, Adelphi University. Physical processes and properties relative to marine environmental problems.

Douglas Hill, Engineeer, Sc.D., P.E.. Systems engineering, energy and environmental policy analysis.

Horrigan, Sarah, Executive Office of the President of the U.S., Office of Management and Budget. Marine policy; plankton ecology.

Garry Mayer, National Oceanic and Atmospheric Administration. Estuarine processes; marine environmental restoration.

Peter Minnett, Brookhaven National Laboratory. Physics of satellite remote sensing and applications to oceanography and climate studies; polar oceanography.

Larry Noonan, Office of the Provost, University at Stony Brook. Management policy; budgeting and fiscal analyses.

Joel O'Connor, U. S. Environmental Protection Agency. Environmental assessment, policy, and quality indicators; marine ecology.

Claudio Pescatore, Brookhaven National Laboratory. Hydrogeology and groundwater transport of contaminants; mathematical modeling; radiochemistry.

Stephen E. Schwartz, Brookhaven National Laboratory. Atmospheric chemistry; cloud and aerosol chemistry and microphysics; chemical modeling; atmospheric radiation.

Scott Siddall, Kenyon College, Ohio. Benthic ecology; aquaculture; animal-flow interactions; computer applications to ecological problems.

Dennis Suszkowski, Hudson River Foundation. Estuarine sedimentology; ocean and estuarine policy and management.

Richard Thomson, Institute of Ocean Sciences, Canada. Coastal oceanography; continental shelf waves; slope currents.

James Vaughn, Brookhaven National Laboratory. Transport fate and effects of viruses in the aquatic environment.

Mario Vieira, U.S. Naval Academy Oceanography Department, Annapolis. Circulation and the dynamics of coastal and estuarine waters.

Douglas Wallace, Brookhaven National Laboratory. Chemical oceanography; use of freons as oceanic tracers.

Professors Emeriti

H. H. Carter
J. L. McHugh
Donald W. Pritchard
J. R. Schubel
Peter K. Weyl

Postdoctoral Scholars

Christina Barnes Heilbrun,
Postdoctoral Research Associate

David Hutchins,
Postdoctoral Research Associate

Byeong Gweon Lee,
Postdoctoral Research Associate

Geoffrey Trager,
Postdoctoral Fellow

Staff

Diane Arwood, Analytical Laboratory Technician
Diane Achman, Research Support Specialist
Janice Barone, Secretary
Trudy Bell, Editorial Associate
James Brister, Flax Pond Laboratory Manager
Christine Campbell, Staff Assistant
George Carroll, Manager, Computing Facilities
Carol Case, Administrative Assistant
Roy Cash, Research Vessel Mate
Aravind Cherukuri, Engineering Design Assistant
Joanne Cosgrove, Secretary
Amir Ehtisham, Research Support Specialist
Gina Gartin, Secretary
Eileen Goldsmith, Administrative Assistant
Clifford Jones, Facilities Manager
Roger Kelly, Assistant Librarian
Jodi Kopp, Secretary
David Hirschberg, Senior Research Scientist
David Lucyk, Ocean Instrument Technician
Lori Palmer, Director of Graphic Arts
Laura Richardson, Graduate Program Coordinator
Susan Rudnick, Project Staff Associate
Jeri Schoof, Executive Assistant to the Dean and Director
Bonnie Stephens, Administrative Assistant
Ian Stupakoff, Research Support Specialist
Hiram Szeto, Research Support Specalist
Helen Ulreich, Secretary
Maryanne Wente, Research Support Specialist
Mark Wiggins, Field Specialist
Thomas Wilson, Oceanographic Instrumentation Engineer
William Wise, Associate Director, Director, Living Marine Resources Institute
Bernice Wornow, Staff Assistant
Qing Xia, Research Support Specialist
Randy Young, Senior Staff Assistant
Bret Zielenski, Research Vessel Captain

1992-1993 Ph.D. Recipients and Thesis Titles

Student (Advisor)

Sigrun Huld Jonasdottir
(Darcy J. Lonsdale)
Chemical composition of food and the reproductive success of the copepods *Acartia tonsa* and *Acartia hudsonica*

Arnoldo Valle-Levinson
(Robert E. Wilson)
Effects of tidal mixing on stratification and exchange in Long Island Sound

Miguel Olaizola
(Edward J. Carpenter)
Significance of the xanthophyll cycle in diatoms

John R. Reinfelder
(Nicholas S. Fisher)
The fate of elements ingested by marine planktivores

Woong-Seo Kim
(Darcy J. Lonsdale)
The influence of zooplankton community on phytoplankton populations in Long Island bays

Jose Gomez-Valdes
(Dong-Ping Wang)
Massively parallel computing in ocean circulation model with application to the Gulf of California

Marco Salamanca
(J. Kirk Cochran)
^{210}Pb Mass balance in Concepcion Bay, Chile

Byeong-Gweon Lee
(Nicholar S. Fisher)
The fate of elements associated with planktonic particles

Mead A. Allison
(Charles Nittrouer)
Coastal sedimentation and erosion adjacent to the Amazon River, Brazil

Xu-chen Wang
(Cindy Lee)
Biogeochemistry study of aliphatic amines and amino acids in coastal marine sediments

Minghang Chen
(Robert D. Cess)
Cloud radiative forcing anomalies associated with equatorial Pacific sea surface temperature anomalies and their contributions to the atmospheric response

Lisa M. Clough
(Glenn R. Lopez)
The separate and combined effects of oxygen, carbon, and sulfide on the head-down deposit-feeding polychaete *Heteromastus filiformis*

Chung-Wu Wang
(Dong-Ping Wang)
Underwater acoustic propagation on the continental shelf

1992-1993 M.S. Recipients and Thesis Titles

Student (Advisor)

Ralph K. Tegge
(David O. Conover)
Comparison of metabolic rates among Atlantic silversides (Menidia menidia) exhibiting countergradient variation in growth rate

Chongle Zhang
(Jerry R. Schubel)
Studies on dissolved oxygen in New York-New Jersey Harbor

William G. Wallace
(Glenn R. Lopez)
The trophic transfer of biologically sequestered cadmium from the oligochaete *Limnodrilus hoffmeisteri* to the grass shrimp *Palaemonetes pugio*

Andrew M. Parrella
(Frank J. Roethel)
Bioassay of stabilized municipal solid waste ash using diatoms, larval shrimp, and larval clams

Sereno A. Barr-Kumarakulasinghe
(Vincent T. Breslin)
Modelling thermal degradation kinetics of starch polyethylene films

Jing Wang
(J. Kirk Cochran)
Sediment accretion rates and atmospheric heavy metal contamination recorded in high salt marshes adjacent to Long Island Sound, New York

Stephen M. Zahn
(Peter M.J. Woodhead)
A hydroacoustic examination of the distribution and swimming behavior of fish in the Lower Hudson River Estuary

Shawn E. Tisdell
(Vincent Breslin)
Heavy metal concentrations, variability, and leachability in solid waste compost

Geoffrey H. Pierson
(Charles A. Nittrouer)
Characteristics of glacial-marine sediments accumulating in the Ross Sea

Judith Ben-Porath
(Jonathan Zehr)
Development of gene probes for marine nitrogen fixing cyanobacterial communities

Rafael Niño-Lopez
(Elizabeth Cosper)
The effects of low dissolved oxygen concentrations on the opossum shrimp, *Mysidopsis bahia*

Karen Galindo
(Jonathan Zehr)
The use of PCR amplification for the assessment of nitrogen-fixing capabilities of natural open ocean communities

Patrick J. Dooley
(Josephine Aller)
The affects of chronic exposure to various oxygen tension on the infaunal bivalve *Tellina agilis*

Jill J. Bauman
(Paul G. Falkowski)
The use of satellite imagery to distinguish between the effects of natural and anthropogenic aerosol sulfates on cloud albedo

Hanguo Wu
(Mary I. Scranton)
Cycling of low molecular weight volatile fatty acids in a permanently anoxic estuarine basin

Jianguo Sun
(Roger D. Flood)
Digital processing of side-scan sonar images for geological interpretation

Christopher K. Sommerfield
(Charles A. Nittrouer)
Late holocene regional erosion on the Amazon Shelf: stratigraphic and geochronologic evidence

Ian Stupakoff
(Robert C. Aller)
Biogeochemical interactions between rhizospheric sediment and roots of the eelgrass *Zostera Marina* L.

Matthew R. Morgan
(Henry J. Bokuniewicz)
The influence of antecedent topography on shoreline character and position

Jiong Shen
(Jerry R. Schubel)
Studying the dynamic response of SBE temperature cell and conductivity cell by a well designed spiking generator in the lab

Vera Agostini
(Henry J. Bokuniewicz)
Hypoxia in the New York Bight and the Adriatic Sea: a comparative study focusing on monitoring strategies

Jihyun Lee
(V. Monica Bricelj)
The kinetics of PSP toxins transfer from toxic dinoflagellates *Alesandrium spp.* to two bivalve species, *mytilus edulis* and *mercenaria mercenaria*

Todd Ward
(Henry J. Bokuniewicz)
Bathymetric influences on current patterns in shallow coastal environments

Graduate Student Achievements

Grants, Fellowships, and Awards

Anderson, Timothy H.
Student Research Fellowship, $13,000. New York Sea Grant, 1993.

Anderson, Timothy H. Research award for "Pelagic Microbiological Processes and Hypoxia in Western Long Island Sound," $36,500, New York City Department of Environmental Protection, 1993.

Bauer, Susan. Research Fellowship, New York Sea Grant, $13,000, 1992.

Buckel, Jeffrey. Student Research Fellowship, $13,000, New York Sea Grant, 1992-93.

Cabelli, Alejandro. Office of Naval Research, $13,600 annually for four years.

Diaz, Mara. National Science Foundation, $13,600 annually for four years.

Hare, Jonathan A. Hudson River Doctoral Fellowship, $12,000, Hudson River Foundation, 1993.

Hare, Jonathan A. Andrew J. Boehm Fellowship, $2,500, 1993.

Hare, Jonathan A. Best student paper, Northeast Fish and Wildlife Conference, $300, 1993.

Hare, Jonathan, A. Sounds Conservancy Grant, $2,000, 1992-93.

Hare, Jonathan A. Graduate Student Fellowship, Fish Otolith Research and Application Symposium, $400, 1993.

Hurst, Thomas. Research Fellowship, Fellowship Program in Population Biology, The Electric Power Research Institute, $36,192, 1993-95.

Jaunes, Francis. Pritchard Award for Best Ph.D. Thesis, $125, 1993.

Juanes, Francis. Stony Brook Alumni Award, $250, 1992.

Lin, Senjie. National Science Foundation, $13,600 annually for four years.

Panagiotis, Michalopoulos. State Scholarships Foundation of Greece for completion of Ph.D. program, $9,000 annually for three years.

Pantoja, Silvio. Pritchard Award for Best Master's Thesis, $250, 1992.

Reinfelder, John. Pritchard Award for Best Ph.D. Thesis, $125, 1993.

Reinfelder, John. The American Society of Limnology and Oceanography, 1993. Lindeman Award for best paper in any area of marine or freshwater research, entitled, "The assimilation of elements ingested by marine copepods," co-authored with N. S. Fisher, *Science* (1991)

Romans, Kristen. National Science Foundation, $13,600 annually for two years.

Sponaugle, Susan. J. Frances Allen Scholarship for Outstanding Female Doctoral Student, $2,500, American Fisheries Society, 1992.

Steinberg, Nancy D. Student Research Fellowship, $13,000, New York Sea Grant, 1992, 1993.

Subramaniam, Ajit. Global Change Graduate Fellowship, $44,000, National Aeronautics and Space Administration, 1992-1994.

Sun, Mingyii. Pritchard Award for Best Ph.D. Thesis, $250, 1992.

Tanikawa-Oglesby, Shino. Kenneth Staudte Award, New York Sea Grant, $200, 1992.

Tonjes, David. Grant to support technical assistance to Commissioner of Waste Management, Town of Brookhaven, $22,000 annually, 1992 - present.

Wallace, William G. Pritchard Award for Best M.S. Thesis, $250, 1993.

Wallace William G. Tibor T. Polgar Fellowship, Hudson River Foundation and the New York Department of Environmental Conservation, $4,000, 1992.

Wallace, William G. Award to attend course, "Advanced research training in marine molecular biology and biotechnology," at Duke University School of the Environment, Office of Naval Research, $3,500, 1993.

Wallace, William G. Hudson River Foundation Graduate Fellowship Hudson River Foundation, $12,000, 1993.

Wang, Wen Xiong. Research Fellowship, $13,000, New York Sea Grant, 1992-94

Young, Randall R. Hudson River Foundation Doctoral Fellowship, $12,000, 1993.

Singly Authored Publications

Lee, Jihyun. (1992). Concepts and applications of coastal zone management.*Ocean Policy Research* 7(1):1-36.

Tonjes, David. (1993). Town of Brookhaven updated solid waste management plan. Town of Brookhaven Department of Waste Management, Medford, NY, 1100 pp.

Tonjes, David. (1993). Town of Brookhaven comprehensive recycling analysis update. Town of Brookhaven Department of Waste Management, Medford, NY, 1100 pp.

Jointly Authored Publications

Fox, J. L., **J. F. Brannon**, and H. S. Porter. (1993).Upper limits to the nightside ionosphere of Mars, *Geophysical Research Letters*, 20: 1339.

Brannon, J. F. and J. L. Fox. (1993). Evidence for day-to-night transport at low solar activity in the Venus pre-dawn ionosphere, *Geophysical Research Letters*, 20: 2739.

Castro, Leonardo R., P.A. Bernal and V.A. Troncoso. (1993). Coastal intrusion of copepods: mechanisms and consequences in the population biology of *Rhyncalanus nasutus*. *Journal of Plankton Research* 15(5):501-515.

Cowen, R.K. and **Leonardo R. Castro**. (in press). Retention of coral reef fish larval distribution to island scale circulation around Barbados, West Indies, *Bulletin of Marine Science*.

Green, Mark A., R.C. Aller, and J. Y. Aller. (1992). Experimental evaluation of the influences of biogenic reworking on carbonate preservation in nearshore sediments. *Marine Geology* 107: 175-181.

Green, Mark A., R. C. Aller and J. Y. Aller. (1993). Carbonate dissolution and temporal abundances of foraminifera in Long Island Sound Sediments. *Limnology and Oceanography* 38(2): 331-345.

Kim, Y. H., J. L. Fox, and H. A. Porter. (1992) H^+ in the Jovian ionosphere: densities and vibrational distribution, *Journal of Geophysical Research*, 97: 6093

Lee, Byeong-Gweon and N.S. Fisher. (1992). Degradation and elemental release rates from phytoplankton debris and their geochemical implications. *Limnology and Oceanography* 37:1345-1360.

Lee, Byeong-Gweon and N. S. Fisher (1992). Decomposition and release of elements from zooplankton debris. *Marine Ecology Progress Series* 88:117-128.

Lee, Byeong-Gweon and N.S. Fisher. (1993). Release rates of trace elements and protein from decomposing debris. I. Phytoplankton debris. *Journal of Marine Research* 52:391-421.

Lee, Byeong-Gweon and N.S. Fisher. (1993). Microbially mediated cobalt oxidation in seawater revealed by radiotracer experiments. *Limnology and Oceanography* 38:1593-1602.

Lee, Byeong-Gweon and N.S. Fisher. (in press). Effects of sinking and zooplanktonic grazing on the release of elements from planktonic debris. *Marine Ecology Progress Series*.

Lee, Jihyun, Y.H. Lee, S.Y. Hong, and M.S. Kwon. Coastal zone utilization in Korea: status and prospects. International Perspectives on Coastal Ocean Space Utilization. P.M. Griffman and J.A. Fawcett, eds. Sea Grant Program, University of Southern California, Los Angeles, 1993, pp.99-118.

LoBue, Carl P. and M.A. Bell. (1993). Phenotypic manipulation by the cestode parasite *Schistocephalus solidus* of its intermediate host, *Gasterosteus aculeatus*, the threespine stickleback. *American Naturalist* (October) 142 (4).

Monetti, M. and M.I. Scranton. (1992). Fatty acid oxidation in anoxic marine sediments: the importance of hydrogen sensitive reactions. *Biogeochemistry* 17: 23-47.

Pantoja, Silvio, C. Lee, J.F. Marecek, and B.P. Palenik. (1993). Synthesis and use of fluorescent molecular probes for measuring cell-surface enzymatic oxidation of amino acids and amines in seawater. *Analytical Biochemistry* 211:210-218.

Reinfelder, John R., N. S. Fisher, S. W. Fowler, and J.-L. Teyssié. (1993). Release rates of trace elements and protein from decomposing debris. 2. Copepod carcasses and sediment trap particulate matter. *Journal of Marine Research* 51: 423-442.

S.N. Luoma,, C. Johns, N.S. Fisher, N. A. Steinberg, R. S. Oremland, and **John R. Reinfelder.** (1992) Absorption of organo-selenium and elemental selenium via ingestion in the bivalve *Macoma balthica*. *Environmental Science and Technology* 26: 485-491.

Reinfelder, John R. and N.S. Fisher. (in press). Effects of sinking and zooplanktonic grazing on the release of elements from planktonic debris. *Marine Ecology Progress Series*.

Fisher, N.S. and **John R. Reinfelder.** (in press) The trophic transfer of metals in marine systems. In: Metal Speciation and Bioavailability. A. Tessier and D.R. Turner, eds. Lewis, Chelsea.

R. L. Swanson, V. T. Breslin, S. Reaven, **Stella Ross,** R. Young, and R. Becker. (1933). An assessment of impacts associated with implementation of the Suffolk County plastics law, Local Law 10-1988. Special Report =106, Reference =93-4, Marine Sciences Research Center, University at Stony Brook, 255 pp.

Sponaugle, Susan and R.K. Cowen. (in press). Larval durations and recruitment patterns of two Caribbean gobies (Gobiidae): contrasting early life histories in demersal spawners. *Marine Biology*.

Houde, E.D., D.L. Breitburg, **Nancy D. Steinberg**, and R. DuBeau. (in press). Potential effects of low dissolved oxygen on trophic interactions in an estuarine food web. *Marine Ecology Progress Series*.

Subramaniam, Ajit and E.J. Carpenter. (in press). An empirically derived protocol for detection of blooms of the marine cyanobacterium *Trichodesmium* using CZCS imagery. *International Journal of Remote Sensing*.

Tonjes, David and R. L. Swanson. (1992). Where does it all go? The size and methods of disposal of Long Island's solid waste, 1986 and 1991. Special report =103 (Reference 92-12); Marine Sciences Research Center, Stony Brook, 123 pp.

Tonjes, David and J. Black. (1993). Town of Brookhaven landfill groundwater assessment, 1992 update. Town of Brookhaven Department of Waste Management, Medford, NY, 110 pp.

Tonjes, David and R. L. Swanson. (1993). What hath Albany wrought? Waste Management Research Report, 5.2:2-9.

Tonjes, David and R. L. Swanson (in press). Long Island's solid waste perplexities. *Urban Technology*.

Presentations at Conferences

Anderson, Timothy H. and G. T. Taylor, Pelagic biological processes influencing hypoxia in western Long Island Sound, Long Island Sound Research Conference, Southern Connecticut State University, New Haven, Connecticut, 1992.

Bauer, Susan, V. M. Bricelj. Dynamics of mud crab predation on juvenile bay scallops. Marine Benthic Ecology Meeting, Mobile, Alabama, 1993.

Brannnon, J. F., J. L. Fox, and H. A. Porter, Model calculations of the nightside ionospheres of Venus and Mars, Second International Planetary Science Conference, (and Annual Meeting of the Division for Planetary Sciences, American Astronomical Society), Munich, October, 1992.

Brannon, J.F. and J. L. Fox, Nightward fluxes of O^+ in the Venus ionosphere, Seventh Scientific Assembly of the International Association of Geomagnetism and Aeronomy, Buenos Aires, August, 1993.

Buckel, J.A., N. D. Steinberg, and D. O. Conover, Impact of bluefish predation in the Hudson River: Preliminary results,Gutshop '92 (a fish feeding ecology symposium), Orcas Island, Washington, 1992.

Buckel, Jeffrey A., Gastric evacuation rates, diet, and daily ration of piscivorous juvenile bluefish, 73rd Annual Meeting, American Society of Ichthyologists and Herpetologists, University of Texas, Austin, Texas, 1993.

Buckel, Jeffrey A. and D. O. Conover, Diel movements and foraging patterns of juvenile bluefish in the Hudson River estuary, 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Chaloupka, Kristin A. and R.C. Aller, Diagenetic cycling of arsenic in the Amazon shelf sediments, AmasSeds Symposium, Niteroi, Brazil, 1993.

Castro, Leonardo R. and R.K. Cowen, Vertical distribution patterns of coral reef fish larvae around Barbados, West Indies, 73rd Annual Meeting, American Society of Ichthyologists and Herpetologists; American Fisheries Society Larval Fish Conference, University of Texas, Austin, 1993.

Cowen, R.K. and **Leonardo R. Castro,** Retention of coral fish larvae around the island of Barbados, West Indies,73rd Annual Meeting, American Society of Ichthyologists and Herpetologists; American Fisheries Society Larval Fish Conference, University of Texas, Austin, 1993.

Chaloupka, Kristin A. Arsenic in the pore water of Amazon shelf sediments, Marine Sciences Research Center Student Symposium, Stony Brook, New York, 1993.

Chaloupka, Kristin A. and W. F. Fitzgerald, The distribution and fluctuation of iron and manganese in an ombrotrophic peat bog in Minnesota, Undergraduate Chemistry Research Symposium, University of Connecticut, 1992.

Hare, Jonathan A. and R.K. Cowen, Mechanisms of larval transport from the South Atlantic Bight to the Middle Atlantic Bight, First Biennial Larval Ecology Meeting, Port Jefferson, New York, 1993.

Hare, Jonathan A. and R. K. Cowen, Ecological implications of the larval transport and reproductive strategy of bluefish (*Pomatomus saltatrix*).American Fisheries Society Larval Fish Conference, University of Texas, Austin, 1993.

Hare, Jonathan A. Ontogeny and otolith microstructure of bluefish (*Pomatomus saltatrix*). American Society of Ichthyologists and Herpetologists; University of Texas, Austin, 1993.

Hare, Jonathan A. and R. K. Cowen. The potential role of larval transport in shaping estuarine recruitment patterns in bluefish *(Pomatomus saltatrix)*. Northeast Fish and Wildlife Conference, Atlantic City, New Jersey, 1993.

Hare, Jonathan A. and R.K. Cowen. Ontogeny and otolith microstructure of bluefish*(Pomatomus saltatrix)*. Fish Otolith Research and Application Symposium, Hilton Head Island, South Carolina, 1993.

Hurst, Thomas and D. O. Conover. Potential for size related overwinter mortality in juvenile Hudson River striped bass, Electric Power Research Institute Compensatory Mechanisms in Fish Populations (CompMech) - Striped Bass Project Workshop, Cornwall, New York, 1993.

Kunze, Holly. Is larval transport in the lower Hudson River Estuary controlled by hydrodynamics or behavior? 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Kunze, Holly. Behavioral and physical mechanisms of larval transport in Hudson River estuary. American Society of Limnology and Oceanography, Ocean Sciences, San Diego, California, 1994.

Lee, Jihyun. Challenges for coastal resources management in the Cheonsu Bay, the Republic of Korea, Eighth Symposium on Coastal and Ocean Management, New Orleans, 1993.

Lin, Senjie. Growth stage-related antigens in phytoplankton detected by anti-PCNA and anti-p^{34cdc2}, satellite meeting of the Annual Conference of American Society of Cell Biology and Biochemistry, Denver, Colorado, 1992.

Matthews, Andrew. Cross-shelf transport of decapod larvae in New York Bight. 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Michalopoulus, Panagiotis and R. C. Aller. Authigenic iron-rich carbonate minerals on the Amazon continental shelf, Amaseds Symposium, Niteroi, Brazil, 1993.

Pantoja, Silvio and C. Lee. Removal of amino acids from seawater by cell-surface oxidative deamination measured using fluorescent molecular analogs. Fall Meeting New England Estuarine Research Society, Wells National Estuarine Research Society, Maine, 1992.

Schell, Jeff. Variation in larval transport mechanisms between semidiurnal and diurnal tidal regimes, 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Sponaugle, Susan and R. K. Cowen, Recruitment after dissimilar larval durations in two Caribbean gobies (Gobiidae), 73rd Annual Meeting, American Society of Ichthyologists and Herpetologists, University of Texas, Austin, 1993.

Sponaugle, Susan and R.K. Cowen, Recruitment after dissimilar larval durations in two Caribbean gobies, *Coryphopterus glaucofraenum* and *Gnatholepis thompsoni*, First Biennial Larval Ecology Meeting, Port Jefferson, New York, 1993.

Steinberg, Nancy D., and D. O. Conover, A bioenergetic determination of young-of-the-year bluefish consumption in the Hudson River estuary, 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Subramaniam, Ajit, P. Falkowski, D.G. Capone, and E. J. Carpenter, Does *Trichodesmium* facilitate "echo blooms" of phytoplankton? American Society of Limnology and Oceanography, Santa Fe, New Mexico, 1992.

Subramaniam, Ajit, E. J. Carpenter, and P. Falkowski, An initial algorithm to identify blooms of *Trichodesmium* in satellite imagery, American Geophysical Union Conference, San Francisco, California, 1992.

Subramaniam, Ajit, Using satellites to identify *Trichodesmium* blooms of the West Coast of India, National Remote Sensing Agency, Hyderabad, India, 1993.

Tanikawa-Oglesby, Shino. The effect of a swimming predator, *Sphoeroides maculatus*, on the refuge value of eelgrass for juvenile bay scallops, *Argopecten irradians*. Marine Benthic Ecology Meeting, Mobile, Alabama, 1993.

Wallace, William G. The trophic transfer of biologically sequestered cadmium from the oligochaete *Limnodrilus hoffmeisteri* to the grass shrimp *Palamonetes pugio*, Marine Benthic Ecology Meeting, Newport, Rhode Island, 1992.

Wallace, William G. The role of prey contamination exposure history in cadmium trophic transfer, Marine Benthic Ecology Meeting, Mobile, Alabama, 1993.

Wallace, William G. and G. Lopez. Chronic cadmium exposure: Effects on resistance, accumulation, detoxification and trophic transfer, 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Young, Randall R. and N. S. Fisher. The mobilization of cadmium from contaminated sediment to the Hudson River and its transfer to the blue crab, *Callinectes sapidus*. 12th Biennial International Estuarine Research Federation Conference, Hilton Head Island, South Carolina, 1993.

Postdoctorates and Professional Appointments Obtained

Allison, Meade (Ph.D. 1993) Post-doctoral Fellow, Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, 1993.

Chang, Jeng (Ph.D. 1989) Research Assistant Professor, Marine Sciences Research Center, State University of New York, Stony Brook, 1992. Assistant Professor, Institute of Marine Biology, National Taiwan Ocean University, Keelung, Taiwan, 1993.

Clough, Lisa (Ph.D. 1993) Post-doctoral Fellow, East Carolina University, Greenville, North Carolina, 1993.

Juanes, Francis (Ph.D. 1992) Assistant Professor, University of Massachusetts, Amherst, Department of Forestry and Wildlife Management, 1993.

Kim, Y.H. (Ph.D. 1991) Postdoctoral positions at Berkeley and the University of Maryland; in 1994 appointed Assistant Professor, Department of Astronomy and Space Science, Chungnam National University Daejon, Korea.

Lee, Byeong-Gweon (Ph.D. 1993) Post-doctoral Fellow, Water Resources Division, U. S. Geological Survey, Menlo Park, California, 1993.

Morgan, Matthew (M.S. 1993) Computer Systems Manager, Environmental Defense Fund, New York, 1993.

Reinfelder, John (Ph.D. 1992) Post-doctoral Fellow, Civil Engineering Department, Massachusetts Institute of Technology, Cambridge, Massachusetts, 1992.

Rude, Peter (Ph.D. 1992) Head, Geochemistry Section, Landau Associates, Inc., Edmonds, Washington, 1993.

Siddiqui, Pirzada J.A. (Ph.D. 1992) Assistant Professor, Marine Sciences Department, University of Karachi, Karachi, Pakistan.

Stupakoff, Ian (M.S. 1993) Technical Associate, Marine Sciences Research Center, 1993.

Sun, Mingyi. (Ph.D. 1992) Post-doctoral Fellow, Skidaway Institute of Oceanography, Savannah, Georgia, 1993.

Valle-Levinson, Arnoldo (Ph.D. 1992) Post-doctoral Fellow, Center for Coastal Physical Oceanography, Old Dominion University, Norfolk, Virginia, 1993.

Young, Randall (Ph.D. expected 1994) Senior Staff Assistant/Marine Specialist, Waste Management Institute, Marine Sciences Research Center, State University of New York, Stony Brook, 1993.

Zahn, Stephen M. (M.S. 1993) Marine Scientist, New York State Department of Environmental Conservation, Marine Division, Long Island City, New York.

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