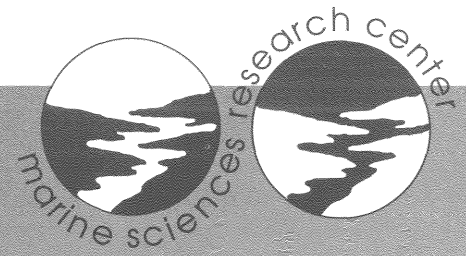


Marine Sciences Research Center



N E W S L E T T E R

Vol. II, No. 6 Summer 1991

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MSRC HOSTS ANTHES AND STONE IN "CELEBRATIONS AND CONCERNS FOR EARTH" SERIES

Rick Anthes

Rick Anthes, President of the University Corporation for Atmospheric Research (UCAR) and a leading researcher in modelling scales of weather that turn into severe storms, spoke at MSRC in April about recent trends in global warming and its consequences for the future. UCAR is a consortium of 59 academic institutes having the nation's top programs in atmospheric sciences.

"The summer 1988 drought brought home the possibility of global change to the people more

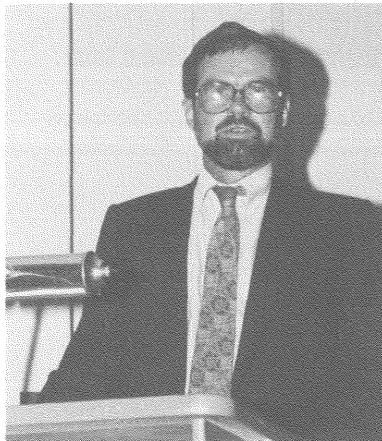


Photo by Lori Palmer

Atmospheric researcher and President of UCAR, Rick Anthes.

than anything else," said Anthes, describing the summer as one of the hottest and driest with the most widespread droughts in the 100 years of weather record-keeping in the northern hemisphere. The following summer was an average year, but the

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VISITING COMMITTEE TOURS CENTER

"Today there is an explosion of data, with hundreds of thousands of bits of information gathered on a routine basis," said MSRC geological oceanographer Henry Bokuniewicz to touring members of the Visiting Committee. He was describing the prolific output of oceanographic research to the group of long-standing MSRC advisors and supporters. At the same time, he was explaining the Center's proliferation of computerization.

"There is a renewed interest in the coastal environment, and we at MSRC are frequently asked questions by the public, which require our having quick access to data," said Bokuniewicz. "The computer is a

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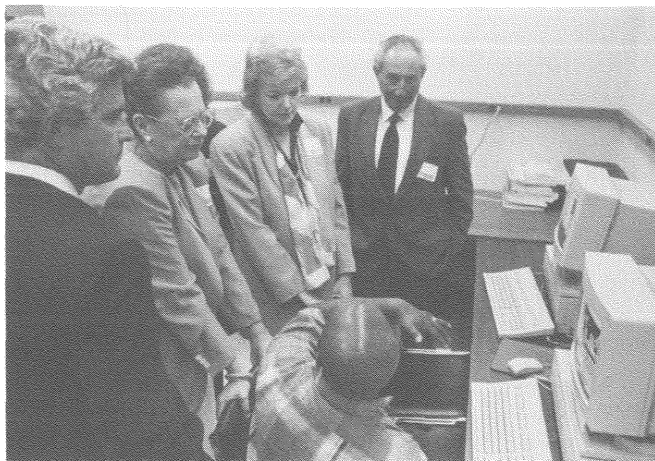


Photo by Lori Palmer

Visiting Committee members (from L.) James Larocca, Evelyn Berezin, Rosemary Scanlon, and Walter Kissinger observe graduate student Barr Kumarakulasinghe using Macintosh to display global sea surface temperatures acquired by satellite.

global mean surface temperature of 1990 topped the 1988 record.

Addressing the uncertainty debated among scientists about what we will actually experience as the globe warms, Anthes pointed to the complexity and variability of the atmosphere as the reason for our lack of knowledge. Among the many variations in the geology and climate that can either contribute to or reduce future global warming, Anthes cited the amount of ice cover; ocean circulation and transport of heat; change in land features like erosion; and changes in the clouds, "an important component in the radiation budget." Then there are the human-induced effects, such as emissions of trace gases from automobiles and industry, aerosols, and alterations of the land. "People are causing changes as large as the natural variability of the Earth's system," said Anthes.

From scientific measurements, such as studies of ancient gases trapped in ice cores in Greenland and Antarctica and 30-year measurements of the atmosphere in Mauna Loa, Hawaii, we know without a doubt that carbon dioxide (CO₂), an important greenhouse gas, has increased by nearly 15%, and

that the 1990 CO₂ concentration is higher than at any time in the last 160,000 years.

"These increases are being caused by an unprecedented growth in human population," said Anthes. "The doubling time for the world population has decreased from 1,500 years in 8000 B.C. to less than 35 years at present." The solutions to curtailing global atmospheric pollution and environmental destruction, according to him, must include enhancing our nuclear and renewable energy dependence, enacting conservation measures, and stabilizing the world's population.

Roger Stone

Hard work and serendipity are how Roger Stone, author of several books on human-environment clashes, explained much of his success at the writer's workshop given at MSRC this past April. But as the attending writers and would-be writers well knew, keen sensibilities from familiarity with his subject, along with a developed lyrical style are also part of Stone's success formula.

"Some of the best books around are published not necessarily because of the magic flow of words across the page, but because of the depth of knowledge brought by the author" said Stone. He also throws into the recipe for success time to write and facilities to gain access to the subject.

Stone served as foreign correspondent and former chief for Time-Life News Bureau in Rio de Janeiro, Brazil. He said that being a journalist for Time-Life was very important to his career because it gave him access to all kinds of people and ideas, as well as the opportunity to refine his writing skills.

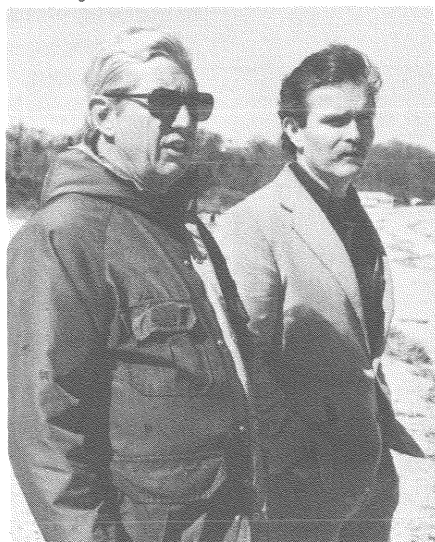
Roger Stone, author of "Dreams of Amazonia" and "Voyage of the Sanderling," at Flax Pond with LIMRI Director Bill Wise.

Stone left journalism, eventually becoming senior fellow at the World Wildlife Fund, a fellow at the Conservation Foundation, and Whitney H. Shepardson Fellow at the Council on Foreign Relations. With a new perspective, "through the eyes of the WWF," and his experiences with the Brazilian people and language gained from his journalist days, he began writing about the Amazon basin. The outcome, "Dreams of Amazonia," is an examination of the coexistence of economic development and the environment, in which he considered the balance between what development could do for Brazil and what the carrying capacity of the environment would allow.

In Stone's second book, "Voyage of the Sanderling," he examined environmental changes wrought by development along the eastern coast of the United States all the way from Maine to Brazil's northern coast. He chronicled, through observation and interviews from the "heart and soul of people," how the 8,000 miles of eastern shoreline have changed when compared to journal entries made by early sailors since the time of Columbus' voyage. During this sojourn, he passed through Long Island Sound, but only stopped long enough to gain some anecdotal information. He is contemplating a longer pause in this area in the future to do research for a possible next manuscript.

The southern coast of Long Island Sound bounded by Port Jefferson, Stony Brook, and St. James are familiar shores to Stone. A native of St. James, where his English emigrant parents started spending their summers in the 1930s and later their retirement, he learned to sail in local Sound harbors. During his recent visit to MSRC, he was astonished to see the amount of development that has taken place since he was last here in the 1950s and wants to explore how the people have adapted and responded to these changes. ■

Photo by Lori Palmer



tool to be able to do this." Jim Simons, Walter Kissinger, Rosemary Scanlon, Evelyn Berezin, Nick Karas, James Larocca, Aaron Donner, and Paul Windels gathered around a tablecloth-length of graph paper to scrutinize "hundreds of thousands of bits" of conductivity readings from Antarctica's Ross Sea. The many data points were accumulated over the course of a year.

One of the major principles underlying the practices of the MSRC is a "seed-to-fruit" approach fostered by Dean and Director Jerry Schubel. Whenever possible, the seeds of raw data from basic research at the Center, like those on the graph, are transformed into meaningful information to be used by agencies, legislators, and others in the business of taking action in the environmental arena.

During the tour of the Center's facilities, members learned how chemical oceanographer Nicholas Fisher examines the pathway of radioactive and heavy metals wastes taken up by phytoplankton and passed through the food web. Other stops and highlights on the tour were a visit to the new experimental boathouse built from municipal incineration ash-concrete composite, the fruition of many years of work by Waste Management Institute researchers Frank Roethel and Vincent Breslin; a summary by chemical oceanographer Kirk Cochran of the Long Island Sound Study findings over lunch; and a viewing of a new movie—the latest laser video of copepod predators (small crustacean zooplankton) trying to catch even smaller zooplankton prey—produced by biological oceanographer Jeannette Yen. ■

CONGRESSIONAL SCIENCE ADVISOR TELLS SCIENTISTS HOW TO BETTER RELATIONS WITH CONGRESS

Adjunct Assistant Professor Sarah Horrigan has spent the past year as an American Association for the Advancement of Science (AAAS) Congressional Fellow, serving as Science Advisor for Congressman Edward J. Markey of Massachusetts' 7th District. The AAAS coordinates a number of different professional societies that sponsor fellows, such as the American Society for Microbiology, sponsoring Horrigan.

One of the purposes of this program is to improve relations between Congress and scientists. This past April, Horrigan returned to MSRC to share her experiences in Washington, DC at a special seminar, "Congress' Image of Scientists."

After giving a synopsis of how Congress is structured, who is involved with which committees, and a comparison of relative budgetary appropriations, Horrigan outlined the image of the scientist on Capitol Hill: either silent and unavailable, or giving information in reports that are too detailed and difficult for non-scientists to understand. According to Horrigan, even with science advisors to help legislators, there is not enough scientific expertise on the Hill. Those agencies and lobbying groups that are in Washington and in frequent contact with the legislators may not be the best sources for the type of technical advice needed.

With the restrictions on the entire federal budget and the intense competition for these monies among lobbyists, Horrigan advised scientists who wanted their congressman to support a project not to just go to him or her when that special project needs funding, but to "make contact first by offering your expertise. You can discuss what research you are doing and how it can help the congressman decide on an issue."

Horrigan cautioned the scientists to keep in mind that Congressmen only have the time to read executive summaries, not thick reports and documents. She also advised her audience not to give detailed reports or testimony laden with scientific jargon. On the tenure of our elected legislators, she said, "Scientists want to answer a question by doing a study that takes two years, but congressmen don't have two years—their lifetime in Congress is only two years." ■

NEIGHBORS INVITED TO FIRST FLAX POND LABORATORY OPEN HOUSE

Flax Pond Laboratory's manager, David Berg, had just put the final shine on the floors and doors of the laboratory before the guests began to arrive. The lab celebrated its first open house this past June to introduce the neighbors living near Flax Pond to the lab's research and researchers and to give guided tours of the new Orville Terry memorial trail leading to the salt marsh. Orville Terry was a faculty member of MSRC, who had a deep love of Long Island's marine environments, particularly salt marshes.

At the lab, fisheries biologist David Conover showed visitors his aquaria of experimental fish populations; trail tours and net tows were the domain of the Museum of Long Island Natural Sciences' Glenn Richard and Alice Lederway; and Byron Young of the NY State Department of Environmental Conservation discussed the department's striped bass program at the lab.

Living Marine Resources Institute Director William Wise and Berg also took the occasion to exhibit a number of recently printed and framed colored photos of marine scenes throughout the building—the artistic legacy of R. George Rowland, director of the laboratory from 1985 to 1990. ■



GORDON TAYLOR

Understanding The Role of Marine Microbes in Organic Particle Breakdown and Biofouling

Carbon dioxide from the atmosphere dissolves in surface seawater, supplying phytoplankton with one of the raw materials for growth. The inorganic carbon is "fixed" by photosynthesis—made into organic molecules that make up plant cell structures. The cells grow and die, eventually become organic detritus, the detritus drifts downward, and then what happens to the carbon?

What happens to the carbon after it is incorporated into organic molecules by the phytoplankton is fundamentally important to all other organisms in the food web, which are dependent on dissolved carbon, a major constituent of biologically important molecules. How much carbon is recycled in the upper layers—used and reused by marine organisms—and how much is held at depth, where it can remain for up to 15,000 years? How much reaches the sediments, where it may become part of the geologic record, the ultimate repository?

MSRC biological oceanographer Gordon Taylor's research focuses on these questions for which answers are not easily yielded. "For marine animals living in the aphotic zone [the part of the ocean

without light], the sole source of nutrition comes from what is produced in the upper layers and imported to depths," said Taylor. Results from deploying sediment traps to collect settling particles all over the world's oceans at various depths have produced very similar graphic profiles: only a very small percentage of carbon arrives in traps as organic particles, and most of the particles "disappear" below the upper 1,000 meters.

Where do the particles go? Do they dissolve during their descent through this zone, or do they become resuspended at depth? If they are dissolved, what is the mechanism? Is it a purely chemical means aided by physical processes that break up the particles, or is it through metabolic activity of microorganisms, such as marine bacteria known to associate with settling particles? Or is it a combination of processes? Do the microbes that attach to organic particles near the surface dissolve the carbon enzymatically and then metabolize it as they ride the particles downward? Or do mid-ocean resident bacteria utilize the carbon released by chemical processes?

These are some of the specific questions being addressed by Taylor, who received his Ph.D. from the University of Southern California and served as post-doctoral fellow and research faculty at the University of Hawaii before joining MSRC's faculty in 1990. And the answers are important not only to marine organisms, but to man as well. "One of the major global concerns today is increased CO₂ in the atmosphere from the burning of fossil fuels and deforestation," said Taylor. "Scientists are increasingly looking to the ocean for a possible role in reducing excess atmospheric CO₂." Some are even considering ways to manipulate the ocean's assimilative capacity for CO₂ by fertilizing the ocean to increase phytoplankton production.

"We need to understand the hows and whys and exactly where these processes occur and what their responses would be to increases in atmospheric carbon dioxide," said Taylor. "If we drive the system to higher productivity, what will happen to the organic carbon produced in the upper ocean?" According to Taylor, if most recycling of carbon occurs in the upper ocean and phytoplankton production is increased, most of the carbon will return quickly to the atmosphere as CO₂. On the other hand, if some of the carbon is tied up at depth for long periods of time, then the ocean can play a major role in reducing the atmospheric carbon dioxide.

Recent data on particle-associated microbes indicate that they are dying as they sink, and are not metabolically active. This suggests, contrary to prior belief, that the microbes are not growing and dividing on the particles, and thus, may not be metabolizing them. With MSRC chemical oceanographers Cindy Lee and Nicholas Fisher, Taylor intends to separate out the chemical from microbiological processes involved in the breakdown of particles in laboratory experiments to finally determine what mechanisms are responsible.

Taylor is also involved in several research projects with more immediate applications. Chemical conditioning of inert surfaces, such as metals, plastics, and glass, occurs before microbes attach to and colonize them. They form a biofilm, initiating a process called *biofouling*. He is examining how the type of inert material used for aquatic structures affects the rates and quality of biofilm formed. More detailed knowledge of biofilms is useful for designing better aquatic structures and vessels that will be less hampered by accumulations of fouling organisms, for example, barnacles and the nuisance species of shellfish, zebra mussels. ■

Biological Oceanographer Darcy Lonsdale has been awarded a National Science Foundation grant with post-doctoral fellow Patrick Hassett for "Gut cell cycles and diel feeding patterns in *Acartia tonsa*."

John M. Olin Fellow Doreen Monteleone is beach captain for the next **National Beach Cleanup Day, scheduled for Sunday, September 22, at Smith Point County Park.** Prospective participants should contact her at 632-8664 for information.

Monteleone spent the month of April at Chesapeake Biological Laboratory, working with Drs. Ed Houde and David Secor. The team is evaluating recruitment dynamics of striped bass early life stages in the Patuxent River. They marked 7 million larvae and released them for later recapture. This work will allow estimates of population abundance, larval dispersal, growth rates, and relative mortality rates of this important species of fish.

Biological oceanographer Charles Wurster was selected by the New York State/United University Professions for the Excellence Award. The award is in recognition for sustained, outstanding performance and superior service to the State University and the State of New York.

Biological oceanographer Jeannette Yen is invited to head a workshop on "Mechanoreception" at the August Zooplankton Ecology Symposium at the University of Wisconsin.

Yen is also an invited participant in an interdisciplinary workshop on "Animal Aggregations: 3-Dimensional Measurement and Modeling," to be held in October at the Monterey Bay Aquarium.

Photo by Ian Stupakoff



A biologist from the Canadian Department of Fisheries and Oceans shows giant halibut to (from L.) MSRC professors Cindy Lee and Darcy Lonsdale, Peter Lawton, and graduate student Xu-Chen Wang. Peter Lawton, a former MSRC professor, also arranged a tour of the Huntsman Marine Science Center in St. Andrews.

MSRC PROFS AND STUDENTS TRAVEL TO NOVA SCOTIA FOR ANNUAL SOCIETY MEETING

A number of MSRC faculty and students drove together to Halifax, Nova Scotia for the annual American Society of Limnology and Oceanography (ASLO) meeting in June and to attend several field trips arranged by Professor Cindy Lee. The meeting was held at St. Mary's University and sponsored by Dalhousie University and Bedford Institute of Oceanography.

Assistant Professor Darcy Lonsdale, post-doctoral fellow Patrick Hassett, and graduate students Penny Weissman and Xiao-hua Yang gave talks at the meeting.

Professor Cindy Lee, Associate Professor Mary Scranton, and graduate students Sigrun Jonasdottir, Silvio Pantoja, Xu-Chen Wang, and Mingyi Sun presented posters. Coastal Marine Scholar Marie de Angelis and graduate students Ian Stupakoff and Ajit Subramaniam also attended the week-long meeting.



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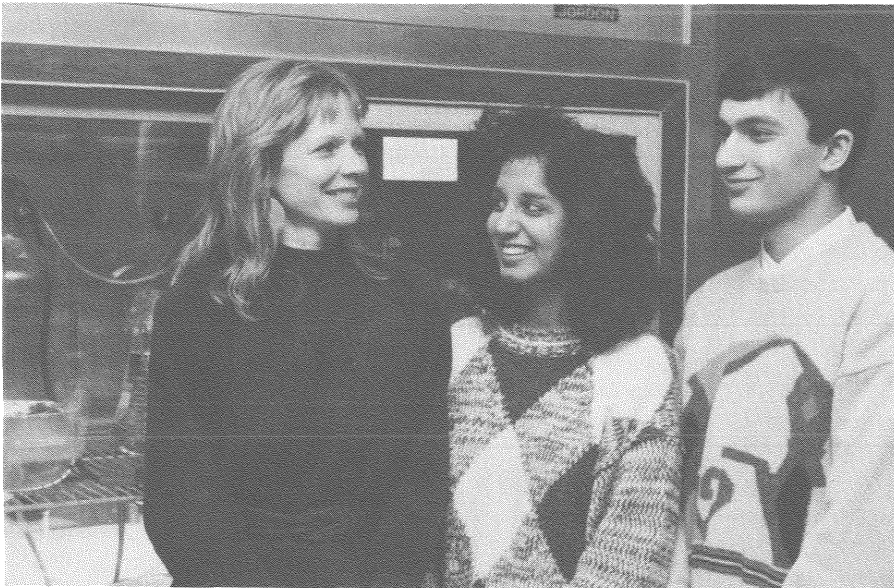


Photo by Trudy Bell

Biological oceanographer Darcy Lonsdale with young scholars Neesha Singh and Rinku Chandra, who worked together on a genetics study involving copepods.

YOUNG SCHOLARS AND SUMMER FELLOWS AID FACULTY RESEARCH

New York Academy of Sciences Scholars

Three New York Academy of Sciences Science Research Training/Young Scholars worked in MSRC laboratories this past Spring. Neesha Singh, a senior at Longwood High School and Rinku Chandra, a junior at Mepham High School in Bellmore, Long Island, worked with biological oceanographer Darcy Lonsdale on a genetics study involving copepods. Lee Pyne-Mercier of Harborfields Schools in Greenlawn, worked with Research Assistant Professor Jon Zehr to develop a method for non-radioactive detection of nitrogen fixation genes.

Ward Melville Summer Fellows

Two Ward Melville Summer Fellows spent part of their summer with MSRC researchers. Elizabeth Bryant, a senior biology major at

SUNY Purchase, worked on a study with biological oceanographer Jeannette Yen to analyze via video filming the swarming behavior of copepods toward a light source.

Wendy Metcalf, a geology major beginning her senior year at Indiana University in Pennsylvania, is working with geological oceanographer Henry Bokuniewicz in a collaboration with Mr. Aram Terchunian, President of First Coastal, a consulting firm in Westhampton, Long Island, on a project to measure variations in the water table within the beach that might affect the accumulation of beach sand.

Simons Fellow

Also working at MSRC is Michael Purdy, a senior from Northport High School. He will aid Bokuniewicz on a sediment study of part of the Hudson River estuary and Long Island Sound by conducting field sampling and producing the most detailed sediment maps available for these areas. ■

MSRC welcomes new Coastal Marine Scholar, Eric Schultz. Schultz received his Ph.D. from University of California at Santa Barbara in aquatic and population biology, and will be working with biological oceanographers Robert Cowen and David Conover on changes in local fish species as they recruit from the plankton.

Biogeochemist Robert Aller is an invited guest speaker at the August Gordon Research Conference held in Meriden, NH.

Chemical oceanographer Cindy Lee was appointed for a three-year position to the National Research Council's U.S. National Committee for the Scientific Committee on Problems of the Environment (SCOPE).

Lee also gave three lectures as the H. Burr Steinbach Visiting Scholar at Woods Hole Oceanographic Institution in June. She gave one lecture and served on the steering committee at an NSF workshop on "Measurement of Dissolved Organic Carbon and Nitrogen in Natural Waters" in July in Seattle.

Lee is chairing a Gordon Research Conference on Chemical Oceanography in August in Meriden, NH. Lee's graduate student Mingyi Sun is also attending the conference.

Continued on back page

Photo by Bret Zielenski



Take 1: MSRC's Peter Woodhead being filmed for video about the NY-NJ Harbor, to premiere in the fall.