Ask many of ESSIC’s research scientists what they like best about their work and they will quickly tell you: going out “in the field.” The field, as it were, can be as close as a nearby outcropping or as far away as the polar ice caps. For ESSIC scientists Ajit Subramaniam and Rossana Del Vecchio (shown onboard the Research Vessel *Seward Johnson*, below), field research has taken them to the Western Tropical Atlantic Ocean southeast of Barbados, where they have been since April 18 and will remain until May 22.

The two are among 26 scientists from various universities working together on a research survey funded by the National Science Foundation Biocomplexity Collaborative Research Program. Ajit, who is the Chief Scientist for the cruise, and Rossana are studying nitrogen-fixing (diazotrophic) microorganisms that Ajit calls “keystone species” – organisms that may be the most important to our understanding of carbon sequestration by phytoplankton in the oceans.

Diazotrophs, by fixing atmospheric nitrogen (N₂), introduce “new” nitrogen – an essential nutrient for growth of phytoplankton – into the oceanic ecosystem. All the carbon fixed by the photosynthetic processes of these organisms is “new” carbon that is taken out of the atmosphere. When these organisms die and fall to the ocean floor, this carbon is “lost” from the atmosphere.

(Continued next page)
Diazotrophs are affected by various geological, biological, chemical, and even social factors. In turn, these nitrogen-fixing microorganisms can have a major effect on other phytoplankton and trophic (nutritional) levels in the Western Tropical Atlantic. The Amazon River affects the region physically by altering salinity and geochemically by introducing iron and silicate, which can stimulate the growth of diatoms, which contain diazotrophic symbionts. Seasonal atmospheric dust from the African Sahel also affects these waters, as it can promote the growth of Trichodesmum, an important diazotrophic cyanobacterium.

“Changes in land use practices in the Amazon Basin and the African Sahel will change the delivery of nutrients into the region, thus affecting diazotrophy,” Subramanian says. This is turn, will change the carbon and nitrogen cycles by changing the primary productivity in the region.

So what is life like onboard a research ship? A typical day – “if there is any such thing,” Ajit notes – begins at 6:30 a.m. Water samples are collected periodically throughout the day from various depths ranging from 1000 meters to the surface and studied for nutrients, phytoplankton biomass, oxygen, dissolved inorganic carbon, particulates and dissolved materials. Net tows are put out to collect diazotrophs, and trace metal clean sampling is done to measure the dissolved and intercellular concentrations of iron. A spectroradiometer is used to measure the underwater light field in order to validate satellite algorithms.

At 4 p.m., the ship begins steaming to the next study location, and the group relaxes (though rough seas are a frequent challenge). After dining on what Ajit reports is the “truly delicious” food prepared by staff cooks, many retire to work with their data. Some watch movies, chat, play cards. Others engage in what Ajit terms a “very serious” cribbage tournament, whiling away the hours til the dawn of a new workday.

-- Marilyn Millstone

**BULLETIN BOARD**

- The ESSIC seminar series continues every other Monday at noon through the end of June. The next seminar is slated for May 19, featuring ESSIC Assistant Research Scientist Joaquim Ballabrera and Distinguished University Professor of Meteorology Eugenia Kalnay. They will address data assimilation using the Lorenz Model. The seminars, which are free and open to the public, are held in ESSIC Conference Room 2106, Computer and Space Sciences Building.

- The University’s fifth annual Maryland Day, held April 26, was a great success. ESSIC’s booth drew lots of attention; to see photographic highlights of the event, please click on the news/current events links on this web site.

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Profiles of ESSIC Personnel, Part II

**Annarita Mariotti**, a native of Italy, has been a Visiting Assistant Research Scientist at ESSIC since February 2001. She specializes in climate diagnostics. Her current research interests are the global and regional aspects of the water cycle, and interannual to decadal global climate variability with a special focus on tropical-extratropical interactions. Previously a Visiting Scientist at NASA Goddard, Annarita has a doctorate in stratospheric dynamics and transport from Université Pierre et Marie Curie, Paris, France.

**Suzanne Martin** is Coordinator of Business Services for ESSIC and the Department of Geology. She oversees all proposal packages, including budget preparation, forms, routing and submission to university officials and funding agencies. Suzanne also prepares and administers the departmental budgets. A 19-year employee of the University of Maryland, she was an Accounting Associate with the Department of Meteorology before joining ESSIC in 1999.

**Keith McBean** is the Business Manager for ESSIC and the Department of Geology. Supervising a staff of three, Keith does the final review of all travel, purchase and budget requests. He also reviews payroll appointments and adjustments and assists with proposal budgets and routings. Keith also tracks and reports inventory. A native of Guyana, he is a member of the Association of Chartered Certified Accountants.

**Jeffrey McCollum** is an Assistant Research Scientist with the Cooperative Institute for Climate Studies (CICS), an element of ESSIC. His research involves various aspects of estimating rainfall, particularly the development of microwave satellite rainfall algorithms over land and validation using rain gauge and radar data. Prior to joining CICS, he did postdoctoral research on satellite rainfall estimation at NOAA. Jeff has a doctorate in civil and environmental engineering from the University of Iowa.
Shuk-Mei Tse is a graduate student from Hong Kong working on ocean modeling. She has a bachelor’s degree in earth sciences from the University of Hong Kong.

Marilyn Millstone is ESSIC’s Communications Associate. She writes, edits and designs ESSIC’s annual report and in-house newsletter, issues updates on research opportunities, provides writing and editing assistance on various projects, and does public outreach. Formerly a program manager and writing instructor at George Washington University, Marilyn is also a trainer and free-lance journalist. She has a bachelor’s degree in communications/environmental studies from American University.

Jeffrey T. Morisette, an Adjunct Assistant Professor, is a Physical Scientist in the Laboratory for Terrestrial Physics at NASA Goddard Space Flight Center. His current research is on the application of multi-resolution satellite imagery to ecological studies and the validation of global land products with a focus on coordinating the MODIS land team validation activities through NASA Goddard. He has a doctorate in forestry and remote sensing from North Carolina State University.

Ernesto Munoz is a first-year graduate student of meteorology who joined ESSIC in September 2002. A graduate of the University of Puerto Rico, he has been part of summer research groups at NCAR Atmospheric Chemistry Division, NOAA Aeronomy Lab and DOE Brookhaven National Lab. His current research topic -- variability of bifurcation of the South Equatorial Current of the Atlantic Ocean – reflects his interest in how oceanic phenomena affect climate variability.
Ragu Murtugudde, an Associate Professor, specializes in the role of the ocean in climate variability, bioclimate feedbacks, marine ecosystem modeling, the global carbon cycle and remote sensing. He is also the editor of the Journal of Geophysical Research – Oceans. Prior to coming to ESSIC, Ragu was a Research Scientist at the NASA/Goddard Laboratory for Hydrospheric Processes. A native of India, he has a doctorate in mechanical engineering from Columbia University.

Sumant Nigam is a Professor with ESSIC and the Department of Meteorology. His research expertise is in climate dynamics, particularly the forcing, evolution and coupled dynamics and thermodynamics of the leading modes of climate variability. He has also analyzed and modeled ocean-atmosphere interactions in the tropical Pacific. Prior to arriving at the University, he was Director of the Large-scale Dynamic Meteorology Program at the National Science Foundation. A native of India, Sumant has a doctorate in geophysical fluid dynamics from Princeton.

Bruce Ramsay, a Visiting Associate Research Scientist at ESSIC, has also been a Geographer at NOAA since 1992. At NOAA, he helped develop the Operational Significant Events Imagery Service, which uses remote sensing data from satellites to detect and monitor environmental hazards. He was also Project Manager for the Interactive Multi-sensor Snow and Ice Mapping System, used to improve numerical weather prediction models. His research focuses on the effect of climate change on snow, ice and vegetation. Bruce has a master’s in environmental earth sciences and policy from Johns Hopkins University.

David Salapata, a Faculty Research Assistant, is currently working on a global water balance project in which flux divergences and residual evaporation are calculated from NASA Water Vapor Project (NVAP) moisture data, Global Precipitation Climatology Project (GPCP) precipitation data, and National Centers for Environmental Prediction (NCEP) reanalysis winds. These results will then be compared to similar work from previous studies. Prior to coming to ESSIC, he worked at the Center for Ocean-Atmospheric Prediction Studies at Florida State University, where he earned his master’s in meteorology.
Christopher Shuman, an Adjunct Research Affiliate, is Deputy Project Scientist for NASA’s Ice, Cloud & land Elevation Satellite (ICESat) Mission. An earth scientist, he interprets climate records from Antarctica and Greenland by using snow pit and ice core samples, as well as automatic weather station and satellite data. Previously an Assistant Research Scientist at ESSIC, Chris has a doctorate in geosciences from Penn State University.

Samuel Shen, an Adjunct Professor, is a Professor of Mathematical and Statistical Sciences at the University of Alberta, a Senior Fellow of the US National Research Council at NASA Goddard Space Flight Center, and the President of the Canadian Applied and Industrial Mathematics Society. His main research interests are statistical climatology and error assessment of climate data. A native of China, Sam has a doctorate in applied mathematics from the University of Wisconsin.

Gerald Stokes, an Adjunct Professor, is the Director of the Joint Global Change Research Institute, a collaborative enterprise created by the Pacific Northwest National Laboratory (PNNL) and the University of Maryland. His primary research interests include climate and the design of large-scale field research facilities. Formerly Chief Scientist of the Department of Energy’s Atmospheric Radiation Measurement program from 1990-1998, Gerald has a doctorate in astronomy and astrophysics from the University of Chicago.

Jesse Stone, a Faculty Research Assistant, is helping develop an algorithm that uses total ozone mapping spectrometer (TOMS) satellite data to compute tropospheric ozone levels. Jesse has a bachelor’s degree in physics from the University of Maryland.
Ajit Subramaniam, an Assistant Research Scientist, uses remote sensing and optical tools to study the marine ecosystem. He is especially interested in remote sensing of oceanic, nitrogen-fixing cyanobacteria. Prior to arriving at ESSIC in March 2000, Ajit was an Assistant Research Scientist at the Chesapeake Biological Laboratory, part of the University of Maryland’s Center for Environmental Studies. A native of India, Ajit has a doctorate in oceanography from the State University of New York at Stony Brook.

Arief Sudradjat, a Research Associate with the Cooperative Institute for Climate Studies (CICS), analyzes long-term climate data to better understand the relationships between surface and atmospheric variables. He is also helping develop a method of merging multiple satellite-derived products into a single time series that will include uncertainty estimates of the products. A native of Indonesia, Arief has a doctorate in hydrometeorology from the University of Maryland.

Anne Thompson, an ESSIC Affiliate, is an atmospheric chemist who works on tropospheric chemical remote sensing and data analysis. Most of her work has focused on how human activity (such as aviation and biomass burning) has affected the ozone layer. She has been affiliated with the University of Maryland as Research Faculty since 1995, co-advising a number of students in the Meteorology Department. Thompson is also a Senior Scientist at NASA/Goddard in the branch that studies ozone. Anne has a doctorate from Bryn Mawr College.

John Townshend, an ESSIC Affiliate, currently chairs the Department of Geography, where he is a Professor. His research focuses on how and why the vegetative land cover of the earth is changing and the affect this has on key biogeochemical cycles, especially the carbon cycle. A native of the United Kingdom, he has a doctorate in geomorphology from University College, London.
**Si-Chee Tsay**, an ESSIC Adjunct Professor, is Deputy Scientist for NASA’s Terra Project. His areas of research interest and expertise include absorption of solar radiation by clouds and theoretical radiative transfer algorithms in multiple scattering and emitting layered media. A native of Taiwan, he has a doctorate in atmospheric sciences from the University of Alaska.

**Baris Mete Uz** is an Assistant Research Scientist who focuses on using remote sensing to study biological-physical coupling process in the ocean. Prior to coming to ESSIC, he was an Assistant Marine Research Scientist at the University of Rhode Island (URI), where he studied small-scale rapid changes in chlorophyll concentrations in response to low-latitude hurricanes, and synoptic storms that occur when the water column is weakly stratified at mid- to high-latitudes. He is continuing this work at ESSIC. A native of Istanbul, Turkey, Mete has a doctorate in physical oceanography from URI.

**Ginette Villeneuve** is an Accounting Associate with ESSIC and the Department of Geology. She reconciles grant awards and handles purchasing requests. Ginette joined the University in 1990 and has worked in the Office of Information Technology, Department of Meteorology, and the Office of the Comptroller. She has also completed the University’s Research Administration Certificate Program. A native of Quebec, Canada, Ginette is bilingual in French and English.

**Roxana Wajoswicz**, an ESSIC Affiliate, is a Senior Research Scientist with the Department of Meteorology. Her research focuses on physical oceanography, numerical modeling and climate variability. Formerly a scientist with the Hooke Institute and the Department of Atmospheric, Oceanic and Planetary Physics at the University of Oxford, Roxana has also been a Visiting Research Scientist at NASA/Goddard, as well as a Research Fellow at Hokkaido University and the University of Tokyo, Japan. A native of England, she has a doctorate in geophysical fluid dynamics from the University of Cambridge.
**Xiujun (Wendy) Wang**, a Research Associate, focuses on ecosystem and carbon cycle modeling in the Equatorial Pacific. Her research experience includes numerical modeling, observation and data analysis. Her particular research interests are ecosystem dynamics and its role in the global carbon cycle, and the interaction of physics and biogeochemistry in the dynamics of the upper ocean. A native of China, Wendy has a doctorate in soil biochemistry from the University of Melbourne, Australia, and a doctorate in oceanography from the University of Tasmania, Australia.

**Fuzhong Weng** is a Visiting Associate Research Scientist at ESSIC and the Executive Director of the Joint Center for Satellite Data Assimilation, NOAA/NESDIS Center of Satellite Applications and Research. His research involves developing operational algorithms for deriving atmospheric hydrological parameters (precipitation, cloud liquid and ice water paths, total precipitable water) and surface products (snow and sea ice) using satellite microwave sensors. A native of China, Fuzhong has a doctorate in atmospheric science from Colorado State University.

**Boz Wing**, a Faculty Research Assistant, uses isotope geochemistry to examine the interaction between the atmosphere and the solid earth throughout Earth's history. His areas of interest include the sulfur cycle during the Archean period; metamorphic controls of the global carbon cycle over geologic time scales; and laboratory experiments of isotopic fractionation during the photolysis of atmospheric sulfur species. He has a master's in geology from Johns Hopkins University.

**Warren Wiscombe**, an Adjunct Professor, is on a one-year sabbatical from NASA Goddard, where he is a Senior Scientist. He began his career in the ARPA Climate Dynamics Program, then spent 6 years at NCAR, then 3 years as a professor at NYU, then came to Goddard in 1983. His specialty is atmospheric radiation and clouds. At ESSIC, he assists Zhanqing Li with teaching a course in the meteorology department and working on ultra-long duration balloon and sunglint projects. He has a doctorate in applied mathematics from the California Institute of Technology (Caltech).
**Xungang Yin** is a Research Associate in the Cooperative Institute for Climate Studies (CICS), an element of ESSIC. His current research focuses on analyzing various global precipitation algorithms. At Florida State University, where he earned his doctorate in meteorology, he worked on dendrochronology and the water balance of East African lakes. A native of China, Xungang joined CICS/ESSIC in the summer of 2002.

**Ning Zeng**, an ESSIC Affiliate, is an Assistant Professor of Meteorology. His research focuses on climate variability and the hydrological cycle. He is also interested in how the earth's carbon cycle and biosphere interact with climate on seasonal to glacial-interglacial time scales. Prior to joining the University in 2001, Ning was at MIT, UCLA, NASA Goddard Space Flight Center, and the Max-Planck Inst. for Meteorology. A native of China, Ning has a doctorate in atmospheric sciences from the University of Arizona.

**At ESSIC, as in other departments and centers around the University, we rely on University students to help us handle the huge volume of administrative and technical support work that takes place in our offices each day. We are pleased to introduce these hard-working young people to you.** – ed.

**Noman Habib**, a native of Pakistan, is a senior majoring in electrical engineering. At ESSIC, he assists Executive Administrative Assistant Linda Carter with general administrative tasks, processing orders and keeping inventory. Noman also assists with minor computer troubleshooting.

**Jay Haddad**, a native of Silver Spring, Maryland, is a sophomore majoring in computer science. At ESSIC, he assists Information Technology Manager Mark Baith in computer troubleshooting and installing software and hardware.

**Jasmine Shah**, a native of Rockville, Maryland, is a junior majoring in architecture. At ESSIC, she assists Linda Carter with general administrative tasks and minor computer troubleshooting. A student assistant since 2000, Jas submitted the award-winning entry in the competition to design ESSIC’s logo, which is the masthead for this newsletter.