SCIENCE AND TECHNOLOGY CORPORATION

# NEWSLETTER

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## STC-Boulder Supports NOAA's Meteorological Research

The STC personnel at STC-Boulder, Colorado are involved in several diverse meteorological research projects, all related to improving weather support. **Frank Klein**, STC-Boulder Project Manager, oversees a 25–35 member staff which provides meteorological and computer science support to the National Oceanic and Atmospheric Administration (NOAA) Laboratories. Over the past twelve (12) years STC has provided support to four of the laboratories, including the Forecast Systems Laboratory (FSL), Environmental Research Laboratory (ETL), Climate Monitoring and Diagnostics Laboratory (CMDL), and the Air Resources Laboratory (ARL). At the present time, the largest support effort is for ETL.

The ETL supports NOAA's environmental monitoring and stewardship charter by both performing oceanic and atmospheric research and developing new remote-sensing systems. To this end, ETL gathers experts on all aspects of the interaction of radio, radar, light, and sound waves with the ocean and atmosphere. The ETL finds ways to use these waves to study atmospheric and oceanic processes and to probe regions that are not readily accessible by direct measurements. The ETL program areas focus on a number of different sensor technologies and their application to the study of the ocean-atmosphere environment.

The ETL was established in 1967 (formerly Wave Propagation Laboratory) and consists of four divisions: Microwave System Development Division headed by Dr. Albin J. Gaslewski; Optical Remote Sensing Division headed by Dr. Michael R. Hardesty; Clouds, Radiation, and Surface Processes Division headed by Dr. Chris Fairall; and Regional Weather & Climate Applications Division headed by Dr. Martin F. Ralph, plus the Computing & Network Services section, and ETL headquarters section. Acting Director is Dr. William D. Neff. For 6 years of STC's ETL work effort, Ms. Jo Novosel has been the COTR. STC expresses appreciation for her support and wishes her all the best. The new government point of contact is Ms. Jorgeann Hiebert.

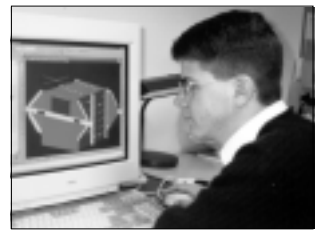
### Microwave Technology Division

In the Microwave System Development Division **Jack Harlan,** STC physicist, is the project lead on several efforts for ETL dealing with US coastal ocean circulations. Although there are thousands of miles of coastline in the United States, coastal ocean circulation, or flow of water, is still poorly understood. The details of this flow and how it is affected by the wind is the thrust of his research at ETL.

Jack Harlan

Circulation determines how fish larvae will be distributed, which is important for our national fishing industry. The flow of ocean pollutants and oil spill can also be predicted and monitored if the coastal circulation is well understood. High frequency radar systems that transmit signals out over the ocean are used in this research to measure the backscatter signal and measure ocean currents. This research has gone to the U.S. Virgin Islands to help understand coral reef fish populations and to the West Coast of the United States to better predict how fish of commercial interest will be dispersed by currents.

**Peter Kimball** is a full-time aerospace engineering student at the University of Colorado in Boulder. He works part-time with STC as a mechanical design engineer in ETL's Microwave Radiometry Group. Using a 3-D solid-modeling



Peter Kimball

*(Continued on page 2; see* **NOAA**)

## STC-METSAT Provides Advanced Remote Sensing for Global Databases

STC-METSAT in Fort Collins, Colorado is a leader in satellite data processing and remote sensing instruments and algorithms for atmospheric research. STC-METSAT continues to push the limits of technology to create processing systems and value-added products for use by the meteorological community.

### NVAP

One of the key products that continues to be produced is the NASA Water Vapor Project (NVAP) global dataset. STC-METSAT has been a partner with NASA since the early 1990s to produce the NVAP dataset. This product combines retrievals from radiosondes and satellite platforms into a global grid of one degree resolution precipitable water content at four levels and cloud liquid water. The NVAP dataset begins with 1988 and is currently complete through 1998. In collaboration with **Dr. Paul Try,** STC Senior Vice President and Director of the International GEWEX Project, STC-METSAT has made this NASA Pathfinder data set on global water vapor variation available for use by hundreds of scientists around the world. Processing is in progress for the year 2000 and beyond using new instruments such as the Advanced Microwave Sounding Unit (AMSU). **John Forsythe** is the project leader and the key team members are **Shannon Woo** and

John Forsythe

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**NOAA** (*continued from page 1*)

software package, Peter designed a housing for the group's Polarimetric Scanning Radiometer (PSR) that allows the instrument to be flown on NASA's WB-57F high-altitude research aircraft. Currently, Peter works on an existing PSR housing used for installation on a Navy P-3 aircraft. Peter is making design changes that will allow two PSR instruments to be installed in the P-3 quickly and easily, and he will prepare new manufacturing drawings of the housing when implementation of the changes is complete.

A major activity of ETL's Microwave Radiometry Group is to develop and install instruments on aircraft in order to measure atmospheric and oceanographic parameters using remote sensing techniques. Some of these radiometers have special requirements if they are to be successfully used in measuring these physical parameters. **Brad Patten** designed and fabricated a fairing to house a microwave reflector mounted external to a NOAA research aircraft cabin which allows the microwave horn to be used with a microwave clear window. One project in which this instrument played an important role was the Shoaling Waves Experiment off the coast of North Carolina to determine the atmospheric responses to the incoming waves. Brad has recently completed the assembly of three airborne Polarimetric Scanning Radiometer (PSR) positioners for multiple instrument requirements. The PSRs measure a variety of atmospheric and oceanographic parameters depending upon the instrument package installed in the system. One physical parameter, that has been measured by the PSR, is ocean surface winds, over a wide swath, in various hurricanes.


Brad Patten

**Optical Remote Sensing Division**

**Sherlyn Hilton** is a graduate student working in the Optical Remote Sensing Division, and is part of Dr. Alan Brewer's project to rebuild the 2-□m High Resolution Doppler Lidar (HRDL). She is moving the lidar onto a smaller optical breadboard, which will allow the system to be used in airborne applications. The HRDL will be aboard the DLR Falcon research aircraft for the International Water Vapor Project (IHOP) experiment over the southern great plains. The system will measure winds and provide data about the transportation of water vapor over the region. (Subsequent to submission of this article Sherlyn obtained her MS degree and went to work for the University of Colorado.)


Sherlyn Hilton

**Erik Edqvist** is also a MS graduate student at the University of Colorado who works part-time with STC in the Optical Remote Sensing Division. The project he is working on photographs clouds with an infrared camera and from different temperature readings of the cloud pictures. Useful information can be extracted, like types of clouds and the way they form. The main objective of his work is to make sure the instrument gets a new encapsulation capable of letting it be deployed in Barrow, Alaska for the winter. He is also in the process of upgrading calibration processes, software and statistic programs.

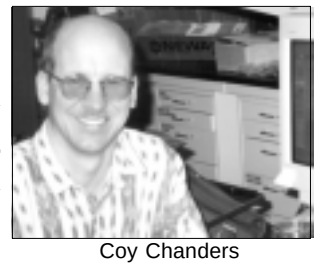

Erik Edqvist

**Clouds, Radiation, and Surface Processes Division**

The Clouds, Radiation, and Surface Processes Division includes several STC employees. **Michelle Ryan** has been with STC for over 6 years as a data analyst who works with ETL's various Doppler radars and radiometers. She is in charge of collection, quality control, and management of the radar data. In the past two years she had the opportunity to work on the NOAA research vessel, *Ronald H. Brown*, participating in experiments dealing with climate change and monsoonal variations. She is currently the mentor of the C-band Doppler radar that is on the *Ronald H. Brown*, and is in charge of any issues dealing with this radar, including training, maintenance, and operation.


Michelle Ryan

**Coy Chanders** is a C++ programmer who is continually advancing the Lapxm software suite that he wrote. Lapxm is a NT, COM-based software control system for Doppler wind profiling radars. Lapxm's modular architecture allows for the addition of new capabilities through the easy creation of COM processing modules without modifications to the original software.


Coy Chanders

**Matthew Shupe** is in the Arctic Research Group of the Clouds, Radiation and Surface Processes Division, where his work consists of studying the macrophysical, microphysical and radiative properties of Arctic clouds using surface-based remote-sensor measurements. Most of his current work has focused on the year-long Surface Heat Budget of the Arctic Ocean (SHEBA) program, which took place in the Beaufort and Chukchi Seas in 1997–1998. To facilitate this work, he has developed a number of software tools for visualizing the processed data, worked with many large observational data sets that extend over multiple years, and compiled statistics that describe the pertinent cloud properties. Recent results include the characterization of fundamental arctic cloud parameters such as particle sizes, the association of various cloud properties with cloud radiative effects on the surface, and the validation of various techniques used for retrieving cloud properties from remote-sensors.


Matthew Shupe

**Regional Weather and Climate Applications Division**

In the Regional Weather and Climate Applications Division, **David Merritt** has been working with project lead **Scott McLaughlin** to design, build and deploy a new 2 GHz FM-CW (Frequency Modulated-Continuous Wave) radar system for atmospheric observations. The software was written in the LabView "G" language, which is a graphical, data-flow programming en-


David Merritt

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vironment. This FM-CW radar system acquires atmospheric returns with very high temporal and special resolution, and is quite sensitive to small atmospheric refractive index fluctuations. The system was deployed at Dugway Proving Ground, Utah in September 2001, and it performed flawlessly.

**Irina Djalalova** supports the Precipitation and Microphysics Group of the division as a senior programmer providing the data from different experiments to the scientists in both scientific and visualization forms. Research in this group focuses on developing and applying techniques for improved ground-based observations of clouds and precipitation using advanced radar systems. Unlike the nation's huge operational weather radars, the group operates much smaller radars that are readily transportable to experiments and provide vastly superior spatial resolution. Her group pioneered methods combining simultaneous radar and radiometer measurements to prove the microphysical composition of the clouds. Practical applications of the research include improving radar estimates of rainfall and snowfall rates, detection of aircraft icing and much more.


Irina Djalalova

**Jessica Koury** is working full-time towards her B.S. degree in physics at the University of Colorado, Boulder and part-time with STC in the Precipitation and Microphysics Group. Jessica began as a summer intern, where she created a web page about convection and also contributed to a related project, a laboratory demonstration of Rayleigh-Benard convection cells. In August 2000, she accompanied other representatives from ETL to Spelman College in Atlanta, GA to present a short course on convection to approximately 150 high school students and teachers (see photo). Her current projects include using IDL software to perform computations and to produce publication-quality graphs and images of radar data and meteorological surface station data collected at the Mount Washington Icing Sensors Project (MWISP), the Lightning Launch Commit Criteria project at Cape Canaveral, and the Trial Hornsea experiment. ETL project leads for these efforts are Brooks Martner and Timothy Schneider.


Jessica Koury

**Laboratory Headquarters**

STC also provides the administrative support team staff to ETL and ARL at NOAA in Boulder. Each of the four divisions in ETL have a Program Support Technician assigned to it. **Rita Bonino**, **Karen Martin**, **Tina Schiffbauer**, and **Mona Tell** support the scientific and management staff of their respective divisions including travel arrangements, processing purchase requisitions, maintaining timekeeping records, monitoring security badge renewals, etc. In the ETL Administrative Office, **Dianne Marshall** and **Angie Halverson** process task requisition paperwork and perform as the interface with OAR. (Angie has now departed STC to stay home with her baby.)


From left to right: Karen Martin, Dianne Marshall, Angie Halverson, Rita Bonino, Mona Tell, and Tina Schiffbauer.

**Vicky Thompson** joined STC in May 2001 as a senior Administrative Assistant in the Surface Radiation Research Branch of Air Resources Laboratory (ARL). Much of her focus is on preparing travel documents and providing administrative support by preparing Monthly and EEO reports, Time and Attendance cards and reports for the new financial Database Management Systems. In January 2002 she was promoted to the position of Administrative Officer for the ARL branch in Boulder.


Vicky Thompson

**Larissa Holderness** works in the Programs Office for Jorgeann Hiebert at ETL headquarters. In her current position Larissa is a Multi-Media Specialist and is responsible for creating and updating the Administrative Web, and the Educational Outreach pages for ETL. She also develops posters and electronic forms for the laboratory.


Larissa Holderness

**Kevin Knott** manages and operates the Instrument/Machine shop for ETL. In this capacity he provides precision machined components and shop support for NOAA's labs at the DSRC site. Utilizing all machine tools, including CNC (computerized numerical control), Kevin fabricates a wide variety of tooling, including parts for LIDARS, wind profilers, scanning radiometers and support towers. FSL (Forecast Systems Laboratory), CMDL (Climate Monitoring and diagnostics Laboratory), and ARL (Air Resources Laboratory) all depend on ETL's Instrument shop for support and development of new scientific instruments for NOAA.


Kevin Knott

STC's newest employee is **Christine Sweet**, who joined in January 2002 as a technical editor in support of the Climate Monitoring and Diagnostics Laboratory (CMDL).

STC employees supporting ETL, ARL, and CMDL are working on exciting projects dealing with microwave systems, optical remote sensing systems, clouds, radiations and surface processes, and regional weather climate applications. It all makes for a fascinating and stimulating place to be in and to work for.

## STC ISO 9001 Compliant

STC began developing an ISO 9001 compliant quality system in 1998. ISO 9001 is an internationally recognized standard for quality control and assurance. The new system was developed around our existing procedures and entailed codifying many of the "best practices" the company had used for many years. Several new procedures were also developed; primarily related to checking compliance with the existing procedures. The quality system manual was completed and transmitted in mid-1999. The company has invested significant time and resources into implementing the plan, including orientation and training for most of our staff. In September 2001, the system and its implementation were reviewed by external quality experts and found to be compliant, with only minor corrective actions required. All corrective actions have been implemented.

Congratulations to all for achieving this very important goal. Keep up the good work by strictly following the required procedures at all times; in addition to improving STC's performance, it will keep us ready for our next external surveillance. To keep your understanding of the system and its requirements refreshed, visit the "Quality" page on our intranet at www.stcintranet.com.

**METSAT** (*continued from page 1*)

**Drs. Dave Randel**, **Richard Engelen**, and **Tom Vonder Haar**.

**CHANCES**

Another state-of-the-art global product compiled by STC-METSAT is the CHANCES (Climatological and Historical Analysis of Cloud for Environmental Simulations) database. The database is a composite of processed imagery from up to eight of the current operational meteorological satellite platforms to produce a global, 5-km, 1-hour-resolution cloud/no cloud dataset. In its third year of production, CHANCES is in demand by the Department of Defense and the modeling and simulation community. STC-METSAT has developed innovations to handle the tremendous data volume required for CHANCES that totals roughly three terabytes per year. Shannon Woo is the project leader.

Shannon Woo

**CloudSat**

In addition, STC-METSAT is playing a critical support role in the CloudSat satellite mission scheduled for launch by NASA in April 2004. The satellite will carry a 94-GHz cloud radar and fly in formation with EOS-PM (Aqua) and up to three other satellites. Operating as a subcontractor to the Cooperative Institute for Research in the Atmosphere (CIRA) and CloudSat Principal Investigator, **Dr. Graeme Stephens** of Colorado State University (CSU), STC-METSAT will help build the CloudSat Data Processing Center by integrating science team code into a modified version of the current Data Processing/Error Analysis Systems (DPEAS). We will also develop system monitoring and quality assessment tools. Building on STC-METSAT innovations in multi-sensor data fusion, the Data Processing Center will also merge products from CloudSat and Aqua to perform cloud property retrievals. During the operational phase of the mission, STC-METSAT will manage day-to-day operations and oversee production, with others from STC-METSAT and the CloudSat Team, of the standard and experimental data science products. **Phil Partain** is the STC-METSAT CloudSat project leader.

Phil Partain

**Technical Services—Development of "Cutting-edge" Algorithms and Data Fusion Methods**

In addition to dataset production, STC-METSAT provides technical services in satellite remote sensing. This has included contributions to algorithm and sensor design of Ball Aerospace's Conical-Scan Microwave Imager and Sounder (CMIS), a key instrument on future NPOESS satellites. STC-METSAT has also teamed with ITT Technologies of Fort Wayne, Indiana to compete for development of the Advanced Baseline Imager (ABI) to be included on future GOES satellites. STC-METSAT provides special expertise on the scientific and operational uses of the data and image quality metrics. **Dr. Stan Kidder** is the ABI project leader, assisted by John Forsythe and Dr. Tom Vonder Haar.

## Contracts

In our Government services area, we have received prime and subcontracts totaling about $8.5 million from customers such as: (1) the US Army Program Manager for Chemical Demilitarization/SAIC (as the prime) for continuing support of the PAISC III - Integration Support program; (2) the US Army Aberdeen Test Center/Sverdrup Technologies (as the prime) for engineering services and test support; (3) the US Army Cold Regions Research and Engineering Laboratory for research support in collecting and analyzing climatological and hydrologic data; (4) NASA-LaRC/SAIC (as the prime) for continuing support of the Atmospheric Science Research and Technology Support Service (ASRATSS); and (5) the US Army Research Laboratory/Colorado State University (as the prime) for processing an additional year of weather data for the Climatological and Historical Analysis of Clouds for Environmental Simulations (CHANCES) database.

In our commercial services area, we have received over $1.3 million in contracts from Exxon and SeaRiver Maritime, Inc. for naval architecture services in oil tanker and ice breaker designs. In addition, we have been awarded our second Federal Supply Service schedule from the General Services Administration for "Professional Engineering Services," and have recently received our first Blanket Purchase Agreement (BPA) under the GSA PES contract from the US Coast Guard Engineering Logistics Center.

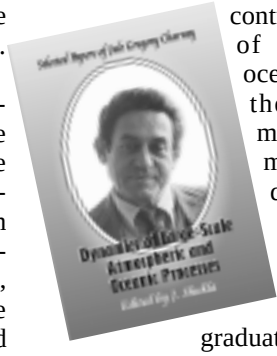
## New Titles from A. Deepak Publishing

**IRS 2000: Current Problems in Atmospheric Radiation**, Edited by W.L. Smith and Y.M. Timofeyev, Proceedings of the International Radiation Symposium, St. Petersberg, Russia, 24–29 July 2000

The objective of the quadrennial International Radiation symposium is to provide a forum to review the state of the art in the field of atmospheric radiation. These proceedings contain peer-reviewed papers from those presented at the International Radiation Symposium held in St. Petersberg, Russia in July 2000. The sessions were arranged according to nine major topics and the same organization is followed in this book.

**Dynamics of Large-Scale Atmospheric and Oceanic Processes: Selected Papers of Jule Gregory Charney,** Edited by J. Shukla

This volume contains a selection of the papers of Jule Charney, one of the foremost meteorologists of this century. The papers chosen reproduce Charney's fundamental contribution to the study of atmospheric and ocean dynamics and are the foundation for modern-day computer models of weather prediction.



An additional feature is a collection of reminscences from Charney's graduate students. A section on Charney's Last Decade is also included.

This volume is suitable for all graduate students in meteorology and oceanography, and a large number of graduate students in related fields, such as geophysical fluid dynamics. It is also a necessary addition to the libraries of researchers and faculty members in dynamic meteorology and oceanography, ocean/atmosphere dynamics, and climate modeling.

### Dr. J. Shukla

Dr. J. Shukla is a Professor of Earth Sciences and Global Change in the School of Computational Sciences at George Mason University, and the President of the Institute of Global Environment and Society. His area of expertise includes predictability of weather and climate, dynamics of monsoons, dynamical long range forecasting, atmosphere-land interactions, desertification and climate dynamics.