SCIENCE AND TECHNOLOGY CORPORATION

# NEWSLETTER

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## STC Plays Key Role in Enroute Mission Planning and Rehearsal System (EMPRS)

The STC Edgewood Office recently played a key role in the evaluation of a new system being developed for the Army: a system for equipping soldiers who are enroute to an air assault with digital connectivity, so that they can continue planning and adapting to fast-paced and fluid military-political situations.

When paratroopers of the 82nd Airborne Division left Pope Air Force Base (NC) for Haiti, their orders were simple enough: "parachute in, secure the airfield and defend it such that additional friendly forces can land and reinforce the area. If anyone tries to stop you, take them out." In fact, the paratroopers air-landed and conducted peacekeeping and security assistance operations. The mission had changed seven times while they were enroute.

Elements of the 82nd Airborne Division conducting EMPRS activity during a pre-AWE training session.

Similar changes occurred during the assaults into Grenada and Panama.

In 1998, a concept developed that involved equipping Warfighters with a family of computer and digital systems that would allow them to take their "plan" with them and update it enroute as necessary.

By 1999, the system was on the drawing board and came to be known as EMPRS. In September 1999, it was slated for test and evaluation—along with 25 other advanced technologies—during the Joint Contingency Forces Advanced Warfighting Experiment (JCF AWE) at Forts Bragg (NC), Drum (NY) and Polk (LA). EMPRS was joined by a score of digital/high tech items, all studied to assess their military utility for Warfighter technology for the Army's Force XXI (21st Century) initiatives.

**Steve Abdalla**, STC Edgewood, was the senior evaluator for this two-year effort on behalf of the Army Test and Evaluation Command, Alexandria, Virginia. Mr. Abdalla had a long career with airborne and special operations forces, and has been a T&E evaluator and analyst for STC for seven years.

The EMPRS systems equip the Warfighters with a computer network, several specially designed software programs

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

## STC Convenes Peer Review Blue-Ribbon Panels on Chemical Biological Defense Programs

**Dr. Adarsh Deepak**, President of STC, has issued two reports of Blue-Ribbon Panels, sponsored by William Loerop, Business Area Manger of Stand-off Detection at ECBC, Aberdeen Proving Ground, Edgewood Area, Maryland.

The panels, held in March and May 2001, each consisted of four invited experts, with Dr. Deepak serving as Panel Chair. Both panels were tasked to make assessments and to develop recommendations to meet the future exploratory development needs for CB Stand-off Detection at Edgewood Chemical Biological Center (ECBC).

The March panel focused on "Hyperspectral Imaging Standoff Detection." Its charge was to conduct a peer review of the Hyperspectral Imaging Program at ECBC, primarily to (1) examine and analyze data from Owl Field Tests to determine the utility of the three HSI instruments tested, and (2) to make suggestions

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## Honors and Awards

STC staff who support NASA Langley's Public Affairs Office Programs under subcontract to Planners Collaborative Inc., have recently received letters of commendation for their dedication, professionalism, and creativity.

Harmony Hunter, STC employee on the NASA Public Services Contract, (left) receives a Letter of Appreciation from Dr. Karen Credeur, Deputy Head of the Office of External Affairs. In the center: Cheryl Cleghorn, FOIA Officer.

Jim Roberts, STC employee and Editor of the *NASA Researcher News*, (right) receiving an award from Dr. George Wood, Aerospace Programs Projects Manager, for development of the On-Line version of the *News*.

### *IN THIS ISSUE...*

**EMPRS** (continued from page 1)

supporting the Military Decision-Making Process (MDMP), and web-based technology coupled with "white-boarding" capability. Thus the soldiers can establish a "meeting" on their local area network, retrieve files and records, display maps and other graphics showing the tactical plans, and make concurrent changes both by hand (laser pen) and by voice radio.

To use this very new technology amongst several assault aircraft flying a tactical formation enroute to an area of operations breaks new ground indeed.

The test provided that not only could a Task Force Commander "talk" digitally and via voice with his command and control aircraft forward and with the assault force commander aboard the lead aircraft, but also various commanders and staff officers could do the same amongst the assault formation when aloft. When a

Mass Tactical Air Drop

change was injected into a mission, the new data caused the task force commander to add to, or change, portions of the mission.

These new data, disseminated among the paratroopers, enabled them to conduct the assault in a manner that reduced both casualties and time required.

The EMPRS, now called JeMPRS (Joint Expeditionary Mission Planning and Rehearsal System), will hereafter undergo two avenues of development: development of the actual hardware and software systems to be employed, and a better means for quantifying the term "Situational Awareness."

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# Lucker and Hansen Support NASA Langley's Arctic Region Field Mission

STC scientists, **Patricia Lucker** and **Dr. Gary Hansen**, have participated in a tongue-twisting field mission in the Arctic Region: the SAGE III Ozone Loss and Validation Experiment (SOLVE) and the Third European Experiment on Ozone (THESEO).

This field campaign was based above the Arctic Circle in the town of Kiruna, Sweden, and entailed three missions of about three weeks each. Over 350 scientists and support personnel from around the world collaborated in airborne and ground-based measurements, balloon instrumentation, and satellite observations. It was the largest field campaign, to date, to study the polar atmosphere.

Kiruna was chosen because of its easy access to the polar vortex region of the upper atmosphere and the common occurrence of the Polar Stratospheric Clouds (PSC) which are thought to be a key to understanding the chemistry of the upper atmosphere. It also has excellent facilities, including the Arena Arctica.

Located at 68 degrees North Latitude and 20 degrees East Longitude, Kiruna is situated to provide an area of operations of over 3000 miles, as far west as Greenland and well into Russia to the east.

The Lucker-Hansen team was responsible for the Langley Aerosol Lidar, which was deployed on the NASA DC-8 airplane: Lucker developed the data acquisition and controls software and provided computer support and data analysis, while Hansen was responsible for hardware and electronic support.

The goal of this mission was the coordination of flights of several aircraft at the same time as satellite overpasses, ground-based measurements, and balloon launches. The two major airplanes—flying laboratories—were the NASA DC-8 and the ER-2, both based at the NASA Dryden Flight Research Center, Edwards, California. (The ER-2 is a retrofitted U2 spy plane, which can carry a payload of 2500 pounds to an altitude of over 65,000 feet. During the SOLVE mission it carried up to 17 instruments.)

The DC-8 is a converted 4 jet engine commercial airliner, which can fly longer than 12 hours without refueling. It contains an onboard data system that streams positional information and aircraft parameters to all experiment stations. A Russian navigator was in the DC-8 cockpit whenever the intended flight path included Russia. It contained 16 Instrument Teams, including three lidars and a host of passive and active instruments making measurements of ozone, methane, carbon dioxide, water vapor, chlorine, bromine, and many other trace gases.

The LARC team on the Arctic mission, Pat Lucker second from left, and Gary Hansen on the right end.

The winter temperatures in Kiruna hover well below freezing and can descend to –120ºF at 20 km. These extreme temperatures allow the formation of high altitude PSCs which enable very interesting chemical reactions to occur that accelerate ozone loss. Made up of tiny crystals that refract the light like prisms, PSCs are often referred to as Mother of Pearl clouds.

Also of spectacular beauty were the Northern Lights, caused by high energy particles from the sun being concentrated in the polar regions as they spiral down the magnetic field lines. During the first mission in December, the sun never rose above the horizon, and twilight lasted from 10:30 to 2:30. Snow fell almost constantly, but it was just as constantly ploughed, so that the planes always had good access.

The inside of the DC-8 during the SOLVE mission, taken from the Langley Aerosol Lidar Rack looking forward.

Kiruna is the home of the Ice Hotel, constructed each fall and melted each May. The beds are of ice, on which are placed heated sleeping bags. There is an ice chapel ... and an ice baptismal font!

The mission successfully provided very detailed information about stratospheric aerosols as well as the PSCs. The efforts of scientists and engineers from 5 NASA centers as well as university and research facilities from Germany, Switzerland, Japan, and Russia helped to make significant advances in our understanding of the chemistry of the upper atmosphere.

# Dr. Hinkley's Laser Goes to M.I.T.

Last November, NASA made a donation of several lead-salt diode lasers to the Massachusetts Institute of Technology (MIT) Museum. These lasers were used in historic experiments sponsored by the Langley Research Center in the early 1980s. Originally used by scientists from MIT Lincoln Laboratory and General Motors Research Laboratories, it was donated by GM Corp.

Museum Director, Jane Pickering, cited two reasons for the importance of the gift: "First, we will be preserving an important and significant technology of the late 20th century. Second, we are adding two artifacts to the collection that remind us of the vital partnership between MIT and industry."

Photo taken in 1968 of Dr. E. David Hinkley and laser equipment at MIT Lincoln Laboratory.

In 1966, **Dr. E. David Hinkley**, STC Scientist then at Lincoln Laboratory, teamed up with Theodore C. Harman, and Charles Freed, a senior staff member at the Lab. They had developed some special lead-salt diode lasers, as Freed was developing an ultrastable carbon-dioxide gas laser. Their goal was to verify the Schawlow-Townes theory of optical lasers, first published in 1958.

*(Continued on page 4; see* **LASER**)

# Staff Support STC's K–12 Outreach Programs

## Ewing and Axenson Conduct Aerospace Careers Classes

**Wayne Ewing**, STC Director of Human Resources,and **Dr. Theresa Axenson**, STC Scientist in the Laser Systems Branch at NASA Langley Research Center, have received letters of appreciation for their participation in this year's Aerospace Careers Program.

This program is a unique initiative of NASA Langley Office of Education, in which they reach out to sixth grade students across the Peninsula. This year they reached 15 schools, 29 classes, and over 845 students for the purpose of encouraging the students to aim high in their career goals, and especially to consider working in the sciences.

On a visit to Poquoson Middle School, Ewing and Axenson teamed with representatives of Johnson Control to provide two classes (60 students) with multiple perspectives on aerospace careers. Ewing emphasized the job application aspects, and Axenson focused on the science and engineering aspects.

Dr. Theresa Axenson (left) works with two NASA SHARP students, Issel Lim and Melanie Fox, in the Laser lab, explaining the mechanics of her Near-IR (946 nm) Laser.

Students were also given handouts which included a Careers Tabloid describing various aerospace careers, an Aero&Space comic book, a careers fact sheet, and a HyperX Glider kit.

## NASA SHARP Students Inspired by STC Mentors

STC Scientist **Dr. Theresa Axenson**, working in the Laser Systems Branch at NASA Langley Research Center, recently participated in the Summer High School Apprenticeship Research Program (SHARP), mentoring two students, Melanie Fox from Gloucester High School and Issel Lim from Hampton Roads Academy, Newport News.

Their project involved measuring polarized optics using the spectro-photometer of the Laser Systems Branch. Using a DOS-based CAD program, they designed a mount for the spectro-photometer to aid in the work.

They also disassembled and upgraded their computer, and installed a "Burleigh pulsed wave meter" in one of them, and received instruction in the use of Power Point and the writing of research reports. The young women, already interested in the sciences, found the experience very beneficial academically.

Ms. Lim was planning to study medicine, but was inspired to pursue a course in biomedical engineering when she started her college program at M.I.T. this fall.

*Those interested in the Outreach Programs may call Wayne Ewing at (757) 766-5800.*

**PANEL** (continued from page 1)

for future program plans in the passive standoff detection effort at ECBC.

The panel received briefings from scientists and engineers from ECBC, and its support contractors including STC Senior Scientist, **Dr. Avishai Ben-David**.

Their recommendations for the technical aspects of the Program for HSI standoff detection of CB agents were divided into short term (0–2 years) and long term (3–5 years). They strongly supported the fullest exploitation of advanced infrared HSI sensors, and the continued pursuit of research and exploratory developments, including: maintenance of core capabilities; enhanced hardware capabilities; and the need for airborne sensors.

Participating in the panel were: Dr. Jack Margolis, Scientific Consultant in Remote Sensing; Dr. J. Bruce Rafert, Chair of the Physics Department at the Michigan Technological University; and Dr. James Russell, Senior NASA Scientist and principal investigator for the Halogen Occultation Experiment (HALOE).

The second panel, held 30 April–1 May 2001, deliberated on the Laser and Biological Standoff Detection Program at ECBC. Its charge was to (1) assess past performance as well as planned work as a function of mission needs and requirements; (2) identify technology gaps ... and suggest possible technical solutions; (3) to compare the ECBC program with other U.S. programs ..., and (4) make suggestions for future active and passive standoff detection efforts at ECBC.

Panel members at the Blue Ribbon Panel held on 30 April–1 May 2001. From left to right around the table: Cynthia R. Swim (ECBC), Alan Samuels (ECBC), Avishai Ben-David (STC), Adarsh Deepak (STC), Dennis Kozakoff (STC), Capt. Myers (Air Force), Alan Lee (JSIG), John Scully (Battelle/ JSIG), and William Loerop (ECBC).

They also made long and short term recommendations, underscored by the need to prepare new systems, evaluate and improve prior developments, and carefully invest resources to prepare the new technologies. In general, the Panel recommended that more resources be allocated to the test and evaluation phases of programs to demonstrate performance.

Participants in the second Panel included Dr. Dennis Killinger, Professor of Physics at the University of South Florida and an expert in laser and optical remote sensing; **Dr. Dennis J. Kozakoff,** Senior Scientist with STC; Dr. C. Russell Philbrick, Professor of Electrical Engineering at Pennsylvania State University; and Dr. Henry E. Revercomb, Director of Space Science and Engineering Center, University of Wisconsin and Madison.

# Col. (RET) Samuel L. Eure, Sr....In Memoriam

## EURE Scholarship Fund Established

The STC family was deeply saddened by the loss, on July 5, of Senior Vice President, **Samuel L. Eure**.

Sam grew up in Portsmouth, Virginia, and was educated in the city's public schools, graduating as salutatorian from the I.C. Norcom High School. He received a Bachelor of Science degree in Chemistry from Virginia State College in 1956, his ROTC commission as second lieutenant in the U.S. Army Chemical Corps, and entered active service in September.

Col. Samuel L. Eure, Sr. (RET) 1934–2001

During his 30 years of distinguished service he earned a Master of Science degree in Physics and Nuclear Effects Engineering, and completed the resident course at the Army War College in 1979. He served in Vietnam during 1971-72.

On retirement in 1986, the family moved to York County in the Hampton Roads area of Virginia and Sam began a second career with STC, as Senior Scientist and Program Manager. His high degree of professionalism as well as his congeniality earned him the respect and affection of all STC staff.

During his active service, Col. Eure commanded at each level, from Platoon Commander up to Brigade Command. He received the Bronze Star, and three Legions of Merit—the second highest peacetime award that a soldier can earn.

Based on his military perfornace he was presented two unique awards. The first is the State of Tennessee, House of Representatives, Joint Resolution No. 502 for oustanding performance as the commander of the Holston Army Ammunition Plant. The second is the International Star Registry designation of a star as the "Samuel l. Eure Guide to Hope," permamently known by this name and registered in the Library of Congress.

Sam's contributions of service to his church and his community are almost too numerous to describe: Sunday School teacher, youth leader, speaker, and volunteer in many service organizations. At the time of his death he had been selected as "Patriarch of the Year, 2000" of the Delta Beta Lambda Chapter of his fraternity, Alpha Phi Alpha. He competed successfully for the same award at the state level, and was preparing for the regional and national competitions.

He will be greatly missed by his family and friends.

Scholarship fund contributions to a memorial "Guide to Hope" fund may be made out to "Eure Scholarship Fund" and mailed to 10 Basil Sawyer Drive, Hampton, Virginia, 23666.

# Thomas Pool STC's New Vice President for Business Development

**Tom Pool** has recently joined STC as the Vice President of Business Development. His experience in Government contracting goes back over the past 14 years with REMTECH, a NASA contractor at MSFC; Raytheon; and most recently as CEO of Computer Systems International, which

Tom Pool

was sold to Trinity Telecom in May of this year. He is excited about the opportunity to assist STC in pursuing an expanded role in Government contracting.

Prior to this, Tom, a native Texan, was an Army aviator who served many years in Germany as well as two years in Viet Nam. His experience included flying both attack helicopters and jet fighters. Tom and his wife Helen live in Chesapeake, Virginia. They have one son and two granddaughters, living in Charlotte, North Carolina.

He may be reached in Hampton at (757) 766-5800.

**LASER** (continued from page 3)

In 1968 they published their results, to the acclaim of the scientific community. The NASA Researcher News of March 9, 2001 states, "For the next 12 years, textbooks cited Hinkley and Freed and included their photographs to illustrate the Schawlow-Townes theory."

Ted Harmon (prepared semiconductor laser material), Charles Freed (developed stable $CO_2$ gas laser), and Roger Sudbury (MIT Lincoln Laboratory Liaison Officer) at presentation of laser materials to MIT archive.

Lead-salt diode lasers are currently used in many applications, such as oil exploration, isotope analysis, and the detection of toxins and explosives.

Dr. Hinkley, Senior STC Scientist and Manager, STC-Los Angeles, describes the work of Charles Freed and himself as "being the first to demonstrate the fundamental power spectrum (linewidth) of any laser." Three of the semiconductor lasers donated to MIT are ones that he built.

# Paper Published

**Pi-Huan Wang**, Robert E. Veiga, Lelia B. Vann, Patrick Minnis, and **Geoffrey Kent**. "A Further Study of the Method for Estimation of SAGE II Opaque Cloud Occurrence," in *JGR - The Journal of Geophysical Research*, Vol. 106, No. D12, June 27, 2001.

Information on vertical cloud distribution is important to atmospheric radiative calculation, general circulation modeling, and climate study. The method used for estimating the vertical structure of opaque cloud occurrence from the solar occultation in observations obtained by the Stratospheric Aerosol and Gas Experiment (SAGE) II has been reviewed for further understanding of the nature of the derived cloud statistics.

## Contracts

Since May 2001, in our Government services area, we have received prime and subcontracts totaling about $5 million from customers such as the U.S. Army Aberdeen Test Center and Sverdrup Technologies for engineering services and test support, and from the U.S. Army Cold Regions Research and Engineering Laboratory for research support in collecting and analyzing climatological and hydrologic data.

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."