



STC Wins Prestigious Nunn-Perry Award

Partner in Best Mentor-Protégé Team

Dr. Adarsh Deepak, President and CEO of Science and Technology Corporation, has received the Department of Defense Nunn-Perry Mentor-Protégé Award on behalf of the company. It was presented in April by Robert L. Neal, Jr., DoD Director of the Office of Small and Disadvantaged Business Utilization.



From left to right: Larry Nave (SAIC), Dick Gilligan (STC), Janet Koch (Director DoD Mentor-Protégé Program), Dr. Adarsh Deepak (STC), Dr. Joseph Skorcz (SAIC), Sam Eure (STC), and Greg Mowris (SAIC).

In the award letter, Mr. Neal wrote, "Let me extend my appreciation for your commitment to excellence and your dedicated efforts toward best practices and program results. Your efforts enable us to maintain the high quality of the DoD Mentor-Protégé Program."

STC has been the protégé partner of the Science Applications International Corporation (SAIC) in the DoD program. Since 1997, SAIC has provided 12 different training courses and several workshops for STC management and staff, and has established a quality management system within STC based on ISO 9001 standards. SAIC (Continued on page 4; see **AWARD**)

Fairlie Studies Ozone Depletion Over Arctic Polar Region

Visits Howling Dog Saloon

Duncan Fairlie, a scientist with the STC Aerospace Group in Hampton, Virginia, was a member of the NASA Langley Research Center science team that participated in the Polar Ozone Loss over the Arctic in Summer (POLARIS) aircraft campaign from March to September 1997. The mission, which was based primarily in Fairbanks, Alaska, was designed to investigate the relative contributions of the NO_x, HO_x, ClO_x and BrO_x chemical families to observed losses of ozone in the low stratosphere over the Arctic during late Spring, Summer, and Fall. Results of the mission will contribute to the environmental assessment studies being conducted as part of NASA's AEAP program, into the impact of flying a fleet of commercial supersonic airliners over northern high-latitudes.



The POLARIS mission consisted of a series of flights by the ground crew and instrumentation technicians preparing the ER2. A converted U2, the ER2 flies at high altitudes.

(Continued on page 3; see **OZONE**)

STC Tests New NSF Research Ship in Antarctic

The *Laurence M. Gould* was delivered in 1997 by Edison Chouest Offshore for long term charter to the National Science Foundation (NSF) as the new Antarctic research ship. The *Gould* will also be the supply ship for Palmer Station on the Antarctic Peninsula. The STC Arctic Technology Group (ATG) under the leadership of Jim St. John, working out of the Columbia, MD office and under contract to Antarctic Support Associates (ASA), provided technical support for the procurement of the charter, and design and construction oversight while the ship was being built.

In May 1998, the ATG was asked to perform the ice trials on the ship to prove her capability. Additional measurements were made to determine the fuel consumption during normal transits across the Drake

Passage in open water. The ship was tested during the last austral fall trip to Palmer Station between 9 and 24 May 1998. Jim St. John met the ship in Punta Arenas with Mike Steele from Fleet Technology Ltd. The

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



The *Laurence M. Gould*, Antarctic research and supply ship.

IN THIS ISSUE...

STC Wins Nunn-Perry Award.....	1
Fairlie Studies Ozone Depletion	1
St. John Tests Antarctic Ship	1
STC Employees Remember	
15 Years	2
Myers Promoted	3
Axenson Joins STC NASA Team	3
Publications	4
New Contracts	4

STC Employees Remember 15 Years of History



"I have been very fortunate to find a group of people who have come to have the interests of STC at heart, whose company I have been able to enjoy, and who have grown with me and STC over the years. From the very beginning with Sue Crofts working from her home, our core team has provided stability and a degree of loyalty that many would envy." Adarsh Deepak

Sue Crofts' official starting date was November 11, 1977—the same day that company founder, Adarsh Deepak, started IFAORS, the Institute for Atmospheric Optics and Remote Sensing, a not-for-profit organization conceived by him the previous December.

A native of Pennsylvania, Sue accompanied her husband to his home on the Peninsula. She met Dr. Deepak when they were working on a NASA grant and started working for him as a typist in 1974. In December 1976 she organized a workshop in Williamsburg. IFAORS was located first at NASA, and then at 17 Research Drive, Hampton.

In 1979, STC was set up to provide opportunity for diversification and for bidding on small-business set aside government contracts. The group of scientists began to grow, with Pi Wang in 1979 and Geoffrey Kent in 1980. There were also Drs. Michael and Gail Box, a husband and wife team from Australia. For a time, Sue was the only U.S. citizen on the staff. Later, in 1978, she accompanied Adarsh Deepak when he received his citizenship, an experience she treasures. In fact, it has been the multicultural aspect of STC that she has enjoyed the most: a very interesting environment, with great civility.

(Continued on page 3; see **CROFTS**)



Pi-Huan Wang came to the U.S. from Taiwan in 1967, and earned a Ph.D. in Meteorology from Florida State. He taught for a short time, and in March 1979 came to work with Dr. Glenn Yue,

then associated with Dr. Deepak on the exciting new contract IFAORS had received from NASA.

The first office at NASA was very small, with three staff, including Sue Crofts, in one room. There were no 'computers'—perhaps an ABM/CDC 606 in the computer center. Pi's dummy terminal sent the jobs through cable, but he often carried a big box of punched cards into the center to feed the machine.

The 'stuff' on the cards was programs for the analysis of data for studying atmospheric

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dynamics and radiative transfer. Pi and Glenn were doing basic research on the structure of the atmosphere. Eventually they had data from NASA Langley's satellite instruments: SAM II launched in 1978, and later SAGE I and SAGE II.

SAM II measured the aerosol extinction coefficients in the polar region. SAGE II measures, in addition, gas species such as ozone, NO₂, and water vapor. SAGE II provides a nearly global coverage, as the earth spins. It was a brilliant idea, to use satellites for remote sensing of the earth's atmosphere in this way.

Dr. Wang says, "This was the most amazing, satisfactory thing I was ever engaged in. I was fortunate to be with a wonderful, expert group of people, and to work in aerosol research. The discovery of polar stratospheric clouds was one of the most significant results of the aerosol research team's work, because they are a very important factor leading to ozone depletion and the understanding of that phenomenon."

Without the work of Dr. Wang and others, there would not be a 20-year data archive against which to monitor current developments in global warming, ozone problems, and weather changes.■



Geoffrey Kent joined IFAORS in 1980, transferring to STC in 1981. A native of England he holds the M.A. in Physics and the Ph.D. in Radiophysics from Cambridge University.

When he came to Hampton, there were three staff scientists working with Dr. Deepak: Glenn Yue, Pi Wang, and Usamah Farrukh. He began his work with SAGE I in 1980, saw SAGE II launched in 1984, and is preparing now for SAGE III, due to be launched in 2000.

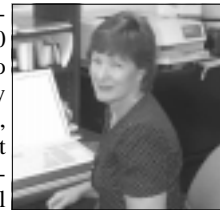
When he was working in Nigeria and Ghana in the early 1960s, he and two colleagues conceived the idea of using lasers for atmospheric probing. Successful first projects led to Air Force funding of the world's largest lidar instrument, able to measure aerosol layers and molecular density up to an altitude of 100 km, and a stay of 14 years in Jamaica for Dr. Kent.

Kent became a member of the Lidar In-space Technology Experiment (LITE) team, responsible for advising on the mission objectives, interpreting and validating the data obtained. This shuttle-borne system, launched in 1994, was used to make scientific observations on the atmosphere.

The atmospheric studies participated in by Kent, Wang, and others have provided a very

(Continued on page 3; see **KENT**)

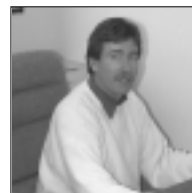
Diana McQuestion, a native of England, was working at Hampton University in 1980 when Pat Deepak, who was teaching gerontology at Hampton University, invited her to help out Dr. Deepak over Christmas by typing journal manuscripts in the atmospheric sciences. She is now the Publications Manager of STC.



In 1981 she joined IFAORS, setting up short courses: "Inversion Methods in Remote Sensing" in Alexandria; "Hygroscopic Aerosols" in Vail; and, for NOAA, "Clouds" in Boulder. A book resulted from a symposium on "Remote Sensing Retrieval Methods," with Dr. Deepak as the editor, and Diana chasing the authors and getting copyright permissions. Gradually she began doing proofing and editing.

She reluctantly left Meetings when the first contract to do the Smoke Symposium required clearance only available to U.S. citizens. She became Dr. Deepak's secretary, often involved in the all night proposal sessions. She began learning to set books, proposals, and articles on the computer phototypesetter, doing all the complex front matter for the Smoke Proceedings. She took on the job of organizing and producing proceedings under STC's contracts, and has also been responsible for production and sales of over 40 titles published by A. Deepak Publishing.

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



A native of Nebraska, **Roger Davis** fell in love with the stars when his boy scout troop visited a local college and he got his first view through a telescope. He now holds the M.S. and Ph.D. in Astronomy, and is an adjunct professor of Astronomy at New Mexico State University. In 1990 he received the Boyden Premium (from the Franklin Institute) for his work with Quasars.

Roger joined STC at Las Cruces in September 1982. One of his first projects was the design of the initial Atmospheric Aerosols and Optics Data Library (AAODL) database. He has also developed laser radiation transfer models for the U.S. Army and the Air Force; analyzed contrast and path radiance in smokes in U.S. and Canadian field tests; developed simulation obscurant images for a NATO study group; and participated in NATO camouflage field tests.

Under Dr. Davis' program management, STC has made a major contribution to the meteorological and smoke obscurant communities with the management of both test and evaluation of smokes/obscurants in field trials, as well as the design and development of the Small Portable Optical Transmissometer (SPOT) system.

Roger and his wife Kathy and their two daughters live in Las Cruces, where he is very active in the promotion of science in the local schools.■

Myers Promoted to Research Assistant

In the spring of 1997 **Emily Myers** was contemplating going into premedicine after graduating from Bridgewater College in Virginia. Instead she opted to join the Biosensor Team in July 1997 as Laboratory Technician working under the mentorship of **Steve Gagliardi**, STC Principal Investigator at the Berger Laboratories, U.S. Army Edgewood Chemical Biological Center, SBCCOM. Emily readily adapted to her new environment and quickly learned laboratory procedures and techniques that enhanced the molecular research team. At this time Mr. Michael Goode, the Research and Technology Directorate Contracting Officer Representative, was shifting emphasis to research DNA techniques and instruments readily available commercially for biodetection. Emily was definitely challenged in her position to become proficient in the preparation of bacterial solutions,



Dick Gilligan, Vice President/Program Manager congratulating Emily Myers on her promotion to Research Associate.

agarose gel electrophoresis, cloning of PCR products, isolation and purification of DNA, and analysis of DNA, as well as independently being able to operate instrumentation. Over the past 17 months Emily's commendable efforts in molecular biology research, as well as her support in assisting other STC team members on their projects, have greatly contributed to the accomplishment of the Government's biodetection research objectives. At the recent Scientific Conference on CB Research at the U.S. Army SBCCOM, Aberdeen Proving Ground, Edgewood Area, Maryland, Emily presented a poster on PCR techniques.

In recognition of her achievements and demonstrated capacity to take on more responsibilities Emily was promoted to the position of Research Associate on 4 January 1999 at the Edgewood Regional Office by **Dick Gilligan**, Vice President/Program Manager. ■

OZONE (continued from page 1)

NASA high-altitude ER-2 aircraft, carrying a payload of instruments to measure ozone, and a wide variety of other chemical constituents. A Mark IV balloon payload was also launched from Fairbanks on several occasions to provide information on vertical structure of the relevant chemical constituents. Measurements from the Mark IV were compared with the ER-2 observations and with measurements made from the Japanese ADIOS satellite flying overhead.

The NASA Langley POLARIS team used a three-dimensional trajectory/photochemical model to investigate the large-scale



The Howling Dog Saloon, a unique and popular watering hole for Alaska denizens, sits at the end of the ten miles of paved road from Fairbanks.

Dr. Theresa Axenson Joins STC NASA Team

Research Scientist **Theresa Axenson**, recently employed by STC, is working at NASA on a task entitled "Development of Advanced Lidar Lasers," in association with two other STC engineers, **Mulugeta Petros** and **Dr. Jay Yu**, under Program Manager **Dr. Leonard Melfi**.



Dr. Axenson earned her Ph.D. in Physical Chemistry from the University of Southern California in 1997. She also holds the B.S. in Chemistry from the

University of Rochester. Her areas of academic research include nonlinear optical spectroscopy; design and construction of an optical parametric amplifier; two-photon resonance absorption measurements; and phase mismatch spectroscopy. She has published articles dealing with the vibrational relaxation rates of vitamin B₁₂ and characteristics of RNA hairpins.

Dr. Axenson is internationally ranked in the martial arts, and has held the rank of shodan in Tomiki Aikido since 1996. She competes annually and in 1998 studied under the master, Nariyama Shihan, in Osaka, Japan. ■

vertical and latitudinal distribution of ozone loss during the mission. The team used observations of chemical constituents from the Halogen Occultation Experiment (HALOE) instrument that flies on board the Upper Atmosphere Research Satellite (UARS) and meteorological data from the NASA Goddard Data Assimilation Office (DAO) to perform their modeling studies. Results of the model studies compared very well with the measurements made from the ER-2, and provided a global perspective for interpreting the ER-2 data.

Mr. Fairlie and the NASA Langley POLARIS team were awarded NASA Group Achievement Certificates for their contribution to the POLARIS aircraft campaign. ■

CROTTS (continued from page 2)

Sue is a veteran of many last minute drives to turn in contract proposals by the deadline. On one occasion she came to work on Monday morning at 7:30, and didn't leave until 5:00 a.m. Wednesday. It was worth it, since that was the White Sands proposal, which STC won. On another occasion, Chand Deepak, STC Executive Vice President, found an error in a proposal already on its way to the airport. After frantic calls, the package was found, and the team sat down on the airport floor, taking out the offending page and putting in the new.

It has been a challenging and enjoyable time, with a group of people Sue considers to

be her other family. (Editor: Sue makes the best cookies and brownies too.) ■

KENT (continued from page 2)

important archive of atmospheric conditions and changes as a basis for understanding global pollution and warming problems and changes in atmosphere, weather, and climate. One of the interesting things scanning lidar can do is to study the plumes of aircraft exhaust and their effect on the atmosphere.

When Dr. Kent came to Hampton he had a dumb terminal and a keyboard. He remembers

the days at Cambridge in the 1950s, when one of the world's first digital computers occupied a room about 20 ft by 20 ft and one walked inside it to solder the vacuum tubes.

Dr. Kent, who retired to part-time status in June 1999, has made unique contributions to atmospheric sciences and instrumentation, such as the Three-Wavelength Scanning Lidar which he built at the STC Laboratory in Hampton and delivered to NASA in 1992. He has received many awards, among them the prestigious NASA Distinguished Public Service Award, the highest award given to a nongovernmental employee, in June 1998. ■

Publications

Geoffrey S. Kent, C. R. Trepte, and **P. L. Lucker**, "Long-term Stratospheric Aerosol and Gas Experiment I and II; Measurements of upper tropospheric aerosol extinction," in *Journal of Geophysical Research*, Vol. 103, No. D22, November 27 1998. A detailed analysis of the SAGE I and II aerosol extinction data for the upper troposphere taken between 1979 and 1998.

T. Duncan Fairlie, R. Bradley Pierce, Jassim A. Al-Saadi, William L. Grose, James M. Russell III, M. Proffitt, and C. Webster, "The Contribution of Mixing in LaGrangian Photochemical Predictions of Polar Ozone Loss over the Arctic in Summer 1997," *Journal of Geophysical Research*, (in press). Measurements from the Halogen Occultation Experiment (HALOE) on board the UARS satellite, together with assimilated winds, temperatures, and diabatic heating rates from the NASA Goddard assimilation office (DAO) are used in the NASA Langley Research Center trajectory/photochemical model to computer 3D air parcel trajectories for the Northern Hemisphere for the period March through September 1997.

Pi-Huan Wang, Derek Cunnold, Joseph Zawodny, R. Bradley Pierce, Jennifer Olson, **Geoffrey S. Kent**, and Kristi M. Skeens,

"Seasonal Ozone Variations in the Isentropic Layer Between 330 and 380 K as observed by SAGE II: Implications of Extratropical Cross-tropopause Transport," in the *Journal of Geophysical Research*, Vol. 103, No. D22, November 27, 1998. This report presents an analysis of the seasonal variations of the ozone latitudinal distribution in the isentropic layer between 330 K and 380 K based on the measurements from the SAGE II, in order to provide observational evidence on the extratropical cross-tropopause transport between the stratosphere and the troposphere via quasi-isentropic processes in the middleworld.

Pi-Huan Wang, **Geoffrey S. Kent**, Robert E. Viega, Glen K. Yue, Lamont R. Poole, Jack Fishman, and M. Patrick McCormick, "A Model for Identifying the Aerosol-only Mode of SAGE II 1.02- μm Extinction Coefficient Data at Altitudes Below 6.5 km," in the *Journal of Geophysical Research*, Vol. 104, No. D8, April 27, 1999. A model is proposed for identifying the aerosol mode of the second SAGE II 1.02- μm extinction coefficient measurements at altitudes below 6.5 km, which also contain cloud samples.■

TESTS (Continued from page 1)

two instrumented the ship during her port call and Jim St. John sailed with the ship to make the measurements during the two-week trip.

The transit to Palmer Station passed through some of the most beautiful scenery in the Antarctic, taking the inland passage down the Peninsula following the Gerlache Strait and the Neumeyer Channel. Many birds, whales, seals, and penguins were spotted. There was little ice on the west side of the Peninsula but satellite imagery obtained at the station revealed bays frozen with level ice in the Weddell Sea east of the Peninsula.



After transferring goods and people to the station, the ship went back up the Gerlache and around the tip of the Peninsula to the Weddell Sea. Good cold ice of 15 inches was found in Duse Bay and the tests in ice were completed in one day. The short stay was fortunate because the wind changed to an onshore direction as the ship departed and the heavy pack ice created pressure against the shore. The ship had to back and ram for a short distance to force her way around the tip of the Peninsula. Results of the test showed that the ship performed better than required.■

MCQUESTION (continued from page 2)

In 1990, she and Judy Cole drove a U-Haul truck with all their supplies to the High Power Microwave Conference at the US Military Academy, West Point, NY. She went to Estonia to the 1992 International Radiation Symposium. In 1994 she organized, in Orlando, the Symposium on Defense Conversion and a Festschrift in honor of Dr. A.E.S Green, Dr. Deepak's graduate professor.

She has particularly enjoyed the international interaction at STC, and the opportunity to be involved in many different areas of STC's activities. Her current interest is updating and increasing the information on STC's website.■

New Contracts

STC has received its first GSA Federal Supply Service contract for providing *Information Technology* services to all federal agencies. The contract was awarded on 1 June 1999, will run for five years, and will enable STC to receive purchase orders, delivery orders, and blanket purchase agreements for IT services from any agency of the U.S. Government. The contract will also provide for the establishment of blanket purchase agreements with agencies that intend to order these services from STC on a recurring basis.

Dr. Pi-Huan Wang of STC's research support group at NASA LaRC received a contract to provide quantitative assessments on aerosol and cloud data. The contract was awarded on 19 May 1999 as a result of STC's proposal on Tropospheric Aerosols and Clouds submitted under NASA's Research Announcement program solicitation. This contract represents a follow-on to STC's current SAGE II effort. In addition and as a result of the award, Dr. Wang has been selected for membership on the SAGE II Science Team.

The STC Aerospace Office in Hampton has received a subcontract award from Federal Data (NYMA, Inc.) to provide support under the Systems Analysis and Engineering Research Support (SAERS) prime contract at NASA Langley Research Center. The work will be managed by **Dr. Gregory O. Boeshaar**.

The STC Arctic Technology Group in Columbia, Maryland has received several commercial contracts to provide feasibility studies for Russian oil development. The Principal Investigator is **James St. John**.

The STC METSAT Office in Fort Collins, Colorado has received several new contracts/purchase orders to provide cloud and advanced satellite application studies by collecting and analyzing imagery data from geostationary and polar-orbiting satellites. These continuing awards represent the **successful commercialization of an SBIR Phase II product**, which was developed under a Phase II contract awarded to STC by the U.S. Air Force in September 1993.

AWARD (continued from page 1)

has also provided STC with more than \$4.4 million in subcontracts, surpassing the goal of \$3 million for the performance period.

Robert Rosenberg, executive vice president and general manager of SAIC's Washington Operations, accepted the award for SAIC. "SAIC is very proud to receive this award with STC. SAIC has been fully committed to the Mentor-Protégé program since its inception and we will continue our efforts to grow together with minority and women-owned business communities," said Rosenberg. "We look forward to continuing our mutually beneficial, long-term relationship with STC."

The DoD Mentor-Protégé program was established to provide incentives for major defense contractors to assist small, disadvantaged businesses in enhancing their capabilities and increasing their participation as subcontractors and suppliers under government contracts.■