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Goddard Space Flight Center

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Associate director retires

Dr. James Trainor

After 30-years of service to NASA, Dr. James Trainor, Goddard's associate director, retired August 24. Trainor, a native of Lancaster, N.H., began his career at Goddard in 1964 after graduating from the University of New Hampshire with a Ph.D. in physics.

Trainor's first assignment at Goddard was as a research physicist. Over a 30-year career, Trainor is credited with having made important contributions to the Center's growth and the advancement of the agency. As associate director, Trainor assisted the Center director on matters of science, engineering and technology. Despite his busy schedule, Trainor has written and co-authored more than 50 scientific and engineering publications.

He held many positions during his tour of duty at Goddard. Each position came with increased responsibility, from section head and branch head, to associate chief of the Laboratory for High Energy Astrophysics, deputy director of the Sciences Directorates, deputy director and director of the Space and Earth Sciences Directorate. Trainor was project scientist for Helios, principal investigator or co-investigator for Pioneer 10 and 11, Helios 1 and 2, and Voyager 1 and 2. He is personally credited with the success of 15 experiments launched on NASA and U.S. Air Force missions.

His instruments were notable for their state-of-the-art-technology, successful operation and long life. Trainor's last instrument was launched on Voyager in 1977, and five instruments remain in space working well today. The longest-lived one is on Pioneer 10, which was launched in 1972.

For his work on the Pioneer and Voyager missions, Trainor received awards from five NASA centers. His highest awards include the NASA Medal for Exceptional Scientific Achievement (1974), the NASA Exceptional Service Medal (1977), election to rank of Fellow of the Institute of Electrical and Electronics Engineers (1983) and two Presidential Rank Awards (Meritorious-1987, Distinguished-1991).

In recent years Trainor made special contributions throughout NASA as an expert in sensor systems, flight data and computing systems and nuclear radiation effects.

Tropical rainfall project reaches major milestone

by Allen Kenitzer

For decades, scientists have been concerned about the conditions of Earth's tropical rainforests. Tropical rainfall comprises more than two-thirds of global rainfall and is the primary distributor of heat through the circulation of the atmosphere. Understanding rainfall and its variability is crucial to understanding and predicting global climate change. But current knowledge of rainfall is poor, especially over the oceans, scientists say. Now, however, things are on track to change all that.

NASA's Tropical Rainfall Measuring Mission (TRMM) is the first mission dedicated to measuring tropical and subtropical rainfall through microwave and visible infrared sensors, including the first spaceborne rain radar. By using a low-altitude orbit of 217 miles (350 kilometers), TRMM's state-of-the-art instruments will provide more accurate measure-

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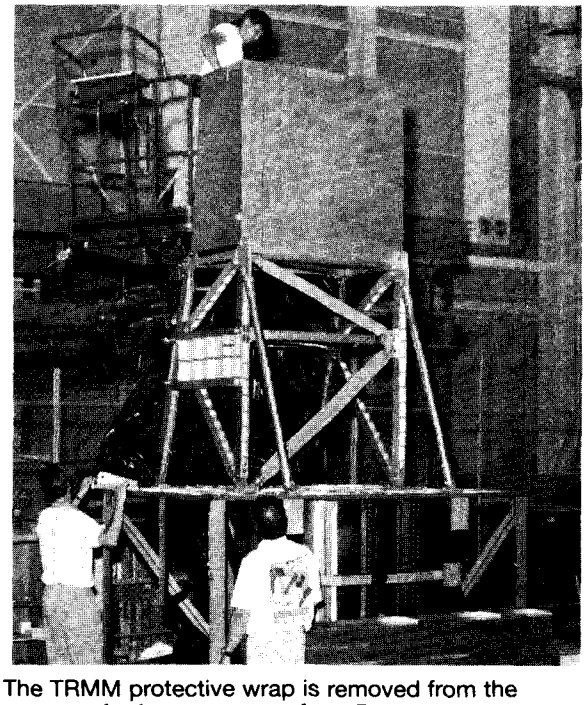
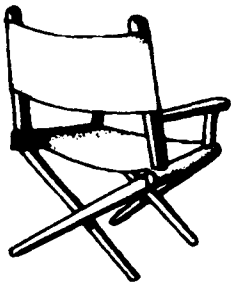


Photo by Randy Frisch

The TRMM protective wrap is removed from the spacecraft after movement from Building 5 to Building 29. Pictured top to bottom left to right are: Kelly Scharmann, NSI, Code 750.5; Eric Johnson, Code 722.3; and Steve Edwards, Code 754.3.



Director's Dialogue

Q: President Bill Clinton has directed the Office of Personnel Management to ban employment discrimination on the basis of sexual orientation in all Federal agencies. (The Departments of Labor, Justice and State, the Federal Bureau of Investigation and U.S. Coast Guard are the latest agencies to comply.) What has NASA and the Center done to comply with this directive and improve the working conditions of gay and lesbian GSFC employees?

A: The Civil Service Reform Act of 1978, as amended, provides that heads of agencies, and those officials to whom authority for personnel management has been delegated, are responsible for the prevention of prohibited personnel practices. 5 U.S.C. 2302 (b) (10) prohibits any employee who has authority to take personnel actions from discriminating for or against any employee, or applicant for employment, on basis of conduct which does not adversely affect either the employee's own job performance or the performance of others.

Discrimination on the basis of sexual orientation is not acceptable and will not be condoned by NASA. On behalf of Goddard, I would reiterate that policy. Should there be instances of such discrimination, they may be brought to the attention of my office. An individual subject to discrimination on the basis of sexual orientation may pursue grievances under applicable grievance procedures as well as notification of the Office of Special Counsel.

Dillard Menchan, chief, Equal Opportunity Program Office, Code 120

Editors Note:
Because of space and time limitations some questions submitted for Director's Dialogue may not be answered in print. For that reason we ask that you include your name and code when submitting a question; this will enable us to see to it that all questions are answered.

Goddard-managed projects fly on STS-64

When the Space Shuttle Discovery is launched from the Kennedy Space Center in Florida, on Mission STS-64, scheduled for September 9, it will carry three Goddard payloads: The Get Away Special (GAS), the Robot Operated Materials Processing System (ROMPS) and Spartan-201.

GAS has flown 107 payloads and remains a viable avenue for individuals and organizations to conduct experiments in space. The 12 GAS experiments on STS-64 are sponsored by a host of U.S. universities, high schools and several foreign countries. A Goddard experiment, the Orbiter Stability Experiment (OSE), also will be flown. The OSE was designed originally to evaluate the space shuttle as a platform for imaging the Sun in X-rays and extreme ultraviolet light. The OSE was designed and built by Goddard's Laboratory for Astronomy and Solar Physics, Code 680.

The instrument is making its third flight on STS-64. The OSE is managed by James Houston, Code 683.2. The principal electronics technician is Thomas Plummer, Code 683.2, and Werner Neupert, Code 680, is the principal investigator.

Spartan-201 is making its second flight on this mission. Spartan-201 is a joint solar mission conducted by Goddard and the Smithsonian Astrophysical Observatory. Spartan-201 will study the acceleration and velocity of the solar wind and measure aspects of the Sun's corona. The spacecraft, which operates autonomously in a free drift mode, is deployed by the shuttle's Remote Manipulator System. After detached operations are complete, Spartan will be retrieved by the shuttle crew and returned to Earth.

The Spartan project is managed by Goddard for NASA's Office of Space Science. Frank Collins, Code 740.1, is the project manager, and Craig Tooley, Code 741.2, is the mission manager.

ROMPS is making its first flight. The purpose of ROMPS is to demonstrate commercial methods of processing semiconductor materials in a microgravity environment. ROMPS is designed to be reflown quickly and relatively easily because of its high degree of automation. It is expected to make its second flight in 1995.

ROMPS is the first U.S. robotics system to be used in space. ROMPS is expected to advance microgravity processing by using a robot to transport each of a large variety of semiconductors from the storage racks to halogen lamp furnaces where their crystal structures are reformed in heating and cooling cycles.

ROMPS project manager is Lloyd Purves, Code 714. ROMPS is managed by Goddard for NASA's Office of Advanced Concepts and Technology.

Milestone

Continued from page 1.

ments. These new measurements will increase scientists' knowledge of how rainfall releases heat energy to drive atmospheric circulation.

Recently, the TRMM project reached a major milestone, according to TRMM Project Manager Tom LaVigna, Code 490.

"We've just completed the assembly of the spacecraft structure, which is one of the critical milestones in the buildup of the observatory," LaVigna said. It was designed by the TRMM Mechanical Engineering Team, led by Al Posey, Code 720, and assembled by the Engineering Services Division, Code 750.

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Milestone

Continued from page 2.

Goddard designed the spacecraft and is building and testing it "in-house." At launch, the observatory will weigh about 8,000 pounds (3,600 kilograms). It is 17 feet tall (approximately 5 meters) and 12 feet (3.6 meters) in diameter. It is the largest spacecraft ever built in-house at Goddard, according to LaVigna.

Next, the structure will undergo a series of tests over four to five months. As part of the test program, engineers will assemble the observatory in a simulated flight configuration. To perform qualification testing, mass models of the flight hardware will be installed on the structure.

Following this test program, TRMM will be ready for the formal integration phase, starting with the propulsion subsystem and followed by the other subsystems and instruments - with the last instrument, the Precipitation Radar (PR), scheduled for installation in November 1995.

"It's a very exciting program," LaVigna said. "I see a lot of enthusiasm and commitment from the TRMM people. We have a great team. We're making excellent progress. The project is on schedule and within budget."

"I'm impressed with how the project tracks progress and has maintained control," said Dr. JoAnne Simpson, project scientist, Code 900. "The scheduling system is very effective in measuring progress and uncovering problems."

TRMM's orbit will range between 35 degrees north and 35 degrees south of the equator, allowing the satellite to fly over each position on the Earth's surface at a different local time each day. Scientists can use data from this kind of orbit to calculate rain variations over a 24-hour period. The result will be a data set vastly more informative than any now available, according to scientists.

TRMM is a joint project between the United States and Japan. The National Space Development Agency (NASDA) of Japan will provide the Precipitation Radar and an H-II rocket to launch the TRMM observatory in August 1997 for a three-year mission. Goddard will provide the observatory, four instruments, integration and test of the observatory and will operate the TRMM satellite via the Tracking and Data Relay Satellite System (TDRSS).

TRMM will have three instruments in its rainfall measurements package. The TRMM Microwave Imager (TMI) and the Precipitation Radar will be the primary instruments for precipitation measurement. The third component of TRMM's instrument rain package is NASA's five-channel Visible Infrared Scanner (VIRS). The Clouds and Earth's Radiant Energy System (CERES) and the Lightning Imaging Sensor (LIS) will round out the instrument complement. Data from the TRMM sensors will be processed at GSFC in the TRMM Science Data and Information Ground System being developed by the Global Data Change Center, Code 902.

The TRMM project is part of NASA's Mission to Planet Earth, a long-term, coordinated research effort to study the Earth as a global environmental system. The mission will make major contributions to several international Earth science programs and is an essential component of NASA's long-range plan to study global change from space. Goddard's Flight Projects Directorate manages TRMM for the Office of Mission to Planet Earth at NASA Headquarters in Washington, D.C.

Specific goals in place for NASA's Tropical Rainfall Measuring Mission

by Allen Kenitzer

NASA's Tropical Rainfall Measuring Mission (TRMM) has several very specific science objectives. They are: to obtain and study multi-year science data sets of tropical and subtropical rainfall measurements; to understand how interactions between the sea, air and land masses produce changes in global rainfall and climate; to improve modeling of tropical rainfall processes and its influence on global circulation in order to predict rainfall and variability at various periods of time; and to test, evaluate and improve satellite rainfall measurement techniques.

Moreover, scientists say, this project is important for the studies of overall human welfare and global change.

"Tropical rainfall affects the lives and economics of half the Earth's population—residents of developing countries in or near the tropics," said Dr. JoAnne Simpson, project scientist, Code 900. "Rainfall variation in the tropics also can affect the weather in locations thousands of miles away, influencing the lives and livelihoods of populations worldwide."

For example, tropical rain systems such as typhoons, hurricanes and monsoons produce floods worldwide. The best known effect of tropical short-term climate variations on the world is the El Niño-Southern Oscillation (ENSO) of the Pacific Ocean. In an El Niño, warm water and its coupled cloud systems spread eastward from Indonesia toward South America. Weather conditions associated with El Niño include wetter than normal weather in California, wetter and colder winters in the eastern United States and dryer summer monsoon seasons across the southern hemisphere.

With temperature, rainfall is perhaps the most important factor in defining climate, according to scientists. Excess rainfall can cause flooding and enormous property and crop damage. Still, a deficiency of rainfall can cause drought and crop failure.

"Rainfall is also the major source of energy that drives the circulation of the atmosphere," Simpson said. "As water changes from liquid to vapor and back to liquid, heat is stored and then released. This latent heat can intensify some weather systems, making tropical rainfall an important determinant of atmospheric circulation and short-term climate changes."

Major advances are occurring in the modeling of rainfall and rain-related cloud processes. The response of cloud systems to their environment is an important link in a chain of climate variations. Scientists are developing cloud models to convert TRMM's signals into rainfall rates.

According to scientists, the atmosphere, oceans and biosphere of our planet are closely coupled components of the global environment. Water is the unifying element of these large environmental systems. It is the active component of the atmosphere and is the basis for all life on the planet. Oceans cover three-quarters of the Earth's surface.

Because of the unifying role of the global water cycle, studies of rainfall are essential for a deeper understanding of the Earth as a System.

Comet leaves a trail of science and excitement

"This comet, this child, has lived up to all of the great expectations and the great desires that we had for it. And now it's not just our comet. It belongs to the world." – Carolyn Shoemaker, co-discover of Comet Shoemaker/Levy

by Michael Finneran

For a breathless six days last month, Comet Shoemaker/Levy put on a celestial show unrivaled in planetary astronomy. Twenty or so fragments of the comet lined up like a freight train and methodically chunked into the atmosphere of Jupiter from July 16 through 22. From the first impact, the event proved more of a display than most had predicted.

While the comet may be history, the show's not over yet.

The dark spots created by the fragment impacts remain visible even to amateur sky watchers. Meanwhile, smaller debris from the comet's tail continues to sweep into the Jovian atmosphere, providing still more fodder for study.

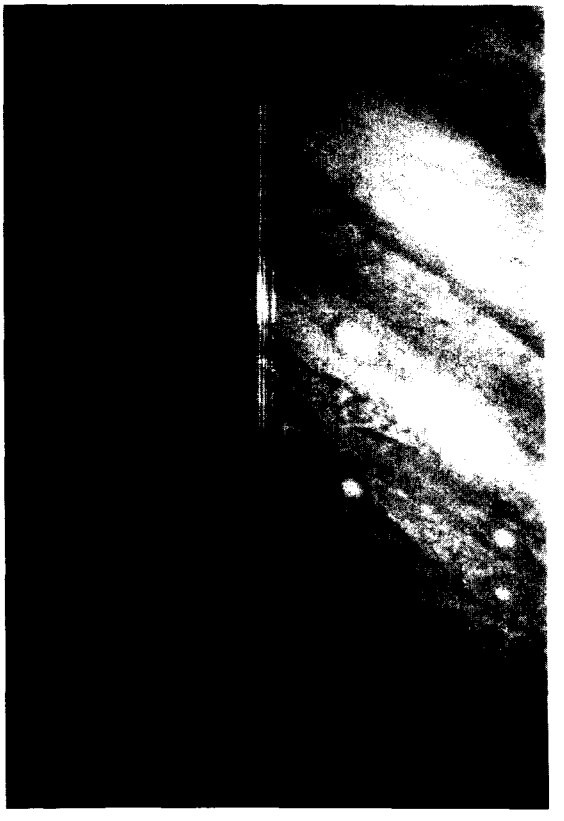
The collision of Periodic Comet Shoemaker/Levy-9 (1993e) with the solar system's largest planet represented the first time that such an event had been predicted more than a few seconds in advance. With more than a year to plan it, NASA and National Science Foundation-funded astronomers prepared the largest observing campaign in history.

Virtually every telescope on Earth peered the 477 million miles (767 million kilometers) to Jupiter. NASA's observatories included the Earth-orbiting Hubble Space Telescope, Extreme Ultraviolet Explorer and International Ultraviolet Explorer, all managed by Goddard Space Flight Center.

The Galileo and Voyager-2 space probes, operated by the Jet Propulsion Laboratory in Pasadena, Calif., watched the display from vantage points far from Earth. Closer to home, Ames Research Center in Mountain View, Calif., flew the Kuiper Airborne Observatory to Australia to take data from 41,000 feet. NASA's Infrared Telescope Facility on Mauna Kea, Hawaii, also set its sights on Jupiter, as did a sounding rocket sent aloft by Wallops Flight Facility in Virginia.

Dozens more ground-based telescopes around the globe joined the campaign. Meanwhile, the Goddard Visitor Center was designated "comet central" – a site where media could gather for daily briefings by astronomers, including comet discoverers Eugene and Carolyn Shoemaker and David Levy.

NASA



This image of the giant planet Jupiter by the Goddard-managed Hubble Space Telescope reveals the impact sites of fragments D and G.

Whether the observing campaign would live up to its media billing, however, remained uncertain until the last moment.

"There had been much speculation that the 1- to 3-kilometer diameter cometary nuclei would not hold together, that they would become dispersed into smaller chunks that would not be capable of producing the spectacular explosions and fireballs that had been predicted on the basis of very sophisticated computer modeling," said Goddard's Malcolm Niedner, Code 684.1, a comet expert and Hubble deputy senior project scientist.

"In some scientific circles, there was a sense that the whole campaign was going to fizzle – that, at best, an observer of Jupiter would witness a super-cloudtop meteor storm but no huge fireballs and rising plumes."

Amid such speculation, Fragment A hit Jupiter shortly after 4 p.m. Eastern time July 16. A few hours later, the Calar Alto observatory in Spain reported seeing a "plume" of heated gases from the impact.

"The plunge of Fragment A – supposedly one of the smaller ones of which little was expected – proved the optimists right," Niedner said.

Buoyed by the news, the Hubble science team that evening held the first two of the scheduled daily press briefings. During the second briefing, Massachusetts Institute of Technology astronomer Heidi Hammel dashed unscheduled to the podium waving the first Hubble image of the comet collision. The print showed a clearly visible impact site from the first fragment. "I think the highlight we'll all take back with us is seeing the images of the A impact," Hammel, the Hubble comet team leader, said later. "That, none of us expected to see."

The chase was on.

Over the next several days, images raced in from around the globe on the vast computer network known as the Internet. The comet campaign demonstrated the power of the network to bring exotic astronomical images to everyday computer users only hours after data are captured.

In two weeks, Internet sites at the Space Telescope Science Institute, Goddard, the Jet Propulsion Laboratory and the European Southern Observatory in Germany logged about two million images that were downloaded for private viewing, according to Sky & Telescope magazine.

At Goddard alone, nearly 340,000

users between July 18 and 26 tapped into the bulletin board run by the National Space Science Data Center (NSSDC). At one point, some 6,000 users accessed the system in one hour.

"The effort demonstrates, for the first time, the 'real world' use of the World Wide Web (Internet) infrastructure for the massive and almost real-time access to NASA data," the NSSDC said in a report on Internet access.

Even lawmakers jumped into the act. (See related story, page 7) Before impact week was over, Congress had directed NASA to develop a comet-tracking plan with the Department of Defense and the space agencies of other countries. The plan's objective is to identify and catalogue the orbital characteristics of all comets and asteroids greater than about a half-mile (1 kilometer) in diameter in orbit around the Sun that cross the orbit of the Earth.

Meanwhile, as the observing campaign unfolded, scientists began to reap the rewards of their careful preparations.

The International Ultraviolet Explorer (IUE), for example, detected sulfur and silicon after the impacts and provided evidence that ammonia and hydrocarbon compounds were absorbing light in the Earth-sized dark spots created by the impacts. "I think there will be very good papers coming out," said Yoji Kondo, IUE project scientist.

Hubble scientists found chemicals never seen on Jupiter that had been brought up from the lower levels of the atmosphere as a result of the buoyant plumes produced by the fragment explosions below the cloud tops. They also found evidence of the molecular and atomic remains of exploded comet fragments.

Hubble found evidence of metals from the comet fragments, including magnesium, silicates and perhaps iron. The space telescope also detected diatomic sulphur, ammonia, hydrogen sulfide and carbon disulfide.

Of the many mysteries to be solved, one of the biggest thus far is the apparent absence of water detection. Water would be expected because comet composition long has been thought to include water in the form of ice. Lack of water could suggest that the comet was a dry comet, or not a comet at all but perhaps a string of asteroid fragments.

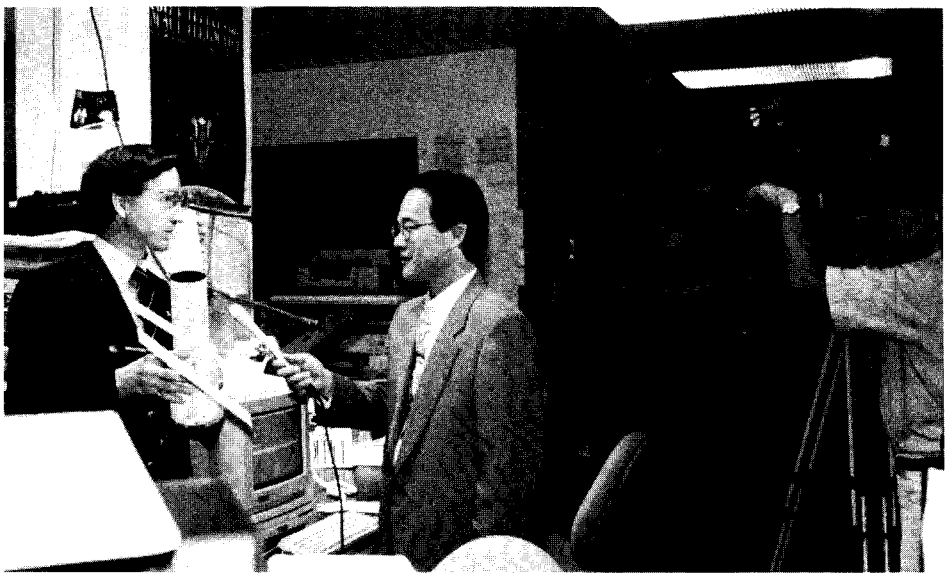


Photo: Jim Elliott

Goddard's Dr. Malcolm Niedner, Code 684.1, (left) is interviewed by one of the many foreign reporters who came to the Goddard newsroom to cover the Comet Shoemaker/Levy event.

Because water also is thought to compose the lower atmosphere of Jupiter, the absence of the compound further suggests that the comet fragments did not penetrate deeply. Jupiter's atmosphere is believed to be made of an upper layer of ammonia, followed by a layer of ammonium hydrosulfide, then water and ice.

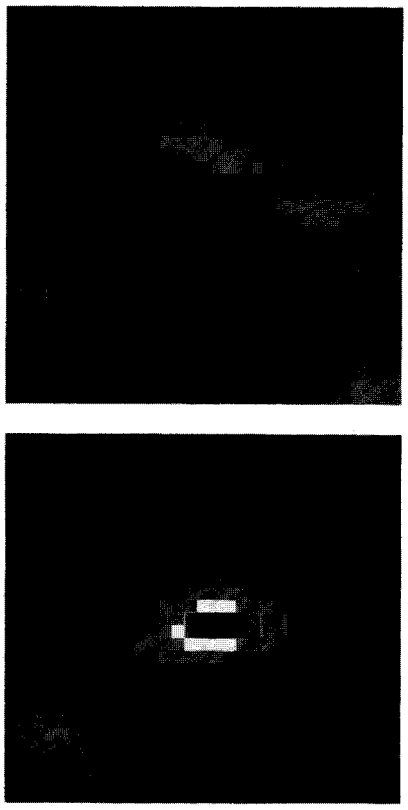
Far ultraviolet imaging by Hubble showed profound auroral and magnetic field effects as a result of the impacts. The space telescope observed the production, in the northern hemisphere, of aurorae in lower latitudes, where normally they are not seen.

Scientists expect to have much more to say about Comet Shoemaker/Levy's effects on Jupiter once they have the opportunity for detailed data analysis. Images still to come from the Galileo and Voyager space probes should further illuminate the astronomical event of the century.

"Once we can combine our efforts and combine our data we will know a lot more than we know now," said Lucy McFadden, an astronomer who co-coordinated the worldwide observing campaign for the University of Maryland in College Park. "It's going to be a lot of fun."

EUVE Helium 58.4 nm Emissions from Jupiter

NASA



These images were acquired by the Goddard-managed Extreme Ultraviolet Explorer satellite. The upper image represents three days of data obtained before the arrival of the comet fragments. The lower image is the data obtained during the arrival of several fragments.

Anything's possible

by Karen W. Davis

At an early age, he had an interest in foreign service and political career aspirations. He never expected to run the Equal Opportunity Program Office (EEO), Code 120. Yet, that is just where Dillard Menchan finds himself.

Menchan, chief of EEO, was born in Philadelphia, Pa., and attended Howard University, Washington, D.C., where he received a bachelor's degree in political science in 1966. Still thinking politics he earned a master's degree in political science in 1974. Married for 25 years, Menchan lives in Mitchellville, Md., with his wife and son.

In 1967, Menchan went to work for the Equal Employment Opportunities Commission, Washington, D.C., as a personnel staffing specialist. From there, he moved on to the D.C. Department of Corrections, Lorton, Va., where he served as a personnel officer. In January 1977, Menchan began his Goddard career as head of the Employee Development Branch, Code 114. He took over as EEO chief in September 1985.

Though he never became a professional politician, his current position puts his political skills to good use. "I am like a broker when it comes to working issues. EEO developed a charter to insure that the groups (advisory committees for African Americans, Asians, Hispanics and people with disabilities) were organized and functional. We counsel people on a variety of complaints and work-related issues," said Menchan.

As head of EEO, part of his job is to work on educational matters, so it's to Goddard's benefit that he has a personal devotion to educational growth and stimulation. That interest is magnified through the development of numerous student programs offered by EEO (see story on page 8). "Goddard is the only NASA center which has both high school and college level programs for students with disabilities. I am proud to be a part of their development," Menchan said.

Menchan also plays a major role in developing programs geared to Goddard employees. In 1992, Goddard was chosen as a pilot center for the Alternative Dispute Resolution program, designed to solve complaints that could not be resolved at the junior management level. In that program an EEO directorate level manager and a mediator — someone with a personnel background — work closely with employees to resolve job-related complaints.

His job is twofold, says Menchan. "On a daily basis, I try to identify ways to improve the representation on Center of women, minorities and people with disabilities," he explained. "It is important to identify the higher grade levels and managerial positions and effectively integrate minority candidates into those positions. It is also my job to work in conjunction with management to insure that all employees have the opportunity to improve their skills for career advancement.

Photo by Debbie McCallum

Dillard Menchan

"Even though my job can be stressful, the end results outweigh the pressures. You have to be very sensitive to political correctness, and the expectations placed on an EEO officer. A lot of times, you get beat up from both sides. Sometimes employees do not think enough is being done to push their cause, and management thinks that we're doing too much and trying to interfere with their management practices. Because of this, you simply have to handle yourself and respond to issues the best way you can."

In the future, Menchan would like to become more involved in the educational arena. "For the last three years, I have been part of the Multicultural Education Program," he said. "The objective is to create an environment in which all people regardless of gender, ethnicity and physical ability are able to realize their full career potential at Goddard. I also would like to see management play such a proactive role in addressing employee issues that there would be no need to file complaints," he said.

Menchan says that he truly believes that most Goddard employees enjoy their work and the level of professionalism in the workplace. He also says that despite Goddard's technological prowess, people are concerned about people and their environment regardless of occupations, academic achievements or ethnicity.

"I feel privileged to have developed positive, professional relationships with people of vast backgrounds. Goddard employees go out of their way to donate time with kids and participate in our various programs. They are always mindful of others despite their ideology and are more than willing to share their knowledge and expertise," Menchan said.

"One day, people will be recognized for their ability and content of their character, not the color of their skin. We have so many talented people here, and it saddens me to see them underutilized. Until then, our responsibility is to establish mechanisms to make sure that people reach their fullest career potential. After all, anything is possible if we truly believe in what we are doing," Menchan concluded.

Goddard scientist on near-Earth committee

In early August, NASA Headquarters announced the establishment of a committee to develop a plan that identifies and catalogues, to the extent practicable within 10 years, all comets and asteroids that may threaten Earth.

Goddard's Dr. Michael J. Mumma, Code 690, will serve on the eight-member Near-Earth Object Search Committee chaired by Dr. Eugene Shoemaker. Shoemaker, an astronomer with the Lowell Observatory and professor emeritus with the U.S. Geological Survey, also was co-discoverer of Comet Shoemaker-Levy 9 that collided with Jupiter in July.

The committee was formed in response to Congressional direction that NASA develop a plan in coordination with the Department of Defense and the space agencies of other countries. The plan's objective is to identify and catalogue the orbital characteristics of all comets and asteroids greater than about one-half mile (1 kilometer) in diameter in orbit around the Sun that cross the orbit of the Earth. The plan is to include estimated budgetary requirements for fiscal years 1996 through 2000.

The chairman of the House Committee on Science, Space and Technology, Rep. George Brown (D-Calif.), introduced the legislation as an amendment to the NASA Authorization Bill. The amendment calls for the NASA Administrator to submit the plan to the Congress by Feb. 1, 1995. In addition to Mumma and Shoemaker, the committee includes; Dr. Jurgen H. Rahe, executive secretary, NASA Headquarters, Wash., D.C.; Dr. Gregory Canavan, Department of Energy, Los Alamos National Laboratory, N.M.; Dr. Alan J. Harris, NASA Jet Propulsion Laboratory, Pasadena, Calif.; Dr. David Morrison, NASA Ames Research Center, Mountain View, Calif.; Dr. David L. Rabinowitz, Carnegie Institution, Washington, D.C.; and Colonel Simon P. Worden, U.S. Air Force Space Command, Colorado Springs, Colo.

Top-level Center appointments made

Three key appointments have been made at Goddard. Dr. Allan Sherman has been appointed director, and W. Brian Keegan deputy director, of the Engineering Directorate, Code 700. Carroll G. Dudley has been named deputy director of the Mission Operations and Data Systems Directorate, Code 500.

Dr. Allan Sherman

W. Brian Keegan

Carroll Dudley

Sherman's appointment was effective July 24. Since March 11, 1990, he had been deputy director of the directorate, managing its broad program of technological research and development in support of space science and applications programs.

He began his career at Goddard in 1966 as an aerospace engineer and has held progressively responsible managerial positions within the Engineering Directorate. He was named associate chief of the Space Technology Division in January 1985 and held that position until being appointed division chief in March 1988.

As deputy director of engineering effective August 7, W. Brian Keegan replaces Sherman. In his new post, Keegan will direct a broad spectrum of activity, ranging from technological research and development to the design, development and test of components, instruments, subsystems and spacecraft for flight projects.

Keegan joined Goddard in 1966 as a structural engineer in the former Systems Reliability Directorate. Since then, he has held progressively responsible engineering positions as well as supervisory/managerial posts.

Carroll Dudley's appointment as deputy director of the Mission Operations and Data Systems Directorate was effective June 26. He replaces Richard Costa, who retired in November 1993.

Dudley had been chief of the Mission Operations Division since December 3, 1989. Before that, he occupied a variety of progressively more demanding managerial positions, including associate chief of that division.

Fall community day coming up

Goddard is having an "open house" that all employees and their families are invited to attend. The Center will open its doors on Sunday, September 25 from 10:00 a.m. to 4:00 p.m. Special events are planned throughout the day. Events include guided bus tours of the Center with stops at the Spacecraft Systems Development and Integration Facility, the Goddard Fabrication Facility, the Hubble Space Telescope control center, and the NASA Communication Switching Center.

To be part of the community day volunteer team please call (301) 286-8981 (voice) or (301) 286-8103 (TDD).

Goddard prepares America's future scientists and engineers

by Tammy Jones

Students who spent some of their summer at Goddard will return to their classrooms this fall with a greater knowledge of science and technology. Goddard offers a smorgasbord of educational programs for students from the fourth grades and up. Goddard prides itself as the only NASA center with programs for students with disabilities at high school and college levels.

Those programs were developed by Goddard's Equal Opportunity Program Office, Code 120, and include the NASA Technical Experience for Select Students program, managed by Galludet College, Washington, D.C., designed for students with disabilities, and the High School High-Tech program, managed by the United Cerebral Palsy Foundation of Prince George's County, designed for students with learning and physical disabilities.

Students are so entrenched in programs managed by the Educational Programs Unit that one could almost mistake parts of Building 8 for a high school during the summer. Students participating in the Summer High School Apprenticeship Program (SHARP) are assigned to offices here and at Wallops. They get a chance to work with engineers and technicians and get a feel for a highly technical environment.

The Space Club Scholars Program also affords students an opportunity to work with engineers as their mentors. The Educational Programs Unit also conducts programs for teachers such as internships, workshops and seminars. Twenty-four Maryland teachers came to Goddard this summer to serve as earth and environmental science "teacher ambassadors". This was the first year for the program, designed to enhance classroom instruction in earth and environmental science programs in Maryland's secondary schools. NASA, the Department of Energy, Maryland State Department of Education, local Maryland school systems and the University of Maryland were partners in this program.

Many of the programs conducted by the Office of University Programs, Code 160, are geared toward graduate level and Ph.D. students. The NASA Space Academy, Space Grant Universities gives graduate and undergraduate students a chance to come to Goddard for a comprehensive 10-week introduction to the space program and for a research experience. University Affairs also offers numerous programs for individuals.

Also in the business of educating our future scientists and engineers is Goddard's Earth Sciences Directorate, Code 900, where there are at least two programs for undergraduates and two for Ph.D.s. Only a sampling of Goddard's educational programs were noted in this article. There are many more, all of which have been highly successful.

Summer Programs

Office of Public Affairs
NASA Educational Workshop for Math/Science Teachers (NEWMAST)
NASA/Goddard Teacher Intern Program
The Maryland Initiative
One-day Seminars
Summer High School Apprenticeship Research Program (SHARP)
Space Club Scholars Program
AeroSpace for Kids (ASK)

Office of University Programs
NASA Space Academy, Space Grant Universities
Summer Faculty Fellowship Program
Joint Venture (JOVE)
Quality Education for Minorities (QEM) Women/Minorities
National Physical Science Consortium (NPSC) Women/Minorities
Graduate Degrees for Minorities in Engineering/Science (GEM)

Equal Opportunity Programs Office
Summer Institute in Science, Technology, Engineering, and Research (SISTER)
Advanced Science and Engineering Program
NASA Collegians Program Prince George's Community College, Md.
NASA Technical Experience for Select Students (NTESS)
High School/High Tech (PG County Private Industry Council)
Summer Institute in Engineering & Computing Applications (SICA)
Public Service Intern Program
Children and Research Engineers Enjoy Rocketry (CAREER)

Earth Sciences Directorate
Institute on Atmospheric & Hydrospheric Sciences
Visiting Student Enrichment Program (VSEP)
Summer School in Computational Physics
Summer Program in the Earth Sciences

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