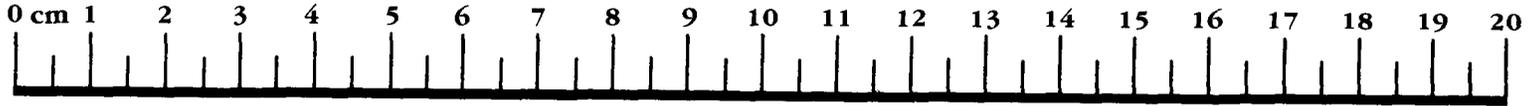


# Goddard's Going Metric!

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National Aeronautics and  
Space Administration

Goddard Space Flight Center

# Goddard News

Greenbelt, Maryland / Wallops Island, Virginia

October 1992 Vol. 39 No. 10

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## 1992 Antarctic Ozone Hole Sets New Size Record

by Dolores Beasley

Preliminary results from NASA's Total Ozone Mapping Spectrometer (TOMS) onboard the Nimbus-7 satellite show that the area of the 1992 Antarctic ozone hole is the largest on record.

The previous surface area covered by low total ozone values, less than 220 Dobson Units, typically has reached near 7.7 million square miles. On Sept. 23, 1992, the surface area covered reached 8.9 million square miles, an increase in size from 1991 of approximately 15 percent.

By comparison, the surface area of the North America continent is 9.4 million square miles. The U.S. 48 contiguous states have a surface area of approximately 3 million square miles, while Antarctica has 5.1 million square miles.

The Nimbus-7/TOMS has measured Antarctic ozone levels since November 1978. The TOMS instrument on the Russian Meteor-3 satellite, launched in August 1991, is compatible with the Nimbus-7/TOMS instrument and has shown similar results. Both TOMS instruments and the Nimbus-7 satellite are managed by Goddard.

Since the mid-1980s, the region covered by low total ozone values begins to grow in early August. The region covered usually reaches its greatest extent in early-October. This is the fifth year since 1986 that large seasonal ozone reductions over the Antarctic have been observed.

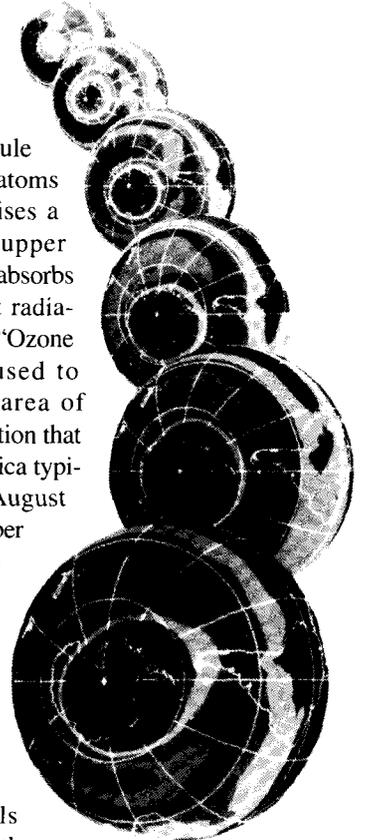
The minimum total ozone value on Sept. 23 was 131 Dobson Units. A record low of 111 Dobson Units was set on Oct. 6, 1991 near the South Pole. The lowest 1992 value probably will not be observed for several weeks, report scientists in Goddard's Atmospheric and Chemistry Branch, Code 916.

Scientists believe man-made chlorine is the primary cause for ozone hole formation. This year's hole also may have been affected by the continued presence of sulfuric acid droplets in the upper atmosphere created

by the eruption of Mount Pinatubo in the Philippines in June 1991.

Ozone, a molecule made up of three atoms of oxygen, comprises a thin layer of the upper atmosphere which absorbs harmful ultraviolet radiation from the sun. "Ozone hole" is a term used to describe a large area of intense ozone depletion that occurs over Antarctica typically during late-August through early-October and breaks up in mid-November.

Since the discovery of the ozone hole in 1985, TOMS has been the key instrument for monitoring ozone levels throughout the southern hemisphere.



How large will the 1992 Antarctic ozone hole be? This graphic, created by members of the Atmospheric Chemistry and Dynamics Branch, Code 916, and artists from the National Geographic Society, illustrates ozone readings for the month of October from 1979 - 1989. These black and white photos when compared to color ones, do not distinguish accurately the different ozone concentrations but do reveal a growing dark spot, or ozone hole, over the South Pole region in each image.



# Directors' Dialogue

**Q.** Why has Goddard dragged its feet on developing a first-class exercise facility, and one available to all employees without going through a physical exam and stress test? Both Langely and Ames have large and excellent facilities which are well used by their employees, and yet Goddard, the largest center, has by far the smallest and most restricted exercise facility. Years of promises of a better facility have now culminated in the slight enlargement at the new Health Unit. Is that all we are going to get for the foreseeable future?

**A.** The Goddard Fitness Facility has a funded expansion in

FY 92, that is planned for construction beginning in November, and will add 2,250 square feet (209 square meters). Expanded showers and locker rooms are planned for FY93. This will support Goddard's civil servants quite adequately. When comparing fitness facilities across NASA, you must be careful to keep the comparison "apples to apples." Several centers have facilities that are funded by both appropriated and non-appropriated funds (employee welfare activities). For example, Langley's appropriated fund activity, the exercise room, is comparable to Greenbelt's facility. They also have a large basketball/volleyball area run by their employee welfare activity with non-

appropriated funding. This is comparable to the welfare activity facility at Wallops. As a general rule, appropriated fund facilities are open only to civil servants with a stress test and physical. This is true at both Langely and Ames. On the other hand, employee welfare facilities are open to all dues-paying members and can include civil servants, contractor employees, family members and retirees.

**Sherry Foster, Director  
Management Operations  
Directorate  
Code 200**

Questions for Directors' Dialogue may be sent in to Directors' Dialogue, Code 130, without identification. Questions are sent to the appropriate directorate office as written but may be edited for space and clarity before being printed.

## Metrics Are Coming!

by Randee Exler

During the next few years, employees will be encouraged to drop inches and pounds. This isn't a crash diet where employees will be asked to count grams of fat or drink liters of water, but the start of a Government-wide transition to the metric system.

At Goddard, the move to metrics will be a gradual transition. Pilot programs and management training are expected to begin in FY 93 to help finalize a Center-wide transition plan.

The move to metrics is in response to a public law and an executive order that designates the metric system of measurement as the preferred system of weights and measures for United States trade and commerce. In response, in 1991, NASA mandated metric conversion at all of its centers and required each field center to establish a transition plan for its own installation.

NASA Headquarters issued an agency-wide plan last winter. NASA's strategy is to integrate a metric transition in conjunction

with the established planning and approval process for hardware development programs.

Functional support activities such as standards, training, supply and equipment management and other institutional capabilities are shared by all programs. The pace of the metric transition for these activities will match the needs established by flight programs, according to the NASA plan.

Because industry provides hardware and support services for most NASA programs, the success of NASA's metric transition depends on industry acceptance and support of the metric system. Another major consideration is NASA's substantial investment in inch-pound hardware. Although policy requires using the metric system for new programs, NASA will continue using the inch-pound system for programs that initially used the inch-pound system for their design, according to the NASA plan. This includes the space shuttle program and Space Station Freedom.

The United States is the only

industrialized country in the world not officially using the metric system. Metrics is a decimal-based system. Just like our monetary system, units are related by factors of 10. Compared with our present system, the metric system has fewer and simpler units, logically-related measurements, and no need for fractions.

Experts say that to use the metric system with ease, it is best to think in metric terms. For example think of square kilometers of land, degrees celsius for temperature, liters of gasoline, kilograms for weight and centimeters for height.

There are seven base units of metric measurement: meter — used to measure length; second (s) — used to measure time; kilogram (kg) — used to measure weight; kelvin (k) — used to establish the Celsius temperature scale; ampere (A) — used for measuring electric current; candela (cd) — used for measuring the intensity of light; and mole (mol) — used for measuring the amount of a substance (for example the amount of molecules in atoms).

# Spacecraft Given A Second Life

by Jim Elliott

The National Oceanic and Atmospheric Administration's NOAA-11 meteorological satellite has been given a second life thanks to the development of new software by a Goddard team.

The spacecraft was launched September 24, 1988 with an expected lifetime of two years. However, gyro problems began to appear in late 1989 threatening its operation.

"The spacecraft has four attitude control gyros," explained Charles E. Thienel, Code 480, project manager for meteorological satellites at Goddard, "and, under normal circumstances, we need three of them

to operate the spacecraft without having a reduction in capability."

When the gyro problem developed, Thienel decided to try to develop a software program that would permit the satellite full operation on fewer than three gyros. No sooner had the team — composed of Loren H. Anderson, Code 480; David A. Coolidge, Code 480; Thomas Flatley, Code 712.3; and Joel P. Gambino Jr., Code 712.4 — completed its work when another gyro showed indications that it too, might fail, leaving the spacecraft with only two gyros.

The new software was tested and installed, and a month later — just three days shy of the spacecraft's two-year expected lifetime — the second gyro failed. The spacecraft autonomously activated the already-installed, two-gyro software and maintained full operational status for the satellite.

"We've now developed software that will allow operations if all gyros failed," Thienel explained.

That would give still another life to NOAA-11.



Photo: P. Baltzell

The French Minister of Research and Space, Hubert Curien, visited Goddard, September 1. While he was on Center, Monsieur Curien met the Executive Council. He also learned about the Hubble Space Telescope Servicing Mission from Tom Huber, Code 700, director of engineering; was briefed about the HST Operations by Joe Ryan, Code 441, operations manager; and took part in a discussion of international relationships at Goddard with Dr. Klineberg, Dr. Steve Holt, Code 600, director of space sciences and Dr. Vince Salomonson, Code 900, director of earth sciences. Shown here, Curien, center, followed by Center Director Dr. John Klineberg, left, met Tom Huber, right.

## What's UP?

October 1, 1992

### **SAMPEX** — *Days in Orbit:* 90

*Interesting Fact:* The Low Energy Ion Composition Analyzer (LEICA) reached a nominal operating state on Sept. 23. Spacecraft operators currently are collecting data from all four SAMPEX instruments. However, analysis of the anomaly with LEICA's high voltage, first reported July 21, is ongoing.

### **EUVE** — *Days in Orbit:* 116

*Interesting Fact:* The satellite is now 11 weeks into a survey of the entire sky which will provide astronomers with their first detailed maps in several EUV energy bands. All EUVE instruments are performing at or above expected levels. NASA's Guest Observer program

will begin at the conclusion of the sky survey.

### **UARS** — *Days in Orbit:* 383

*Interesting Fact:* A routine forward to backward yaw around maneuver was completed on September 21. Attempts to restart the UARS Improved Stratospheric and Mesospheric Sounder (ISAMS) chopper wheel motor continue to be unsuccessful.

### **COMPTON** — *Days in Orbit:* 544

*Interesting Fact:* Compton was reoriented to study an unusually bright X-ray nova in the constellation Perseus for approximately one month before the nova faded in mid-September. As of September

22, the Burst and Transient Source Experiment (BATSE) detected 436 cosmic gamma-ray bursts.

### **HST** — *Days in Orbit:* 829

*Interesting Fact:* The Faint Object Camera (FOC) high voltage came on, then dropped to zero without a command being sent to turn off the unit. The FOC has been safed pending analysis.

### **GEOTAIL** — *Days in Orbit:* 68

*Interesting Fact:* Geotail is now in full science mode with the first segment of the mission, the deep tail phase, during which several orbits will carry the satellite deep into the geomagnetic tail, using lunar swingbys to achieve the deep orbits.

# Lifesaving System Provides Early Warning

by Susie Marucci

In late August, two natural disasters ripped through American territory. One of these, Hurricane Andrew, tore through Florida and Louisiana. The other, Typhoon Omar, also made the headline, but for a different reason.

While Typhoon Omar was a devastating typhoon, wiping parts of Guam flat, what made it even more newsworthy was that while the damage to property was great, the damage to human life was very small thanks to an early warning system, designed, built, tested and installed by Goddard's International Data Systems Office (IDSO).

This lifesaving system is Goddard's Meteorological Information Display and Analysis System (MIDAS), the heart of the Joint Typhoon Warning Center (JTWC). The Air Force and Navy run the JTWC which is located, appropriately enough, on Guam. When they decided to upgrade from a manual system using maps and airplanes to one using state-of-the-art satellite technology, they had

stringent requirements for Goddard's MIDAS.

One requirement was the ability to track five typhoons at once. Another requirement was that the system be very user friendly. To accomplish this, the system was "custom tailored to their [the JTWC personnel's] need," according to Fran Stetina, Code 930.8, of the IDSO and the MIDAS project manager. "They were here working in our lab. They had a say in how we designed it. We gave it to them in phases and modified it as we went along," he said.

In fact, Goddard employees from the IDSO worked so closely with the JTWC personnel that according to Charles Vermillion, Code 930.8, IDSO chief, the system is "not just user friendly, but user sympathetic. There were unique requirements. We put the system in and stayed with it for a year, making changes and fine tuning as they realized what they needed."

Vermillion says the Joint Typhoon Warning Center is the most

significant disaster warning center in the world. It receives information on weather systems from the East coast of Africa to the mid Pacific.

In fact, the system has worked so well, says Vermillion, that "The Air Force has asked us to develop a system for their Global Weather Center in Omaha, Neb. That's where they forecast for the whole world."

A system similar to MIDAS is already in operation in Fiji and Bangladesh. The system in Bangladesh, notes Vermillion, has saved hundreds of thousands of lives, because it has restored the people's faith in weather forecasting. Now when the Bangladeshis hear there is a cyclone heading toward their area, they evacuate.

Stetina talks brightly of the future of disaster management systems the IDSO may build, "The software we've developed can be altered and used to study agriculture, water erosion, and other things that can lead to disasters."

## NASA Names Minority Contractor of the Year

NASA Administrator Daniel S. Goldin presented the NASA Minority Contractor of the Year Award to Goddard's nominee, Jackson and Tull, Chartered Engineers, of Washington, D.C. and Seabrook, Md., on Oct. 1.

Jackson and Tull was cited for providing outstanding and critical technical support in meeting demanding requirements and schedules as part of high visibility programs such as the Hubble Space Telescope (HST).

Jackson and Tull also received Goddard's Minority Contractor of the Year Award from Center Director Dr. John Klineberg on September 30. During the Goddard Award ceremony, Frank Ceppolina, Code 442, HST Flight Systems and Servicing Project manager said, "These people are my 'all stars' in no uncertain terms."

Director of Engineering Tom Huber said, "We couldn't ask for a better service contractor." Klineberg said the award was "well deserved."



On September 30, Center Director Dr. John Klineberg presented Goddard's Minority Contractor of the Year Award to Jackson and Tull, Chartered Engineers. Shown from left, Donald A. Finnegan, Senior Vice President; Brenda Temple Tull, Secretary; Klineberg; and Knox W. Tull Jr., P.E., President of Jackson and Tull.

Photo: D. McCallum

# Schneebaum is an "Awesome Feeling" for 1992 Winner

by Katie Brannigan

What Goddard employee is the developer of a world renowned ultraviolet mirror coating facility at Goddard, producer of an internationally recognized optical measuring facility at Goddard, promoter of space optical technologies and winner of the 1992 Moe Schneebaum Memorial Award for Engineering? These achievements belong to John F. Osantowski, head of the Optics Branch at Goddard and co-investigator on the Goddard-managed Far Ultraviolet Spectroscopic Explorer (FUSE) mission.

Osantowski was awarded the Schneebaum Memorial Award for sustained outstanding contributions to the advancement of space optical technology at Goddard, according to the citation.

"It is an awesome feeling to have your work recognized by your peers and by the Goddard community," said Osantowski.

Osantowski's accomplishments include development of a world renowned ultraviolet mirror coating laboratory at Goddard. The optical coatings from this facility were used on the telescope mirrors of Orbiting Astronomical Observatories (OAO)/Copernicus and the International Ultraviolet Explorer (IUE) missions.

"During the era of these two missions, technologies for the ultraviolet that existed for other applications had to be enhanced and applied to space missions for the first time. Technology breakthroughs had to be realized in order for these missions to take place," states Osantowski who is a pioneer of ultraviolet optical technology for Goddard and the space industry.

His leadership and persistence in the optics field have led to the institution of an internationally recognized optical measurement facility, the Diffraction Grating Evaluation Facility, located on Center and used to support the space research activities of government and university laboratories in the United States, England, France, and Germany.

Osantowski also initiated Headquarters-funded research programs aimed at technology and ultraviolet optical coatings needed to develop the next generation of high-resolution, low-scatter spectroscopic instrumentation. One application stemming from this research program is a silicon-carbide coating to be used on the Far Ultraviolet Spectrograph on the FUSE mission, scheduled to launch in the year 2000 on a Delta II expendable launch vehicle. Osantowski has received two Goddard

Exceptional Performance awards — one for outstanding contributions in advancing equal opportunity at Goddard and the other for outstanding technical achievements in advancing optical technology for space observatories and instruments.

The Memorial Award is named in honor of Moe Schneebaum, who joined Goddard in 1958 and served as chief of the Earth Observations and Systems Engineering Division. Noted for his vision of the future, Schneebaum played a significant role in the development of Goddard's engineering capability. Schneebaum died in 1973.



Osantowski

## Wallops Launches Student Payload

Pictured is the first student managed and built payload flown on a NASA sounding rocket launched successfully Sept. 21, from Goddard's Wallops Flight Facility, Wallops Island, Va.

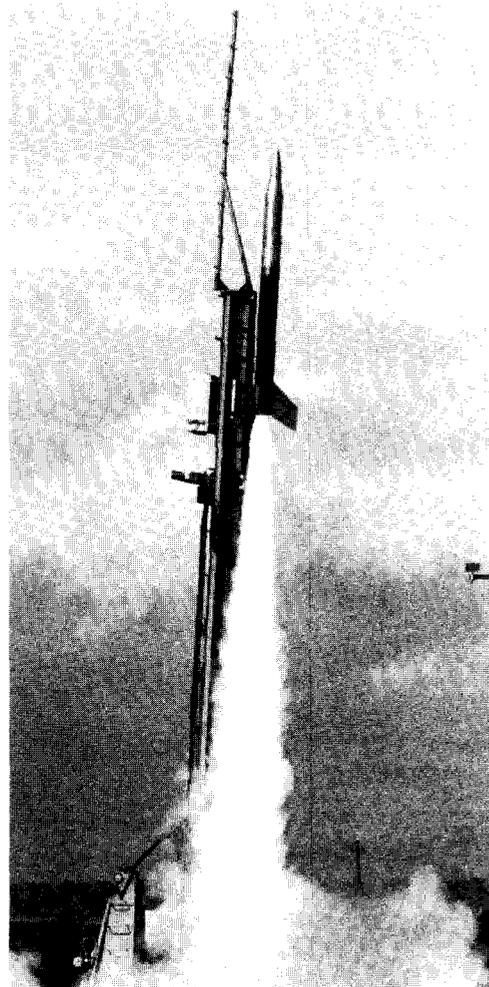
The pilot project, known as the Colorado Student Ozone Atmospheric Rocket (CSOAR), was developed to demonstrate the use of sounding rocket flight as a valuable educational tool for undergraduate and graduate students.

"This is like winning the Super Bowl the first time you try," said Elaine Hansen, Director of the Colorado Space Grant Consortium.

"It was amazing, beyond words," exclaimed Greg Essmeier, a student from Colorado State University at Fort Collins.

The payload, designed to measure ozone density in the atmosphere, was carried aloft by a NASA single stage Orion sounding rocket at 2:32 p.m. EDT. After reaching a 33.5 mile (53.9 kilometer) altitude in 116 seconds, the payload descended by parachute into the Atlantic Ocean where it was recovered by the U. S. Coast Guard from Chincoteague, Va.

The project was a joint venture between NASA and the Space Grant Consortiums in Colorado and Virginia.



# Christopher Scolese: Out in Front

by Jessie Katz

It's the largest single project Goddard ever has undertaken. When fully staffed, it will employ 450 people on Center. Goddard even is constructing two new buildings just to support it. Moreover, it will focus world-wide attention on Goddard.

Scolese explained the spacecraft is called AM because its Sun synchronous orbit will allow AM to cross the equator at 10:30 a.m. every orbit. The PM spacecraft will cross in the afternoon.

"We're doing things that are new and they're all associated with the

combination of instruments we're flying," he noted. "It's going to help us to determine more accurately what the roles of the ecosystem is in climate change and what the role of volcanos are in climatology."

## On The Fast Track

Scolese has been an EOS project manager for nearly two years; first as EOS platform manager and then AM project manager.

The AM satellite was created a year ago after a restructuring of the originally proposed EOS spacecraft. "I've liked space ever since I was a youngster. I've always wanted to get involved with it," Scolese said proudly.

He began as the system manager on EOS when he came to Goddard from the Navy in 1987. It was just a study project back then, but Scolese was interested in management. "I wasn't expecting to become a project manager so soon. But I'm glad it happened and I'm really enjoying the job," Scolese explained with a smile.

Although he has gotten a lot of satisfaction in building hardware, Scolese enjoys managing the process because, "You're actually doing more. You're getting more pieces built. You're responsible for getting that thing delivered, launched and operating. There's a

lot of satisfaction in doing that."

Scolese also is looking at the EOS project from another angle. Since last May, he's been chairman of the EOS Blue Team set up by NASA Headquarters. The team must look at the whole EOS program and find ways to reduce its budget by 30 percent while making it more efficient.

But, he hasn't minded the additional responsibility. "It's given us an opportunity to look back at what we've been doing on EOS. In a lot of ways it's given us an opportunity to make things better."

## Being Busy Is Better

Scolese holds a bachelor of science degree in electrical engineering from the State University of New York in his native Buffalo, a master's degree in control theory from George Washington University, Washington, D.C., and is currently completing work on a doctorate in control theory also at George Washington University.

He says understanding control theory gives a person a background in many areas. "In order to control something, you really need to understand all the details about it so you don't do something that will cause it to go unstable."

Being a project manager, chairman of a NASA Blue Team, working on a Ph.D. and spending time with his wife and two young children, doesn't leave Scolese time for much else. He'd like to bicycle more and spend more time on his long-term interest of model rocketry, but that will have to wait. In the meantime, he finds time to jog around Goddard every day after work.

When he talks about the Center, Scolese's face brightens. "Goddard is the best place I've ever worked and I've never regretted coming here. It's really been a very enjoyable experience."



Christopher Scolese, Code 421, the EOS AM Project Manager, points out his spacecraft on a Mission to Planet Earth display.

It's the Earth Observing System (EOS) project, and Christopher Scolese, Code 421, and his staff of 21 are in the forefront of the project. Scolese is the EOS AM Project Manager.

## EOS Spacecraft

The AM Spacecraft, designed to look at global change, will be the first of several EOS satellites to fly. It's planned for launch in June 1998. The PM Spacecraft comes next in the year 2000 followed by several more EOS spacecraft stretching into the 21st century. All of the data associated with EOS are linked to the investigators by the EOS Data Information System (EOSDIS).

"The most important thing to me is to get the AM spacecraft up. We're first out of the starting block and we have to demonstrate that we can do the job," the Springfield, Va., resident said.

# Goddard Information at the Touch of a Finger

by Katie Brannigan

"It really works!" exclaimed Michael Woywod, Code 250, chief of the Information Management Division, during a ceremony on September 16, where he unveiled a new computer information system in the main gate house, Building 9.

This new computer accesses Goddard information when a person touches the computer screen. The Touch for Information, Products and Services (TIPS) system is user friendly technology for "those who know nothing about computers," said Woywod. It simply takes the touch of a finger on the screen labeled with the desired information.

The system, developed by CompuDyne Business Systems, Inc., San Antonio, Texas, provides visitors with information on topics including Center services, building directions, upcoming events, Federal employment, Goddard Visitor Center activities, general information and a survey to see if the system answered users' questions. Not only is the information accessible with a touch of a finger, but it is printed easily onto a 4-inch by 6-inch (10-centimeters by 15-centimeters) sheet of paper.

The TIPS project began at Goddard in June 1991 with a working group organized by Doug Hanson and Lloyd Bass, both Code 251, Automation and Planning Branch. Major contributors to the system were Linda Ledman and Mark Wilson, both Code 115, Employment and Employee Services Branch; Carl Poleskey, Code 130, associate chief of the Office of Public Affairs; Bill Braun, Code 205.1, Security Branch; Janet Jew and Dorothy Williams, both Code 263, Procurement Support Division; Frann Bolster, president, Goddard Welfare Association; and Carol Eakins, Computer Based Systems Inc. At the ceremony, Woywod thanked the working group for defining what should be a part of the database, and he commented that the system should be an "asset to Goddard."

Future locations of TIPS systems at Goddard may include Building 1 and Building 8, speculates Woywod.



Photo: P. Baltzell

Mark Walther, Code 250, 'let's his fingers do the walking' as he works with the new computer information system in building 9.

## In Memoriam

### DOUGLAS BROOME JR.

Douglas Broome Jr., deputy director for NASA's Solar System Exploration Division at Headquarters, died of liver cancer September 27. NASA Administrator Daniel Goldin said, "Mr. Broome was a rare and talented manager. He made outstanding contributions in every major area of NASA — from the frontiers of exploration back in the Mercury and Apollo programs to recent missions like the Upper Atmosphere Research Satellite, Hubble Space Telescope and Mars Observer." Broome was in charge of the Solar System Exploration Division's flight programs. He was instrumental in the success of the recent Mars Observer launch and in restructuring planetary flight programs toward more efficient, lower cost development and operations. Prior to working in the solar system division, Broome managed the Hubble Space Telescope program, overseeing all aspects of spacecraft development and coordinating engineering and science activities. Also, he was chief of the Observatories Development Branch, which includes the Hubble Space Telescope, Gamma Ray Observatory, and Advanced X-ray Telescope.

## RETIREES

Congratulations to the following employees who recently retired.

Name	Code	Year
Robert Baxter	633.1	32
Edward Falkenhayn	408	35
Wayne Hembree	480	33
John Lesko	735	34
Philip Smith	704.2	34
Charles Trevathan	430	29

# "All We Need Is You"

by Kristen Evans

The National Capital Area Combined Federal Campaign (CFC) officially kicked off the 1992 campaign on Wednesday, September 23. With close to 1,800 agencies qualifying for assistance through the CFC, and a lofty goal of \$38 million, CFC has chosen as this year's theme "All We Need Is You."

Goddard's official kick-off was October 9 and the campaign runs from October 12 through November 6. Goddard's goal this year is \$351,000, a 7.5 percent increase over last year's goal.

Your gift and satisfaction received from helping others can be spread throughout the year through payroll deduction, according to Goddard's CFC Coordinator Steve Naus, Code 311. He also said, "Goddard's record of generous giving is one that we can all be proud of. Let's make sure the 1992 CFC is the best ever." He urges every Goddard employee to "think of CFC as an opportunity to improve our community, our country and our world. Only with your help will we be able to make a difference. Remember, 'All we need is you.'"



Photo: P. Baltzell

Presenting the 1992 Combine Federal Campaign Team! From left to right the members are: Darryl Lakins, Code 551; Bill Jones, Code 324; Eva Doyle, Code 405; Kathy McNulty, Code 694; Johanne Reynolds, Code 201; Cynthia Parks, Code 111.2; Diane Teets, Code 600; Janine Dolinka, Code 100; Nancy Fatton, Code 700; Lois Ryno, Code 201; and Steve Naus, Code 311.2.



Astronaut Story Musgrave, left, uses the High Fidelity Mechanical Simulator in the Building 29 clean room during a recent Hubble Space Telescope (HST) crew familiarization exercise conducted by the HST Flight Systems and Servicing Project, Code 442. Dr. Musgrave, HST Payload Commander (left), is shown changing out a Rate Sensor Unit, one of several instruments scheduled to be replaced by extra vehicular activities (EVA), or spacewalks, during the HST First Servicing Mission, planned for late 1993. Three mission specialists with spacewalking experience will join Musgrave, on STS-61 the Hubble Space Telescope servicing mission. They are Tom Akers (Lt. Col., USAF); Jeffrey A. Hoffman, Ph.D.; and Kathryn C. Thornton, Ph.D.

## Goddard News NASA National Aeronautics and Space Administration Goddard Space Flight Center

The GODDARD NEWS is published monthly by the Office of Public Affairs, Goddard Space Flight Center, Greenbelt, MD 20771.



Deadline for submitted material is the fifteenth of each month. For additional information contact Susie Marucci (301) 286-7504, TDD (301) 286-8955.

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## OOPS...

Two articles in the most recent issue of the Goddard News were printed without the last line of the story. We regret any inconvenience this has caused. The corrected endings of each story are printed below.

Page 1 — "Goddard to Play Important Role in Mission to Planet Mars"

"We know very little about the magnetic fields that surround Mars," he said, "this is a mystery we hope to solve."

Page 7 — "Mopping Up in Flight Dynamics"

In addition to a general overview about computers, there were lectures for software developers, security awareness and C2 — the government standard for computer systems handling sensitive materials and a C2-like computer system, which the FDF uses.