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INSIDE

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**HEIDI
soars
aloft**

4

**Metric is
coming**

6

**Personnel
Specialist
loves
giving**

NOAA-13 failure under investigation

by Jim Elliott

The NOAA-13 weather satellite, launched Aug. 9 from Vandenberg Air Force Base, Calif., suffered what appears to be a failure in the spacecraft's power system Aug. 21.

The \$67-million spacecraft ceased battery charging as it passed over Wallops Island, Va., at 3:45 p.m. EDT, said Charles E. Thienel, Meteorological Satellites project manager at Goddard.

At a later pass over Fairbanks, Alaska, there was an indication of low voltage, he said, and on the following pass, there was no response from the satellite. There has been no contact with the spacecraft since 7:15 p.m. EDT Aug. 21.

Indications are that there is a failure in the circuitry between the solar arrays and the batteries, Thienel said.

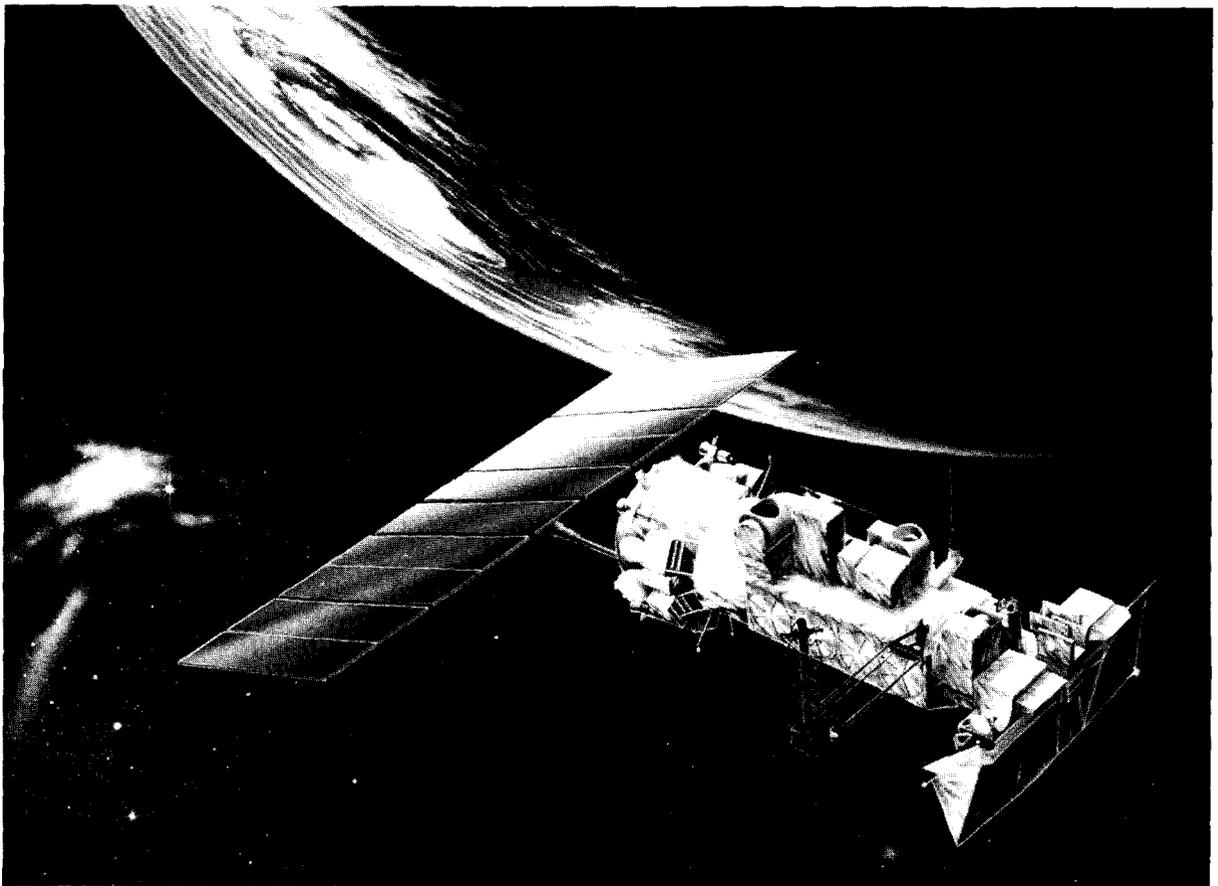
In the meantime, Dr. John M. Klineberg, Goddard center director, named a 12-member Failure Investigation Board to investigate the failure and to recommend

corrective actions to preclude the possibility of similar future failures.

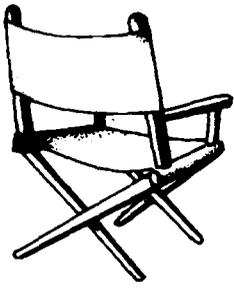
Klineberg named Jeremiah Madden, Associate Director of Flight Projects, as board chairman and James Murphy, of the Flight Projects Office, as recording secretary.

Other members are H. Richard Freeman, chief engineer in Goddard's Engineering Directorate; Thomas E. McGunigal and Gary Davis, from NOAA; William J. Middendorf, NASA Lewis Research Center in Cleveland, Ohio; John Pandelides and Donald Lokerson, Flight Projects Directorate, GSFC; Edward Gaddy, Engineering Directorate, GSFC; Alfred L. Seivold, Flight Assurance Directorate, GSFC; James Greaves, Mission to Planet Earth Office, NASA Headquarters; and Michael Greenfield, Office of Safety and Mission Assurance, NASA Headquarters.

NASA, through Goddard, serves as agent for NOAA in the procurement, development and launch of NOAA satellites.



An artist's conception of a NOAA weather satellite. The satellite is designed to monitor the Earth's oceans and atmosphere.



Directors' Dialogue

Q: I would like to know why custodial services are performed during regular business hours at this center. This is the first and only place I have ever worked where this occurs. In other government agencies and in private industry, these services are performed after business hours. By doing this during business hours normal activities, not to mention meetings and training seminars, are disrupted. It is very hard to conduct an effective meeting or to focus on an instructor's presentation when one of the custodial personnel is running a vacuum cleaner out in the hallway, or walks into the room with the intent of emptying a trash can. When open space office areas are vacuumed, the noise and require-

ment to make way for the vacuum operator can interrupt all work in the area for a considerable period of time. Also, hallways and aisles are clogged with equipment, power cords and trash carts. Finally, I believe these activities do nothing to enhance our professional image in the eyes of visitors.

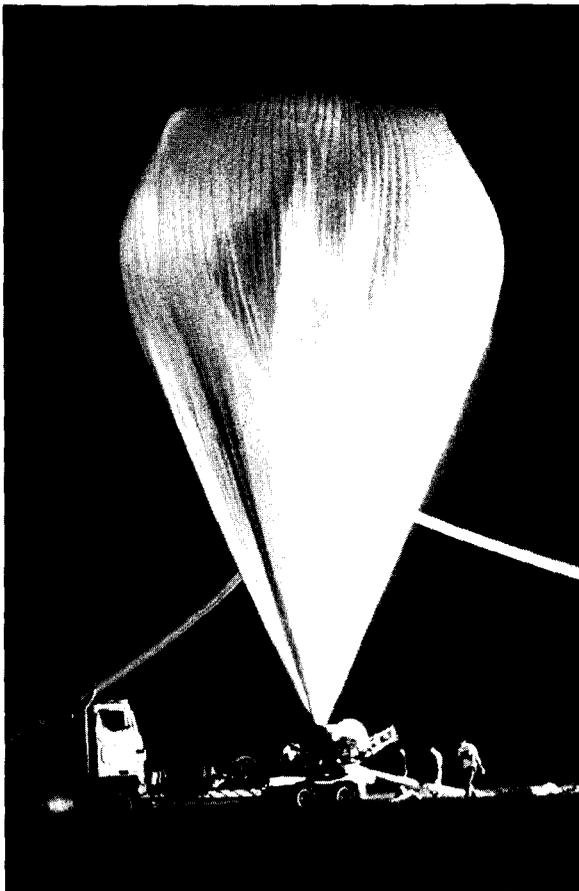
A: The 1972 Oil Embargo necessitated a change in routine custodial working hours from night to day, saving on lighting and heating costs. However, 20 percent of the custodial workforce still work evenings, mainly providing 24-hour facilities support and floor care. Today, energy is still the major issue. The National Energy Conservation

and Policy Act mandates an energy reduction in 1995 of 10 percent over the 1985 levels, and in the year 2000, another 10 percent. Besides energy concerns, day work minimizes any potential evening security problems. Other government agencies perform daytime custodial services; for example, the Department of Defense, National Institutes of Health, and Health and Human Services, to name a few. The custodial force does its best to minimize disturbances.

**Sherry Foster, director,
Management Operations
Directorate, Code 200.**

Questions for Directors Dialogue may be sent in to Directors' Dialogue, Code 130, with or without identification. Due to space limitations, not all questions can be answered. Questions are sent to the appropriate directorate office as written but may be edited for space and clarity before being printed. Some questions may be answered outside of this forum.

HEIDI soars aloft to make images in 'hard' x-rays



The balloon carrying HEIDI aloft is inflated in the predawn hours prior to the 7:25 a.m. EDT launch from the National Scientific Balloon Facility in Palestine, Texas, on June 22.

by Michael Finneran

Goddard researchers are busy refurbishing the High Energy Imaging Device (HEIDI) following its flight from the National Scientific Balloon Facility in Palestine, Texas, on June 22.

HEIDI's scientific objectives: Image the Crab Nebula in "hard" X-rays while testing a new type of imaging system and also image any solar flares that occurred during the flight, said Dr. Carol Jo Crannell, HEIDI principal investigator, Code 682.

Hard X-rays are the most energetic and penetrating of this form of radiation and are emitted continually from the Crab Nebula, which is the cast-off outer layers of a star that exploded long ago.

"What we were trying to do was prove the imaging system as well as do some science," said Crannell, of Goddard's Solar Physics Branch, Laboratory for Astronomy and Solar Physics. "With a balloon payload such as this, you don't expect that everything will work right the first time, but you hopefully learn enough

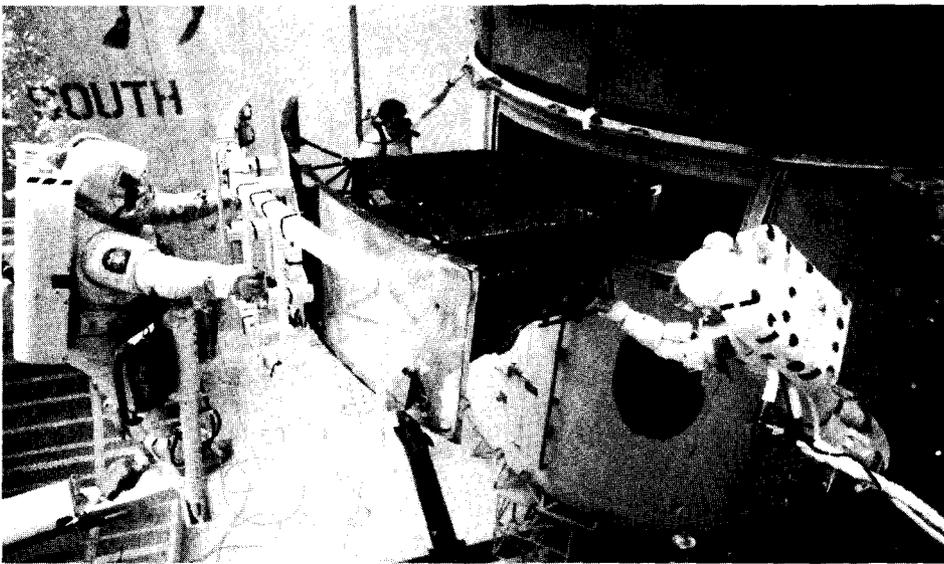
to make it all work on another attempt. This was a pretty successful flight even though we didn't achieve all of our objectives."

Crannell said the HEIDI team hopes to refurbish the payload and fly again with the same science objectives.

The balloon, launched at 7:25 a.m. EDT, reached a float altitude of 26 miles (42 kilometers) about 2-1/2 hours later. During the ascent, HEIDI received a flare alert, and the payload was commanded successfully into the solar pointing mode for observation.

When the flare failed to develop into a significant event, the payload was commanded to resume observations of the Crab Nebula. Because of erratic behavior in the pointing control system, however, observation of the Crab was discontinued, and the payload resumed viewing the sun.

The flight of HEIDI ended at 4 p.m. EDT on June 22 when the balloon was about 375 miles (600 kilometers) west of the launch site. It landed in an uninhabited area, suffering only minor damage.



Wearing training versions of Space Shuttle Extravehicular Mobility Units (EMU), astronauts F. Story Musgrave and Jeffrey A. Hoffman use the giant pool of the Johnson Space Center's Weightless Environment Training Facility (WET-F) to rehearse for the Hubble Space Telescope repair mission. The two are working with a full-scale training version of the Wide Field/Planetary Camera (WF/PC). The current WF/PC will be replaced with WF/PC-2. A total of five extravehicular activity (EVA) sessions will be conducted during the scheduled December mission of the Endeavour.

What's UP?

September 1993

Compton Gamma-Ray Observatory

Days in orbit: 879

Evaluation of orbit reboost options is continuing. The best estimate for beginning the reboost is late October. The reboost, originally scheduled to begin June 15, has been delayed due to an anomaly in the B-2 attitude control thruster. On August 19, the mean orbital altitude of the observatory was 216.47 statute miles (348.38 kilometers). The observatory is in the normal pointing mode.

Cosmic Background Explorer

Days in orbit: 1,380

COBE continues to acquire all science and engineering data despite a C-gyro failure about a month ago. The spacecraft's attitude control does not seem to have been adversely affected by the failure, but the Flight Dynamics Facility is performing a more detailed analysis. In addition, the signal noise and load current from the last remaining transverse gyro, gyro-A, have increased in the last few weeks. The situation is being monitored closely and contingency procedures are ready. Radar tracking of the spacecraft shows 14 pieces of unidentified debris have been in an orbit similar to COBE's. Data is being searched in an effort to determine the nature of the debris. COBE science operations are scheduled for completion in December 1993.

Extreme Ultraviolet Explorer

Days in orbit: 449

The EUVE spacecraft successfully supported the program's first true target of opportunity, slewing to observe the outbursting cataclysmic variable star SS Cygus. As a result, several targets planned for observation were rescheduled.

Hubble Space Telescope

Days in orbit: 1,131

With the First Servicing Mission on December 2 approaching, project efforts are focused on preparing flight hardware and systems as well as ground systems, procedures, command files,

data bases and training. Most major flight hardware components have completed testing and preparation at Goddard and have been shipped to Kennedy Space Center in Florida for integration. The solar arrays were scheduled for shipment September 9. The last hardware to go will be the solar array electronics at the end of September. The Operations and Ground System Freeze Plan is in effect. This freezes all changes to ground hardware and software systems until successful completion of the mission and subsequent alignment of the Wide Field and Planetary Camera II. Space Telescope Operations Control Center simulations are continuing and the first of six joint integrated simulations between the Center and Johnson Space Center in Houston, Texas, has been completed. Meanwhile, science and mission operations personnel are carrying on a full science observing program. All scientific instruments and spacecraft subsystems are operating nominally. Astronomers observing with HST's Faint Object Camera announced the identification of the optical component of an X-ray burst source — 4U 1820-30 — that was discovered in X-rays in the 1970s.

International Ultraviolet Explorer

Days in orbit: 5,725

Battery No. 1 continues to accept no charge current. A top-off charge for the battery was performed August 18 and discontinued after five minutes when the upper voltage limit was reached.

National Oceanic and Atmospheric Administration (NOAA - 13)

On Saturday, Aug. 21, the satellite experienced an anomaly in the power subsystem. Preliminary indication is a short in the circuitry between the solar arrays and the batteries. Contact with the spacecraft was lost at 7:15 P.M. EDT Aug. 21. Command procedures to revive the spacecraft were attempted on subsequent passes with no confirmed results. The team is continuing ac-

tivities to revive the spacecraft and is assisting the NASA/NOAA Investigative Board. Chairman of the 12-person board is Jeremiah Madden, Associate Director of Flight Projects at NASA/Goddard Space Flight Center.

Solar, Anomalous, and Magnetospheric Particle Explorer

Days in orbit: 425

SAMPEX continues to acquire all science and engineering data without any significant problems or operational errors. SAMPEX will begin certification tests with the Merritt Island Station to have backup for the science data dumps that now can be dumped only at the Wallops Island station. SAMPEX has installed new control center software and will install new command memory management software.

Upper Atmosphere Research Satellite

Days in orbit: 716

UARS is entering its 24th month on orbit, collecting data on the chemistry, dynamics and radiative inputs to the upper atmosphere. The observatory is in forward flight, viewing the southern hemisphere. Microwave Limb Sounder observations of lower stratospheric chlorine monoxide and ozone are providing information about the extent of the 1993 ozone hole. Battery performance remains stable and voltage monitoring continues. After the June reconditioning procedures, battery performance appears to have improved. New gyro calibration and sun sensor alignment data were uplinked to the satellite August 19. As a result, UARS experienced an attitude disturbance that settled within one orbit. On August 20, new star-tracker alignment data were uplinked and no attitude disturbances were observed. In early August, the solar array drive clutch slipped. For several days, the solar array was in safe-hold and instruments did not make measurements. The solar array drive was restarted August 8 after a yaw maneuver, and the eight operating instruments were turned on without incident.

Training begins for transition to metrics

by Randee Exler

Goddard is joining the federal government in initiating a transition to the metric system of measurement. As part of a gradual move toward conversion, pilot programs and training are beginning now to help finalize a Center-wide transition plan.

"Training began last month for engineering managers and for mechanical engineers and technicians," said Brian Keegan, Deputy Director for Flight Assurance and Chairman of GSFC's Metrication Working Group (MWG), which was established in December 1991. "Those 125 people that we trained this year will be relied upon to help us complete the detailed planning for metric conversion here at the Center. Future training will be phased so that it is taken as people begin using it in their jobs."

In 1991, NASA mandated metric conversion at all of its centers and required each to establish a transition plan. NASA is among many federal agencies that have initiated a transition. In the federal government, the push for metric usage is being led by the National Institute of Standards and Technology (NIST). Dr. Gary Carver is the NIST Metric Program director.

"I get asked all the time why Americans must change to the metric system when the inch-pound system seems to work just fine," said Carver. "It's a matter of economics. The use of the metric system means a greater ability to commercialize technology into products that are acceptable in world markets. Through the use of metrics, Americans can win in the international marketplace."

"We tried conversion in the mid-70s and it didn't work, but things have changed since then," Carver said.

Since 1975, the world economy has changed to favor metric products. The "global economy" or "global marketplace" emerged. National power and influence depend less on military strength and more on economic strength. And international standards have become more important. The metric system is the international standard of measurement.

"We have no choice but to convert if we are to compete in the world marketplace," Carver said. "We need to stop shooting ourselves in the foot."

Federal agencies, such as NASA, can use their purchasing power and influence to

METRIC IS COMING YOU CAN COUNT ON IT



catalyze a transition to metric usage in U.S. industry.

The transition at GSFC will take place over the next several years, according to Keegan.

"The scope of Goddard's metric transition includes acquisition of the capability to fully use metric measurement within the GSFC institution, including government equipped-contractor operated work-sites," he said. The GSFC metric transition plan does not consider implementation of projects in the metric system at outside contractor plants.

FY94 and FY95 will be devoted to acquiring the capability to support in-house engineering requirements for the Tropical Rainfall Measuring Mission (TRMM), the Thermosphere, Ionosphere, Mesosphere Energetics and Dynamics (TIMED) project, the Advanced Small Explorer project as well as selected construction of facilities projects that will use metric design standards. During this time, documentation supporting Goddard's physical plant will begin to be converted to support future metric efforts.

Although policy requires using the metric system for new programs,

Goddard will continue using the inch-pound system for programs that initially used the inch-pound system for their design. In addition, metric conversion will not be implemented for areas in which international standards use inch-pound units, unless and until those standards are changed.

Questions about Goddard's transition to the metric system of measurement may be directed to members of the MWG: Jim Wilk, Code 110; Randee Exler, Code 130; Pradeep Sinha, Code 270; Brian Keegan, chairman, Code 300; Jim Moore, Code 400; Don Wilson, Code 500; Ken Frost, Code 600; Dick Wirth, Code 720; Emmett Ransone, Code 823 and Bill Barnes, Code 900.

Learn more about Goddard's plans to convert to the metric system of measurement and why it is important to move toward using metrics. An Employee Colloquium on metrics will be held at 3:30 p.m. Thursday, Oct. 21, in the Building 3 Auditorium. Presentations will be made by Brian Keegan, Deputy Director for Flight Assurance and chairman, GSFC Metric Working Group and special guest Dr. Gary Carver, Metric Program director, National Institute of Standards and Technology.

Goddard Historical Essay Competition

It's that time of the year again for those interested in competing in the Robert H. Goddard Historical Essay Award Competition for 1993. The annual event, sponsored by the National Space Club, was the first literary competition devoted to historical affairs in the field of rocketry and astronautics.

Essays may explore any significant aspects of the historical development of rocketry and astronautics, and will be judged on their originality and scholarship. Entries must be submitted by Dec. 3 to the Goddard Historical Essay Contest, c/o National Space Club, 655 15th Street, N.W., Suite 300, Washington, D.C. 20005. The winner, who will be announced at the Awards Ceremony in March, will receive the Goddard Historical Essay Plaque and a \$1,000 prize. Call the National Space Club for more information.

Goddard contractor dies while on travel

Sebert (Goodie) Goodall, an employee of NSI Technology Services Corp., a Code 750 contractor, died Aug. 28 while on travel at Kennedy Space Center. Goodall, 45, was at KSC working on the Hubble Space Telescope First Servicing Mission scheduled later this year.

Goodall's death reportedly was due to bacteria from raw oysters he ate while in Cocoa Beach, Fla. The exact cause of Goodall's death had not been confirmed.

According to the Brevard County, Fla., Health Department, there is a bacteria in shellfish that can cause infection leading to severe illness or death.

While at Goddard, Goodall worked on numerous major spacecraft programs. His first assignments were on the Cosmic Background Explorer and the Broad Band X-Ray Telescope instrument on Astro-D. Goodall provided support at the Center and travelled



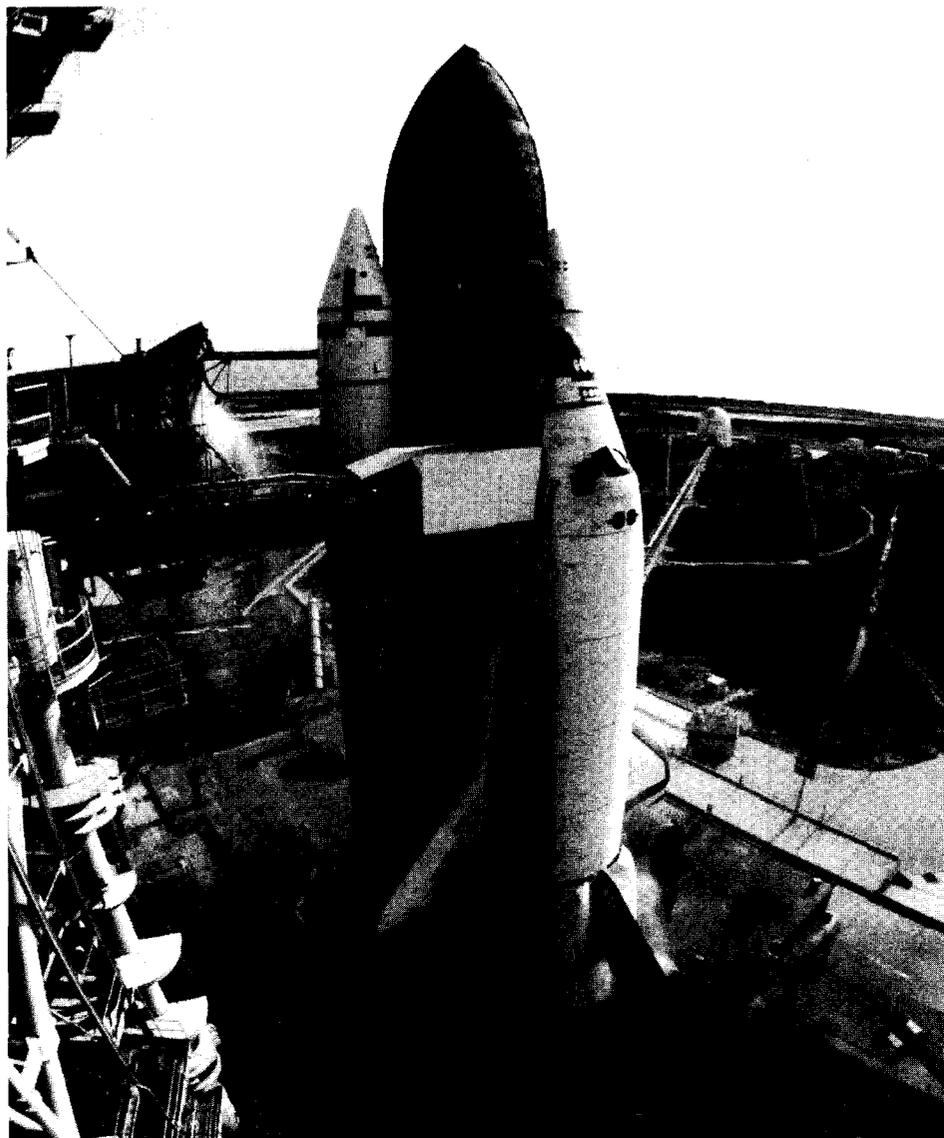
Sebert Goodall had been with NSI Technology Services Corp. since 1988. He worked as an engineering technician III in the Thermal Blanket Fabrication Group.

with each of the projects to launch sites at Vandenberg Air Force Base in Calif. and at Kennedy.

Goodall helped rebuild the Extreme Ultraviolet Explorer (EUVE) modular power systems thermal blankets. He did such a good job that he was charged with refabricating all the blankets for the next EUVE module to arrive at Goddard, the modular attitude control system.

Other successful tasks of Goodall's included: the Mars Observer Laser Altimeter and the Hubble Space Telescope's solar array carrier.

Goodall served on the NSI Quality/Productivity Improvement Steering Committee and was a member of the NSI Employee Recreation Club. He is survived by his wife, Daphne and two daughters and two sons.



NASA Photo

Discovery gets off the ground

NASA made its 57th space shuttle launch Sept. 21 when STS-51 lifted off from Kennedy Space Center, Fla.

The highlights of Discovery's mission were to deploy the Advanced Communications Technology Satellite and retrieve a U.S./German scientific observation satellite.

The crew also conducted a spacewalk to test tools needed for the Hubble Space Telescope First Servicing Mission in December. Several of the tools tested during this mission were developed by Goddard.

Discovery had made five attempts to launch since mid-July. All kinds of technical problems and even a meteor shower caused delays. Once off the ground, commander Frank Culbertson Jr. said, "Hey Houston, I gotta tell ya, you've never seen five happier guys up here."

STS-51 is the 17th flight of the Space Shuttle Discovery. The mission was planned to last eight days.

Space Shuttle Discovery At Launch Pad 39B made several attempts to get off the ground before finally launching Sept. 21.

Putting the “person” back in personnel

by Allen Kenitzer

She’s a Goddard employee who stands alone in her field. She’s one of a kind and her ultimate goal is to see that employees and managers alike are getting the service they deserve.

Arletta Love is a personnel management specialist in the Employee Relations Office, Code 110.2. Specifically, Love serves as a “facilitator and self-assessment specialist” with program responsibility for personnel’s mini-review teams. The team’s objective is to solve organization problems within personnel — and they do know how to solve problems.

“We’ve been doing some form of self-assessment for several years,” said the 36-year-old Landover Hills, Md., resident. “In October 1990, we added a continuous improvement component and formalized the review process. We’re doing really well with it.”

They’re doing so well that, following an Office of Personnel Management (OPM) review of the program in May 1992, the reviewer wrote up Goddard’s self-assessment approach as an exemplary practice — a model for other agencies to follow.

“We’ve gone one step beyond the OPM compliance mode,” she said, “We’re really trying to better serve our customers.

“Improvement though is a continuous process,” she continued. “We have at least two reviews per-quarter and through those reviews we identify areas for improvement.”

Love, however, doesn’t confine herself to this one area. The Washington, D.C., native also serves as a staff technical expert, working with other personnel management specialists, providing advice and guidance to managers and employees alike on employee relations matters.

“I pride myself in providing advice to others,” Love said. “I find it especially rewarding, because it’s the people part of my job.”

Serving as a staff technical expert is something that comes naturally to Love, who has more than 15 years

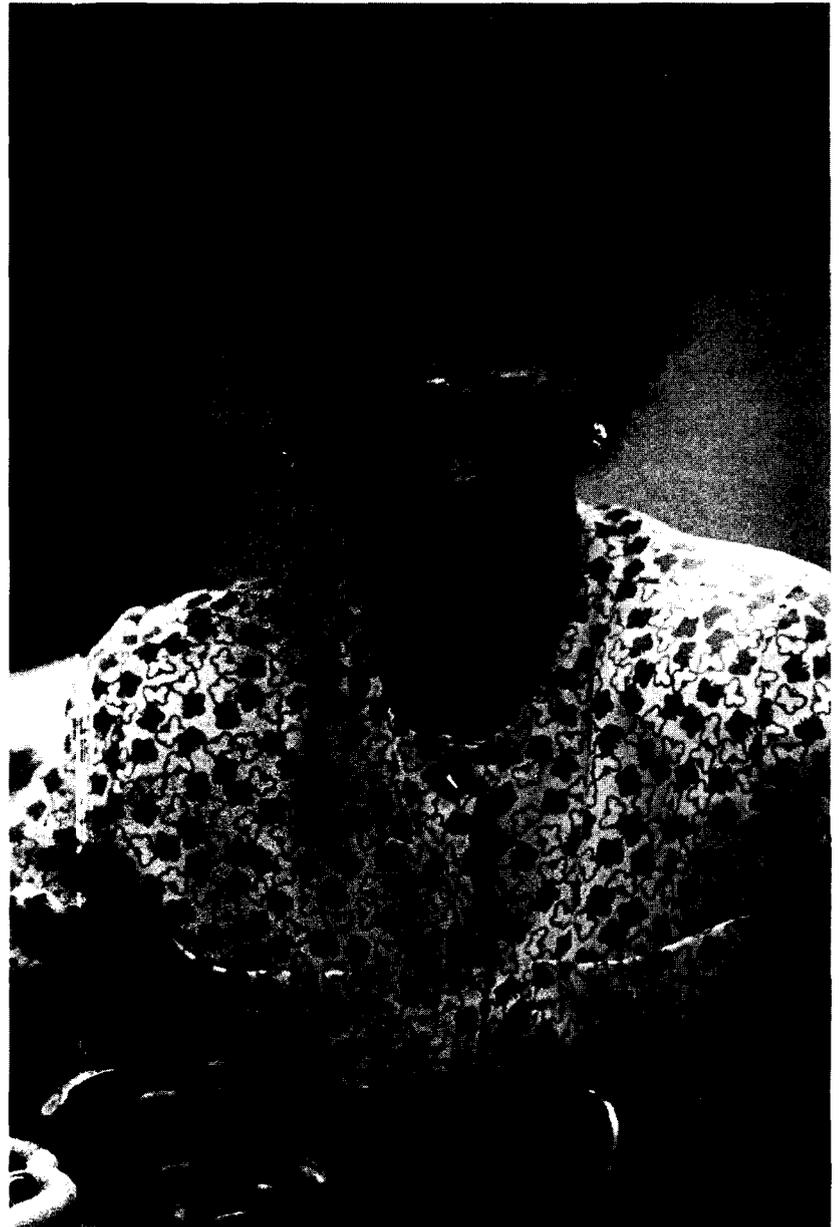


Photo by Debbie McCallum

Arletta Love, a personnel management specialist, says she finds it rewarding to provide advice to others.

of government personnel experience.

Working for NASA, however, was not a plan or even a dream, but something that just happened — and she has enjoyed every minute of it.

“I started here as a co-op student (in Human Resources) in 1978 while attending the University of Maryland Baltimore County,” she said. “Things just sort of evolved from there.”

Love also serves as vice-chairperson of the Goddard African-American Advisory Committee, established in 1991. In addition, the mother of two is vice-president of the Goddard Child Development Center.

Outside of work, she enjoys reading and is active in her church, working on an outreach committee and visiting local homeless shelters.

Except for a short tour with the Department of Transportation in Washington, D.C., Love has been at Goddard all of her career.

“Human Resources at Goddard is different than some agencies,” Love said. “Some just comply with the regulations. We pride ourselves at being a little more creative.

“As a center, we strive for excellence in whatever we do,” she said. “It’s great to be part of this team.”

NASA names chief scientist

The head of the Astronomy and Astrophysics Department at Pennsylvania State University has been named NASA Chief Scientist effective in mid-October.

Dr. France Anne Cordova will serve as chief scientist while on extended detail from the university, NASA Administrator Daniel S. Goldin said. In her new position, Cordova will be the administrator's senior scientific advisor and the principal interface between Goldin and the national and international science community.

One of her critical duties will be to coordinate an integrated strategic plan for all the scientific disciplines across NASA.

Prior to assuming her present position at Penn State in 1989, Cordova was deputy group leader of the Space Astronomy and Astrophysics Group at the Los Alamos National Laboratory in New Mexico. She was staff scientist, Earth and Space Science Division, at Los Alamos from 1979 to 1989.

Cordova serves on the President's National Medal of Science Committee and is a member of the Space Science and Applications Advisory Committee of the NASA Advisory Council.

She has served on the Roentgen X-ray Observatory International Users Committee, the Extreme Ultraviolet Explorer Guest Observer Working Group and the Hubble Space Telescope Advanced Camera Team.

At the National Science Foundation (NSF), she served on the Advisory Committee for Astronomical Sciences, the External Advisory Board for NSF Particle Astrophysics Center, the NSF Advisory Council and the Committee on Space Astronomy and Astrophysics of the Space Science Board.

She was vice-president of the American Astronomical Society in 1993 and in 1990 was chairwoman of the High Energy Astrophysics Division of that society.

OLS gets new project manager

Dr. Donald Miller has been appointed project manager of the Orbital Launch Services (OLS) Project, Code 470. Miller is responsible for planning, developing and executing all aspects of the OLS, which is of vital importance to the Agency's space transportation system requirements.

Miller leads the project in providing launch-to-orbit management services for government or government-cooperative/sponsored payloads using small and medium-class expendable launch vehicles.

Miller was deputy project manager for the Global Geospace Science (GGS) program from Feb. 1992 to the present. Prior to this assignment, he served as deputy project manager for the GGS/Geotail spacecraft for the International Solar-Terrestrial Physics (ISTP) project from Jan. 1989 to Feb. 1992. Miller also served as the work package-3 manager for the Space Station project from Aug. 1985 to Jan. 1989. In addition, he has held several other key managerial positions since joining Goddard in November 1966.

Miller received a NASA Exceptional Service Medal for the International Sun-Earth Explorer in 1979 and a Group Achievement Award for the Space Station Source Evaluation Board in 1988.

National Performance Review calls for sweeping changes

The President's National Performance Review (NPR) was released earlier this month. The NPR is an attempt at reinventing government, making it better and less costly.

"The federal government is taking a much needed step in the right direction," said NASA Administrator Daniel Goldin.

NASA has identified five areas to be used as "reinventing laboratories:" procurement, functional management, space shuttle processing, Mission to Planet Earth, and the Earth Observing System Data and Information System (EOSDIS). Each will be used as a test case for changing the way NASA does business.

Goldin, along with other agency chiefs, will report regularly to Vice President Gore on progress made toward implementing NPR recommendations.

Recommendations NASA received from the NPR focus on program content and sweeping changes in the way the agency manages itself.

NASA will make the following efforts to achieve more efficient government: develop a new strategic plan, ensure safe design of the space shuttle, redesign the space station, begin technology transfer, revitalize the aeronautics program, review field centers roles and missions to reduce duplication and overlapping functions, review the way NASA contracts with industry, and provide for a diverse and equitable workplace.

NASA is placing a high priority on Mission to Planet Earth, one of the agency's most important programs in the 1990s and beyond. Mission to Planet Earth will contribute to national and international assessments about the future of our environment and planet.

Bloodmobile

On August 4, 1993, the Bloodmobile was held in the Building 8 auditorium and 189 prospective donors volunteered to donate blood. The following is a list of Goddard employees who were cited by the American Red Cross with gallon pins at the Bloodmobile.

# of Gallons	Name	Code
5	Bill Anselm	406
5	Barb Vargo	703.1
3	Richard Stavely	724.3
2	John Thorp	931
2	LaDonna Earl	633
2	Robert Frederickson	421.0
1	Wilbur Dale Brigham	750.5
1	Philip Matthews	750.5
1	Emily Greene	696
1	James Rattigan	553.3

The next Bloodmobile is scheduled for October 6 in the Building 8 auditorium. Watch Dateline Goddard for more details.

Goddard scientists and engineers work with university counterparts on study of sulfates, clouds and radiation

Contributed by David Herring and Janine Harrison

In a collaborative effort, a team of researchers recently gathered at Goddard's Wallops Flight facility, Wallops Island, Va., to take part in SCAR-A (Sulfates, Clouds, and Radiation), a three-week field experiment aimed at understanding more about how air pollution affects climate.

Scientists and engineers from Goddard; the University of Wisconsin-Madison, NASA Headquarters in Washington, D.C., the Jet Propulsion Laboratory in Pasadena, Calif., and the Ames Research Center in Mountainview, Calif., assembled a host of instruments to collect data to study how sulfate aerosol particles interact with cloud particles and, affect our climate. Sulfate particles can come from both human-made sources, such as fossil fuel burning, and natural sources, such as volcanic eruptions. Scientists agree that understanding clouds is an important part of understanding global climate change which is one objective of NASA's Mission to Planet Earth.

The data gathered from SCAR-A also will allow scientists to simulate the Moderate-Resolution Imaging Spectrometer (MODIS) instrument, which is scheduled to fly on the Earth Observing System (EOS)

AM-1 spacecraft in 1998.

"Aerosol particle interactions with clouds and climate remain one of the greatest elements of uncertainty in predicting global climate change," said Dr. Yoram Kaufman, of Code 913, a MODIS science team member. Sulfate particles are believed to affect the size, distribution and density of cloud droplets. The relationship between these aerosols and clouds however, still is not well understood.

SCAR-A scientist Dr. Lorraine Remer, of SSAI, said sulfate aerosols are thought to cause the water in polluted clouds to condense into smaller, more numerous droplets than in non-polluted clouds, thereby reflecting more of the Sun's light and having a net cooling effect on the climate.

SCAR-A is the first in a series of experiments to study aerosol-cloud interactions and their effects on climate. It gives mission scientists the opportunity to test experiment logistics in preparation for a much larger campaign in Brazil — SCAR-B — planned for 1995. A SCAR-C experiment also is being planned for 1994 in California.

During SCAR-A, Brazilian atmospheric scientists visited the United States to observe the experiment. "We wanted to

show them that we not only want to measure the pollution they're generating, we also want to measure the pollution Americans are generating," Kaufman said.

The SCAR scientists use a variety of instruments on the ground and aboard two aircraft. A network of Sun photometers were provided ground based data on aerosols. NASA's ER-2 aircraft was flown at high altitude, 65,000 feet (19,812 meters) to gather remote sensing data.

The ER-2's instruments included MAS (MODIS Airborne Simulator) and AVIRIS (Airborne Visible and Infrared Imaging Spectrometer), which collected data on the radiative properties of clouds, aerosols and water vapor.

The Goddard-developed CAR (Cloud Absorption Radiometer) in the nose of an aircraft measured the angular distribution of scattered radiation within clouds and reflected from the ocean and land surface.

Finally, images were obtained from the Landsat 5 Thematic Mapper and the National Oceanic and Atmospheric Administration's Advanced Very High Resolution Radiometer satellite sensors overlooking the same regions at the same time and location as the aircraft.

Objectives for the SCAR missions are to understand more about how the physical, chemical, and radiative processes in the atmosphere are affected by sulfate aerosol and smoke, water vapor, clouds, vegetation and fires, and to assess the effects of deforestation and biomass burning on tropical landscapes.

Mission scientists are particularly enthusiastic about the coming SCAR experiment in Brazil.

"Biomass burning in the tropics generates large quantities of trace gases and particles that affect atmospheric chemistry and physics and regional and global climates," Kaufman said. "Fires in tropical ecosystems consume as much as 80 percent of the total biomass burned on a global basis. Even though regulations are designed to reduce deforestation in Brazil, the rate of deforestation on a global annual basis has increased from 27 million acres (11 million hectares) per year in the early 1980s to more than 37 million acres (15 million hectares) in 1991. The effects of smoke from these fires are poorly understood, and research is needed to characterize their direct and indirect radiative effect."



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