

Goddard Scientists Report Uranian Findings

By Carter Dove

A team of Goddard scientists has reported its findings about the nature of Uranus' magnetic axis and field and the length of its day, based on data from the recent encounter of the Voyager 2 spacecraft with the planet.

In papers presented to the American Geophysical Union's spring meeting at Baltimore, Md., May 19-22, the Goddard team reported that the Uranian magnetic axis is off-center by a significant amount and surprisingly tilted with respect to the rotation axis.

The team also determined that the length of the Uranian day is just under 17 hours, 15 minutes.

The data for the findings were provided by the magnetic fields and planetary radio astronomy experiments—two of 12 on board Voyager—during the spacecraft's unparalleled probe of the planet from early November 1985 through late February 1986.

Analysis of the encounter data has determined that Uranus' magnetic axis is off-center by a significant amount:

3/10th of a planetary radius or approximately 4971 statute miles (8000 km).

The principal investigator for the magnetic fields experiment aboard the Voyager 2, Dr. Norm Ness of Goddard, explained: "The offset of the magnetic field is so large that it strongly supports the view that the dynamo process generating the magnetic field in the interior of the planet must be activated by electrical currents circulating in the electrically-conducting lower oceanic mantle."

Continued on page 2

NASA
National Aeronautics and
Space Administration
Goddard Space Flight Center

Goddard News

Vol. 32 No. 5 JUNE 1986

Strategic Planning: Building A Vision of the Future

By Randee Exler

Goddard in the year 2000: What will our scientific and technological goals be? Will our employees have the skills needed to meet the challenge? Will our facilities support our endeavors?

In the past nine months we have witnessed the International Cometary Explorer hurl through the tail of a comet and Voyager 2 encounter Uranus. We also have faced the loss of the Challenger, Delta 178 and several Goddard payloads. Can Goddard meet the demands of such a rapidly changing environment?

For Center Director Noel Hinners, part of the answer lays in a structured approach called strategic planning. Strategic planning is a process which is being used to determine where we want to be as a Center and what steps we'll take to get there.

Goals and Objectives

Before planning how we're going to get there, we need to know where we're going. Last November, the members of the Goddard Executive Council began examining the basic mission, goals and objectives for the Center.



GODDARD 1986—How will this current picture of our Center change in the future? The answer may lay in strategic planning.

One result of their effort, which has involved a significant number of Center employees and will be published in a booklet this summer, conveys a clear vision of where we want to be.

Once the basic mission, goals and objectives have been established for the Center, detailed implementation strategies and plans can be developed to

Continued on page 2

Uranian Findings

Continued from page 1

Tilted 60 Degrees

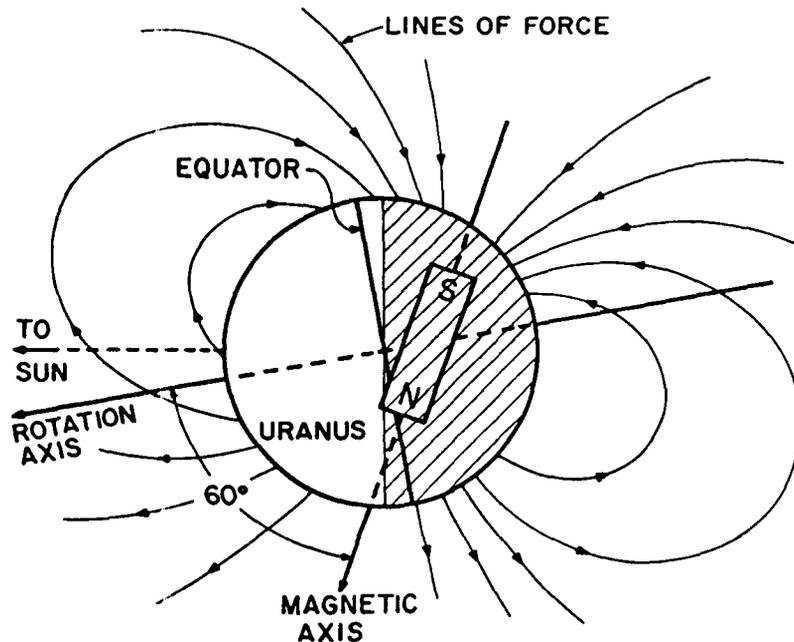
The data from the scientists' magnetometer also surprisingly disclosed that Uranus' magnetic axis was tilted by 60° with respect to the rotation axis, contrasting with an angular difference of only 11.7° for Earth.

The combination of the off-center magnetic axis and its large tilt places the magnetic poles much closer to the equator of Uranus than that of any other planet—15°N and 44°S latitudes. (At Earth, for example, these magnetic poles are at 78°, north and south latitudes).

Additionally, the Goddard magnetometer team—consisting of Drs. Mario Acuna, K.W. Behannon, L.F. Burlaga, J.E.P. Connerney and R.P. Lepping, as well as Ness—found that the intensity of the magnetic field at the planet's magnetic equator is 0.23 Gauss. Although less than at Earth (0.31 Gauss), the magnetic field intensity creates a vast magnetic cocoon around Uranus which shields the planet from the flow of the solar wind

The sunward boundary of this region—the magnetosphere—was observed at 288,000 statute miles (464,000 km) from the center of Uranus and contained significant radiation belts. An extended magnetic tail which trails out far behind the planet also was observed.

Using observations from the planetary radio astronomy instrument on



MAGNETOMETER DATA from the Voyager 2 spacecraft disclosed that Uranus' magnetic axis was tilted by 60° with respect to the rotation axis and off-center by 3/10ths of a planetary radius (approx. 4971 statute miles or 8000 km).

Voyager 2, Goddard scientists M.D. Desch, J.E.P. Connerney and M.L. Kaiser have determined that the length of the Uranian day is just under 17 hours, 15 minutes.

Rotation Slower

The Uranian rotation period is considerably slower than that suggested by the movement of Uranian clouds—travelling at several hundred miles an hour faster than and in the same direction as the planet's rotation—as measured by the spacecraft's imaging system.

This most recent finding also

“builds” a more tightly-constrained model of the planet: a rocky core of 6.6 Earth masses and an outer envelope of 4.4 Earth masses of ice and 3.7 Earth masses of gas.

The Voyager 2's closest encounter with Uranus occurred when it was 1.8 billion miles (3 billion km) from Earth and flying 50,600 miles (81,500 km) above the Uranian cloud tops.

Much of the data was gathered during the Voyager 2's closest approach to Uranus at 1 p.m. (EST), Jan. 24, 1986.

Strategic Planning

Continued from page 1

achieve our objectives. For example, the plan for the next five years will include:

- The Goddard role in Space Station.
- The Explorer programs as our next in-house activity following COBE
- A New Explorer Project Office
- Transition of Hubble Space Telescope operations to become part of the Space and Earth Sciences Directorate

Plan for the Future

How do we get there from here? “Without some type of plan nothing

would happen,” Dr. Hinners explained.

“Goals in and of themselves are nice but relatively useless. In all areas we need to develop specific plans of action to work towards accomplishing our goals. Those can range from very near-term to very long-term plans and strategies.”

One area of concern is getting major projects assigned to Goddard, Dr. Hinners explained. “We haven't done enough work with Headquarters and the science community early-on to get ourselves identified with particular missions. We need to establish what missions we want to go after and develop a plan to be sure we have the right kind of science and skills to do it and work

with people at Headquarters and the scientific community to pin it down as a Goddard mission. This may have to happen 5 to 15 years ahead of time.”

This takes tremendous foresight when hiring new employees. “We're going to have a lot of hiring opportunities in the near future,” Dr. Hinners commented. “With so many people potentially retiring... we'll have room to hire people. But whom should we hire? Four hundred secretaries? Four hundred computer scientists?”

“Strategic planning should give us enough of a sense of where we want to be in the future to impact the kind of skills we will look for in hiring.

Continued on page 3

GODDARD ANNUAL SAFETY AWARDS

By Carolynne White



BE A DEAR—DON'T FEED THE DEER—or the geese—or the turtles—or any other animals on Center. For the safety and well being of our wild neighbors, Goddard Security asks that we enjoy these animals in their natural habitat and don't treat them as pets. Rick Stern, Citywide Security Services Investigator, made several attempts to reunite this wandering fawn with her mother before Larry Pratt, Code 733.2 (pictured) found her sleeping in a flower bed outside of Building 11. Pratt worried that she would be hit by a car racing towards the back gate. A decision was made to relocate the fawn to a safer environment. The Chesapeake Wildlife Sanctuary offered to take the fawn, rehabilitate her, and release her back into the wild.

Information Exchange

For the more than 125 local and remote users who attended the NASA Space and Earth Sciences Computing Center (NSESOC) Users Symposium held May 29 at Goddard, informal hands-on workshop sessions during the afternoon provided opportunities for technical discussions with computing center staff. The all-day symposium encouraged users to exchange information and personal experiences using NASA's supercomputing facility at Goddard. Howard Eiserike, Code 630.1, was the symposium coordinator.

Symposium proceedings are available from the NSESOC Documentation Center, Building 22, Room 072, 286-9367.

NOAA-G Postponed To August 22

The launch of the National Oceanic and Atmospheric Administration meteorological satellite, previously scheduled for June, has been postponed until no earlier than August 22.

The postponement was announced by the U.S. Air Force after pre-launch tests of the Atlas E launch vehicle showed an unusually high rotational torque in a turbopump used to flow

Continuing Goddard's tradition of safety, the Center held its Sixth Annual Safety Awards Ceremony on May 20, in the Building 3 Auditorium.

More award recipients than ever were recognized for their contributions to the Center's safest year ever.

Photos of previous Award of Honor winners, as well as large brightly-colored graphs showing the Center's dramatic reduction of lost time and compensation claims, served as the backdrop for this year's event.

Benita Cooper, Director of Code 200, welcomed the recipients of awards and the audience and introduced Bob Thompson, NASA's Director of Safety, and Leven Grey, the former Chief of Health, Safety, and Security, who initiated Goddard's Safety Award Program.

John Boeckel, who gave opening remarks, pointed out that the key to our success is to make safety part of everything we do.

The highest safety award the Center bestows upon employees, the Safety Award of Honor, was given to two Goddard employees this year, marking the first time the award has been given to more than one person.

Henry Maurer, Jr. received the award in recognition of outstanding leadership in the development and implementation of safety policies for the Environmental Test and Integration Branch, and Matthew A. Opeka was recognized for exemplary leadership in managing the safety operations of the Engineering Services Division.

Other awards given include the Safety Award of Merit, in recognition of

employees who have made outstanding contributions to the GSFC Safety and Health Program; the Accident Prevention Award, presented annually to Divisions that achieve a perfect accident-free record during the fiscal year; and the Certificate of Honorable Mention, given to individuals who have shown continual interest and support of the Health and Safety Program.

Contractors can receive the Contractor Safety Award, the highest safety recognition the Center can bestow on its contractor employees, granted annually to those individuals making the most significant safety contributions among on-site employees. This year's recipients were: William Young of A&M Machine Company; Ezra Owens, Philip J. Lunz, and Charles A. Young of Bendix Field Engineering Corporation (BFEC); Randal S. Maday of Information Systems & Networks Corporation; and Oscar Palini of Northrop Services, Inc.

In addition, those on-site contractors that achieve a perfect accident-free record during the fiscal year receive the Contractor Accident Prevention Award.

Immediately following the ceremony, which was organized by Pat Greco and Charlie Marcus, was a reception in the lobby of the Building 3 auditorium. Refreshments for the reception were provided by the Goddard Employees Welfare Association (GEWA).

Viking Project Reunion

A tenth anniversary Viking reunion will be held at the NASA Langley Research Center on Saturday, July 19, 1986. For further information or reservations, contact:

Jesse Timmons
Mail Stop 433
NASA Langley Research
Center
Hampton, VA 23665
(804) 865-4621



propellant to one of the five booster engines. Further analysis led to the decision to replace the entire engine.

The Atlas booster was removed from its Space Launch Complex 3 pad and transported to the Vandenberg Air Force Base Atlas Modification Program Facility in the base's main cantonment area, where a replacement engine was to be installed.

The Mars Conference

A comprehensive conference on the subject of Mars will be held at the National Academy of Sciences, in Washington, DC on July 21-23, 1986. The Conference is sponsored by the NASA Headquarters Office of Space Science and Applications and will take a comprehensive look at:

- Our current knowledge and understanding of Mars
- The current and future unmanned exploration of Mars
- The issues and options for manned exploration of Mars

For further information or a registration package, please contact:

The Mars Conference
Attn: Ms. Lu Agee
P. O. Box 416
Hampton, VA 23669
(804) 865-8400



“Operation Heads Up” Initiated

In an effort to increase NASA's internal communications throughout the agency, a project called “Operation Heads Up” has been initiated. It is jointly sponsored by the Headquarters Offices of Public Affairs and Management to improve and expand NASA internal communications.

The new communication project is set up to create a forum for an ongoing exchange of current news about NASA programs, people and issues of concern.

One main objective of “Operation Heads Up” is to produce a bi-weekly half-hour program to be broadcast from Headquarters to personnel at each of the NASA Centers via NASA select with input by tape from the field centers. This program, called “NASA Update,” is hosted by Jim Kukowski, a NASA Public Affairs Officer, who will interview management and others on timely topics of concern to employees. Also, Congressional reports and updates, messages from the Ad-

Future Astronaut: Craig Casey

By Carolynne White

What do you have when former Goddard summer intern Craig Casey gets together with his mother, Employee Development Specialist Carolyn Casey? An unbeatable Trivial Pursuit team, according to Carolyn.

“He knows everything,” she said, “And what he doesn't know, I often do.”

How did this winner of more than \$50,000 worth of scholarships get to know so much? It all started in the third grade, when he decided he wanted to be valedictorian. “If that's the highest honor you can win, then that's what I want to do,” went his logic, according to his mother.

Selected to participate in the 1981 Mathematics and Verbal Talent Search conducted by the Johns Hopkins University Office of Talent Identification and Development, Craig was identified as gifted, which gave him the opportunity to participate in Anne Arundel County's Gifted and Talented program.

During his freshman year at Broadneck Senior High School, he was selected as one of twenty students out of 400 applicants to participate in a two-week engineering internship at Goddard. “The internship was the first chance I got to see hands-on engineering at work,” said Craig, “It was there that I first formulated my career goals and decided to become an engineer.”

He is captain of the Broadneck Senior High School Math Team, and President of the Junior Engineering and Technology Society. “My involvement in these two organizations has enabled

me to enhance my mathematical skills and further explore the world of engineering,” wrote Craig in a Statement of Career Goals that helped him win a full scholarship to the University of Maryland.

“My long term goal is to become a mission specialist on the Space Shuttle and to work for NASA.” In support of this goal, Craig will begin pursuing his degree in electrical engineering at the University of Maryland this fall.

But Craig's real drive is his desire to work with NASA in space. “I want to use my natural mathematical ability to advance the space program, which is an essential part of our society,” says Craig.



CRAIG CASEY—scholarship winner with his Academic Sponsor, Renee Domogauer and his mother, Carolyn Casey (Code 224.1). Craig's essay “My Most Meaningful Experience,” in which he describes his summer internship at Goddard, helped him gain acceptance into the University of Maryland's General Honors Program.

ministrators, programmatic and center highlights and NASA audiovisual reports will be included among the programs.

A “Mailbag” concept encouraging employees to submit suggestions, concerns or complaints will be implemented as well. The service will present a needed outlet for employees and will provide a quick analysis or barometer of the program. The success

of this program is dependent upon the level of participation from the centers.

A new edition of “NASA Update” is produced every other week.

Viewing times will be announced in DATELINE and on the GODDARD AUDIO NEWS SERVICE (344-0890). Interested offices may borrow videotapes of these programs by calling the Office of Public Affairs, 286-8955.

Flight Dynamics Facility Hosts Open House

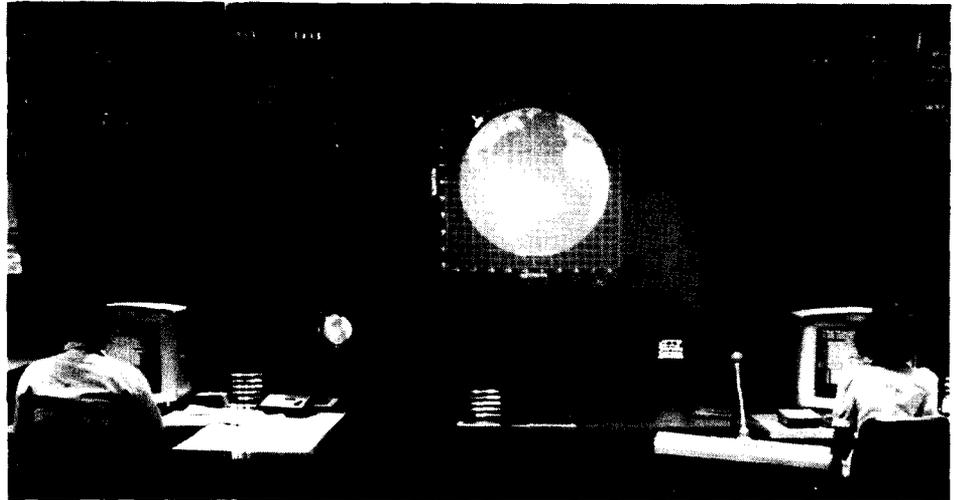
By Carolynne White

A giant screen picturing a three-dimensional view of the globe served as a main attraction during an open house at the Center's Flight Dynamics Facility (FDF) May 22.

The screen gave a visual interpretation of data received from three different spacecraft, although the system is capable of receiving data from up to 15.

The FDF consists of operations areas and computing facilities which support orbit and attitude determination and control, and the generation of products derived from computations. The FDF also tracks shuttle and rocket launches and receives and archives tracking data from these and other spacecraft, using the Tracking and Data Relay Satellite System (TDRSS) to track such satellites as Landsat, the Earth Radiation Budget Satellite (ERBS), and the Solar Maximum Mission (SMM).

A new software system, the Trajectory Computation and Orbital Products System (TCOPS), is being developed and implemented in a series of phases, the first of which has been in operation since January 1986. The final



GLOBAL VIEW—A three-dimensional, visual interpretation of data received from three different spacecraft was a main attraction at the Flight Dynamics Facility open house on May 22.

phase is scheduled for 1987. The one system performs many functions which previously had been performed by several different hardware and software systems. Although the new system will serve, as intended, to modernize the FDF, "It still doesn't bring us galloping into the modern technology age," said Robert Groves, Division Head for the Flight Dynamics Division. Groves sees the future of the FDF in expert

systems, which are less people-intensive and, therefore, less expensive.

Also featured at the open house was a demonstration of the Integrated Raster Imaging System (IRIS), which "draws" a computer-simulated picture of a spacecraft as it would look if there were a camera in space. The animated picture can be adjusted for any angle, and includes background objects, such as the Sun, stars, and the moon.

Space Station

Dr. Burton I. Edelson, NASA's Associate Administrator for the Office of Space Science and Applications (OSSA/Code E), has announced that a Space Station Systems Integration function will be established within OSSA—a step he said will "...help NASA meet its research and development objectives during the transition into the Space Station era."

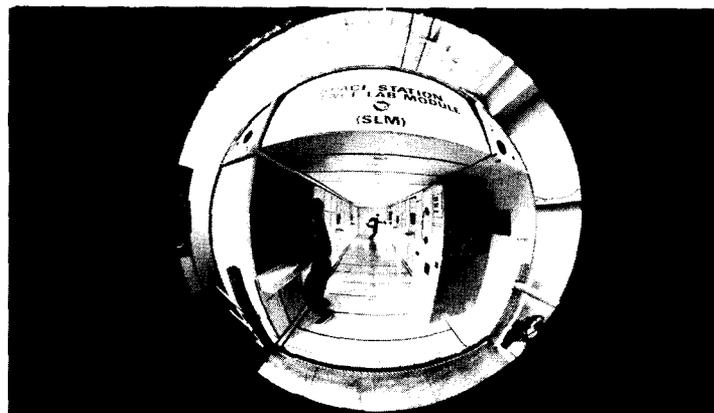
According to Edelson, this special Space Station function—when formally established—will incorporate all or part of the OSSA's Shuttle Payload Engineering Division, Information Systems Office and Space Station integration activities.

He has designated Richard Sade, who has represented Edelson in preparing and executing the OSSA planning activity for Space Station, to plan and direct the new function and represent

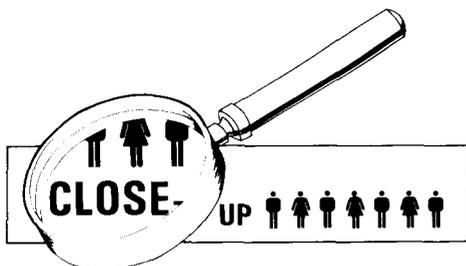
OSSA management on Space Station-related matters.

During the interim period, Michael Devirian, Information Systems Office, will direct the OSSA Space Station Integration function; and Paula Burnett will direct Systems Management Planning, both reporting to Sade.

In his announcement, Edelson reasoned "...These appointments will strengthen and focus OSSA management attention on our many tasks necessary for the further development of Space Station and will integrate these tasks into the overall OSSA program."



A LOOK INTO THE FUTURE—A full mockup of the Space Station Lab Module (SLM) is on display in Building 10. GSFC's Space Station Project is responsible for outfitting this common module. The mockup was designed by Operations Research Incorporated (ORI).



NASA's Group Achievement Award will be given to the Space Research and Remote Sensing Organization (SPARRSO) of Bangladesh in ceremonies in Dhaka this month. The honor is being given for SPARRSO's role in Agro-Climatic and Environmental Monitoring Project, managed by Goddard under the direction of Charles H. Vermillion. **DR. ERIK MOLLO-CHRISTENSEN**, Associate Chief for Science, Laboratory for Oceans at Goddard, will be guest speaker at the ceremonies, to be held in the Sonar-goan Hotel. More than 450 guests from more than 10 countries are expected to attend.

CAROLYNNE WHITE, a co-op student from the University of New Mexico, Albuquerque, is assisting the Public Affairs Office this summer. This is White's second stint at Goddard. In the fall of 1985 she worked in the Procurement Analysis Branch. White is a junior at UNM majoring in Professional Writing. After undergraduate school, she said she would like to get her M.A. in Public Administration.

Ultimately, she would like to teach freshman composition, after getting her Ph.D. in English.

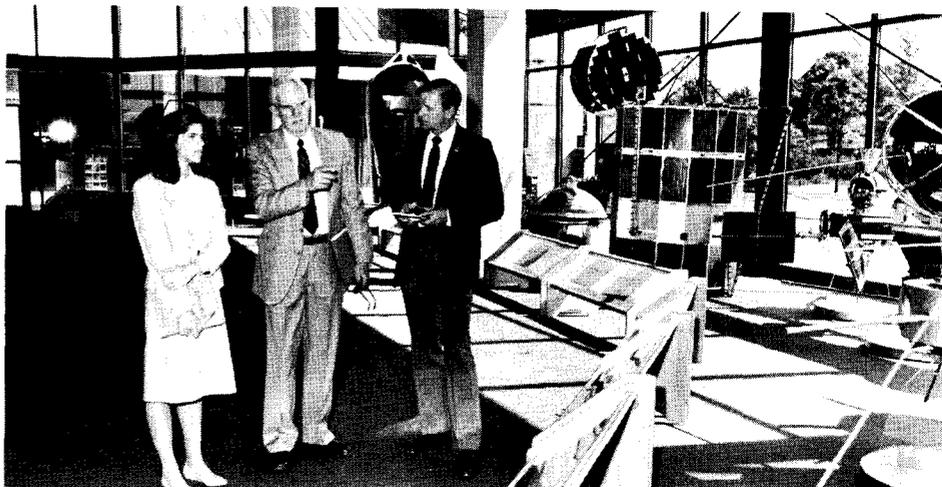


WHITE

JIM ROBINSON, Code 200 Associate Director for Institutional Management, has accepted a position at NASA Headquarters in the Office of Space Station. Jim will serve as Operations Integration Manager in the Operations Division. He assumed his new position June 8, 1986.



ROBINSON



TEACHER IN SPACE Barbara Morgan visited Goddard on May 13. During a special colloquium she told center employees, "Keep being the excellent role models that you are... Keep doing the great job that you're doing." Morgan is carrying out an intensive public appearance program for major educational groups throughout the country. When the Space Shuttle schedule resumes, she will be offered the first civilian flight opportunity. Pictured: Public Services Retiree William P. O'Leary (center) took Teacher in Space Barbara Morgan (left) and Teacher in Space Finalist Michael Metcalf (right) on a tour of the Center.

Early Retirement?

There has been no official word, but according to newspaper reports, the Office of Personnel Management (OPM) supports the early-out idea, with limitations. OPM has proposed that the early retirement period last only three months instead of the 6-month period proposed by Senators

Roth and Stevens. OPM would also like to restrict the early out to employees who have 20 years of service and are age 50, or 25 years of service at any age. Congressional hearings on the subject started in mid-May. If early out is approved, it would probably not begin until later in the year, instead of the July 1 date first proposed.

Small Reduction in Pay for All Civil Service Employees

Civil Service employees saw a slight reduction in their paychecks beginning the May 20 payday. This is because Congress has changed the number of hours that make up a year for pay purposes. The average difference will be 4¢ per hour. So why the change? Civil Service salaries are set in terms of what you earn per year. To convert this to your hourly pay rate, Payroll used to divide your annual salary by 2080 hours. Then, a couple of years ago Congress changed the divisor to 2087 and this number was used from January 1984 through October 13, 1985. For a few months the number was again 2080. But now it's been changed back to 2087. What does this mean to you? A small decrease in your paycheck because now your hourly pay rate will be figured by dividing your annual salary by 2087 instead of 2080. The difference adds up to 7 hours' worth of pay over the course of a year.

Blood Donors

Following is a list of Goddard donors who were cited by the American Red Cross with Gallon Pins at the bloodmobile of June 4, 1986.

Name	No. of Gallons
John Adolphsen	14
Patrice Andrucyk	2
Carol Jo Crannell	4
Donald Dazlich	3
James L. Foster	5
Grace Miller	3
Jon Z. Walker	4

Your overwhelming support of the recent bloodmobile put us way over our goal! Thank you, Goddard!

The next mobile is scheduled for Wednesday, August 6, 1986, in Bldg. 8 auditorium from 8:30 to 2:30.

13th Annual Small Minority Business Conference Held

Business cards were flying at the Thirteenth Annual Small and Small Disadvantaged Business Conference, held in the Building 8 Auditorium May 28. Sponsored by the Procurement Analysis Branch, the conference was designed to bring together small companies with technical and administrative representatives at Goddard to discuss Goddard's needs and how they may be filled by the companies.

Also present were representatives from the Small Business Administration, NASA Headquarters, Prince George's County and the Departments of Agriculture and Transportation.

The companies could get information about subcontracting opportunities with Goddard's prime contractors, many of which were also represented at the conference.

"Last year we had about 380 com-

panies," said Frank Hoffmann, Head of the Procurement Analysis Branch. "We had close to 400 this time, too."

Eugene Rosen of NASA Headquarters presented John Quann with a plaque for Goddard's outstanding service in providing contracting opportunities and assistance to small and disadvantaged businesses.

Concerning the American Spirit

Hugh Sidey, prominent journalist and commentator addressed 2,300 National Space Club members and guests at the annual Goddard Memorial Dinner, March 21 at the Washington Hilton. Following are his excerpted remarks:

"What concerns us tonight is not something that can easily be described in words, or caught by television cameras for the night news. We are concerned with the American spirit. We know when it is there. We know when it is absent. Catching its essence in moments like this is terribly difficult. But making certain that the spirit of this Nation is alive and healthy is what we are about on this night. It is that spirit that brought this country together, what bound us through our darkest days, which generation after generation has pushed us to achievements beyond our dreams, and what today beckons us to continue to march into the unknown.

"We here are specifically interested in space. But that is only the most re-

cent manifestation of the American spirit. I am talking about something bigger than just rockets and satellites, and shuttles and space stations. I am talking about that God-given something in our minds and our hearts that is nurtured by freedom and this unique experiment in liberty, that stirs us beyond any other people to dream and to risk and to triumph.

"Space is only the latest chapter. But it is vital. Our journey into space is sustained by the two centuries that came before. Our adventures among the planets and stars will build for the discoveries that now lie beyond our reason. It is a particularly difficult time for everyone in this hall. The failure of Challenger is a human tragedy of immense proportions. It is a scientific setback that cannot be underestimated. But what it must not become is a defeat of the American spirit.

"We fail in space now, we fail, period. To grow timid, to decline to peer beyond the known, to listen to the faint hearts, to look down at our own earth-

ly miseries and to decide to pause, then we are in profound trouble. History does not wait. Others will do what we planned to do. Others will risk when we decided the price was too high. Others will see that voyaging into the unknown is essential for the survival of any nation that wants to lead the world.

"I don't worry about the people in this room. You know what it takes to explore. But I have heard the doubters and the dissenters already. They worry now about politics being involved in science. They argue that there was too much risk. They say there should not be deadlines for space flight. They say every conceivable doubt must be erased before humans fly in space.

"They do not understand science or the United States or how we achieved flight, or built the Panama Canal or defeated polio. Deadlines and politics, and risk and failure, and disappointment are as much a part of the scientific process as any other. Let us not be foolhardy. But let us go ahead into space."



Goddard News

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 first of each month. For additional information, contact Randee Exler, 286-7277. The GODDARD NEWS staff is:

Executive Editor James C. Elliott
 Managing Editor Randee Exler
 Senior Editors Carter Dove and
 Joyce Milliner
 (Wallops).

Retirees

Best wishes to the following Goddard employees who retired in May!

	CODE	YEARS
Burton, William A.	735	40
Cuchambo, Virginia	742.2	19
Estes, Douglas R. Jr.	822.1	31
Forlifer, William	300	27
Pettit, Mae M.	244.2	29
Quimby, Dudley	683.1	26
Ralinski, Andrew	541.2	30
Seek, Joseph B.	695	30
Semyan, John	674	27