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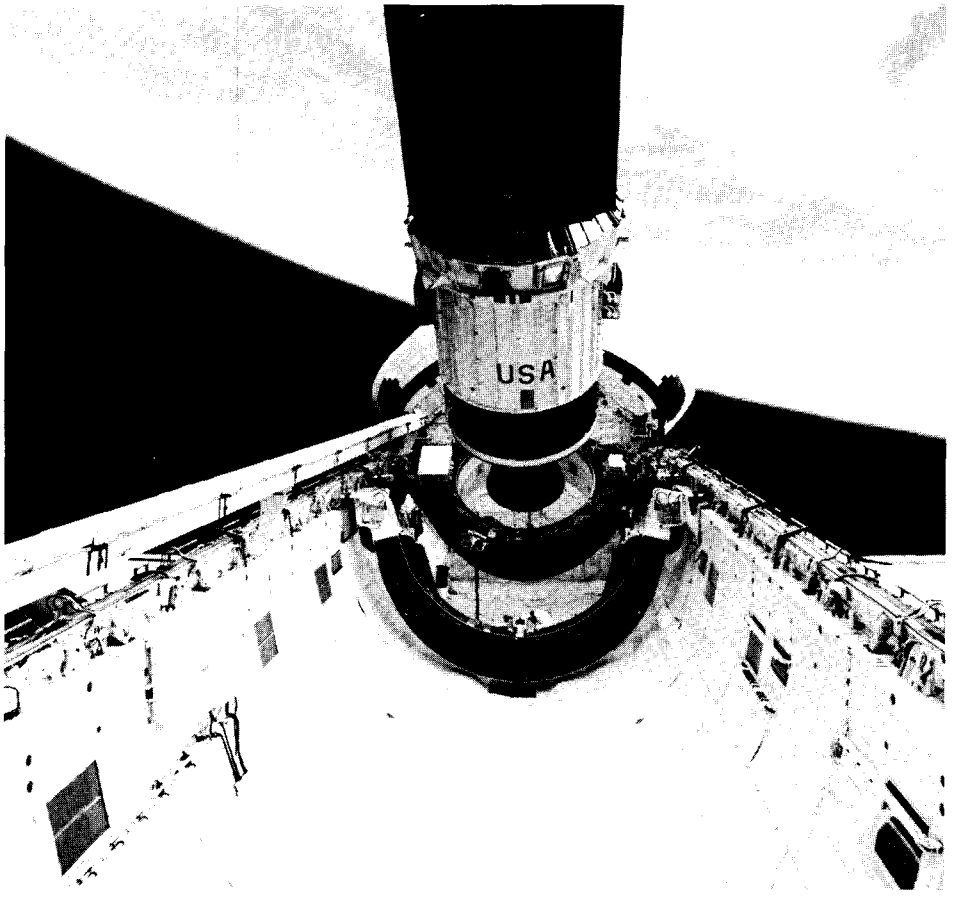
TDRS-D to Complete Satellite Constellation



SUCCESSFUL DEPLOY—**This on board photo shows the Tracking and Data Relay Satellite (TDRS-D) and the Inertial Upper Stage (IUS) booster tilted in the cargo bay prior to its release via a spring-loaded system on Discovery's flight deck. The satellite officially became TDRS-4 when it joined TDRS-1 and TDRS-3 on orbit, completing the three-satellite constellation.**

by Carter Dove

One auspicious beginning—Space Shuttle Discovery's (STS-29) March 13 launch from Kennedy Space Center, FL—led to another as the Goddard-managed Tracking and Data Relay Satellite (TDRS-D) was deployed successfully the same day from Discovery to join the orbiting TDRS-1 and TDRS-3 satellites.

When TDRS-D (it became TDRS-4 on deployment) becomes fully operational—approximately three months after launch—it will replace TDRS-1 at 41 degrees west longitude (east location, over the Atlantic Ocean off the northeast coast of Brazil) and will complete a three-satellite constellation, the heart of Goddard's Space Network.

The deployment of TDRS-D and its attached Inertial Upper Stage (IUS)—a two-stage solid rocket propulsive unit built by Boeing Aerospace Company under Air Force contract—took place approximately six hours and 13 minutes after the launch of Discovery.

After two successful "burns" of the IUS's solid rocket motors, the TDRS spacecraft separated from the IUS as it achieved its operational altitude of 22,300 miles (37,500 km). The spacecraft officially became TDRS-4 at that time.

This event occurred just a little more than 13 hours after the launch of Discovery.

Within 15 days from deployment, TDRS-4 completed its drift to 150 degrees west, where testing and evaluation will be conducted. When testing is complete—approximately 54 days after deployment—the spacecraft will be drifted to 41 degrees, a 51-day maneuver.

After the spacecraft users have been shifted from TDRS-1 to TDRS-4, the former will be drifted to 79 degrees west longitude, over the Pacific, just west of Ecuador. There, it will serve as an operational spare, to see duty when and if the volume of data demands.

Like TDRS-1 during its tenure, TDRS-4 will be known also as TDRS-East.

The second satellite in the constellation, TDRS-3, was deployed by Discovery, following its September 29, 1988 launch from Kennedy Space Center, FL (STS-26). TDRS-3 is now in orbit at 171 degrees west longitude, over the Pacific Ocean southwest of the Hawaiian Islands and just east of the Gilbert Islands.

It is known as TDRS-West.

Built by TRW, Redondo Beach, CA, the TDRS-4 spacecraft weighed 4,905 pounds (2227 kg) at launch and is the largest communications satellite in the world.

In addition to the TDRS-D spacecraft, its primary payload, Discovery also carried several secondary experiments:

- Space Station Heat Pipe Advanced Radiator Element (SHARE), tested a first-of-its-kind method for a potential cooling system of Space Station Freedom. The heat pipe used no moving parts and worked through the convection currents of ammonia.
- Chromosomes Experiment (CHROMEX). This experiment was to determine whether the roots of a plant in microgravity will develop similarly to those on Earth.
- Protein Crystal Growth Experiment. These experiments, flown on four previous Space Shuttle missions, were aimed at methods of altering or controlling the function in ways that may result in new drugs.
- Student Experiments. There were two: Chicken Embryo Development in

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Talk from the Top

John W. Townsend Jr.

Two employees wrote suggestions for solving the Center's parking problem:

Q: If more motorcyclists used their motorcycles to travel to work the parking problem would not be as severe. . . . If there was an area for motorcyle parking that was protected from the weather I believe more people would use their motorcycles for work.

Q: I'm sure you are aware of the acute parking problem in the Bldg. 16-16W lot. . . . The grass area on the west side of Bldg. 16W could take care of this problem.

A: We have considered many options to resolve the Center's parking problems, but the best one remains more parking spaces or fewer cars. Encouraging the use of motorcycles would only be a token gesture because motorcyles are, for most people, a seasonal mode of transportation. . . . There are now about 35 additional temporary and permanent spaces around building 16-16W. In November, an additional 166 parking spaces were reopened on the West lot of Bldg. 7-10-15. . . . In fact, there are now more parking spaces available than there were before the construction. Prior to the construction there were 293 parking spaces around Bldg. 7-10-15. Now there are 322 plus another 148 temporary spaces for a total of 470. We have asked the Bldg. 7-10-15 employees to park in these newly-reclaimed spaces, so that the congestion across the street can be relieved.

Q: Why bother to have drug testing at Goddard if you are going to give everyone a 60-day warning? Will future tests be advertised in advance? Why waste the time and effort? Let's get real — no warnings!

A: Everyone has been given a general 60-day warning, but individuals (randomly selected) will not receive any warning in the future before the actual test.

Center Director John W. Townsend, Jr. wants to hear from you! Send your questions to: TALK FROM THE TOP, Code 130.

New Mexico CAP Assists Goddard Search and Rescue Experiment

Most people are familar with COSPAS/SARSAT, Code 480's search and rescue effort that uses satellites to locate activated emergency distress beacons. But what happens when a plane crashes that is not carrying a beacon? Suppose the beacon malfunctions and does not go off ?

Goddard's search and rescue team is looking at ways to assist local rescue forces, such as the Civil Air Patrol (CAP), in locating downed aircraft that have not been picked up by the COSPAS/SARSAT system. COSPAS SARSAT is an international program which makes use of U.S. and Soviet satellites to locate emergency radio transmissions from downed aircraft or ships in distress.

Members of the New Mexico Wing CAP recently participated in a Goddard experiment to help determine the usefulness of airborne and spaceborne optical sensors as aids in locating missing aircraft during search missions.

CAP members from the Alamogordo and Roswell units participated in the two-day effort along with representatives from Goddard and the Ames Research Center. Crew members from Ames and researchers from Goddard performed the experiment in a NASA Lockheed C-130 aircraft with the assistance of the CAP.

Goddard's Advanced Solid State Array Spectroradiometer (ASAS) imaging instrument was mounted in the aircraft for the experiment. The ASAS camera takes x-ray and infrared pictures. The purpose of the experiment was to see if these images could be processed to reveal downed aircraft.

Members of the Alamogordo CAP Unit provided NASA with the location coordinates of previously crashed aircraft near Alamorgordo which could be used as subjects for the airborne optical sensor.

CAP representatives overflew the downed aircraft prior to the C-130 flight to find the best preserved wreckages and determine their status and locations. During the flight, they pointed out the wreckages to the C-130 aircrew so they could execute the sensor overflights.

Baseline Exercise

In another exercise, a ranch airfield, located near Roswell, and an undamaged aircraft were used to obtain baseline optical imagery data. The aircraft was placed at the far end of the airstrip, away from buildings, where the optical sensor could obtain data from an undamaged general-aviation aircraft. This is usually the type of aircraft that the CAP attempts to locate.

The images collected of the undamaged aircraft will be used to create a standard signature. Variables such as the effect of Sun angle and Sun glazing (the effect of the Sun when imaging a target from different angles) will be built into the baseline. This information then will be used with the images collected at the actual crash sites to provide data for investigating methods of processing to enhance target recognition and to determine their utility for search and rescue.

If this experiment and follow-on research prove successful, this technology may be used someday to assist the CAP in locating missing aircraft. The Goddard team is currently analyzing the test results.

Retirees

Good luck to the following employees who recently retired from Goddard:

	CODE	YEARS
Atkins, Raymond D.	832	26
Dardarian, Sahag	696	35
Keller, Warren	800	31
Krider, Robert E.	408	26
Lawrence, Alexander	235.1	22
Lord, William L.	832	34
Pearson, Lloyd L.	833.1	31
Smith, Kathryn A.	720	27

NASA Update

Stay Tuned

NASA Update, a weekly news magazine program, will be shown continuously from 9 a.m.–4 p.m. on the closed-circuit TV system on the following dates:

Friday May 5, 12, 19, and 26

Check **DATELINE GODDARD** and the **GODDARD AUDIO NEWS SERVICE (286-NEWS)** for details.

Launch Update: Magellan Mission

Launch of the Magellan mission (STS-30) to perform radar mapping of the planet Venus is scheduled for no earlier than April 28, 1989. In addition to this primary payload, the Space Shuttle Atlantis will carry two secondary payloads—the Mesoscale Lightning Experiment and the Fluids Experiment Apparatus.

The Mesoscale Lightning Experiment will use the Shuttle's payload bay camera, augmented by a 35mm hand-held still picture camera to observe lightning discharges at night from active storms in an attempt to better understand effects of lightning discharges. Information on how lightning discharges affect each other, nearby storm systems, storm and wind patterns, and the interrelationships of other weather elements could lead to better weather prediction models for use in airline operations and such applications as lightning early warning systems for outdoor crews of oil derricks, electrical power companies, large cranes and construction equipment.

Experiments have been conducted in electricity and atmospheric research over the tops of active thunderstorms using NASA's high-altitude U-2 aircraft, but optical observations are limited by the maximum height the aircraft can fly. To document large, or mesoscale areas, video must be obtained from satellites or the space shuttle.

The other secondary payload, the Fluids Experiment Apparatus (FEA), built by Rockwell International's Space Transportation Systems Division, Downey, CA, will be used to conduct experiments on two separate shuttle flights. A Joint Endeavor Agreement (JEA) with NASA's Office of Commercial Programs provides for microgravity experiments in materials processing to be conducted in the FEA on the two flights.

NASA Pipeline

AMES-DRYDEN FLIGHT RESEARCH FACILITY, Edwards, CA—Ames-Dryden has completed flight tests of the Mission Adaptive Wing, flown on the Advanced Fighter Technology Integration F-111 aircraft. For these tests, the F-111's wing was modified so that the curvature of the leading and trailing edges could be varied in flight. The tests produced reductions in air drag from 8 to 20 percent, and wing bending during maneuvers was reduced 20 percent.

NASA HEADQUARTERS, Washington, DC—Outgoing NASA Administrator Dr. James C. Fletcher and the Ambassador of Japan to the United States H.E. Nobuo Matsunaga recently signed a memorandum of understanding (MOU) between NASA and the government of Japan on cooperation in the detailed design, development, operation and utilization of the permanently-inhabited Space Station Freedom. Under this agreement, Japan will provide the Space Station Freedom program with a Japanese Experiment Module (JEM)—consisting of a pressurized laboratory module, two experiment logistics modules and an exposed facility—to be permanently attached to the space station base.

LEWIS RESEARCH CENTER, Cleveland, OH—Lewis has been selected by the Office of Management and Budget (OMB) as a quality improvement prototype which is one of the highest honors a Federal government facility can achieve for quality and productivity. OMB Director Joseph Wright said that the center demonstrated an "extraordinary commitment to quality improvement, focused attention on satisfying its customers, and established high standards of quality, timeliness and efficiency."

MARSHALL SPACE FLIGHT CENTER, Huntsville, AL—Engineers at Marshall are testing an Advanced Recovery System (ARS) being developed by Pioneer Aerospace as part of a joint U.S. Air Force/NASA Advanced Launch System Program aimed at providing a low-cost space launch capability around the year 2000. The ARS is being developed to demonstrate the application of high glide, deployable wing technology to the recovery of large, valuable space launch components, especially propulsion and avionics modules associated with advanced launch systems, according to Gary Johnson, ARS project manager for Marshall.

TDRS-D

Continued from page 1

Space, to determine the effects of spaceflight on the development of fertilized chicken embryos; and the Effects of Weightlessness on the Healing of Bone, an experiment which used four rats with bone fractures to study the healing process in microgravity. Of the 32 chicken embryos flown on board Discovery, half were fertilized nine days before launch and half two days before launch. Upon landing, eight of each group were opened. Although the eight younger embryos had died within three hours, the nine whole eggs in the older group hatched normally, and are currently being studied at Purdue University. After the study they will be donated to a children's zoo.

Additionally, the crew of Discovery had an IMAX camera on board. Developed by the IMAX Systems Corporation, Toronto, Canada, this 70mm camera produces very high definition photography.

In the meantime, NASA reported that the Earth observation photographs taken by the crew of Discovery during STS-26 (September 1988) were among the clearest in more than 20 years.

The crew took 1,505 photographs, including one that shows at least a one million square-mile smoke cloud over South America's Amazon River basin.

Research Facility Instruments

Goddard personnel have been selected to be Team Leaders for two of the NASA facility instruments—Moderate Resolution Imaging Spectrometer (MODIS) and the Geodynamics Laser Ranging System (GLRS)—and team members on five of the six facility instruments which will fly on one of the polar orbiting platforms:

Moderate Resolution Imaging Spectrometer (MODIS)

MODIS is a major new imaging spectrometer for remote sensing of Earth's biological and physical processes in the study of terrestrial, oceanic and atmospheric phenomena.

DR. VINCENT V. SALOMONSON MODIS TEAM LEADER

Team Leader: Dr. Vincent V. Salomonson, Code 620, "The Dynamics of Snow and Ice Cover Over Large Areas and Relationships to Surface Balance Components as Observed by MODIS N and T."

Team Members: Dr. Wayne Esaias, Code 671, "Oceanic Productivity and Photosynthetic Efficiency."

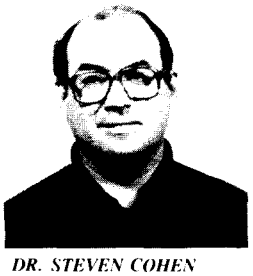
Dr. Frank E. Hoge, Code 672, "Species Variability and Improved Carbon and Nitrogen Cycling Determinations."

Dr. Michael D. King, Code 613, "Determination of Cloud and Aerosol Radiative and Microphysical Properties from MODIS N."

Dr. Joel Susskind, Code 611, "Determination of High Resolution Atmospheric and Surface Parameters from MODIS-N."

Geodynamics Laser Ranging System (GLRS)

GLRS is a laser ranging system to study Earth's crustal movements in earthquake-prone regions and across tectonic plate boundaries by precisely determining the locations of special mirrors set up on the ground. GLRS also can measure the surface height of polar ice sheets to determine how fast they are growing or shrinking, and determine cloud-top heights.



DR. STEVEN COHEN GLRS TEAM LEADER

Team Leader: Dr. Steven Cohen, Code 621, "Simulation, Determination and Interpretation of Crustal Movements from GLRS Observations."

Team Members: Dr. Jack L. Bufton, Code 674, "Analysis and Testing of Laser Ranging and Altimetry Systems."

Dr. James D. Spinhirne, Code 671, "Atmospheric Science Investigations by a Modified GLRS Facility Instrument."

Dr. H. Jay Zwally, Code 671, "Snow and Ice Altimetry Investigations."

Laser Atmospheric Wind Sounder (LAWS)

LAWS is a laser detection and ranging system for direct measurement of tropospheric wind velocities by observing the Doppler shift in light reflected from wind atmospheric aerosols.

Team Member: Dr. Robert M. Atlas, Code 611, "Application of LAWS Data to Meteorological Analysis and Numerical Weather Prediction."

Atmospheric Infrared Sounder (AIRS)

AIRS will measure atmospheric temperature, moisture and other properties as a function of height above the ground with an accuracy and resolution far surpassing current operational satellite instruments.

Team Member: Dr. Joel Susskind, Code 611, "Determination of Atmospheric Vertical Structure from AIRS."

Synthetic Aperture Radar (SAR)

SAR is an imaging radar which can see through clouds to observe properties relating to the geology, hydrology and ecology of the land and properties of sea ice and ocean waves.

Team Member: Dr. K. Jon Ranson, Code 623, "Eos SAR Derived Spatial Descriptors for Boreal Ecosystem Dynamics."

Goddard Hos

by Randee Exler

Researchers representing 32 states, 13 countries and 168 scientific organizations met at Goddard during the week of March 20 for the first "All Hands" meeting of the Earth Observing System (Eos), a multi-mission program expected to be one of the most exciting and challenging space efforts ever conducted by the U.S.

Eos is the centerpiece of NASA's Mission to Planet Earth, a 15-year coordinated effort to study and understand global change. The goals are to understand the Earth as a system and to determine those processes that contribute to our environmental balance, as well as those that may result in change.

Eos is an international, coordinated effort that combines observational instrumentation with the scientific power to produce a significant part of the database underlying Mission to Planet Earth. Eos will use a new breed of spacecraft, the polar orbiting platform, to carry scientific instruments into space.

Under the auspices of the Space Station Work Package 3, Goddard is responsible for the first platform, called NASA Polar Orbiting Platform-1 (NPOP-1), slated for a 1996 launch. Dr. Gerald Soffen, Code 600, is the Eos Project Scientist. Chuck MacKenzie, Code 415, is the Eos Project Manager.

Instrument Investigations

The instrument investigations will provide scientific instruments for flight on the polar platforms and analysis of the resulting data. The following Goddard personnel were chosen as principal investigators (PIs) or co-investigators (Co-Is):

"Geomagnetic Observing System":
PI: Dr. Robert A. Langel, Code 622
Co-I: Dr. Mario H. Acuna, Code 695; Dr. James A. Slavin, Code 696; Dr. Coerte Voorhies, Code 622.

ts Eos "All Hands" Meeting

EARTH OBSERVERS — **Chuck MacKenzie, Earth Observing System (Eos) Project Manager, Code 415 (left) and Dr. Gerald Soffen, Eos Project Scientist, Code 600, will manage the hardware, software and science for NASA Polar Orbiting Platform (NPOP)-1, the first U.S. platform for the Eos. The Eos is the centerpiece of NASA's Mission to Planet Earth program.**

PHOTO: D. McCALLUM

Eventually, up to five platforms may fly: a second U.S. platform, managed by NASA's Jet Propulsion Laboratory (JPL); two European platforms; and one Japanese platform.

Preceding the meeting on Sunday, March 19, a press briefing was conducted at the Visitor Center to educate interested members of the media about this ecological endeavor. Dr. Dixon Butler, Eos Program Scientist, of the NASA Headquarters Office of Space Science and Applications, presented a broad overview of the program to environmentally-interested writers representing local and national publications.

Beginning on Monday, there was standing room only in the Building 8 auditorium as detailed discussions of the program, instruments and investigations unfolded during the three days of plenary sessions. More than 60 GSFC scientists helped make up the group of 551 selected to participate in this endeavor (see related stories this page).

"Positron Electron Magnet Spectrometer":
Co-I: Dr. Robert E. Streitmatter, Code 661; Dr. Reuven Ramaty, Code 665; Dr. Donald Reams, Code 661; Dr. Louis Barbier, Code 661; Dr. Jonathan Ormes, Code 660.

"A Proposal to Investigate Clouds and the Earth's Radiant Energy System: Instruments for Attached Payloads on the Manned Space Station (CERES-IS)":
Co-I: Dr. Michael D. King, Code 613.

"Stratospheric Wind Infrared Limb Sounder":
Co-I: Dr. Richard B. Rood, Code 616.

"Stratospheric Aerosol and Gas Experiment III Proposal for Eos":
Co-I: Dr. David Rind, Code 640.

"X-Ray Imaging Experiment (and Optional Particle Detectors)":
Co-I: Dr. Richard Goldberg, Code 696.

"Global Geophysical Information Retrieval with a High Resolution Microwave Spectrometer Sounder":
Co-I: Dr. James C. Shiue, Code 675; Dr. Thomas Wilheit, Code 675; Dr. Joanne Simpson, Code 610; Dr. Alfred Chang, Code 624; Louis Dod, Code 675; Dr. James R. Wang, Code 675.

"Advanced Scatterometer for Studies in Meteorology and Oceanography":
Co-I: Dr. Robert M. Atlas, Code 611.

Interdisciplinary Investigations

Following are the Goddard personnel selected as Principal Investigator (PI) or Co-Investigator (Co-I) for interdisciplinary investigations including analysis interpretation and significant use of data from Eos:

"The Development and Use of a Four-Dimensional Atmospheric-Ocean-Land Data Assimilation System for Eos"
PI: Dr. John R. Bates, Code 611
Co-I: Dr. Robert M. Atlas, Code 611; Dr. Mark Helfand, Code 611; Dr. James Pfaendtner, Code 616, Dr. Max Suarez, Code 611; Dr. Dean Duffy, Code 611; Dr. Paul Schopf, Code 671; Dr. Joel Susskind, Code 611.

"Estimation of the Land Surface Water Budget"
PI: Dr. Robert J. Gurney, Code 624
Co-I: Dr. Joanne Simpson, Code 610; Dr. William K. Lau, Code 613; Dr. Marvin A. Geller, Code 610; Dr. John R. Bates, Code 611; Dr. Paul Schopf, Code 671; Dr. Man-Li C. Wu, Code 611; Dr. Prabhakara Cuddapah, Code 663, Dr. Thomas J. Bell, Code 613; Dr. Warren Wiscombe, Code 613; Dr. Robert F. Adler, Code 612; Dr. H. Mark Helfand, Code 611; Dr. David O'C. Starr, Code 613; Dr. Yogesh C. Sud, Code 611.

"Long-Term Monitoring of the Amazon Ecosystems Through the Eos: From Patterns to Processes"
Co-I: Dr. Compton J. Tucker, Code 623.

"Interannual Variability of the Global Carbon and Energy Cycles"
PI: Dr. James Hansen, Code 640
Co-I: Dr. Anthony Del Genio, Code 640; Dr. Inez Fung, Code 640; Dr. Andrew Lacis, Code 640; Dr. Michael J. Prather, Code 640; Dr. David Rind, Code 640; Dr. William B. Rossow, Code 640.

"A Proposal to Investigate the Chemical and Dynamical Changes in the Stratosphere Up to and During the Eos Observing Period"
PI: Dr. Mark Schoeberl, Code 616;
Co-I: Dr. Marvin A. Geller, Code 610; Dr. Robert D. Hudson, Code 616; Dr. Charles H. Jackman, Code 616; Dr. Jack A. Kaye, Code 616; Dr. Richard B. Rood, Code 616; Dr. Richard S. Stolarski, Code 616; Dr. Joan Rosenfield, Code 616; Dr. Anne Thompson, Code 616.

"A Global Assessment of Active Volcanism, Volcanic Hazards, and Volcanic Inputs to the Atmosphere from the Earth Observing System"
Co-I: Dr. Arlin Krueger, Code 616; Dr. Louis S. Walter, Code 620.

"Polar Ocean Surface Fluxes: The Interaction of Oceans, Ice, Atmosphere and the Marine Biosphere"
Co-I: Dr. Nancy Maynard, Code 670.

"Biogeochemical Fluxes at the Ocean/Atmosphere Interface"
Co-I: Dr. Nancy Maynard, Code 670; Dr. Wayne Esaias, Code 671; Dr. Anne Thompson, Code 616.

"Biosphere-Atmosphere Interactions"
Co-I: Dr. Inez Fung, Code 640; Dr. David Randall, Code 611; Dr. Compton J. Tucker, Code 623.

"A Proposal For An Interdisciplinary Investigation of Clouds and the Earth's Radiant Energy System: Analysis (CERES-A)"
Co-I: Dr. Michael D. King, Code 613.

INSIDE

Back To School With Dr. Ron Lepping

by Carolynne White

Last September, astrophysicist Dr. Ronald P. Lepping went back to high school.

He wasn't visiting his daughter's classroom, or taking a course. Every morning Dr. Ron Lepping stands in front of a group of Advanced Placement (AP) Physics students at Southern Senior High School in Anne Arundel County, explaining college-level principles of physics as he illustrates on the blackboard.

"I like teaching because it's a way of expressing myself," said Lepping. "As the months go by I enjoy it more and more—passing my knowledge on to the younger generation."

And that knowledge is considerable. A 20-year Goddard veteran, Lepping's youthful appearance belies his 50 years.

He has been a magnetometer co-investigator on Interplanetary Monitoring Platform (IMP) 7 and is now the principal investigator for IMP 8. Lepping was involved with magnetic field data processing as a co-investigator on Mariner 10, a planetary spacecraft that went to Venus and Mercury, for which he received a NASA Special Achievement Award. He recently was awarded the principal investigatorship of the WIND magnetometer experiment and shares a co-investigator role with Dr. Mario Acuna on another experiment whose magnetometer will be launched on a Japanese spacecraft, GEOTAIL, in 1992. In addition, Lepping has conducted studies on bow shocks and galactic structure. Both WIND and GEOTAIL are part of Goddard's International Solar Terrestrial Physics (ISTP) project.

Magnetic Phenomena

Bow shocks, as Lepping explains it, are usually associated with the magnetospheres of planets. "When the low-density, supersonic solar wind blows out from the Sun and slams into the two-pole magnetic field of the Earth, it stretches the field way back and forms a big teardrop-shaped tail, known as the magnetotail," explained the distinguished-looking scientist. "The interaction forms a big shock wave, a boundary between the magnetosphere and the solar wind, and that's one of the boundaries I'm interested in studying."

Lepping is also interested in studying plasmas—a special kind of matter consisting of "electrified" gases. "The solar wind is a plasma, and all known mag-

PHOTO D. McCALLUM

LEPPING

netospheres are filled with plasmas," said Lepping. "So our studies with spacecraft data are like working in a big plasma laboratory. You couldn't have such a wonderful plasma laboratory on Earth."

Originally from Philadelphia, PA, Lepping came to Goddard in 1969, after doing his Ph.D. work at Renssalaer Polytechnic Institute, in Troy, NY. He now works in the Laboratory for Extraterrestrial Physics.

Early in his Goddard career, Lepping's team, led by Dr. Norm Ness, was awarded the magnetic field experiment on the Voyager planetary probe, which carries two sensitive magnetometers. Launched in 1978, Voyager will encounter the planet Neptune on August 24, 1989—within a few days of Lepping's 20-year anniversary at Goddard. Lepping has received six NASA Awards for his contributions to the Voyager project.

He is the data processing manager for the Voyager magnetometer experiments, developing the mathematics necessary to process the data, in addition to his role as astrophysicist, studying and comparing the magnetospheres of the different planets.

Voyager Studies

"It's fun to figure out how the magnetosphere of the Earth differs from those of Jupiter, Saturn, Uranus or Neptune," he said, "which is what Voyager's going to help us do. It's been one of the greatest missions mankind has ever conceived—both in terms of scientific return per dollar and overall increase in knowledge.

"For instance, our team has been able to study all of these various planets, and we now know that Earth, Mercury, Jupiter, Saturn, Uranus and probably Neptune all have magnetic fields, and this tells us something about the interior of the planets."

"In fact," said Lepping, "our team has 'traveled' to almost every planet in the solar system—Mars is our next trip!"

For his students, this makes Dr. Lepping a particularly interesting teacher. "I have NASA and Voyager posters all over the classroom walls," said Lepping. "At every opportunity I interject examples, applications of the physics I'm teaching them in terms of NASA's work."

The transition from dealing with adults every day, to dealing with students was not an easy one for Lepping.

"It wasn't fun at first," said Lepping about his new teaching job. "They didn't know what to expect, and I didn't know what their reactions meant. Teaching as a graduate student definitely helped prepare me, although that was easier. But now things have changed 180 degrees. The students really do care about learning. They're good kids, and I'm glad to teach them. In my younger years, I would have suffered too much from stage fright to have been effective.

"And I've developed a lot of respect for high school teachers. It's a difficult profession. Our country needs more qualified high school science teachers."

Perhaps it is with the future education of his two children—Erica, almost 15, and Miles, almost 12—in mind, that Dr. Lepping daily makes the 56-mile round-trip drive from his home near Annapolis to the high school where he teaches, then to Goddard and back.

Both of Lepping's children have shown signs of following in their father's scientific footsteps. Erica's mainly interested in biology, according to her father. And Miles' interest in space could blossom into a scientific career—he built the scale model of Voyager Lepping holds in the photo, above.

Lepping thinks both his children resemble his wife, Karen, an amateur artist, whose paintings have been shown locally.

Teaching in the morning, then coming in to the office to do his research makes

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CLOSE UP

PHOTO: R. FRISCH

FLETCHER

NASA ADMINISTRATOR DR. JAMES C. FLETCHER salutes Goddard at a farewell speech on March 28 in the Building 8 Auditorium. Fletcher has resigned from NASA effective April 8.....In procurement, Goddard has issued as request for proposal from commercial sources to launch three identified satellites and options for NASA to order up to 12 additional launches, if exercised, over the next five years..... Also, Goddard has awarded Ogden Logistics Services, New York, NY, a contract to perform logistics services in support of Goddard's Management Operations Directorate, including maintenance of the stores-stock, supplies and materials in warehouse facilities both at Greenbelt and Wallops Flight Facility, plus mailroom, transportation, traffic management and integrated logistics support at Greenbelt.

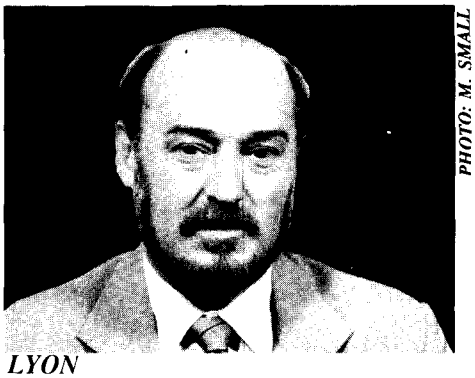

PHOTO: M. SMALL

LYON

JOHN C. LYON is Goddard's new Assistant Director for Space Station in the Mission Operations and Data Systems Directorate (Code 500)....**TOM WHITE,** Chief of the Logistics Management Division, will act as Branch Head until a selection is made....**DAVID G. CLEVELAND** (Code 311) has been promoted from Head of the Parts Engineering Section to Head of the entire Parts Branch.....**WALTER F. TRUSZKOWSKI,** of the Automation Technology Section (Code 522.3) was appointed head of his section.

Goddard Third-Time Winner of Equal Opportunity Trophy

PHOTO: D. McCALLUM

EQUAL OPPORTUNITY—**Goddard received NASA's 1988 Equal Opportunity Trophy at a ceremony in the Building 8 lobby on March 16 and was especially recognized for its advancement in the promotion of minorities to managerial and supervisory positions. Present at the ceremony were (left to right): John Scully, Deputy Director, Management Operations (Code 200); Dr. Frank B. McDonald, Associate Director/Chief Scientist (Code 100); Harriet Jenkins, Associate Administrator for the Office of Equal Opportunity, NASA Headquarters; Dillard Menchan, Goddard Equal Opportunity Programs Officer (Code 120); and William Keathley, Associate Director for Programs (Code 100).**

Goddard is the 1988 recipient of the NASA Equal Opportunity (EO) Trophy Award for the third time since 1980.

The trophy is awarded based on an assessment of each center against 72 different factors based on quantitative performance towards fulfillment of EO objectives. Goddard received especially high marks for its advancement in the promotion of minorities to managerial and supervisory positions and for the center's various outreach programs involving minority students at the high school, undergraduate, and graduate level.

Goddard received the trophy at a ceremony in the Building 8 lobby on March 16.

Langley Research Center, Marshall Space Flight Center, and Johnson Space Center also received recognition for their affirmative action performance in 1988.

"This trophy symbolizes NASA's efforts to provide all employees with the opportunity to contribute their talents to the Agency's mission and to share resources through research and training grants with a broader array of the nation's various ethnic groups," said Dillard Menchan, Goddard's Equal Opportunity Programs Officer.

PHOTO: D. McCALLUM

SATELLITE SAVERS—**Center Director John W. Townsend, Jr., recently rewarded Goddard engineers for their "continued vigilance of satellite launches for well over two decades." The center director presented his newly-created Satellite Saver Award to Henry W. Price, Chief Engineer (Code 700) Henry C. Hoffman, Head of the Guidance and Control Branch (Code 712) and Dr. Thomas W. Flatley (Code 712).**

Join Goddard's 30th Anniversary Celebration!

30th Anniversary Schedule of Events

Monday, May 1

12 noon— U.S. Army Band Concert/Goddard Birthday Cake/Pioneer Award Ceremony — Building 8 Front Steps

Thursday, May 4

12 noon— Goddard Child Development Center Skit — Cherry Tree Planting in Front of Building 8

1-5 p.m.— Employee Tours of Building 7/10, Robotics Labs, and SSDIF — Open House Format

Friday, May 5

11 a.m.— "Apollo to the Moon," One-Man Drama — Building 3 Auditorium

2 p.m.— Former Center Director Seminar — Building 8 Auditorium

3:30 p.m.— Scientific Colloquium — Alan Stern, University of Colorado, "60 Years of Pluto"

5-9 p.m— 30th Birthday Party — Rec Center

Saturday, May 6
Community Day
Visitor Center

11 and 2:30 p.m.— "Apollo to the Moon," One-Man Drama

12 noon— U.S. Air Force Band

1 p.m.— "Reach for the Stars" P.G. Schools Essay Contest Winners

6:30 p.m.— Model Rocket Launch

8:30 p.m.— Star Watch

*** * * ALL DAY * * ***
NASA Compatibility Test Van Parked Outside VC

10:30-5 p.m.— Tours of GSFC Leaving From Visitor Center

Goddard will celebrate its 30th Anniversary during the week of May 1 through May 5. A week-long festival of events has been planned to celebrate the event (see schedule on left). All employees are invited to attend the events.

Goddard will kick-off the week with an awards ceremony honoring Goddard Pioneers on Monday, May 1, in front of Building 8. The U.S. Army Band, and a Goddard Birthday Cake will highlight the event. Other events include a skit by the Goddard Child Development Center and Open House Employee Tours of Buildings 7/10, the Robotics Labs, and the Space Systems Design and Integration Facility (SSDIF) on Thursday; a former Center Director Seminar in the Building 8 Auditorium and a Birthday Dance at the Rec Center on Friday; and Community Day at the Visitor Center on Saturday. Tickets for the Dance on Friday, May 5, may be purchased from your Directorate Secretaries.

Back to School

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for a busy schedule. "I wake up late to teach, because I stay in the office late. I'm a night person by nature—I stay until three in the morning sometimes, although I try to avoid that." Though this agenda doesn't leave much time for recreation, you might catch Lepping working out in Goddard's gym, running on the treadmill, or taking out his frustrations on the punching bag, an idea he says he borrowed from the Japanese.

Maybe it's this outlet that relaxes him for the classroom—Dr. Lepping's children tell him that he's too lenient as a teacher. "I'm an easy teacher, really—I'm soft. You can't be too strict, because it would only discourage the students. I respect them for attempting a difficult course, and I like to encourage them as much as possible. Passing on my knowledge to the younger generation is a contribution I can make that hopefully will last for years and years."

NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Goddard News

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The GODDARD NEWS staff is:

Executive Editor
Jim Elliott
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