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President Reagan visits Goddard during STS 41-D

NASA Photo by Randy Frisch

PRESIDENTIAL VISIT — More than 300 people listen to President Reagan at Goddard in building 10 during the second Presidential visit here since President Richard M. Nixon visited the Center during the Apollo XIII mission in 1970.

Making his first visit to the Goddard Space Flight Center, President Ronald Reagan lauded Goddard for its supportive role to the welfare of the Nation and to the world.

Speaking to more than 300 employees while here for a tour, demonstrations of technology utilization and a briefing of Goddard projects on August 30, the Chief Executive underlined the many technological breakthroughs and spinoffs developed by NASA and Goddard and underscored their benefits to mankind.

The President, citing progress the space program has achieved over a quarter century, told the audience gathered in Building 10:

"You go quietly about your work, far removed from the glare, gloss, and glitter of public spotlights," the President said, "but what you do is so important. You are expanding our wealth of knowledge; and with that knowledge, you are fueling a mighty tide of progress carrying the hope of an optimistic future — for people here and everywhere.

". . . Today, on behalf of a grateful Nation, I salute you and your colleagues in private enterprise and the academic world. You are the heroes of high-tech; the pulse of America's technological power; the champions of a confident people, whose faith and courage are pushing America up and out to a world of wonders for us, our children, and our children's children . . .

"The space age is barely a quarter of a century old, but already we have taken giant steps for all mankind. And our progress is a tribute to American teamwork and excellence. We can be proud that we are first, we are the best, and we are so because we are free."

The President addressed employees just three hours after the Orbiter Discovery lifted off on her maiden voyage carrying six crew members. The seven-day flight was very successful.

41-D Summary

Discovery performed well on her debut: three communications satellites were launched as planned from Discovery's cargo bay; McDonnell-Douglas engineer Charles Walker conducted the first commercial usage of the Continuous Flow Electrophoresis System (CFES) experiment, designed to produce pharmaceuticals in space; and a ten-story aluminum solar array was unfolded from the cargo bay by America's second spaceborne woman Judith Resnik, raising hope that future missions could last twice as long as current missions by drawing more solar power.

A high percentage of the samples were gathered in the student crystal growth experiment, of which the President said ". . . we can manufacture crystals of exceptional purity that may enable us to produce super-computers, and make even greater breakthroughs in productivity."

In a twist of showing its versatility, the crew used the 50-foot robot arm to bump some ice off an Orbiter waste dump module that officials deemed dangerous to reentry. These were a few of the highlights of the mission.

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STS 41-G

Goddard experiments fill next shuttle

Goddard payloads will make up a big share of the cargo aboard the spacecraft Challenger on mission 41-G, now scheduled for launch no sooner than October 5, officials at this NASA Center reported today.

In addition to the Earth Radiation Budget Satellite (ERBS), Goddard-managed payloads include eight Get Away Special experiments and the Shuttle Imaging Radar-B (SIR-B), in which Goddard engineers and scientists are involved in four of the 40 experiments.

GAS Experiments

The eight Get Away Specials (GAS) on this mission and their customers and payloads are:

Alabama Space and Rocket Center — Space processing and transmitting computer voice on amateur radio bands.

Kayser-Threde — Heat lamp test.

International Space Corporation — Asahi TV — physics of solids and liquids in zero gravity.

Marshall Space Flight Center — vacuum deposition.

McDonnell-Douglas Company — zero-G fuel system test.

Air Force Space Test program — cosmic ray effects on computers. John Adolphsen, of Goddard is principal investigator.

Utah State University — Physics and material processing.

Naval Research Laboratory, The U.S. Naval Academy — Trapped ions in space.

Also on board the Orbiter will be an experiment called Shuttle Imaging Radar-B (SIR-B.) SIR-B is the next step in a series of spaceborne earth-imaging radar missions. The series started with the Seasat in 1978 was followed by SIR-A in 1981 and is expected to continue beyond SIR-B through this decade. As part of the Office of Space and Terrestrial Applications (OSTA-3) payload, the SIR-B is intended to provide data for various geoscientific investigations conducting research in geology, hydrology, oceanography, botany and agronomy.

Over 40 investigations are under way in the United Staes and abroad to examine the utility of the SIR-B images for various applications. Among these Goddard has four of them, which are: "Structural Investigation of the Canadian Shield by Orbital Radar and Landsat." Principal investigator is Dr. Paul Lowman, Code 922.0; "Vegetation Penetration Biomass Assessment and Flood Boundary Assessment with Space Borne L-Band SAR". Principal Investigator is Marc Imhoff, Code 902.1; "Automatic Terrain Elevation Mapping and Registration". Principal Investigator is Dr. H.K. Ramapriyan, Code 636; and "Remote Sensing of Soil Moisture Experiment." Principal investigator is Dr. James Wang, Code 675.

Mission Firsts

Mission firsts include: First extravehicular activity (EVA) by a woman — astronaut Kathy Sullivan; two women astronauts on board; seven crew members, and a foreign payload specialist from Canada.

Veteran Shuttle Astronaut Robert Crippen is the commander of the seven-member crew. He will be joined by pilot Jon McBride and three mission specialists: Sally Ride, Kathryn Sullivan and David Leestma. Also riding on this mission will be Navy oceanographer, Paul Scully-Power, and Canadian payload specialist, Marc Garneau.

ERBS will be prime cargo on 41-G; three langley instruments on board

The first NASA satellite designed and engineered exclusively for shuttle launch, the ERBS — Earth Radiation Budget Satellite — will be one of the prime cargo bay payloads on the space shuttle Challenger for its launch from Cape Kennedy, Florida not earlier than Friday, October 5.

ERBS is one of three satellites which ultimately will be launched under the NASA-directed Earth Radiation Budget Experiment (ERBE) research program aimed at improving our understanding and simulation of the Earth's climate.

The 2300 kg (5000 lb) ERBS will be plucked from its tailor-made fit in the Challenger's cargo bay by the shuttle's giant mechanical arm at the 305 km (190 mi) high shuttle orbit altitude within six orbits or nine hours after the mission begins. ERBS four on-board thrusters then head it for its operational 610 km (379 mi) high orbit level. Within four days after leaving Earth the ERBS will have reached its final orbit; within four weeks it will be performing its daily chore of collecting and transmitting climate data.

Key to Understanding

The key to improved understanding and simulation of climate is determining the Earth's radiation budget — the amount of solar energy absorbed by a particular

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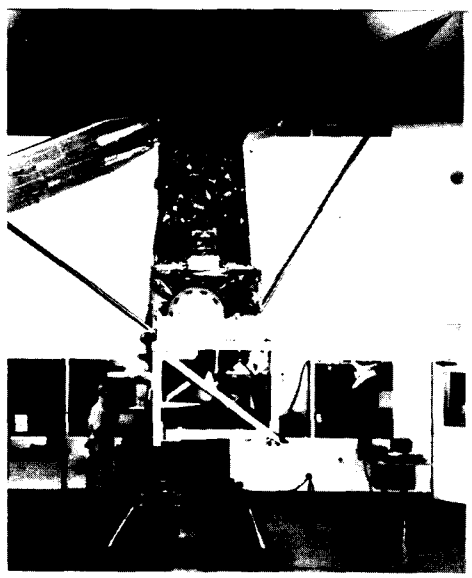


ERBS WIGGLER — The Earth Radiation Budget Satellite is "wiggled" on the "Wooley Wiggler," developed by Dick Wooley, Ball Aerospace Systems Division, Boulder, Co. The new balancing machine yields measurements of large payloads through small oscillations rather than spinning.

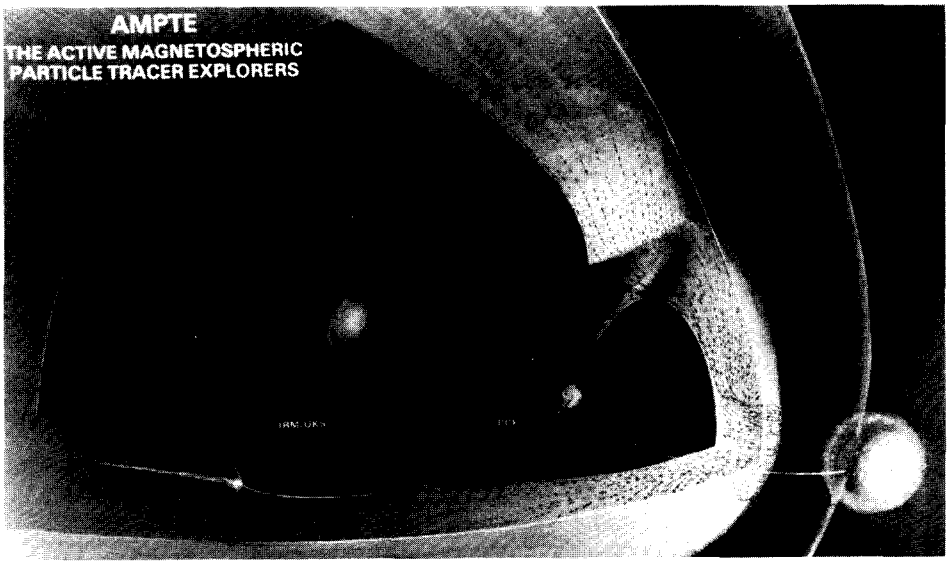
AMPTE makes ion release outside magnetosphere: cloud to help understand Sun-Earth relationship

Although unseen and unheard, one of three satellites in an international scientific venture has begun an experiment approximately 113,000 km (70,160 mi) from Earth to help shed additional light on some of the unknowns in our relationship with the Sun.

Goddard Space Flight Center Project Manager Gilbert W. Ousley said that one of the three satellites in the AMPTE — Active Magnetospheric Particle Tracer Explorers — program successfully released tracer dyes of lithium into the solar wind on Tuesday, September 11 and Thursday, September 20 so that scientists can trace the element's movement into the Earth's magnetic field.

The experiments by the three AMPTE satellites — one each from the United States, West Germany and the United Kingdom — are designated, according to Ousley, "to answer a fundamental question of space physics: how the solar wind enters the Earth's magnetosphere."

The magnetosphere is an invisible envelope of magnetic field and charged particles surrounding the Earth, extending approximately 40 thousand miles toward the Sun and at least four million miles away from the Earth on the night side. The solar wind is a stream of hot ionized gas expanding outward from the Sun in all directions at a speed of about 1 million miles an hour.



CLOUD RELEASES—This artist's conception shows a release of lithium from one of the AMPTE spacecraft. Two such releases were made this month in the solar wind on the sunward side of the Earth. A barium release, generating a small artificial comet visible to residents in the West and in the Pacific, is planned for late December (lower left). A lithium tracer release (left center) is typical of what two additional lithium releases will do during releases to be made in March and April, 1985. Two barium releases also will be made during that time period. The lithium releases are not visible to the naked eye.

Dye Markers Injected

Following the release by the German satellite (Ion Release Module — IRM) outside the magnetosphere, the lithium canisters exploded approximately 10 minutes later into a cloud two and one-half times the diameter of the Earth. This cloud was sampled by the United Kingdom's subsatellite (UKS) in the immediate vicinity of the release.

When the injected dye enters the magnetosphere, it will be detected by the American satellite (Charge Composition Explorer- CCE) as it analyzes the makeup of the charged particles around it.

Dr Mario H. Acuna, the Goddard project scientist, said that lithium was chosen for the AMPTE experiment because "the solar wind contains little natural lithium and it becomes, in effect, a marker dye for this experiment." Acuna added that another reason for selecting lithium was that "it ionizes very slowly and forms a very dilute dye which paints a large area of the magnetosphere."

"Bow Shock" Formed

Scientists know that the solar wind forms a shock wave (the "bow shock") around the front of the Earth's magnetic field and arranges it into a blunt, bullet-shaped region. Additional data should help them better understand the Sun-Earth relationships in yet another step in the peaceful exploration of outer space.

With all three satellites' systems in a "go" condition for the first lithium release on September 5, a "full dress rehearsal" — which could have been declared an official start for the experiment — had to be postponed because, according to Ousley, "the turbulent conditions of the solar wind and the disturbed state of the Earth's magnetic field were not favorable for a successful experiment." Scheduled releases on September 7, 9 and 18 also were postponed for the same reasons.

Perhaps the most spectacular sight of the near-Earth space experiment will come when the world's first artificial comet is formed by the release of a cold, dense barium cloud into the solar wind on the dawn flank of the Earth's magnetosphere.

The comet will be viewable in the western U.S. and parts of the Pacific, including Hawaii, for about 10 minutes before sunrise in late December this year.

The three AMPTE satellites were launched in a stack aboard a Delta rocket from Cape Canaveral Air Force Station, Florida on August 16, 1984.

Mail your story to the Goddard News, Code 202, or call the Editor at

344-8102

Structural Analysis

Space Shuttles offer new, varied challenges

The Space Shuttles present new challenges for payload analyses because previous spaceborne experiments were launched by expendable rockets — the orbiters being manned, reusable vehicles dictates that analysis be made for activities during launch, orbit and landing.

Previously, analysts didn't have to consider the varied payload configurations required by the Shuttle and the Johnson Space Center in Houston, Texas, NASA's manned flight center.

"Whereas before we only had to consider the requirements for a relatively simple expendable rocket launch, we now have to determine the requirements for payload safety and success via a Shuttle carrier," said Steve Brodeur, a Goddard structural analyst for Shuttle payloads in the Mechanical Engineering Branch, code 731.

"JSC decides where payloads will fly on the Shuttle," he said. Therefore, we must analyze for a number of cargo bay locations and design the payload accordingly.

Most of the analysis is done prior to launch. Months before any Shuttle flight, mission officials review plans to determine what changes, if any, should be made to ensure a smooth flight and mission success.

Structural analysis featured prominently in the success of the Solar Maximum Repair Mission and possibly prevented failures or anomalies.

SMRM Design

For example, during a SMRM review cycle Goddard analysts decided that using one OMS engine, rather than two as originally planned, would suffice to support the SMM orbit altitude reboost maneuver. Using two OMS engines would have overloaded the SMM's Flight Support System in the cargo bay.

"The consequences of such an overload most likely would have been the jamming of the release mechanisms and the possible failure to release SMM into its new orbit, or, less likely, SMM could have come loose and damaged itself or the orbiter," said Mike Weiss, also of 731, who worked closely with the SMRM.

"Our job is to make sure nothing breaks and to make sure it works," he explained. Before we fly our payloads, we have to be sure that they can withstand all probable loading situations."

Simply put, this type of analysis determines the most appropriate structural configuration to ensure payload safety and success, he said.

Brodeur said Goddard has analytical capability from end-to-end — "from payload design to the impact the Shuttle landing has on our experiments."

Goddard's in-house STS payload structural capability covers design, launch, orbit and landing operations as well as fracture control. Fracture control analysis ensures payload safety despite the possibility of an initial crack in the particular experiment.

Additionally, Brodeur said fracture control is new: "We've never had to include fracture control in our design before . . . it's generated a lot of interest, too."

Rapid turnaround of analyses is the biggest advantage of the Center's in-house capability. This allows quick design and load determination, incorporation of fracture control in the design process, supporting other in-house projects, checking or augmenting contractors' analyses and assessing the impact of payload design changes.

Further advantages include the reduced cost of analysis compared to industry; retaining the ability to develop analytical procedures suited for Goddard payloads; and providing safety verifications documentation for JSC safety reviews.

Goddard scientist to conduct radar experiment in Bangladesh jungle

Bengal Tigers by Land, Sharks by Sea—A Scientist Becomes an Endangered Species

Marc Imhoff is a young Goddard scientist who will conduct an experiment with the STS 41-G Shuttle in October. And although he won't be in orbit with the astronauts, he's probably facing almost as much danger.

The 30-year-old agronomist and physical scientist will be deep in the jungles of Bangladesh during that mission, where he will conduct Shuttle Imaging Radar experiments to determine vegetation penetration and flood boundary delineation using L-band radars.

And while his interest will be on his experiment, his concerns are going to be more with Bengal tigers, huge snakes, sharks, alligators and mosquitoes.

Dangerous Animals

Because of the tigers, he and his party of eight (including four armed guards) will build tree houses and tiger fences; because of the snakes, they will build a barrier of carbolic acid; because of the mosquitoes, they will surround themselves with netting and gulp anti-malaria pills like they're going out of style.

Imhoff, a native of Butler, Pa., and a graduate of the Pennsylvania State Univer-

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BANGLADESH BOUND — Marc Imhoff holds the on/off switch which activates the radar calibrator for his L-band transponder, an electronic version of the corner reflector to be used in his Shuttle Imaging Radar experiments. Imhoff is the Goddard principal investigator in the project, which seeks to determine vegetation penetration and flood boundary delineation using L-band radars.

Jungle

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sity (M.S.), has been in Bangladesh on two previous occasions, in February and in June of this year.

"I haven't seen a tiger yet," he explained happily, "but I have several news clippings from my last trip. One tells how tigers killed four woodcutters. Another tells of how a young girl was dragged off by a tiger while she was picking flowers outside her village, and the other one tells about five people—three of whom later died—being mauled by sharks.

"The message there, as I read it, is 'if you're being chased by a tiger, don't jump in the river. The sharks will get you there!' "

Conducting the experiment in the inhospitable Sundarbans Forest, the world's largest mangrove forest with 4 million acres, not only is dangerous, it is difficult as well.

Jungle Trip

To get to his location in the jungle, Imhoff will fly to Dhaka. There, he will be joined by a British colleague from the British Overseas Development Administration, two people from the Bangladesh Space Research and Remote Sensing Organization and four armed Bangladesh guards. After organizing their food stores and other needs, they will board a 100-year-old British paddle steamer for a 24-hour trip down the Ganges River to Khulna. There, they will transfer their equipment to speed boats, pick up five to 10 Bengali laborers to help prepare the experiment site, and travel two more days over water to their jungle site at Sundarbans.

At the site, with the guards watching over it, the group will build its protective fences and barriers and construct its tree houses. Then, it will place radar reflectors, which are being built by Bengali craftsmen, and American made L-band transponders on the jungle floor beneath the tree canopy and others in the open, for radar signal calibration and attenuation measurement purposes. The trihedral, steel radar reflectors have six-foot edges and weigh about 80 pounds.

Radar Experiment

During its eight-day mission, scheduled to begin October 1, the STS 41-G Shuttle will transmit radar signals which will be reflected at the jungle site and sent back to the Shuttle where the data will be collected. The experiment is designed to determine how capable radar is in measuring vegetation, flooding, and other surface phenomena through a forest canopy.

If the results are positive, the experiment could pave the way to much improved methods of vegetation and hydrological mapping, mineral exploration, even archaeological locations, according to Imhoff.

On the ground, Imhoff and his associates will make other measurements, such as canopy closure, tree classification and foliage density.

In addition to the dangers of the waters and the jungle, Imhoff worries about food poisoning.

"That's a serious problem over there," he explained. "And it's a problem we haven't quite worked out yet.

"To give you some idea of what I mean—the chef on that British steamer sharpens his knives on the ship's metal stairways. Those are the same stairs that everyone travels over in their barefeet. That's not exactly appetizing."

What makes things even worse for Imhoff is that the Shuttle's passes all will be in the middle of the night. That will give the animals an advantage he doesn't exactly find too appealing. But he hopes he'll be able to stay high enough in the trees to stay clear of danger.

Some think he'd be a lot better off aboard the shuttle!

Co-investigators chosen for Space Infrared Telescope Facility

NASA officials have selected six Goddard scientists as co-investigators in the Science Working Group (SWG) for the Space Infrared Telescope Facility (SIRTF), the next generation Earth-orbiting observatory for infrared astronomy.

The SWG has six principal investigators and 28 co-investigators, chosen after a review of proposals solicited from the scientific community in 1983. Investigators were sought in three different categories — focal plane instrument, facility and interdisciplinary.

Goddard members of the SWG are: Drs. Daniel Gezari, Gerald Lamb, Peter Shu, Gordon Chin, Robert Silverberg and John Mather. They are among the co-investigators with Dr. Giovanni Fazio, principal investigator from Smithsonian Astrophysical Observatory, Mass. This group will conduct focal plane investigations for the wide field camera.

Other principal investigators are: Dr. James Houck, Cornell Univ., Ithaca, N.Y., infrared spectrometer; Drs. George Rieke and Frank Low, University of Arizona, Tucson, multiband imaging photometer and facility investigators respectively; and Drs. Edward Wright and Michael Jura, University of California, Los Angeles, interdisciplinary.

The SWG, along with the Ames project team, will help guide the detailed definition studies for the observatory and the instruments. NASA's Ames Research Center has project responsibility for the SIRTF.

The SIRTF will be used to study a variety of objects ranging from solar system dust around nearby stars to forming galaxies at the edge of the known universe. The SIRTF's sensitive infrared observations will advance our understanding of many important astronomical problems.

The SIRTF will build upon the results of the recently expired Infrared Astronomical Satellite (IRAS), which successfully carried out the first all-sky survey at infrared wavelengths.

During its 300 days of operations, IRAS made many discoveries, including seven comets, a ring of solid material around the star Vega and bands of dust around the sun and between the orbits of Mars and Jupiter.

The SIRTF will be about 1000 times more sensitive than IRAS and will study a range of infrared wavelengths which extends almost ten times farther in each direction than that observed by IRAS. SIRTF's spectral resolution will be between 100 and 1000 times that of IRAS. SIRTF also will have much greater capability for providing images of infrared sources with fine spatial detail.

Presidential Visit

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SHUTTLE BACKGROUND—Mock-up of the Shuttle payload bay looms behind the President as he lauds NASA and Goddard for contributions in technology. Mock-up of Solar Max spacecraft hangs above the payload bay.

Milestones Achieved

But as mission events developed, the President continued praising Goddard for milestones already achieved. For example, the Human Tissue Stimulator. The H.T.S. sends electrical impulses to the brain through wire leads to targeted nerve centers or particular areas of the brain, providing relief from pain and stopping unwanted, involuntary motion.

"I'm happy to point out that H.T.S. was sponsored by the Goddard Space Center," the President said.

The H.T.S. was one of seven technology exhibits the President saw while at Goddard. Other exhibits were: Landsat, a satellite which aids in the discovery of Earth's resources, in the determination of flood threats and control and in the monitoring of agriculture; the Get Away Special, which offers schools, businesses and individuals low-cost opportunity to fly scientific experiments packaged in canisters in the Shuttle's cargo bay; a hand-held X-ray machine; the Programmable Implantable Medication System, which administers medication automatically within the body; a new, lightweight protective garb for firefighters, which offers heat protection for longer periods; and a new commercial tuna net, produced from work be-

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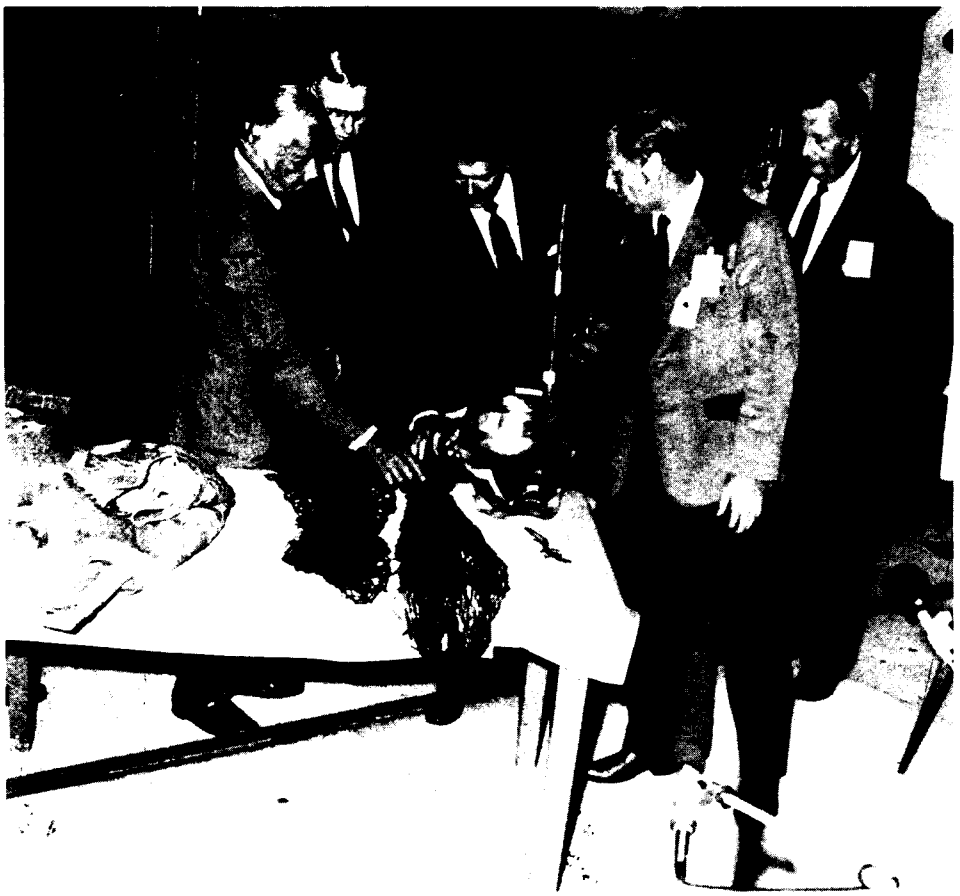
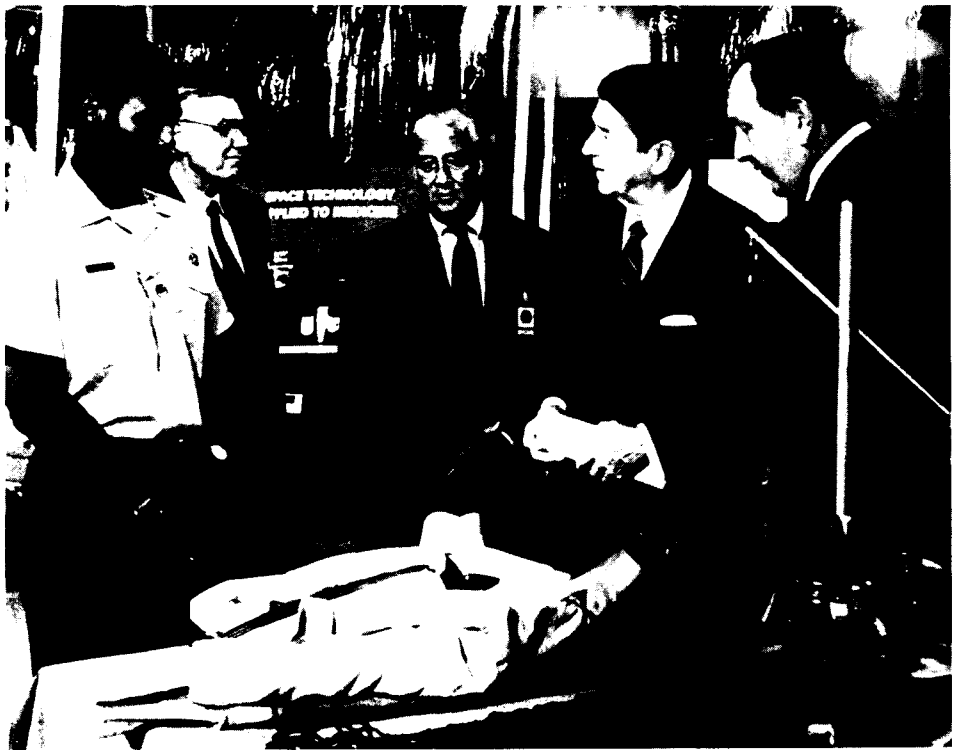


ADVANCED TUNA NET—Bill Kirkland (right), President of West Coast Netting, Inc., in California, explains advantages of a new tuna net developed by his company as a result of NASA research. Looking on are Senator Charles Mc. Mathias (R-Md.), NASA Administrator James M. Beggs, and Donald Friedman, Goddard Technical Utilization Officer.



PROTECTIVE GARMENT—Fire Technician Darrell Odom of the Prince George's County Fire Department exhibits a new lightweight protective garb for firefighters which resulted from NASA research and development.

PRESIDENTIAL GIFT—Goddard Center Director Dr. Noel W. Hinners and President Reagan display commemorative scene depicting the Solar Maximum Mission repair on STS 41-C last April. The gift to the President was fashioned by Goddard glass artisan Bob Harris whose unique glass-blowing talents showed the Shuttle, the Solar Max spacecraft and an astronaut in a manned maneuvering unit. Looking on from left to right are Dr. Lo I Yin, of Goddard, who developed the hand-held X-ray device; Deputy Center Director John J. Quann; NASA Administrator James Beggs; Janet Sayre, a local high school senior; and Darrell Odom, Prince George's County fire technician.

FAREWELL WAVE—President Reagan waves goodbye to Goddard employees as he boards his helicopter, Marine One, following his visit to the Center.

Mike Comberiate, fast-moving Goddard engineer, spreads the word: hand stands, smile and personality sell NASA and USA around world

A WORLD OF REMEMBRANCES—Mike Comberiate sits among some of the items he has collected in making what has been the equivalent of going around the world four times.

To most of us, a vacation is a period of relaxation . . . a time to get away from everything and to enjoy the luxury of simply lolligagging.

Then there is Mike Comberiate. Comberiate is a 36-year-old systems engineer at Goddard (Code 407). For the past several years, the dark-haired, bearded native of the Washington area has spent his vacations traveling the world.

Unquestionably, he enjoys a keen desire to see the world. But his motivation goes far beyond personal satisfaction. On no less than what would amount to four trips around the world, Comberiate probably has done more to sell the United States and NASA to a more diverse group of people than any other individual in the world.

In simple terms, he's a NASA Pied Piper who plays the tune of America's achievements in space to whomever will listen wherever they might be. He's a one-man public relations blitz who has the courage to face up to unknowns, the willingness to sacrifice time and money and the determination to go to almost any length to explain to the world that America's space program is, indeed, "for the benefit of all mankind."

Determined Dreamer

A dedicated American, a devoted NASA employee and, if you will, a determined dreamer who sees that those dreams come true, Comberiate just recently returned from a trip to Red China, Russia and Finland at his own expense. Among the things that took place on his journey were:

1. A 6,000-mile, 6-day train trip from Beijing to Moscow cramped in a compartment with a Mongol who not only did not speak English, but stayed joyously drunk on vodka most of the trip; and
2. Encirclement by police in Red Square in Moscow who confiscated his camera film.

The train trip almost found him being left at the train station 1,000 miles from nowhere. He had gotten off the train at Krasnoyarsk to look for a postage stamp. The next thing he knew, the train was moving out.

"I made a 100-yard dash that would have made Jesse Owens proud," the young engineer explained. "On Russian trains, they don't warn you with a whistle or shout 'all aboard,' either. They just leave. As magnificent as Siberia was, I really didn't want to stay there."

Known for his friendliness, Comberiate had become a friend of many on board by the time they arrived in Moscow. His Mongolian cabin mate was even making enough sense in sign language to let the American know that he was offering Comberiate some of his food.

Food Offer

"It was a nice gesture," Comberiate explained, "but it was all covered with flies, and my appetite sort of disappeared."

Comberiate, who has been a karate instructor at Goddard for years and currently is president of the Center's karate club, is also a gymnast. He's made many friends on these trips by doing handstands in the most unusual places . . . on the pyramids of Egypt, the great wall of China and the South Pole, to name a few. The handstands often collect a crowd and conversation.

He also takes along all kinds of NASA space program souvenirs, decals and other handouts for "special" people he meets.

In China, he lectured on NASA and on the Antarctic at the invitation of Professor Cao Chuanjun, the President of the Beijing Institute of Aeronautics and Astronautics (BIAA).

He had expected to lecture at BIAA for one day only, but ended up cancelling some planned tours to give more lectures.

Chinese Respect

"The Chinese have a tremendous respect for America and for American space technology," the Goddard systems engineer explained. "The cultural revolution suppressed education in China for a decade, and now, technical specialists from other countries are invited to China to lecture. We were all treated like VIPs. I presented non-classified lectures on my spacecraft systems engineering experiences at NASA, along with some colorful material provided by the Public Affairs Office. The faculty couldn't believe the enthusiastic responses from the graduating seniors."

In Moscow, Comberiate met a Russian engineering student who spoke English and dressed like a tourist. From Red Square, through the streets and subways, they

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COMBERIATE—*Continued from Page 8*

toured the city for a day. The young Russian even flagged down a metro bus. The driver finished his route and then drove them all over the city on request. The American would flash postcards of places like Yuri Gagarin Square, and off they'd go. That bus driver now has a few Shuttle decals on his dash.

"My friend really wanted to look like an American," Comberiate said. "He wanted to trade shoes, shirts, pants, anything—with the right clothes he wasn't worried about any police taboos.

"In the end, I gave him the Shuttle T-shirt I was wearing. Later, we walked into a 'tourist-only' hotel shop, where I also bought him some Russian-English dictionaries."

Moscow Downer

"The only downer in Moscow," he noted, "was getting my film confiscated in Red Square for doing a handstand. The sign forbidding it was in Cyrilic and I couldn't read it!"

He had an opportunity in Leningrad, however, that made up for that embarassment. He swapped places with his cab driver and got to drive around that beautiful European-type city, known as "Venice of the North."

In Helsinki, Comberiate visited a huge Russian space exhibit, which included a full-scale mockup of the Soviet 30-meter space station. When the exhibit director learned that he worked for NASA, he was given a personal tour from end to end. Serendipitously, the Russian and Finnish astronomers and exhibit guides gathered in an auditorium to hear one of Comberiate's lectures on the "History of NASA."

There, he found meaning in the saying "it's a small world." On meeting the Russians, an astronomer named Olga Sluzhnevsnaye, turned to Comberiate and asked: "Do you know Jaylee Mead? I'm going to see her in Russia this fall."

Dr. Mead, of course, is a NASA astronomer at Goddard, where she also is Assistant Chief of the Laboratory for Astronomy and Solar Physics.

The 190-pound Comberiate won his B.S. and M.S. degrees at the University of Maryland. He's been at Goddard for 15 years.

Record Traveler

He started roaming the world in 1980. That year, he went 60,000 miles, going to 30 places in 20 different nations—all in 30 days. To accomplish that record, he was on 37 flights covering 120 hours that zigzagged across the Equator and International Dateline to six continents.

In 1981, he went to Alaska and the Arctic.

In 1982, he took his 93-year-old great uncle, Anthony Gardella of Washington, DC, on a whirlwind tour of the United States. They moved from one coast to the other six times and visited Las Vegas, Miami, the Grand Canyon, Philadelphia and then, for good luck, witnessed the launch of a space shuttle at the Kennedy Space Center.

In 1983, he went to Western Europe and took his great uncle along again. This time, his uncle was a year older and in a wheelchair. Comberiate pushed that wheelchair and his uncle up to 11 and 12 hours a day through 11 countries in 17 days.

Traveling along, Comberiate also went to the Antarctic in 1983, leaving an emblem of NASA's Pioneer 10 mission smack-dab at the South Pole.

Simple Address

In his travels, Comberiate has built up a flock of friendships that he cherishes highly. He dutifully maintains communications with them. He is so well known by the Postal Service that any letter addressed "Mike, 20777, USA" gets delivered to his door.

"That's what I give the people," he said, "because it isn't complicated."

When asked, "What happens next?" Mike has the answer. He plans to lead a team to the South Pole to set up the first satellite tracking and data relaying ground station on the ice. "On the way home I plan to meet my fiancee, Karla Jacob from Pittsburgh, PA, in Queenstown, New Zealand and marry her there. She's the only one I've found who would have me. So, from then on, we'll go for it together!"

As yet, he has not received any official recognition for this outstanding sales campaign for his Nation and his agency. But that doesn't seem to be a priority of his.

When one has the determination and courage he has, and when one has a steady handstand and a mile-wide smile that are known the world over, the best recognition in this world is simply a friendly letter or a card to:

"Mike, 20777, USA"

WORLDLY WALK — Mike Comberiate literally walks around the world on his hands at the South Pole.

ERBS

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region on Earth minus the amount it sends back into space.

The land, water and air around us are natural balancers of Earth's radiation budget as they absorb solar radiation, emit back thermal radiation into space and move energy from one area of the globe to another. Measurements indicate that on an annual average the Earth is almost in thermal equilibrium: the amount of shortwave radiation it absorbs from the Sun is balanced by the amount of thermal longwave radiation it gives off to space.

The budget surplus occurs in the tropics; the deficit, in the polar regions — both conditions due to differences in Sun angle, cloud distribution and surface reflectivity. The near-balance in the radiation budget is reached as the atmosphere and oceans move the excess energy of the tropics to the energy-short polar regions.

Three Scientific Instruments

The ERBS will measure this complex process with its complement of three scientific instruments. Two of the instruments, the ERBE Scanner and ERBE Non-Scanner, are designed to measure the radiation budget and the solar constant. The third instrument, the Stratospheric Aerosol and Gas Experiment II (SAGE II) will monitor the distribution of aerosols (ultramicroscopic liquid or solid particles suspended in the air), ozone, water vapor and nitrogen dioxide in the stratosphere. This is the region of Earth's atmosphere that begins above the clouds at about 12km (7.5mi) and extends upward to about 50 km (31mi).

Later, two TIROS-class satellites of the National Oceanic and Atmospheric Administration will carry a like set of ERBE instruments into near-polar, Sun-synchronous orbits of 830 km (516 mi) in altitude. The data provided by these satellites, the NOAA-F (set for November, 1984 launch) and NOAA-G (due for launch in late 1985 or early 1986) will complement that gathered by the ERBS.

The NASA Office of Space Science and Applications oversees the ERBS program under the management of Dick Diller; NASA/Goddard Space Flight Center is directly responsible for the overall project management as well as the space segment development. The Goddard project manager is Carl Wagner; and NASA/Langley Research Center has systems responsibility for the three instruments and science data reduction. The instruments manager is Charles V. Woerner.

HE'S GOT LEGS — Modern ingenuity can move a guy up in the world. An employee from a construction company shows how an old concept can be applied to today's work as he remodels the ceiling in building 8. Stilts are usually wooden and used in the circus. These stilts are mostly aluminum except the rubber soles and the straps around his calves and shoes.

Call for docents

Got some spare time with nothing to do? Or maybe you'd like to take some time to do something constructive and enjoyable. How's about learning to inform people about NASA, about Goddard's role in the agency and in the community and about the space program in general. TIME'S A WASTIN'! Now's your chance to become a docent at our Visitor Center.

Goddard's Public Affairs Office is looking for adult volunteers to conduct general tours at the Visitor Information Center.

Since its inception in 1976, Goddard Space Flight Center's Visitor Center, Greenbelt, Md., has attracted thousands of neighbors and tourists. But we'd like for you to help us accommodate even more visitors. We are looking for volunteers to help us in explaining Goddard's mission and our Visitor Center's exhibits.

Volunteers must be at least 18 years old and U.S. citizens. Volunteers must be prepared to spend at least four hours per day one day per week. Interested parties should write: Darlene Ahalt, Volunteer Program, Code 130, Goddard Space Flight Center, Greenbelt, MD 20771, or call 344-8101 for applications.

Once accepted, volunteers will be expected to attend training sessions.

President Reagan

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tween West Coast Netting, Inc. and NASA. The net allows larger catches.

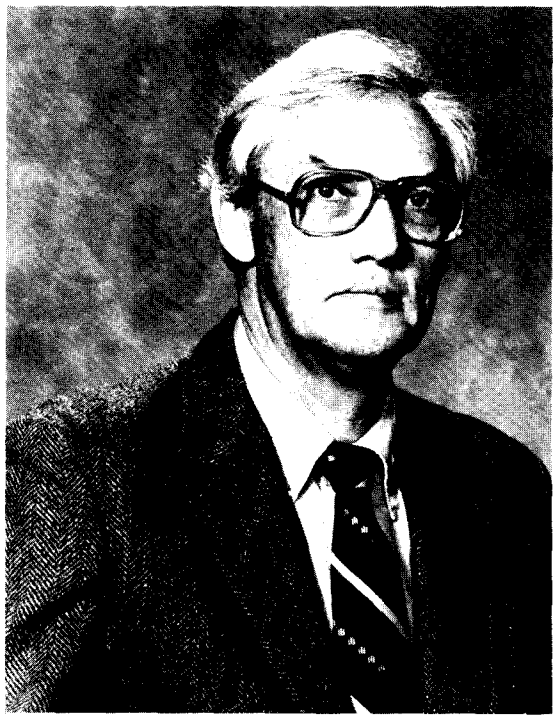
The President said putting a price tag on these benefits would be difficult and that each breakthrough paves the way for even greater achievements which might have been considered unthinkable years ago.

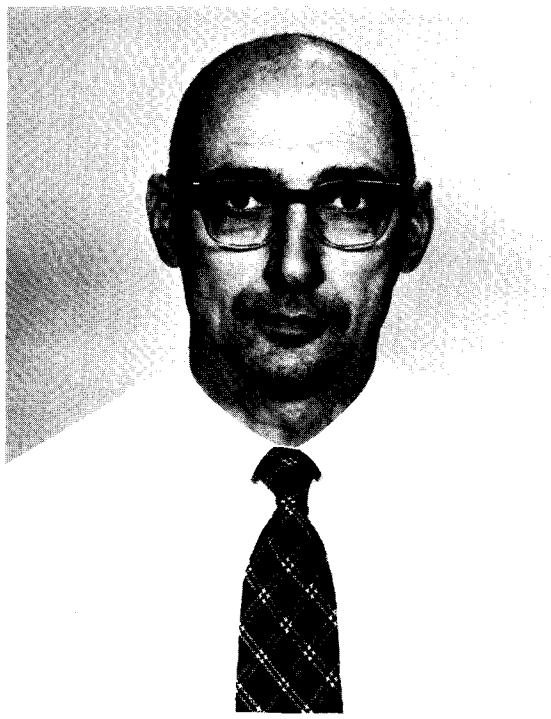
President Reagan's visit was the second presidential visit at Goddard since 1970 when President Richard M. Nixon came to the Center during the Apollo XIII mission.

Center Director Noel W. Hinners presented the President with a glass-blown scene which depicted the historical (SMRM) last April. Goddard played a crucial role in that mission. The scene, encased in a mahogany frame, included the Earth in the foreground with the shuttle hovering in the background, while an astronaut equipped with a jet-powered backpack approached the solar observatory. The SMRM marked the first time a shuttle was used to repair an orbiting spacecraft.

LOCAL STUDENT MEETS PRESIDENT—Dr. Vincent Salomonson, Goddard's Chief, Earth Survey Applications, introduces Janet Sayre of Roosevelt High School to President Reagan during the Chief Executive's visit at the Center on August 30. Sayre explained how her experiment with round worms in space will work. Her experiment, a Get Away Special, will fly on a future Shuttle mission. From the left: NASA Administrator James M. Beggs; Senator Charles Mc. Mathias (R-Md.), and Goddard Center Director Dr. Noel W. Hinners.

Key Appointments





KEY APPOINTMENTS — Drs. George Pieper (l) and Leslie Meredith have been named Center associate directors. Pieper formerly was assistant director for Policy Planning and Development, and Meredith formerly was director of Applications (code 900). Pieper now is responsible for the Center's research and technology programs, advanced technology programs, University relations, DOD interfaces, Director's discretionary fund and policy planning and development. Meredith's new duties include meeting the Center's project and other commitments, optimizing usage of Center facilities and manpower and development of long-range plans.

STDN AWARD

PERFORMANCE AWARD—Employees of the Bendix Field Engineering Corporation's (BFEC) Spaceflight Tracking and Data Network (STDN) Operations Support Team at the Goddard Space Flight Center (GSFC), Greenbelt, Md., have been awarded the Lawrence A. Jochen Memorial Award for Outstanding Performance. John P. Gale, BFEC STDN deputy program manager, presents the award at Goddard to M. Edward Briggs, BFEC operations group manager. Attending the award presentation are (from left) Edward J. Danko, Head, Networks Operations Control Branch, GSFC; Gale; Briggs; Jul S. Scarborough, NOCC Operations Shift supervisor, Network Operations Control Center; Jeanne Burley, NOCC Documentation/Librarian, Operations Scheduling; Glen A. Barbro, Ground Support Manager, Operations Assurance; Thomas W. Morris, Network Operations Manager, Mission Operations; and Melissa L. Blizzard, NST Data Engineer, Network Support Team.

Navy Tests Rocket at Wallops Facility

The VANDAL Vehicle blasts off during a recent operational firing from Goddard's Wallops Flight Facility (WFF), Wallops Island, Virginia. The Navy plans to use the VANDAL as a target missile for test and evaluation of their AEGIS, the new Navy surface warship defense system. AEGIS is a sophisticated radar and fire control system which can track up to 200 targets while firing missiles at enemy targets. It will be installed on guided missile cruisers and destroyers. Ship-based operational AEGIS systems are planned to begin testing with VANDAL offshore of WFF as early as January, 1985. The objective of these operational firings from WFF, which began in August, 1984, is to evaluate VANDAL assembly, handling and launch procedures; evaluate the launch complex and launch control equipment; evaluate blast effects of a low angle launch; and evaluate the ability of WFF instrument systems to track and control the VANDAL. The VANDAL test firings will be conducted at very low elevations and will fly as low as 50 feet or as high as 70,000 feet above the water's surface.

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