

INAUGURAL PARADE—At the request of the State of Maryland NASA/Goddard was featured on the official state float during President Carter's inaugural parade. William P. O'Leary of the Office of Public Affairs kept warm in an astronaut suit as he stood beside the Explorer 10 satellite.

Public Service Satellite Consortium Meets at GSFC

Robert Mott, Vice President of the Public Service Satellite Consortium, addressed members of a December meeting of prominent physicians, educators, clerics, and public administrators at Goddard. The national meeting was conducted to exchange ideas on public service communications satellite concepts required to meet future needs. The meeting of about 175 people was introduced by Goddard Director Dr. Robert S. Cooper and was addressed by NASA Administrator Dr. James C. Fletcher. "The obvious and exciting versatility of satellite communications today challenges us to take a fresh look at its potential for public service and to act to exploit that potential," stated Dr. Fletcher.

Other speakers included Mr. John Wilhelm, Project Director of the recent Agency for International Development's AIDSAT global communications experiment with Goddard's ATS-6; Mr. Wasyl M. Lew of NASA Headquarters's Communications Program; and Al Whalen of GSFC's Communications and Navigation Division.

The Public Service Satellite Consortium is a private organization formed to provide a mechanism for effective use of telecommunication for the public service. The meeting at Goddard was designed to explain communications satellite capabilities to potential users.

Valley of the Cobras

When John Maruschak of Goddard's Telecommunications Systems Branch and his adventurous cohorts volunteered for foreign duty involving AIDSAT they anticipated offbeat experiences, but certainly none as spine-tingling as one that occurred in a part of Pakistan called the "Valley of the Cobras."

Here's how John describes it:

"A part of our duties during the AIDSAT project was the setup and take-down of the transit and receive terminal in each country, which included the assembly and disassembly of the segmented antenna. In Islamabad, the antenna was erected near the Embassy auditorium on a wooden platform above a long hedge and adjacent to a large area of lawn. We had seen a large lizard in this area and noticed numerous holes in the lawn and wondered what type of animal had made them. Connecting the segments of a ten foot antenna requires a little maneuvering so we did it on the lawn where there was plenty of room and we knelt and leaned and laid on our backs to tighten some of those hard-to-reach screws.

Near the end of our stay in Pakistan, we learned that the Embassy was built in a cobra nesting area, that the holes in the lawn were entrances to the nests and we realized that we had done our antenna gymnastics in the Valley of the Cobras.

One evening at the American Club on the Embassy compound, an Embassy official told us about the former occupant of his office and that this man had reported on numerous occasions, seeing a snake in his office on the third floor of the American Embassy building. Subsequent searches of the room revealed nothing and nothing was done about it. Finally, at his insistence, the carpeting in his office was pulled up to reveal a nest of cobras. During the next few days, as we worked in and walked around the Embassy, and jokingly warned each other to avoid stepping on a cobra, the story would periodically come to mind and inspire me to exercise a little extra vigilance."



NEW COMMUNICATIONS EQUIPMENT—Bendix Field Engineering Corporation employees at Goddard are using the latest communications equipment in providing support to NASA's worldwide Spaceflight Tracking and Data Network (STDN). The new equipment called DATASPEED 40, which is manufactured by the Teletype Corporation, is being used in the Goddard Network Operations Control Center (NOCC). In the initial configuration the DATASPEED 40 equipment replaces six standard Model 28 Teletype machines and is capable of transmitting messages in excess of 300 words per minute and can receive message traffic at a rate of 1200 words per minute. The new equipment features a cathode ray tube display and has a tabulator capability which speeds up message corrections.

Powerful Gamma Ray Bursts Come from Outside Solar System

Powerful bursts of energy have been detected by satellites in the past few years that have been speculated to originate from everything from black holes to supernovas in and out of our galaxy. Both X-Ray and gamma ray bursts have been observed raising much controversy in scientific circles about their sources.

In a paper presented at the American Geophysical Union Conference in San Francisco, December 6-10, the first satellite experiment designed to detect gamma ray bursts provides some important conclusions, according to Dr. Thomas L. Cline, of Goddard's Laboratory for High Energy Astrophysics.

Data from the Helios-2 spacecraft shows the gamma ray bursts do not come from the Earth's vicinity or from anything in the solar system.

He says that examination of the Helios-2 data, the first spacecraft to measure these bursts at great distances from Earth, in comparison with "inadvertent" gamma ray measurements made by a few Earth-orbiting satellites, conclusively show the powerful bursts originate either in or outside our galaxy. Gamma rays are the most powerful energy source known in the universe.

Could they come from super nova, stars bursting apart in gigantic explosions that would obliterate our solar system in seconds?

Are they dying stars the size of our Sun that have collapsed to themselves with such powerful gravitational pull that they somehow produce gamma rays?

Do they come from stars being born in a congealing of interstellar dust and gas which will finally erupt in a mighty hydrogen furnace or new Sun?

Are the bursts coming from neutron stars, a large star that has collapsed on itself but emits light and other energy? Or could they somehow be coming from the much discussed black holes which theoretically emit no light or other energy because their gravitational pull is so immense that not even light can escape? The extremely dense mass of a black hole would be so heavy that a teaspoon would weigh as much as New York City.

The answers to these questions will come in time as satellites continue to collect data on the bursts, according to Dr. Cline.

He explains how he arrived at his conclusion:

Because Helios-2, which "skims" as close as about 30 million miles to the Sun, can take programmed measurements far away from Earth, he was able to compare these data with the random data picked up by satellites in Earth orbit. These are satellites not equipped to zero in on gamma rays, but nevertheless capable of recording the powerful gamma bursts from time to time. Comparison of both measurements show that the bursts appear the same far from the Earth as they do near it; thus they came from outside the solar system. Times of flight of the gamma rays between the two stations give narrow celestial source bands to compare with the positions of candidate sources.

But to pinpoint actual sources of the gamma rays he says it will be necessary to fly gamma ray detectors on a spacecraft going to other parts of the solar system for a triangulation base. Pioneer Venus, scheduled for launch to Venus in 1978, will carry such instrumentation.

ATS-1 Still Meets Public Service Needs

A ten-year-old NASA satellite with a design life of three years is still serving the medical emergency communications needs of remote Alaskan peoples as well as relaying educational materials to university students through the Pacific area.

When launched on December 7, 1966, the Applications Technology Satellite-1 (ATS-1), heralded a new era in the application of space technology to areas beneficial to man. For the first time, a single spacecraft carried instruments for combined research in communications, meteorology, aerospace engineering, and science.

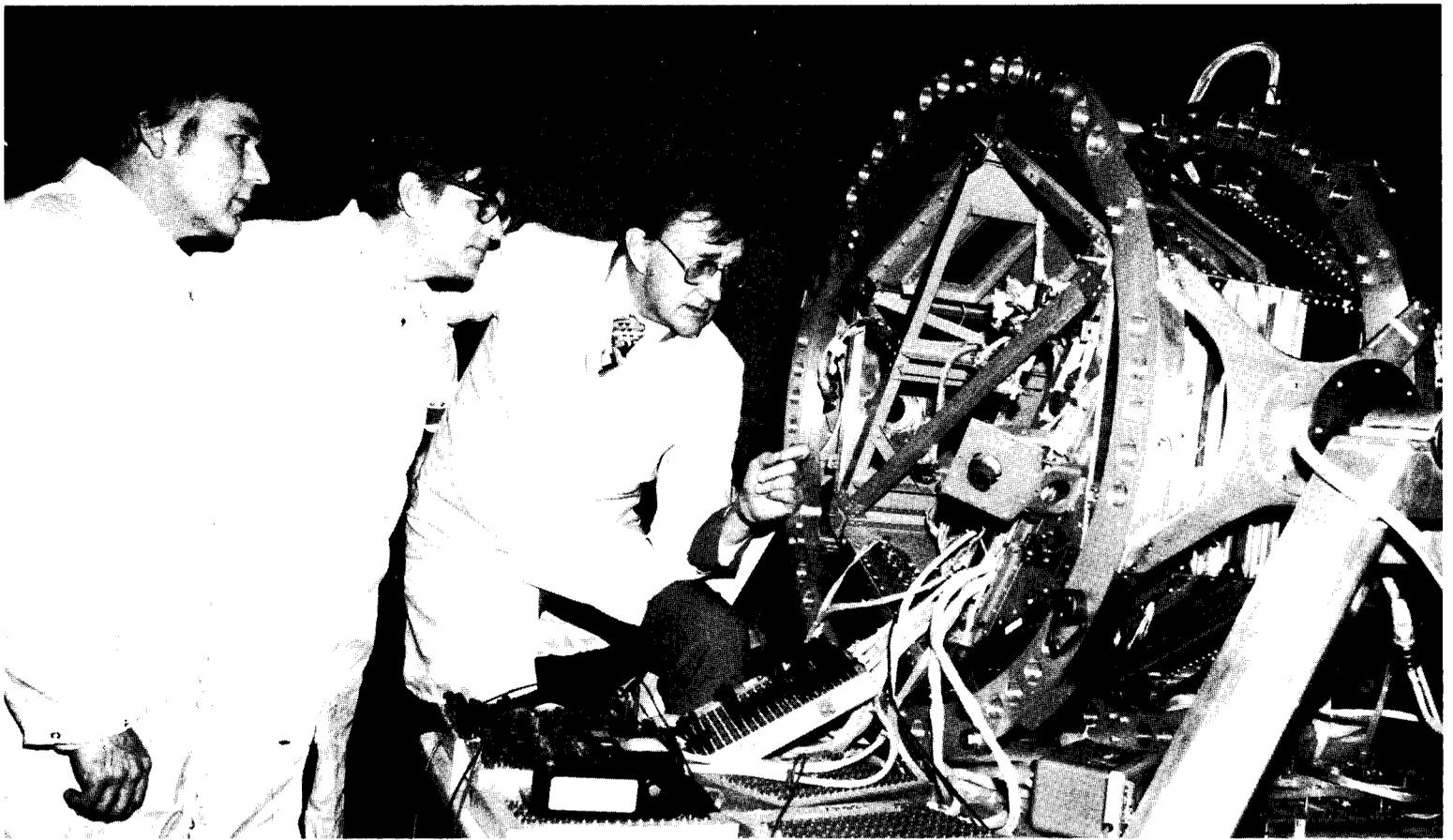
"Although this versatile satellite has already exceeded its design life three times over, it is still being operated eighteen hours a day and potential users are standing in line," said Richard L. Moore, ATS Missions Operations Manager Goddard.

In its synchronous orbit some 35,680 kilometers (22,300 statute miles) above earth, the ATS-1 matches the earth's rotational speed. The 352-kilometer (775 pounds) satellite thus remains stationed over the equator at a point south of Hawaii until commanded to move. From this perch, ATS-1 views the Pan Pacific area, including Alaska and the contiguous United States.

Doctors in Anchorage and Fairbanks, Alaska, are linked via the ATS-1 with paramedics or nurses in remote villages and areas where the sick or injured are without modern medical facilities. Called "Doctor's Call," this vital program is administered by the state of Alaska.



LANDSAT II photographs ice-choked Chesapeake Bay, January 15, 1977.



THE HEART OF NASA's first Applications Explorer Missions (AEM) satellite grasps the attention of Goddard officials visiting Boeing Aerospace Company, which is fabricating the satellite's base module. The spacecraft, to be launched in April 1978, will perform a heat capacity mapping mission, measuring the Earth's surface temperatures and allowing scientists to determine such things as mineral resource locations, soil

moisture effects and snowfield runoff predictions. T.K. Freeman (right), Boeing's AEM project manager, describes subsystem integration work to Carl Wagner, Jr., Goddard AEM project manager (left) and William Schneider, Goddard Director of Projects (center). Boeing also is building a base module for AEM-B, a stratospheric aerosol gas experiment, to be launched in March 1979.

Another Piece of Global Climate and Ozone Jigsaw Puzzle Slipped into Place

Another piece of the global climate and ozone jigsaw puzzle has been slipped into place as a result of a series of aircraft flights probing upper altitudes, 18,000 meters, (60,000 ft.), from Alaska to Argentina from January to May in 1974.

The experimenter, Ernest Hilsenrath, of Goddard's Atmospheric and Hydrospheric Applications Division, in a paper he presented at the American Geophysical Union meeting in San Francisco December 8 says for the first time water vapor has been mapped in northern and southern latitudes in the lower stratosphere.

What this means, he says, is that we now have information on the transport and distribution of water vapor from the tropic areas of the higher latitudes as well as vertically to the stratosphere. This knowledge is important to the understanding of the Earth's ozone layer and possibly climate. Ozone transport and distribution from lower and higher latitudes is believed to behave in much the same way as water vapor.

There have been previous studies of water vapor in the stratosphere but they have been by short aircraft or balloon flights returning no data on latitudinal transport. However, Mr. Hilsenrath, points out that the 1974 flights at altitudes from 13 to 19 kilometers (7.8 to 11.8 miles) confirm results of numerous

balloon flights over a period of ten years prior to 1974 that the amount of water vapor in the stratosphere continues to increase.

In addition, the '74 aircraft data shows that the tropic regions provide most of the water transported to higher latitudes. Ozone also seems to be a product of tropic areas and is believed moved to the higher latitudes, north and south, possibly by similar mechanisms that transport the water vapor, causing the highest ozone concentrations in the higher latitudes.

The amount and distribution of water vapor and ozone in the stratosphere has an important impact on the Earth's climate as it may point to a change in Earth temperatures. The amount of water vapor and ozone at upper altitudes is believed to have a direct relation to whether or not the Earth is getting warmer or cooler.

In addition, the more ozone there is the fewer harmful ultraviolet rays reach the Earth's surface. Without Earth's protective ozone layer ultraviolet light from the Sun would destroy any life exposed to it.

The experiments, flown on an Air Force RB-57, were managed by Goddard under contract to the Department of Transportation as part of its Climatic Impact Assessment Program.

High-speed Solar Plasma Affects Earth

For at least a hundred years scientists all over the world have wondered why there is a monthly peak of activity in the Earth's magnetic field related to such things as northern lights.

Experiments on a solar-skimming spacecraft, Helios-1 are providing a deeper understanding of the interplanetary conditions that cause such activity.

A scientist in Goddard's Laboratory for Extraterrestrial Physics, Dr. Leonard Burlaga, says that the magnetic field and plasma experiments on Helios together with solar observations have revealed two streams of high-speed solar plasma erupting from coronal holes, one extending from the south pole to the solar equator. The holes face Earth every 27 days or with each complete rotation of the Sun.

Every rotation, the plasma is spewed out toward Earth at speeds of up to 800 kilometers per second (500 miles per second) compressing the interplanetary magnetic field in front of it much like an aircraft compressing air in front of it as it moves through the sky. The speed of solar plasma from non coronal areas between rotations is 400 km. per second (250 miles per second).

When this high speed plasma and magnetic field strikes Earth's magnetosphere, they cause increased activity resulting in such phenomena as auroras. The effects on Earth are directly related to the intensity of the solar plasma and magnetic field coming from the Sun.

Dr. Burlaga says, "the new discovery about the Sun is that the coronal holes are not only the source of this plasma acceleration, but that plasma streams themselves and their associated magnetic fields vary appreciably with small changes of solar surface latitudes." He adds:

"All we can measure now is the way this solar plasma is acting in a very narrow band near our ecliptic plane. This discovery means that solar wind originating from other parts of the Sun, which we cannot see, is probably much different than we believe up to now. And we won't be able to understand the difference until we place a spacecraft in orbit well outside the plane of the ecliptic." The ecliptic plane is that area in which the planets rotate around the solar equator or 7-1/2 degrees north and south.

Helios-1 was launched by NASA for West Germany in December 1974 and goes as close as about 45 million km (28 million miles) from the solar surface. NASA provided the Titan/Centaur launch vehicle and three spacecraft experiments.



DR. ROBERT S. COOPER (right), Director, explains Landsat imagery to Hugh Downs (center), President of the National Space Institute and his Aide during a recent visit to Goddard.

Theory Relates Solar Activity and Thunderstorms

Does the Sun really affect weather on Earth?

For at least 200 years scientists have been wondering about this possibility and have engaged in formal debate about it over the last century.

Now it appears that the first theoretical concept based on hard statistical evidence has established a logical chain of events that explains how solar activity can play a direct part in triggering non-tropical thunderstorms on Earth.

For almost 50 years evidence has been accumulating that the Sun affects thunderstorm activity in middle and upper latitudes. However, until now, no one has come up with a plausible theory that explains how this would work.

In a paper scheduled to be presented at the American Geophysical Union meeting in San Francisco, December 8, two scientists, Dr. John R. Herman, of the Radio Sciences Co., Lowell, Mass. and Dr. Richard A. Goldberg of Goddard's Atmospheric and Hydrospheric Applications Division, say their theoretical computations pinpoint the first plausible coupling mechanism between solar activity and thunderstorm occurrence.

If so, this will prove to be not only an important step forward in building a model of solar-Earth weather activity, but could have far-reaching effects on long-range weather forecasting.

What they are saying is that solar activity, Sunspots or solar flares, produce a stream of high-energy protons which impact our atmosphere changing its electric field distribution, while at the same time blocking out cosmic ray intensity and decreasing conductivity in the lower atmosphere.

When all the interactions are finished the result is an atmospheric electric charge distribution similar to that found in thunderclouds. In effect, a thunderstorm triggered for action.

Their conclusions are supported by previously reported correlations between solar activity and thunderstorm occurrence in northern latitudes and by established atmospheric electrical concepts.

Previous studies by scientists all over the world have linked thunderstorms with flare occurrence and with the appearance of active Sunspot groups on the solar surface for many years. However, there has never been any direct or plausible theoretical evidence to explain why this is so.

Goddard Mourns . . .

CHARLES M. SHUMAKER, a Logistics Management Specialist in code 854.1, died of a heart attack on January

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Edited by PAO Staff
Patricia Ratkewicz, Secretary, Phone Extension 4955