

Goddard Space Flight Center photographed from helicopter above the center's main gate on Greenbelt Road.

## *NASA marks ninth anniversary of first Moonlanding*

NASA celebrated Space Week July 16 through July 23, marking the ninth anniversary of Man's first steps on the Moon.

The Goddard Space Flight Center played a vital role in making those historic footsteps possible. The center is the heart of most communications between Earth and NASA spacecraft, both manned and unmanned, and is responsible for worldwide tracking of the craft throughout their missions. In effect, Goddard was the electronic lunar lifeline of astronauts going to the Moon.

In addition to the technological and scientific feat of landing a man on the Moon, the Space Program has brought innumerable benefits to life on Earth. Weather reports, for example, use satellite technology proved at Goddard. Commercial communications satellites apply Goddard research. And Goddard's Landsat satellites provide a constant watch on our planet's natural resources, while studying the means for their most efficient use.

Many satellite and sounding rocket projects at Goddard are providing scientists with invaluable information about the

Earth's environment, Sun/Earth relationships and the Universe itself.

NASA's Delta rockets have placed over a hundred satellites into orbit for the United States as well as foreign governments. The Goddard managed rocket enjoys a better than 90 percent success record.

Goddard people managed or provided project and launch support for over half of the free world's civilian unmanned Earth orbiting satellites, and developed about one third of the scientific experiments flown aboard these spacecraft.

Future manned space missions promise to create new roles for NASA and for Goddard, the Space Agency's most diversified field facility. The center will have responsibility for packaging scientific experiments to be flown aboard the Space Shuttle, and will administer the Shuttle's "Getaway Special" program. The getaway specials will enable industries, schools and organizations to send small scientific experiments on round trips into space.

# Scientists find methane in far Space

*First discovery of natural gas outside our solar system*

Faint radio signals coming to the Earth from 10 million billion miles away are providing astronomers with their first proof of the long suspected presence of methane (natural gas) outside our solar system.

Goddard's Dr. Donald Jennings and Dr. Kenneth Fox of Infrared and Radio Astronomy Branch have detected methane in three locations in deep Space: in the Orion A gas cloud (in the constellation Orion), and in the gas clouds surrounding variable star RX Boo and carbon star IRC-plus-10216.



The 11 meter (36 foot) radio telescope at Kitt Peak near Tucson, Arizona, where the astronomers did much of their work in detecting methane in interstellar Space.

Methane may have been one of the major components of the Earth's primitive atmosphere two to three billion years ago. The carbon bearing molecules can be used in laboratory experiments to form amino acids, the building blocks of life as we know it.

"The discovery of methane outside our solar system could have an important role in determining the abundance of carbon in the universe," noted Fox. Previously methane has been detected only on Earth, Jupiter, Saturn and its moon Titan, Neptune and Uranus.

The discovery is also further proof that interstellar space is not devoid of complicated molecules. Methane may now be added to a list of no less than 40 molecules discovered suspended in the "vacuum" of Space. That list is important to scientists testing and predicting models of how the Universe began.

The confirmation of methane by Fox, a National Academy of Sciences

Research Associate from the University of Tennessee, and Jennings, a Goddard scientist, culminates years of attempts by astronomers to find and measure methane in the interstellar medium.

In 1971 Fox predicted radio transmissions previously unknown for methane, and suggested looking for longer wavelength microwave signals from the gas rather than continuing to seek shorter wavelength signals in the infrared.

"We suspected methane would have a strong infrared signal from Space," Fox explained, "but it is confounded by methane present in the Earth's atmosphere."

After laboratory work by other scientists confirmed microwave transmissions from methane, Fox and Jennings searched three years for the emissions with radio telescopes at the National Radio Astronomy Observatory at Greenbank, W. Va., and Kitt Peak, near Tucson, Arizona, and at the Haystack Observatory in Westford, Mass.

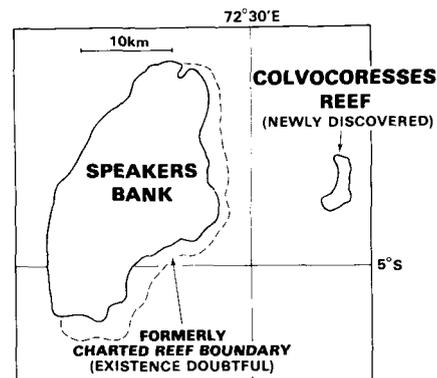
"Methane now appears to be one of the most abundant molecules in Orion A, perhaps second only to hydrogen," said Fox. Hydrogen is the most abundant gas in the cosmos.

Fox and Jennings plan to map the source of methane in Orion A for its precise location and any associations with stars and stellar objects.

## Space 'Scope Spectrograph goes to contractor

NASA has selected Ball Brothers Research Corporation of Boulder, Colorado, for negotiation of a contract to provide a High Resolution Spectrograph (HRS) for the Space Telescope. Goddard is responsible for the telescope's scientific payload.

Now under development by NASA's Marshall Space Flight Center, Huntsville, Alabama, the Space Telescope will fly on the Space Shuttle in the 1980's. The contractor's estimated price is approximately \$8 million.



Map of Speakers Bank in the Chagos Archipelago shows correct position of bank and new reef revealed by Landsat data.

## Landsats go to sea to map shipping lanes

Two Goddard satellites which usually study Earth resources have gone to sea and found new uses in charting safe shipping lanes.

The Landsat satellites 1 & 2 found a dangerous reef 8 km long where maps of the Indian Ocean showed safe, deep water. That discovery sparked emergency radio warnings to all ships sailing near the Chagos Archipelago.

The spacecraft also spotted banks out of position on the charts by more than 15 km relative to the nearest land. That caused a new edition of maps to go to press.

The only detailed survey of the entire archipelago was conducted by the Indian Navy in 1837.

Today international concern is growing over the need to improve the currency and accuracy of worldwide ocean survey data for navigational safety.

However, study groups say that thousands of ship years will be required to upgrade existing sea charts.

NASA joined with the Cousteau Society and the U.S. Defense Mapping Agency to test the feasibility of using satellite imagery to speed the task. The researchers found that Multispectral Scanners aboard the Landsats could probe and measure clear oceanic waters to depths required for safe passage by most ships.

The success of the experiments means shipping routes through reef and shoal areas can be determined initially by satellite. That could free expensive and limited ship surveys for optimum use in locating small navigational hazards in areas shown to offer safe shipping routes.

# People

## Letter to the Editor

Dear Editor,

I appreciate your office sending me the Goddard News, each issue, even though I have now been retired for six years. I like to keep up with events in Goddard. I spent the last twelve years of my career in Code 325 and it's like getting a letter from home. To give you some information on what happens when you retire and can't sit still, I'll bring you up to date on my retirement.

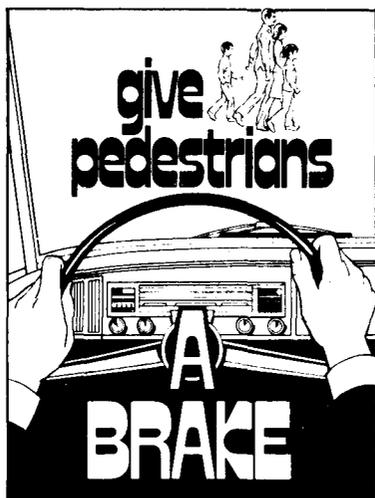
I tried retirement; working around the house, painting, fixing things I had been putting off while I was working. It didn't take long to find out I didn't want to spend the rest of my life putting in time. So I built a rather large "Deci. House" to keep busy and after that I started an Electrical Contracting business which is going good.

In 1976 I ran for Mayor of our Town (Chesapeake Beach, Md.) and was elected. Believe me, I don't have any time anymore to waste. I'm now 69 years old and feel like 40. I guess you have to keep your mind and body working to feel good.

Well, thanks again for sending me the Goddard News.

As ever,

William L. Fortier  
Mayor of Chesapeake Beach



Prince George's County schoolgirls who participated in Goddard's summer program for exploring non-traditional careers for women. Mentor Winifred Cameron stands sixth from the left.

## Schoolgirls explore science careers in summer program at Goddard

Women scientists at Goddard acted as mentors for 25 Prince George's County girls interested in pursuing non-traditional career fields during a two week study program at the center late in June.

The program, "The Summer Institute in Science and Technology for Junior High School Girls," was sponsored by the Federal Women's Program Advisory Committee (WPAC).

Most of the girls who attended will be entering ninth grade in Fall. They were chosen by the Prince Georges County School System to explore their career interests by meeting with professional women working in their fields.

Ann Merwarth, WPAC Coordinator; Bettie White, WPAC Assistant Coordinator, and Margaret Tindal, Employee Development Specialist, arranged for the students to meet Goddard women in science, engineering and mathematics.

The mentors met with the girls three to four hours a day. Mentors included: Helen Conway, Mathematician (Code 565); Isabella Cole, Mathematician (Code 280); Helen Neumann, Assistant Chief Spacecraft Technology Division (Code 710); Alda Simpson, Aerospace Engineer (Code 732); Barbara Lowrey, AST Mathematician (Code 932); Barbara Putney, Mathematician (Code 921); Dr. Regina Cody, AST Astrophysicist (Code 691); Dr. Carol Jo Crannell, Astrophysicist (Code 684); Winifred Cameron, Space Scientist (Code 601); Barbara Walton, Systems Software Analyst (Code 932); Barbara Scott, Data Analyst (Code 734); Jean Fries, Computer System Analyst (Code 206); Karen Moe, AST Electronics Engineer (Code 511); Valerie Thomas, Mathematician, Data Analyst (Code 563); Theresa Nagy, Space Scientist (Code 681) and Pat Lightfoot, Mathematician (Code 514).

## Garden Club tip

If there is less than 1" of rain per week, give a bucket of water to each of your shrubs or trees planted last fall or this spring.

Mulch gardens now to preserve as much as possible of sporadic rains; if you don't mulch, you can start a compost pile with the weeds you pull.

## Goddard mourns...

Chester C. Kurinsky, Retired February 1977, Servo-Engineer in Code 723. Died June 12, 1978.

## *Rock samples to travel high schools*

# Center hosts Moon rock orientation for educators in northeastern U.S.

Educators from Virginia to Maine came to Goddard June 23 to learn about Moon rocks and how to protect them.

The center's Educational Affairs Office hosted the "Lunar Sample Education Project" as part of NASA's effort to put Moon rocks into high school classrooms around the country. NASA is loaning the lunar samples encased in plastic to schools for use in their science courses.

Six samples of soil from different locations on the Moon are encased in each circular slide. With a binocular microscope students can see different minerals in the soil. In some samples they may even see tiny craters in the rocks caused by lunar bombardment by micrometeors.

The discs include lunar highland soil, lowland soil, and the famous "orange soil" which was brought back

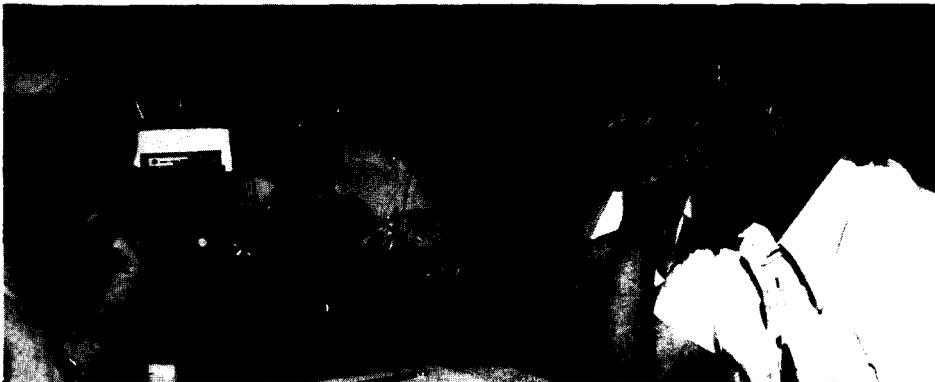
by the last Apollo flight. The orange soil once caused some excitement when the possibility of its volcanic origin was raised but later disproved.

At the end of the day's program, the 67 educators who attended received certificates from NASA qualifying them for showing the lunar rocks at their high schools.

Over a dozen Goddard scientists from many fields of lunar study lectured to the educators and led lunar rock study sessions.

The speakers included Dr. Jacob Trombka and Dr. Robert Chapman, Laboratory for Astronomy and Solar Physics; Dr. Paul Lowman, Earth Survey Application Division; David Sudeth, Project Management Directorate, and Dr. Bevan French, Discipline Scientist for Extraterrestrial Materials from NASA Headquarters. Topics ranged from "What's New on the

Dr. David Nava (second from left) explains slide of lunar rock samples to educators.



Dr. Bevan French (standing) of NASA Headquarters talks about Moon rocks with educators attending Goddard's "Lunar Sample Education Project."

Moon?" to comparing the Moon with the planets.

Consultants at the rock study sessions were: Dr. Isadore Adler, Chairman, Geochemistry Dept., U. of Md.; Winifred Cameron, National Space Science Data Center; Dr. Bevan French; Dr. Herbert Frey, Astronomy Dept., U. of Md.; Dr. Paul Lowman; Dr. David Nava, Laboratory for Extraterrestrial Physics; Dr. John O'Keefe, Laboratory for Astronomy and Solar Physics; Dr. Jacob Trombka; Dr. Louis Walter, Chief, Earth Survey Applications Division and Dr. Peter Wasilewski, Laboratory for Extraterrestrial Physics.

## GEOS-2 launched

GEOS-2 was launched by NASA for the European Space Agency (ESA) from Cape Canaveral, Fla., July 14.

The GEOS-2 launching marked the 143rd flight mission for Delta. Of the previous 142 launchings, 131 were successful for a better than 90 percent launch record.

Mission Integration Manager at Goddard for GEOS-2 was Frank J. Lawrence. The satellite will study the magnetosphere, that region of near-Earth space where the magnetic field of the Earth still plays a dominating role. The magnetosphere prevents direct access of energetic solar particles to the Earth and thus protects our planet from the harmful effects of space radiation.

Because of its scientific importance, GEOS-2 has been chosen as the reference satellite for the International Magnetospheric Study (IMS), a three year research program in which American, European, Japanese and Russian spacecraft are participating.

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