

Artist's illustration demonstrates how Shuttle-borne laser will monitor positions of reflectors placed along faultlines. This will provide a measure of Earth crustal movement.

Shuttle-borne laser to study earthquakes

A new laser ranging system is being designed by Goddard for possible use aboard NASA's Earth-orbiting Space Shuttle to monitor strain build-up in the Earth's crust. Such strain is thought to be an early indicator of earthquakes in the making.

Initial tests of the system may be conducted as early as 1982 on the quake-prone San Andreas Fault in southern California.

Design of the new system is centered around use of the Shuttle-borne laser to locate a number of optical reflectors installed over a region of the San Andreas Fault. This reflector network will cover an area 200 kilometers (125 miles) along the fault by 400 kilometers (250 miles) inland.

Any change in the location of the reflectors from mission to mission will be due to movement in the Earth's crust.

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Copernicus finds second 'black hole'

After a two month search, Goddard's Copernicus satellite has located what may be a second invisible "black hole" in the universe. The satellite's X-ray experiment found the black hole, believed to be a super dense collapsed star with such strong gravity that not even light can escape it, in the constellation Scorpio three weeks ago.

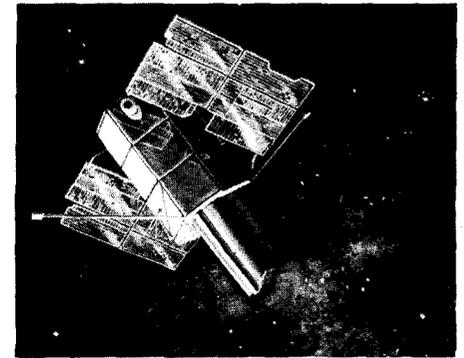
"This is the second black hole found in our galaxy," said co-investigator for the project Glen Pollard. "It is much more active and convincing than the first, Cygnus X-1."

The invisible black hole is orbiting Scorpio V-861, a super giant star which can be seen with the naked eye from Earth. It is gradually siphoning away the larger star's atmosphere.

The massive amounts of X-rays released from matter as it is transported from the giant star led the scientists to what another co-investigator, Ronald Polidan, calls "the best black hole yet."

Most importantly, the scientists say, the discovery has given astronomers their first opportunity to study a black hole as it passes behind its companion star. The new data will give astronomers a chance to test some of their black hole theories. Pollard hopes the new information will define the shape of the cloud of stellar material being sucked into the black hole, thus reveal-

ing some of the dynamics of black hole systems. It may also provide a measure of the quantity of material being removed at speeds up to 2 million miles per hour.

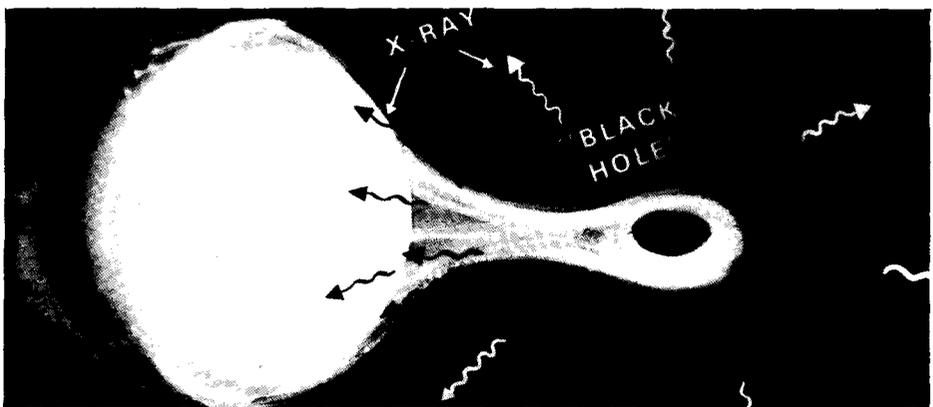


The Copernicus satellite's X-ray experiment located the new black hole in the constellation Scorpio. Artist's drawing shows the 6-year old astronomy satellite in orbit above the Earth.

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Studying black holes will also extend astronomers' knowledge of physics into realms of laws not observable on Earth—the Physics of Relativity.

Teams of scientists at Goddard from Princeton University and University College of London conducted the search specifically for black holes. The universities co-operate NASA's Copernicus satellite which was launched almost six years ago.



Continued on page 4

Scientists study heat maps of Earth

U.S., Canadian, and other scientists are currently studying the first products from Goddard's Application Explorer Mission-1 (AEM-1) placed in a polar orbit around the earth on April 26.

Rich with information on day-night temperature changes, the black-and-white and false color images are being examined for clues to the identity of mineral resource locations. The images also may reveal invaluable information for identifying rock types, monitoring soil moisture changes and plant stress, and studying the effects of urban heat islands.

The first false color image, produced from May 11 data, covers a 700 km swath of eastern U.S. from Cape Hat-

teras to Lake Ontario. Resembling an impressionist painting, the image is rich in a variety of hues marking different temperatures in soil, rock, water, and urban features.

The warm Gulf Stream stands out amidst the light and deep blue colors of the colder Atlantic Ocean. Purple blots east of Ocean City, Maryland, reveal a new enigma to scientists. They do not appear to indicate clouds nor are they sites of known ocean dumping grounds.

Brilliant gold, rust, and lighter yellow strokes sweep diagonally across the image to reveal the warmer folds of the Appalachian Mountains. Lack of foliage in the image is considered responsible for the obvious higher temperatures revealed here.

Major cities along the coastline appear as white spots of urban heat: New York, Philadelphia, Baltimore, Washington, and Norfolk stand out distinctly.

The May 11 false color image was published on the cover of "Aviation Week's" June 19, 1978 issue through the efforts of the Center's Office of Public Affairs.

The AEM-1 is the first of a series of satellites for NASA's Heat Capacity Mapping Mission.

According to Goddard's AEM-1 Project Scientist, Dr. John C. Price, this data is being correlated with that received from other satellites, especially Landsat.

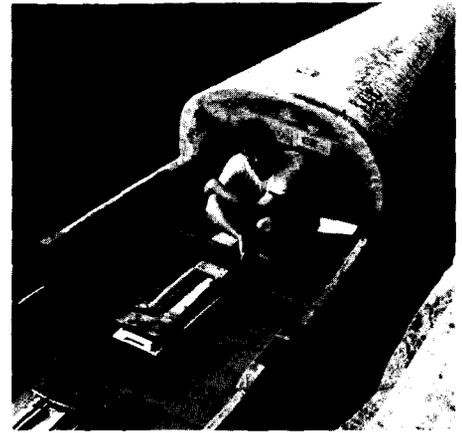


Laser Beam Recorder

Better and more useful image products will be produced by this Laser Beam Recorder unit in the NASA Image Processing Facility here at Goddard. Systems engineer Doug Buckley and operator Bobi Watkins are shown adjusting the unit.

Processing satellite data on computer tapes, this new unit can produce nine-by-nine inch negatives or positive transparencies of images from Landsat, the upcoming Nimbus-G, the Heat Capacity Mapping mission and others.

It replaces an Electron Beam Recorder unit which was limited to the production of Landsat images on two-by-two inch negatives which required enlarging. Enlargements always incorporate some geometric distortions due to the use of lenses as well as radiometric distortions caused by dust particles on the lenses.



Pat Satterlee aboard boat he plans to row solo across the Pacific.

Goddard to track solo row of Pacific

Professional adventurer Pat Satterlee plans to set out this month from San Diego in an attempt to make the first solo crossing of the Pacific in a row-boat. His destination is Australia, his estimated arrival time one year hence.

Satterlee's only protection is his 35-foot, self-righting boat, a radio, and a satellite beacon to Goddard's Nimbus-6. Goddard will keep track of the lone oarsman's position so that it can be known immediately to rescuers in an emergency.

Why is Satterlee, who is 26 and was once a commercial fisherman, undertaking the voyage? "Essentially for the raw challenge," he says, "the same thing that drove men like Hillary and Chichester to do what they did."

Seek first proof of gold in stars

Astronomers hope for gold on star as satellite re-checks first glimpses

Goddard astronomers believe they are about to confirm for the first time that there is gold on a star. And there could be as much as one hundred billion tons of it.

That amount of gold would mean the metal is present in one part per 100,000 on the star. On Earth gold exists only in one part per million.

William Heacox and David Leckrone of Stellar and Cosmic Astronomy

Branch are now making additional observations to confirm their first signs of gold on Kappa Cancrui, a blue white star which is visible to the naked eye in the constellation Cancer.

The two Goddard astronomers found traces of gold on the star in early April while looking with the International Ultraviolet Explorer (IUE) satellite at chemically peculiar stars rich in exotic elements.

People

Cars and pedestrians: mix with caution

As he stepped along the crosswalk, the man watched the car bearing down on him. But he did not turn back.

The car screeched to a halt inches before him. The pedestrian and the driver glared at each other, then the car swerved behind the man and roared off.

"I almost had to throw my briefcase at him", the fellow said as he reached the curb. "That would have stopped him!"

But would it?

A pedestrian's only real safety is in the courtesy of the driver.

At Goddard, a sign at the main gate asks all drivers to yield the right of way to pedestrians. However, Chris Bryan, Chief of Security, reports that there recently has been an alarming increase in near accidents.

Bryan asks that drivers please remember that they hold the pedestrians' lives in their hands.



The Logistics Management Division sponsored the 7th annual Sam LaBarbera Golf Tournament June 22. Above, some of the contestants pose on the green at Laurel Pines. L. to R. are: (top) Bob Cowan, Jack Knox (1st low-handicap winner), Carl Wilbert, Sterling Gilmore (1st low-gross winner), Phil Waller, and Dan Pendleton (2nd low-gross winner); (middle) Mary Ellen Shoe, Joyce Eaton, Shirley Darby, Ester La Barbera, and Ida Davidson; (kneeling) Linton Cheers, Don Hutchison, Damian Ramano, Chris Bryan (2nd low handicap winner), and Herb Fivehouse. Players not pictured are Brenda Coleman, Lin Wiedman, and Bernie Farrell. Part of the money from the entrance fees was donated to the American Cancer Society.



PENALTY BOX

Sorry, Code 723. We should correct our June 21 story about the laser tracking sites that are monitoring earth motion at the San Andreas Fault.

Code 723, Instruments and Electro-Optics Branch, developed the laser ranging technology and stations for the San Andreas Fault Experiment.

Editor

You may have noticed that the Goddard News has increased its frequency of publication. This is but one step planned to bring you a better publication.

And you may have noticed another change. One section is devoted to people activities. The rest of the publication carries substantive news stories.

We are interested in your story. Call Pat Ratkewicz on 4955.

The Editor

Energy savings in Building 22

Simple operation saves Goddard \$\$

When Henry Obler went to fit the air conditioning in Building 22's basement to the new Global Atmospheric Research Project computer, he found energy waste.

So he performed a simple "surgical operation" which may save Goddard as

... a design which dates back to the days when energy was not a problem ...

much as \$20,000 a year if the computer is operated 24 hours, seven days a week as projected.

The basement's air conditioning system was based on an old principle of mixing air from hot and cold ducts to obtain exactly desired temperatures.

"It is a design which dates back to the days when energy was not a problem," says Obler, Project Engineer for Energy Conservation. "It is very inefficient when all that is needed is to cool computer equipment by providing a variable amount of cold air."

Obler redesigned the two air conditioning systems feeding the ground floor by eliminating the hot air which was originally used to raise the temperature of the cold air as it flowed into the room. He replaced its function with the heat generated in the room by the computer and the lights.

Since then Obler has found similar targets for energy savings in the remaining five systems of Building 22, three more in Building 14, and one in Building 5. The improvements will be funded with 1980 C&F funds.

Reusable, heat-regulating enclosure to protect experiments on Shuttle

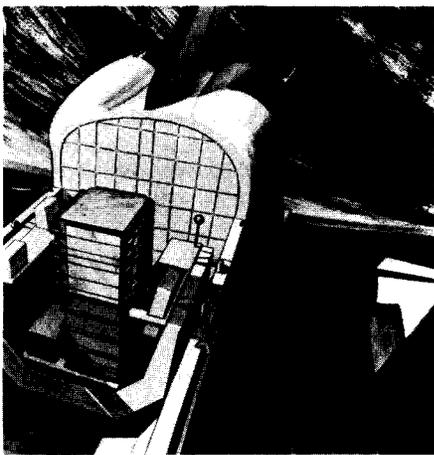
In the cargo bay of the orbiting Space Shuttle, temperatures could vary from 100 C to -100 C.

Thermal control will be essential to protecting the scientific instruments carried inside.

Goddard plans to meet the challenge with an experiment that could both advance thermal control technology and reduce costs. It is a heat-regulating enclosure into which can fit a wide variety of the scientific instruments flying aboard the Shuttle.

"This will be much less costly than tailoring each instrument to survive the harsh space environment," said Program Manager Stanford Ollendorf,

Artist's illustration shows heat-regulating enclosure protecting a scientific instrument package in the open bay of the Space Shuttle.



principal investigator for the experiment.

The device is scheduled for testing on the fourth orbital flight of the Space Shuttle.

The canister's design is a further step in the same technology from Space that is being applied on Earth today to solving some of the nation's energy problems.

Heat pipes like those in the walls of the canister, for example, are stabilizing the permafrost along the Alaskan Pipeline during alternate freezing and thawing of the arctic tundra.

Heat pipes also are playing a role in waste heat recovery where banks of these pipes are placed in the exhaust air of homes and industries to preheat incoming air.

Goddard's Space Shuttle canister is designed to insulate instruments against the outside heat from the sun while rejecting heat from inside the equipment as necessary.

Heat is absorbed from the instruments by pipes in the canister walls and transferred to radiators on the outside which will regulate heat loss to maintain near room temperatures within a 1 degree range.

After the first test flight, the canister will be available for use on following missions such as Spacelab.

Management of the experiment is under the Systems Division (Code 700), Donald Krueger, Chief. Roy McIntosh is responsible for engineering.

Shuttle laser

Continued from page 1

"We expect to detect any Earth crustal movement in excess of two to five centimeters (one to two inches) with this system," said Dr. Mike Fitzmaurice of the Center's Engineering Directorate.

During a Shuttle mission, the on-board laser will flash 20 pulses of narrow light beam to each of 42 optical reflectors in a prescribed sequence. These unique reflectors will return the laser beam to its source—the Shuttle.

It is the precise measurement of the laser beam's roundtrip transmission time that provides the essential data for locating the changing reflector positions.

"Orbiting laser systems which can measure land motions before and after earthquakes will increase our understanding of this phenomena. They may eventually lead to a capability to predict the time, place, and intensity of major earthquakes," said Fitzmaurice.

Training course teaches Landsat uses

The first Regional Remote Sensing Applications Center (ERRSAC) Training Course for state related users of remote sensing systems was held at Goddard in June. Participants were invited from agencies implementing or planning facilities to use Landsat image data in their projects.

The course, developed by Dr. Nicholas Short, Goddard Training Officer, and Mr. Henry Robinson of CSC, provided the participants with a comprehensive background in image processing from expert lecturers drawn from NASA, outside agencies, and contractors.

Participating in the courses were: Dr. Floyd Henderson, State University of New York; Lawrence Matson, Ulster County Community College; James Uhl, Pennsylvania State University; Dr. Howard Mielke, University of Md.; Dr. Cheng Jin-Fan, Morgan State University; Dr. Carl Budelsky, Southern Illinois University; Kevin Richardson, University of Massachusetts; Roy Whitmore Jr., Jeffrey Harris, and Canute VanderMeer, all of University of Vermont; John Antenucci, Dale Johnson, and Thomas Roguski, all of State of Maryland, and Dr. Ben Drake, Old Dominion University.

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