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GODDARD NEWS

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Laser tracking sites monitor earth motion at San Andreas Fault

Preliminary results from a six year experiment on the famous San Andreas Fault in California seem to indicate that earth motion along the fault is accumulating at a much greater rate than was expected and is equivalent to 6 to 7 meters over the past 70 years.

That is the same magnitude of earth motion which was associated with the 1906 San Francisco earthquake. During the 1906 earthquake, the relative motions of points close to the fault after the break was 6 to 7 meters, resulting in a major quake registering about 8 on the Richter scale.

The recent San Andreas Fault measurements come from the San Andreas Fault Experiment (SAFE), initiated in 1972 to determine gross plate motion across the fault. The experiment is also the first demonstration of the practical applications of laser tracking of spacecraft to determine relative motion of the Earth's upper plates.

SAFE has established a tracking site on both sides of the fault, one in Quincy and one in San Diego. Satellite tracking data from the two sites is accurate to a few centimeters.

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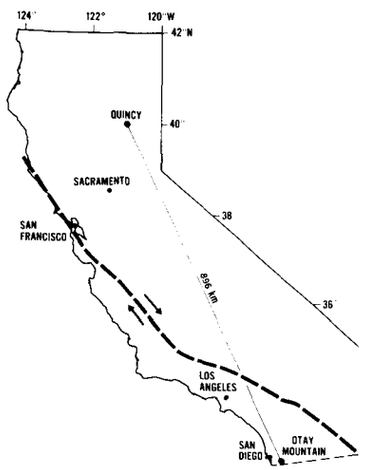
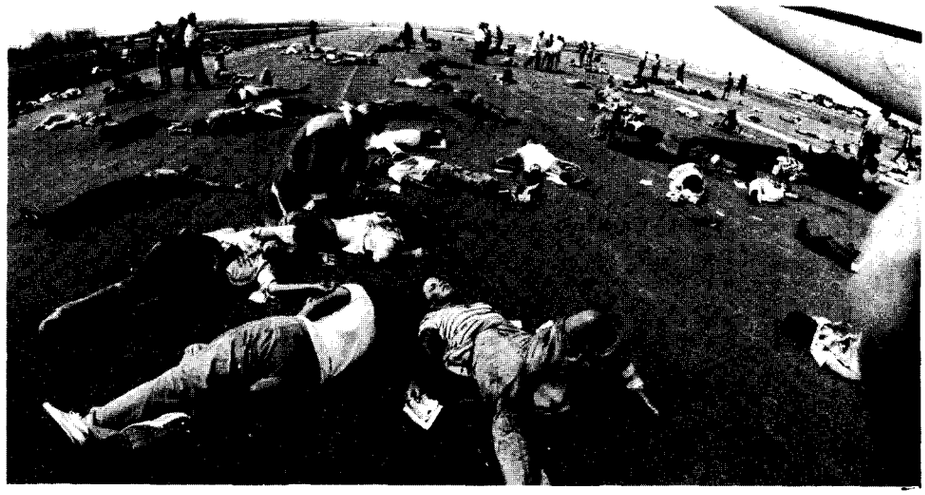
Artist's illustration shows earth movement of crustal plates along the San Andreas Fault. Tracking stations are at Quincy and Otay Mountain.





"Crash victims" in simulated accident at Baltimore/Washington Airport sprawl beside "wreckage" of their plane.

Portable transmitter calls satellites, brings distant aid to "crash victims"

A commercial airliner "crashed" into a fuel truck on the runway of Baltimore/Washington International Airport May 12.

As dense smoke billowed into the air from dozens of canisters around the vehicles, simulating disaster, firemen raced to the scene. Stumbling into the smoke, the rescuers found scores of "burn victims" scattered underneath the plane, some moaning and some motionless.

Airport emergency personnel immediately unpacked an ordinary looking white suitcase and began giving reports of the patients' conditions into a microphone. They were calling on Chicago's O'Hare Airport and Boston's Logan Airport for assistance from burn-specialist physicians. And they were in communication instantly—by satellite.

The rescuers beamed slow-scan TV pictures of the "patients" in black and white to Boston' Logan Airport, which a team of three physicians assessed along with the verbal reports. Three physicians at O'Hare worked with audio reports only, though O'Hare too received the video for monitoring purposes.

The simulated disaster was conducted by the Maryland Institute for Emergency Medical Services as a field exercise of Maryland's statewide emergency medical system.

Medics broadcast TV pictures of "patients" via satellite to Chicago and Boston airports, where burn-specialist physicians make diagnoses and send back advice.

Goddard's "briefcase transmission system" and two NASA satellites, Application Technology Satellite-6 (ATS-6) and the Communication Technology Satellite (CTS), made it possible for medics at the scene to immediately make calls nationwide for the best assistance available in coping with the disaster. Goddard's Dr. James P. Brown, Project Scientist, and Indalecio Y. Galicinao, systems engineer, supervised Goddard's team of engineering and support personnel on the scene.

This thermal image from the Heat Capacity Mapping Mission illustrates surface temperature contrast in the vicinity of Norfolk, Virginia, which is in the upper center of the picture. Norfolk is hot (bright) due to the urban heat island effect while the nearby ocean and small clouds at the bottom of the scene are cold (dark). An eddy breaking away from the Gulf Stream is apparent in the lower right corner of the image. Temperature variations associated with near-surface moisture are evident in drainage basins and swampy areas south of Norfolk. A number of small cities stand out as bright (hot) spots. This image was acquired on May 11, 1978, from a south to north satellite track. The image is about 200 km square and is a section from the 700 km wide swath from the instrument.

Arterial Pulse Wave monitor

Trying to predict heart problems

Heart attacks don't only strike the elderly. Occasionally they take the young by surprise, dropping even athletes on the playing field in "the prime of life."

For Harry Taylor of the Laboratory for Planetary Atmospheres, such "surprises" are a compelling indication that we need to know more about predicting human heart and circulatory problems.

Two years ago Taylor initiated a task under the Technology Utilization Program at Goddard to help the Veterans Administration perfect a device that measures externally the frequency characteristics of the pulse wave of blood as it flows through the arteries.

"The hope is that one day such measurements will provide a simple, widespread, and accurate means of screening humans for signs of developing hypertension, arterial sclerosis, or other heart problems," says Taylor.

The researchers also believe that the arterial pulse wave monitor (APW) will be a less costly alternative to some of the more extensive cardiovascular measurements used today. The monitor employs a single sensor that is lightly strapped to the crook of the patient's arm. There it records on a graph the rhythm of the blood as it surges down the brachial artery.

Graphing the pulse waves obtains the "signature" of the blood flow. As any individual's blood flow is affected by such factors as elasticity of the blood vessels, timing of the heart beat, and occlusions in the artery, doctors hope that studying such signatures will contribute to early warning of cardiovascular disease.

According to Taylor, the problems of sensing and synthesizing arterial waveforms have proved directly analogous to information extraction problems he encounters in spaceflight on spectroscopy. Taylor has also applied NASA experience with microcomputer technology to storing and reducing the test data for analysis within the monitoring system. This, he hopes, will cut time needed by doctors and technicians to read results.

Retarded persons find role in Space

Working for an agency long associated with the cutting edge of advanced technology is not an easy job for the most sophisticated and biggest companies in the United States. Certainly its not the kind of job one would expect of a company composed of some 30 severely retarded persons, people with IQs of 50 or lower.

But that is indeed the case with a small organization, the only one of its kind, located in Washington, D.C. called Project SKILLS. It is a 4-year old non-profit company that has recently completed a $1,000 printed circuitry board job for NASA's Goddard Space Flight Center, Greenbelt, Md.

NASA needed 33 new printed circuitry boards for use in ground tracking station command/encoder systems. The boards are specifically designed to modify the encoder such that it can support three Nimbus meteorological satellites, 4, 5, and 6, as well as other orbiting spacecraft, including the upcoming Shuttle. The new printed circuit boards are expected to function some 10 years.

Bill Hocking, Head of Goddard's Tracking and Command Data Systems Branch, gave the go-ahead on the contract after a competitive three-company bid in which Project SKILLS came out the winner. Hocking said Project SKILLS had to be fast, do first quality work and meet budgetary requirements. It did them all.

Hocking said, "The company not only did top quality work at a good price, but it delivered on time—five weeks after we let the contract." He is so pleased with the results that he believes the company will be getting more NASA work in the future simply because "they do excellent work."

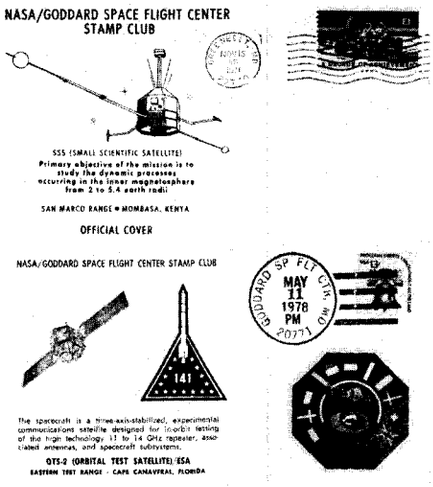
San Andreas Fault

Continued from page 1

Determination of the gross motion across the fault provides a measure of strain energy (which eventually will be released as an earthquake) while it accumulates—an important input in any prediction of another earthquake. Earthquake prediction in this country is the responsibility of the U.S. Geological Survey.

Goddard's pulsed laser ranging systems measure earth motion by determining the range to a satellite, measuring the time required for a short pulse of intense light to travel from the laser to the satellite and return. The measurements are repeated once per second throughout each satellite pass.

Goddard is cooperating with a broad cross-section of the scientific community to carry out the SAFE experiment. Goddard's Geodynamics Branch (Code 900) is administering the center's effort. The Engineering Services Division (Code 750) developed the laser system and Network Operations Division (Code 850) is tracking and operating the laser systems. The Missions and Data Operations Directorate (Code 500) predicted and pre-processed laser data for the experiment.



Two of the Goddard Stamp Club's launch covers: the first (top) and the most recent (bottom).

Space covers and stamp clubs
—making and saving first impressions

Whenever a popular NASA Goddard satellite flight is launched, members of the Goddard Stamp Club start stamping.

They prepare rubber "cachets" and hand-stamp commemorative insignias on hundreds to thousands of self-addressed envelopes that flood in to Goddard from philatelists around the world. The letters are returned via the Greenbelt post office cancelled with a special Goddard postmark that is authorized by the U.S. postmaster for the day of lift-off.

The Goddard Stamp Club members also print and cancel a limited edition of 500 commemorative envelope "covers." The envelopes bear pictures and print describing the mission and are sold at cost.

All this activity has been going on since 1971, when the Goddard stamp club first assembled. "We do it for the fun of it," says Pete Sarmiento, a founder of the group. "Providing launch souvenirs, collecting them from other space centers, keeping up with history—it's all a part of the hobby of stamp collecting."

While stamp collecting itself probably dates back to the first stamps ever printed, in the early 1800's, saving stamped covers for special events is a relatively new trend. According to Sarmiento, there is great interest today in early "rocket mail," for example. In the 1930's inventors occasionally put their rockets to use to carry mail on a one-way trip of two to three miles to the next town, and gave the mail their special cancellation.

Not all of the Goddard Stamp Club's energies are spent on space events, however. There are members who collect stamps on topical themes such as birds, art or foreign countries. Whatever one's interests in collecting stamps, they are welcome to join the club simply by giving president Stu Hanlein a call at extension 5620.

"Spastic Spikers" win Mixed Volleyball

The Goddard Mixed Volleyball League recently completed its fourth successful season. The upper division champions are the Spastic Spikers captained by Steve Esmacher. The lower division was won by Judy's Team captained by (who else?) Judy Corwin.

The League Commissioner for next year is Judy Corwin, x 5971. A call for teams for next year's season will be made in September.

Tom Golden honored

Tom Golden, Director of the Baltimore Applications Project, has received the Lenoir-Rhyne College's "Distinguished Alumnus Award."

The honor is awarded to Golden, a 1942 Physics graduate of the college in Hickory, North Carolina, for "the distinction (he has) achieved in his profession, for the significant contributions he has made in his field."

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Author Ann McGovern talks with students and faculty of Kenilworth Elementary School about her TV educational demonstration. The program was carried live via satellite from Goddard.

Noted children's author visits here

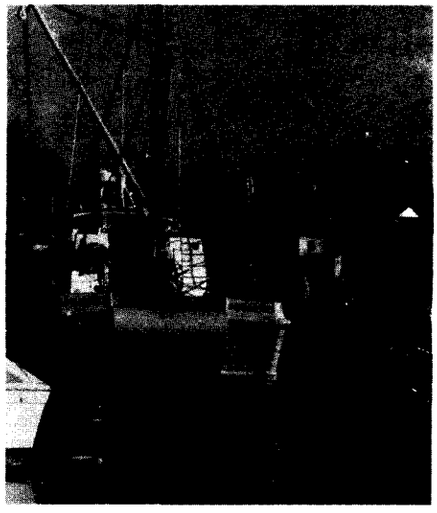
Noted author of books for children, Ann McGovern, participated in a unique educational demonstration conducted via satellite between the NASA Goddard Space Flight Center in Greenbelt, Md., and the NASA Lewis Research Center in Cleveland, Ohio.

During the 45-minute program, which occurred on April 26, Ms. McGovern conducted a narrated slide presentation of the underwater adventures which provided material for her most recent books for children.

Students from the Kenilworth Elementary School in Bowie, Md., provided the audience at Goddard. Some 60 students from the Bedford School System near Cleveland, Ohio, participated in the program at the Lewis Center.

A lively question and answer period followed the presentation, with both audiences participating via satellite.

The entire program was conducted in full duplex color television via the Communications Technology Satellite (CTS), co-owned and time-shared by the United States and Canada.



Snapshot of "The Aquarius" at dock. Jack Trombka and his associates in the portable neutron generator experiment used this boat—the fastest on the Chesapeake Bay—to collect water samples.

Soil analysis technique from Moon seeks new use on Chesapeake Bay

Jack Trombka was thinking about the Moon and the Chesapeake Bay.

Satellites 100 km from the moon have studied the spectra of its elements, he thought. Couldn't new technology he used in the Laboratory for Astronomy and Solar Physics be applied to analyzing soil in water samples taken from the bay?

"In fact, it seemed it would be a lot easier to do the job here on Earth," Trombka now recalls—three years after he began a Technology Utilization program to assist Maryland state and university officials with Project High Tide.

The project is aimed at checking soil deposited by rivers into the bay for contaminants.

Trombka is developing a portable neutron generator that will enable researchers to do on-the-spot spectra identification of soil elements in the water.

"The new technique's advantages of portability and speed come from the fact that it is not based on your standard neutron activation process," Trombka points out. Instead it uses a new technology of "prompt capture" that requires dosing samples for spectra readings with far fewer neutrons than before.

From watching neutrons from space bombard surface elements on the Moon, researchers have learned that they can record gamma rays of energy as they are released the moment a foreign neutron is first absorbed or scattered by a nucleus. It is the gamma ray which reveals the element's identity.

Previous methods have waited to record gamma waves when the element eventually returns to its natural state, for example, by releasing an electron. The new technique is much faster, and can help investigators in the bay narrow down sample areas before going to the lab for more detailed analyses.

Trombka tested his technique on samples from the bay for the first time in March. "We went out on the fastest boat on the bay, 'The Aquarius'," he notes. Along with Bob Johnson and Dr. Sheldon Sommers (both of the U. of Md.), Trombka is now continuing to test the technique in his Goddard laboratory, using the dozens of samples he collected that day.

AOIPS Study helps satellites see cyclones

Goddard scientists, cooperating in a joint program with NOAA, have established the benefits of using short-interval, full resolution satellite images for monitoring tropical cyclones.

The agencies undertook the program in 1975 and 1976 to determine the optimum resolution and image frequency for deriving winds to study and forecast tropical cyclone intensity.

The experiments used the SMS-2 satellite to study hurricane Eloise and cyclone Caroline in 1975. GOES-1 was also used to study tropical storms Belle and Holly in 1976. The satellites took scan images of the storms at varying resolutions and at a variety of time intervals.

Goddard examined the experimental data using the Atmospheric and Oceanographic Information Processing System (AOIPS). The results establish that the best wind vectors can be obtained with rapid scan, full resolution visible images.

Because many clouds of the type and size best suited for tracers do not persist or maintain their shape for even 30 minutes, scans made every half or quarter an hour were found to be inadequate for monitoring cyclones.

Full resolution visible images benefited cirrus tracking and increased the number of traceable elements by a factor of 2 compared to using coarser resolution infrared.

Center hosts expo for minority firms

In recognition of the center's commitment to small business, Goddard sponsored a Small and Minority Business Exposition hosted by the Industry Assistance Office on May 17. The exposition provided an opportunity for approximately 31 business firms to demonstrate their technical capabilities. They discussed business opportunities with Goddard and visited technical personnel relating to their products and services.

Robert Smaldore (l) discusses the products produced by Baltimore's Middlestadt Machine Co. with the company president Herbert Middlestadt (C.) and Norman Brailey of U.S. Senator Paul Sarbane's staff.

This is the group responsible for the Exposition. Front row (l. to r.) Paulette Giggetts, Joyce Mooten, and Dorothy Williams. From the left in back row, they are: Eugene Stowell (SMA rep. at Goddard), Ila Burnell, William Wright, Robert Smaldore, Arthur Wolter (all from Goddard's Industry Assistance Office), and Douglas MacKinnin of the Contract Administration Branch.