earth sciences

Earth tides and geysers

The gravitational attractions between the earth, moon and sun cause deformations or earth tides in the solid earth. Earth tides, like ocean tides, are periodic, with semidiurnal, diurnal (daily), fortnightly, semiannual, 8.8-year, 18.6-year and 20,900-year components.

Earth tides regulate geothermal activity, and it has been found that certain geysers are especially responsive to the fortnightly and semiannual components. In the July 28 SCIENCE, John S. Rinehart of the National Oceanic and Atmospheric Administration and the University of Colorado reports that two geysers in Yellowstone National Park respond to the 18.6-year earth tidal component. He found a strong correlation between earth tidal force and frequency of eruption of the Grand and Steamboat geysers. "This appears to be the first time that the influence of the 18.6-year component has been observed in a solid earth geophysical phenomenon."

Antarctic changes two million years B.C.

In cores from the Ross Sea off Antarctica sediments younger than about two million years are sparse or missing, according to Richard H. Fillon of the University of Rhode Island, who has examined 64 cores from within and north of the Ross Sea.

This discontinuity in the sediment record may have been caused by an increase in the velocity of ocean bottom currents that scoured away the sediments. But, he wonders, why were older sediments not scoured away as well? Fillon suggests that there was also a change in the nature of sediments. The older sediments are coarse and compacted, of a type that would have been deposited by icebergs from the Ross Ice Shelf. The younger sediments that were eroded away must have been less compacted, containing less ice-rafted material.

When the shelf is thick, most of the debris on its bottom drops off before reaching the edge, so icebergs are relatively clean. At warmer temperatures the thinner shelf breaks up faster and more debris is carried to sea. Fillon concludes in the July 17 NATURE PHYSICAL SCIENCE that the ice shelf must have become thicker and the climate cooler over the past two million years. He also found a change in fossils in the sediments that may be tied to the circulation and sediment changes.

Sources of squeaky sand

Some beaches have squeaky sand. If the grains of sand on a beach are very nearly the same size and are roughly spherical, they produce a whistling or squeaking sound when scuffed or walked on.

Kenneth Ridgway and J. B. Scotton of the University of London have noted 33 sites on the coast of the British Isles where squeaking sand occurs. They have found a correlation between the occurrence of such beaches and the position of "bed-load partings"—underwater lines where the flow of sand over the seabed diverges, flowing away on each side at a 90-degree angle to the parting line. The two researchers found that these partings almost always point toward squeaky beaches. Where there is land at both ends of a parting, as in the Irish Sea, beaches with very similar sand occur on both sides of the water. The two conclude in the July 28 NATURE that conditions along bed-load partings must be favorable to production of round sand grains.

space sciences

U.S.-U.S.S.R. space biology report

Soviet scientists have confirmed that the cosmonauts of the 24-day Soyuz/Salyut mission died from hypoxia and gaseous embolism due to loss of pressure in their landing capsule (SN: 7/17/71, p. 38). An autopsy report was delivered to the joint working group on space biology and medicine of NASA and the Academy of Sciences of the U.S.S.R. The report of the meeting, held in Houston May 12, was released this month.

The autopsies reveal no indication of deterioration of the physiological status or performance efficiency of the crew during the entire mission.

The working groups decided to begin development of common preflight and postflight medical examination procedures for space flight crews. This would enable scientists of both nations to exchange flight results in areas such as the cardiovascular response to weightlessness, vestibular measurements, exercise-work capacity and biochemical examination of body fluids.

Earth resources investigators announced

NASA has selected 106 scientists to investigate the earth resources data from Skylab (to be launched April 30 and May 1, 1973). Twenty-three of the scientists are from foreign nations including Iran, Brazil, Italy, Israel, Australia, France, Greece, Venezuela, Argentina, Canada, Japan, Chile, Thailand, India and Mali. At least 60 of the spacecraft passes over the United States will be used for earth resources photography.

The earth resources experiment package (EREP) contains five instruments. S-190(A) consists of six cameras, for imagery in the red, green and infrared ranges of the spectrum. S-190(B), called an earth terrain camera, has an 18-inch focal length. It will get resolution from 12 to 40 meters depending on the ground contrast. Color film will be used. S-191 is an infrared spectrometer for imagery in 0.4 to 2.6 microns, and 6.2 to 15.5 microns. S-192 is a 13-band multispectral scanner ranging from 0.4 to 2.35 microns and 10.2 to 12.5 microns. S-193 is a K-band microwave radiometer, scattermeter and altimeter. S-194 is a passive microwave radiometer.

Investigations proposed cover ten disciplines. Study topics vary from inventory of forestland in Iran, tectonic analysis of the Big Horn Mountain region in Wyoming and Montana, crop acreage and estimated yield in Michigan to mapping and analysis of sand dune fields in the Namib and Kalahari Deserts and research and development of mineral resources in Brazil.

One answer to the data glut

Most of the unmanned scientific satellites launched by NASA over the years have continued to operate long past their expected lifetime. They often continue to relay more data than the principal investigator needs. Now, NASA has come up with a partial solution: open up the data to all comers who have reasonably small proposals.

The satellite data include that from orbiting geophysical, solar and astronomical observatories (OGO's, OSO's and OAO's) as well as from explorer-type spacecraft such as the interplanetary monitoring platforms (IMP's). Proposals with definite scientific objectives are due by Oct. 31, 1972. David R. Hallenbeck of NASA headquarters in Washington is in charge of the project.