

earth sciences

AIR-SEA INTERACTIONS

Enzyme role in ocean-gas exchange

It is well known that a special enzyme, carbonic anhydrase, is essential in the removal of carbon dioxide from the blood for expiration in the lungs. Now there is evidence that some enzyme might play a similar role in the absorption of carbon dioxide from the atmosphere by the oceans.

A study has found that the addition of carbonic anhydrase to samples of surface seawater from off Santa Monica Beach increases the rate at which the water absorbs carbon dioxide by some 20 times. In the report in the June 20 *SCIENCE*, Drs. Rainer Berger and Willard F. Libby of the University of California at Los Angeles suggest that an enzyme like carbonic anhydrase, produced by sea life, may help control the rate at which oceans absorb the gas. They say also that there may be extensive areas of the sea devoid of the quality imparted by the enzyme and thus slow to dissolve carbon dioxide.

The two scientists call for additional work to isolate and identify the enzyme, measure its oxidative stability and survey its prevalence in the oceans.

SOLAR-TERRESTRIAL SCIENCE

Probing near the sun

Agreement has been reached on an advanced mission to take a pair of solar probes closer to the sun than any other spacecraft so far scheduled. The spacecraft, to be built by the Federal Republic of Germany and launched by the U.S. National Aeronautics and Space Administration one year apart in the period 1974-75, will be sent to within 0.3 of an astronomical unit of the sun (28 million miles).

Known as Project Helios, the mission is designed to produce a better understanding of fundamental solar processes and of solar-terrestrial relationships through study of the solar wind, magnetic and electric fields, cosmic rays and cosmic dust.

Seven of the 10 experiments on board will be provided by German scientists; the other three will be devised by NASA's Goddard Space Flight Center in cooperation with American, Australian and Italian investigators.

OCEANOGRAPHY

Low-salinity area in sea

An infusion of low-salinity water has been detected in the area of the Atlantic being studied in the Barbados Oceanographic and Meteorological Experiment (SN: 4/26, p. 411).

During the first two weeks of May, measurements turned up only normal levels of salinity: 35 parts per 1,000. But later measurements found the salinity to have decreased to 32 to 33 parts per 1,000, which is regarded as a very large change, according to Feodor Ostapoff, director of the Air-Sea Interaction Laboratory of the Environmental Science Services Administration in Miami, who planned the salinity experiment.

The area of infusion was at least 500 kilometers wide—the length of one side of the study area—and extended 30 meters deep.

The relatively small number of previous measurements in the area during the last 40 years had led the scientists to expect some reduction in salinity during the late spring. The fluctuation is possibly a result of a flow of fresh water from some other source, such as the Amazon River 1,700 kilometers to the southeast, or it could be due to heavy spring rains.

Ten ships, 24 aircraft and 7 satellites are taking part in the three-month BOMEX project, which is designed to help gain a better understanding of the complex interactions between the oceans and the atmosphere.

METEOROLOGY

Temperature-humidity shifts

A previously unrecorded relationship between temperature and humidity has been revealed by shipboard instruments in BOMEX, the Barbados Oceanographic and Meteorological Experiment.

Ordinarily in the tropical marine atmosphere, small-scale temperature and humidity changes are closely linked. When the temperature rises, humidity rises; when one drops, so does the other.

But early BOMEX measurements have shown that in small atmospheric fronts three to four miles long, sudden temperature and humidity increases are often followed by a rapid temperature drop, while the humidity goes back down only slowly, over a period of about 10 minutes. The cause of this is not yet clear.

EROSION

Shutting off the falls

Geologists and engineers began drilling and testing operations on the American Falls at Niagara during the last week of June. They seek ways to lessen the pace of erosion and to remove broken rocks from the base.

A temporary dam has diverted the flow of 4.5 million gallons of water a minute to the much larger Horseshoe Falls. The falls will remain waterless until Dec. 1. During this time a temporary sprinkling system will keep the areas of less durable Rochester shale moist to prevent cracking.

More than 260,000 tons of broken rock lie beneath the falls as a result of major slides in 1931 and 1954.

UPPER ATMOSPHERE

Daytime star photographs

The day sky in the wavelength region from 3,600 to 7,000 angstroms at altitudes above 100 kilometers is only slightly brighter than the night sky viewed from the ground, rocket photographs have shown.

The rocket flight produced daytime photographs of the constellation Cygnus, using an extremely fast panchromatic film. The photographic observations confirm earlier reports by Gemini astronauts that the level of background brightness is relatively low and that discrete particles, probably dust, are visible near the cameras. The report by Dennis C. Evans and Lawrence Dunkelmann of the Goddard Space Flight Center is in the June 20 *SCIENCE*.

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