earth sciences

OCEANOGRAPHY

Another research ship

The University of Miami's School of Marine and Atmospheric Sciences has been awarded $1.4 million by the National Science Foundation for construction of a new deep-sea oceanographic research vessel.

The ship will be equipped for the entire range of oceanographic operations, including trawling for biological specimens, coring for deep-sea sediments, dredging for rocks, echo sounding, seismic refraction measurements and sampling the physical and chemical characteristics of the ocean.

It will be 165 feet long and capable of accommodating about 24 persons for 30 days at sea. The ship is to be ready for use in 1971.

GEOPHYSICS

Upper mantle density

The first independent determination of the density of a portion of the earth's upper mantle has been reported. Knowledge about the crust and mantle beneath the oceans is necessary in understanding sea-floor spreading, continental drift and the origin of the basic rocks.

Dr. Frank Press of the Massachusetts Institute of Technology has found that the mantle region from 75 to 125 kilometers deep is of high density—3.5 to 3.6 grams per cubic centimeter. Beneath this is a region of reduced density. This fits with recent data in support of sea-floor spreading which implies that the suboceanic mantle-crust system consists of a lithosphere about 100 kilometers thick that acts like a rigid plate. Beneath this is a more fluid asthenosphere.

Dr. Press, in the July 11 SCIENCE, proposes a mechanism for formation of the lithosphere in which rising basalt spreads through the mantle and is transformed into a coarse, granular rock called eclogite. It implies the melting of large amounts of basalt, which spreads from the midocean ridges laterally through the earth's mantle.

OCEANOGRAPHY

Drifting with the Gulf Stream

After several delays, the research submersible Ben Franklin put to sea July 14 off West Palm Beach, Fla., on the start of an undersea journey that could take it 1,500 miles in the Gulf Stream (SN: 7/20/68, p. 54).

The first four days of the Gulf Stream Drift Mission were billed as a dress rehearsal. But then, with the 130-ton craft operating normally and drifting 45 miles northeast of Cape Kennedy, the decision was made to continue. The craft, carrying Dr. Jacques Piccard and five other scientists, is designed to drift silently with the current at depths of 600 to 2,000 feet. If things go as planned the vessel would emerge from the depths around Aug. 11 some 200 to 300 miles southeast of the tip of Cape Cod.

The scientists are measuring the Gulf Stream's velocity, temperature, salinity, turbulence and acoustical and optical properties and studying the deep scattering layer, fish movements, sea-floor geology, and gravitational and magnetic anomalies along the route.

MAN-IN-SEA

Permanent undersea laboratory planned

An underseas project involving the establishment of a research laboratory on the seabed beneath 75 feet of water is getting underway in West Germany.

The laboratory and living unit for four scientist-divers will be positioned off Helgoland, an island 30 miles from the German coast in an area notorious for adverse weather, severe tidal currents and near-freezing water temperatures.

In contrast to manned habitat projects by the United States and France, the Helgoland Underwater Laboratory is to be a permanent undersea unit for research, rather than a temporary experiment. An unmanned moored support buoy will contain the principle power source and breathing gas supply, dispensing with the need for a support vessel. An independent backup life-support system can operate for two weeks.

CHEMICAL OCEANOGRAPHY

Organic sediments in the Pacific

The results of a study of organic carbon and nitrogen in the surface and deeper layer sediments of the Pacific Ocean provide a profile of changes in climate and productivity of the ocean waters over much of the Quaternary Period beginning about 3 million years ago.

Heating of the surface waters of the northern Pacific during the postglacial and interglacial periods apparently increased the plankton productivity and the supply to the bottom of skeletal remains of diatomaceous algae, planktonic foraminifers and organic matter. In the equatorial region it can be seen that productivity increased during glacial periods when intensive flows of cold waters brought large quantities of nutrients to the surface.

The report is given in the Soviet journal OCEANOLOGY by Dr. Y. A. Romankevich.

CLOUD PHYSICS

Urban effects on precipitation

In the last few years more and more attention is being given to the possibilities of intentionally modifying the weather for human benefit. But it is now being realized that man's activities are already causing quite a few inadvertent local changes in weather.

Few studies have been performed on this subject, but it has been determined that four cities in the Midwest, and Washington, D.C., and New York City in the East, have shown apparent urban-produced increases ranging from 5 to 16 percent in annual precipitation and rain days and 7 to 20 percent increases in summer thunderstorm days.

Much greater increases in precipitation, thunderstorms and hailfalls—31 to 246 percent—have been shown in a recent study at La Porte, Ind., 30 miles downwind from the Chicago-Gary industrial complex.

Much more study should be given to such urban precipitation relationships, says Stanley A. Changnon Jr. of the Illinois State Water Survey, who carried out the La Porte study. He reported in the June BULLETIN OF THE AMERICAN METEOROLOGICAL SOCIETY.