earth sciences

OCEANOGRAPHY

Unique Antarctic current

The Antarctic Circumpolar Current, which encircles the Antarctic Continent, is recognized as one of the major currents of the world. Its surface velocities are relatively low, but its extensive breadth, ranging from several hundred to 1,000 kilometers, has caused it to be ranked roughly comparable in volume flow to the Gulf Stream and the Kuroshio Current.

Now the circumpolar current will have to be put into a class by itself. Measurements made by the Scripps Institution of Oceanography research ship Thomas Washington during the eight-month Piquero Expedition completed in August, show that the current transports an estimated 270 million cubic meters of water per second. This is more than twice the previously estimated amount and nearly three times that of the Gulf Stream.

The doubled estimate is a consequence primarily of the finding of more rapid movement of water far below the surface than had previously been assumed, says Joseph L. Reid of the Scripps. The current-meter measurements, the first taken down to the ocean floor beneath this current, found flows of 4 to 8 centimeters a second there. The previous estimates had assumed the current did not extend to the bottom. At the surface the current flows at about 40 centimeters per second.

The measurements were taken in the Drake Passage, between South America and Antarctica.

MARINE GEOCHEMISTRY

Helium injection into the ocean

Samples collected by the research vessel Thomas Washington, in the east equatorial and southeast Pacific Ocean, give conclusive evidence that a substantial amount of helium is injected into the deep ocean from the interior of the earth.

The 140 deep samples from the vicinity of the East Pacific Rise yielded eight percent more helium than can be explained by the water's ability to absorb the gas from the atmosphere, reports Dr. Rudolph H. Bieri of the Scripps Institution of Oceanography.

This helium component, he says, probably derives from the decay of uranium and thorium in the earth's mantle and is then transported upward by some mechanism, as yet unknown.

Since helium is a good tracer, Dr. Bieri points out, the discovery provides the oceanographer with a new tool for studying deep currents and diffusive processes in the eastern Pacific.

MARINE GEOLOGY

Gulf of Mexico survey

The floor of the Gulf of Mexico, with an area of 600,000 square miles, may be regarded as an entire small ocean basin. A comprehensive, six-month, marine-science survey of the basin has now been completed by scientists of the U.S. Naval Oceanographic Office and the U.S. Geological Survey aboard the research ship Kane.

Geologic conditions observed beneath much of the area confirm that it has good oil and gas potential. The first use of both an emission spectrograph and a spin magnetometer at sea revealed an unusually high silver content in most cores from the western gulf—up to 15 parts per million—and identified a change in the earth's magnetic field that took place less than 3 million years ago.

The data gathered, such as seismic reflection profiles for 15,000 miles of track across the gulf basin, will lead to the preparation of a tectonic map for the entire Gulf of Mexico. This will help fill a major gap in knowledge of the geologic structure of North America.

MARINE GEOLOGY

Suspended sediments in deep Atlantic

In recent years ocean scientists have been accumulating evidence that the deep ocean is much more turbulent than previously believed.

Several years ago Drs. Maurice Ewing and Edward M. Thorndike detected turbid layers in the deep waters several kilometers off the East Coast of the United States. They called these areas nepheloid layers and found them to be a suspension of clay-sized mineral particles. Others have been found elsewhere.

Now a report to be published soon in DEEP-SEA RESEARCH by Stephen Eittreim and Drs. Ewing and Thorndike, all of the Lamont-Doherty Geological Observatory, says they have established that the layer is a permanent, nonseasonal feature of the bottom waters along the entire western margin of the North Atlantic Ocean at depths greater than 3,000 meters.

The layer increases in vertical thickness from 500 meters in the area between New York and Cape Hatteras to 2,000 meters farther to the south.

For the marine geologist, the transportation of suspended sediment in the deep waters of the oceans is a question of major importance. This nepheloid layer, the Lamont team says, represents sediment carried in turbulent suspension in a generally southward down-current course from continental sources and injected into the bottom waters by turbidity currents.

VOLCANOLOGY

Mt. Rainier showing restlessness

Snowcapped Mt. Rainier, a 14,410-foot dormant volcano in western Washington, is showing signs of geologic restlessness.

This does not necessarily mean that an eruption is likely to occur soon, U.S. Geological Survey scientists emphasize, but does mean that the mountain bears close watching.

Instruments have recorded an increased amount of seismic activity this summer, and a recent infrared image made from a military aircraft seems to reveal a new, warm spot on the summit cone. The most likely hazard is that the warming could melt glacier ice on the mountainside and cause flash flooding on streams in Mt. Rainier National Park.

Mt. Rainier is dormant but not extinct. Past activitiy indicates a substantial steam, pumice or lava eruption could occur each 500 to 1,000 years.