GEOLOGY

Ocean Crust Composition

A 1,000-foot core dredged from the ocean floor lends support to the theory that the third layer of the oceanic crust is composed of serpentine rock.

➤ THROUGH THE AGES, what is below the bottom of the sea has been brought up from the inside of earth.

A 1,000-foot core of serpentine rock may show that the material under the oceanic crust has moved upward through folding and faulting.

The long core was obtained from a test drill in Puerto Rico last fall, as part of the Mohole project for boring a hole into the ocean floor, enabling man to peer deep into the dark secrets of the earth.

Drilled into the central part of an arch of rock under the island, the core is being studied by geologists in an effort to shed light on the theory of composition of the oceanic crust and on possible drilling conditions to be encountered in the ultimate deep hole of the Mohole project.

Geologists today generally agree that the composition of the earth's crust under the oceans differs from that found under the continents. The continents consist of sedimentary rocks that lie over a complex mass of metamorphic and igneous, or fire-fused rocks.

The oceans, on the other hand, have a simpler structure. The top layer consists of unconsolidated sediments. Beneath this is a layer that may be hard sedimentary rocks, or a volcanic rock called basalt, or a combination of both. Still deeper lies the third or crustal layer, of composition that is yet unknown.

Some geologists think that the third layer is basalt lava; others say that it is serpentine, which is a magnesium silicate that has been chemically combined with water and changed to a different substance.

Scientists from the Woods Hole Oceanographic Institution reported that they dredged serpentine from the lower part of the ocean about 100 miles north of the present drill hole of Puerto Rico. This find lends support to the serpentine hypothesis.

The discovery of serpentine from under Puerto Rico may mean that this silicate rock is essentially the material of the earth's mantle that has become altered and hydrated, stated Dr. Harry H. Hess of Princeton University, chairman of the site selection panel of the National Academy of Sciences-National Research Council. This panel gives scientific advice on the final selection of the site for the deep Mohole in the ocean floor. Exact site and date of this grand drilling have not yet been set.

Project Mohole is a national scientific research project, managed and supported by the National Science Foundation. Its purpose is to drill a hole through the earth's crust to the underlying mantle, the 1,800-mile thick layer of plastic rock surrounding the earth's molten inner core.

Started in 1961, the Mohole project takes its name because the hole is to be drilled to the Mohorovicic discontinuity or "Moho" —a region within the earth believed to mark the boundary between the earth's crust and the mantle.

The Mohole will be drilled in the ocean because the crust is thinner there than beneath the land.

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GEOLOGY

Earth's Crust Measured

➤ SHOCK WAVES generated by nuclear and chemical explosives are helping geologists map the dark regions inside the earth.

A different concept of the thickness of the earth's crust has resulted from seismic studies throughout the western United States by Dr. Louis C. Pakiser of the U. S. Geological Survey, Denver.

The earth's crust is usually thought to be thicker under massive mountain ranges than under plateaus.

A two-year study by nearly 2,000 seismological stations showed that the earth's crust is about 30 miles thick under the Great Plains east of the Rocky Mountains, while it is only about 13 miles thick under the central California Valley area, Dr. Pakiser told the American Geophysical Union at Washington, D. C.

Changes in crustal thickness from one region to another do not appear to be controlled by that region's altitude above sea level, Dr. Pakiser said, unless the properties of the upper mantle extend accordingly. However, he pointed out, in certain areas the crustal thickness does seem to be affected by a change in altitude.

"Each area has its own characteristic crustal and upper-mantle properties," he said.

Studying the shock waves generated by new types of man-made explosives, geologists try to pinpoint the depth and density of the outside earth layer, and the upper mantle, a shell of very heavy rock believed to be about 1,800 miles thick. Pressures and stresses under the weight of the continental masses are so great upon this mantle that it will bend, twist and even flow thickly. Results of Dr. Pakiser's survey seem to indicate that the mantle is highly mobile.

The network of his study extends from eastern Colorado to the California coastline and from central Idaho to the border of Mexico.

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GEOPHYSICS

Ancient Rocks Reveal Secrets of Early Life

➤ THE EXCITING STORY of how life on earth began is being unraveled by analysis of chemicals in ancient rocks.

Sedimentary rocks that were developing on earth about three billion years ago have trapped secrets of early life forms.

The chemical remains in these ancient rocks are now being analyzed to learn as much as possible about the forms, functions and processes of early life, Dr. Philip H. Abelson, director of the Geophysical Laboratory of Carnegie Institution of Washington, reported in Washington, D. C.

Scientists have thoroughly studied the records of fossils found in rocks created more recently—during the last 550 million years. The evolutionary processes of land and marine creatures since that time are now known in detail, he said.

But there is little evidence for life and manifestations of its forms in the era known as the Precambrian age. The fossil remains identified with this area are related to algae structures, he said, and there is no real evidence that multicellular animals existed then.

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GEOPHYSICS

Mass Motions of Sun Found Very Turbulent

➤ THE SUN'S "HALO" is more devilish than scientists have previously thought.

More turbulence than ever before recorded is taking place on the solar corona, that flaming luminous halo around the sun.

A new technique of using radar in the low-frequency range is bringing these facts to light, Dr. Jesse C. James, Lincoln Laboratory, Massachusetts Institute of Technology, reported in Washington, D. C.

With this low-frequency radar equipment, Venus seems to be larger than when scanned with radar at high frequencies, Dr. James told the U.S. National Committee of the International Scientific Radio Union.

At the solar radar station near El Campo, Texas, the radar's antenna extends over four and a half acres. It operates at a frequency of 38.26 megacycles per second, substantially lower than other radars being used for observing planets. A 500-kilowatt transmitter sends signals to the celestial objects, where they are bounced back to earth and analyzed. It takes 17 minutes for these signals to make a round trip to the sun, and ten minutes to reach Venus and back, when Venus is in a good position in relation to the earth.

The seemingly larger surface of Venus may be caused by interference of space material between that planet and earth, Dr. James said. It is possible that such phenomena as solar ejections, plasma clouds, magnetic storms, or solar particles act like huge lenses to focus the energy recorded by the El Campo radar.

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