

## GEOPHYSICS

# Test Drill Mohole

## See Front Cover

► UNITED STATES scientists are now deep in a large-scale drilling project designed to unlock the secrets of the earth.

Drilling a 560-foot deep bite out of the ocean floor more than two miles beneath the wind-swept surface is a major feat in itself. However, the tests off the Mexican coast are only a prelude to poking a hole through the earth's outer skin into its unknown interior. Dubbed Project Mohole, the study would yield material, now unobtainable, that would tell scientists more about the earth's history and inner structure.

The ultimate goal is to bring to the surface a sample of the earth's mantle, a dense plastic-like material underneath the earth's crust.

For the first time scientists would then have evidence to shatter or confirm some of the present theories of the earth's interior.

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# Key to Earth in Antarctic

► THE KEY to the history of the earth is locked in the vast deep freeze of the continent Antarctica and its surrounding ocean.

But it will take continued and concentrated scientific effort on an international scale as well as increased national effort to unlock it, the committee on polar research of the National Academy of Sciences stressed in a comprehensive study on Science in Antarctica.

The remote areas of Antarctica extend a vital influence on physical processes elsewhere in the world. Its ocean is the only body of water that encircles the earth. It forms the widest link between the three other major global water bodies, the Pacific, Atlantic and Indian Oceans. Thus the study of the Antarctic Ocean will advance knowledge of the distribution, generation and transformation of different water masses.

The unbounded zonal extent of much of the Antarctic Ocean also makes it a logical region to study the progress of the ocean tides, and the origin, development and decay of other wave phenomena. But present United States research in this ocean is inadequate for such detailed studies and is vastly inferior to Soviet efforts, the report said.

The Russians have two extremely well-equipped oceanographic expeditionary ships. The U. S. Government has none comparable.

The committee recommended that Congress authorize the construction of an atom-powered icebreaker for this mission equipped, as are the Soviet ships, for a variety of biological and geophysical studies: biology, bacteriology, chemistry,

All that is now known is by indirect evidence.

Seismic waves have told scientists there is an irregular dividing line separating the earth's crust from the underlying mantle. This line is known as the Mohorovicic discontinuity, or Moho. It was named after the Yugoslav scientist who discovered that earthquake waves suddenly increase in velocity when they pass through this boundary.

Below the 1,800-mile thick mantle, the earthquake waves reach the earth's core. The core is supposedly composed of iron and nickel.

The earth's crust is a thin, slag-like veneer of light granitic rocks averaging ten miles in thickness. Scientists believe the crust, with its jagged peaks and valleys, "floats" over deeper plastic material.

The Mohole cannot be drilled on land, because the weight of the continents has pushed the mantle to a depth averaging 20 miles, very difficult to drill. Scientists

ornithology, meteorology, oceanography, glaciology, geology and hydrography.

Surface studies of the icy continent itself also should be intensified. The report said that the Antarctic ice sheet has 90% of the ice on the earth's land surface, an amount that, if melted, would cause the sea level to rise 80 meters (more than 262 feet) or more. The south polar region plays an important role in the heat and water budget of the earth.

Antarctica also has provided a unique laboratory for the study of the biological and psychological system that is man. The complete geographical isolation of the continent, the absence of any native human population, the fact that it is the coldest and windiest continent on earth, its vast size, great heights, land masses almost totally ice-covered and summer temperatures around freezing represent features of particular interest from the standpoint of human ecology.

Future studies on man in the Antarctic should concentrate on performance capacity at sea level and high altitudes, particularly under survival conditions; a systematic investigation of the total thermal exchange between man and his environment in all seasons under a variety of conditions; nutritional requirements; local cold acclimatization in exposed parts of the body, and psychological and behavioral problems.

The flora, fauna and insect life of the icy southland also should have more attention, the report urged.

The special committee is headed by Dr. Laurence M. Gould, president of Carleton College, Northfield, Minn.

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have a good chance of reaching the mantle underneath the buoyant oceans where the crust averages only five miles in thickness.

The Cuss-I deep-sea drilling ship, seen on the cover of this week's SCIENCE NEWS LETTER, is participating in the experimental drilling program near Guadalupe Island, off the coast of Mexico. The test drilling is sponsored by the National Science Foundation under the scientific and technical guidance of the National Academy of Sciences.

Information from the Mohole would solve such problems as whether the magnetic poles have wandered throughout geologic history or whether the planet is becoming hotter or cooler. Geophysicists will be able to estimate the density of earth's material all the way to the earth's center from samples of rock taken deep in the crust. And the age of the earth's crust and mantle will no longer be in doubt.

Although the actual drilling of the Mohole to pierce the mantle is still a few years off, preliminary test drilling now underway will yield a wealth of scientific information. Already, drills have gone through the ocean sediments called the "most fabulous history book of all time."

Core samples taken from the ocean's bottom ooze and layers may reveal an



DRILLING RIG OF CUSS-I

uninterrupted record of the earth's development for two billion years.

Somewhere, buried under tons of sediment, is the earth's original face, dotted by a layer of ancient meteorites that fell from the heavens many eons ago.

Whether or not the Americans beat the Russians in the race to earth's inner space is a moot question. Although the Russians claim they now have the necessary equipment to reach the mantle, U.S. scientists do not know if the attempt is being tried.

However, U.S. scientists are not waiting to find out but will soon start another test hole, even deeper, through the ocean bottom sediments.

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