

earth and environment notes

UNDERSEA OBSERVATION

How Deep the Light

Observations from five different research submarines have revealed that daylight penetrates the ocean to depths as great as 2,300 feet. Horizontal viewing in off-shore tropic and subtropic areas ranges from about 20 feet, at a depth of almost 1,000 feet, to almost 200 feet at a 600-foot depth.

Such observations could mean that light is available for undersea tasks at depths "really greater than earlier studies indicated," according to Roswell F. Busby of the Naval Oceanographic Office's Deep Vehicles Branch.

In one case, observers aboard the Deepstar 4000 found that natural light 600 feet down off the coast of San Diego, Calif., offered greater viewing range than even the sub's artificial lighting, because of the lesser effects of scattering.

The maximum depth of penetration of natural light apparently was reached by the deepsub Alvin, in a dive at Tongue of the Ocean, in the Bahamas. A vertical fairing around the Alvin's hatch, visible through a viewing port, disappeared at between 2,100 and 2,300 feet, reports Busby in *SCIENCE* (Dec. 1).

NATURAL RESOURCES

Russia's Deepest Oil Well

A petroleum-seeking drill hole, already the deepest ever made in the Soviet Union, is close to its planned depth of 20,670 feet. But those last few feet, according to the drilling foreman, are coming hard.

Drilling temperatures have approached 400 degrees F. Layers of quartz-porphyrite rock that "cannot even be scratched with a wrench" rapidly wear out both drill bits and pipe, and merely raising the drill from such depths to replace it takes 14 hours. At 20,340 feet the electric metering instruments failed, and new equipment had to be designed and installed, *Isvestia* reports.

Despite these difficulties, a second hole has been started, located like the first one near Krasnodar, north of the Black Sea. The area is already known for petroleum and gas deposits at lesser depths, and has a well-developed pipeline network that would be usable with the new deep wells.

METEOROLOGY

The Helpful Hurricane of '45

It's an ill wind that doesn't blow somebody some good, and the Environmental Science Services Administration even has a kind word for hurricanes, which from time to time have ended droughts over parts of the U.S.

Arnold Sugg of the National Hurricane Center in Miami, recently analyzed nine helpful storms that have occurred over the past 40 years. The most beneficial of them, he said, was one that lasted from June 20 to July 1, 1945. It brought drought relief to an estimated 40,000 square miles of land across central Florida and up the East Coast, while causing no deaths and little damage.

"Any measure of the benefits of tropical cyclones," Sugg admitted, "has to be offset by the death and destruction which resulted from these storms."

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GEOPHYSICS

Listening for Landslides

Detection devices buried in hillsides can spot the potential active zones of impending landslides, as well as enable prediction of the depth of material that will actually be carried away in the slide, according to two California geologists.

To test their theory in the laboratory, the researchers staged model landslides by tilting a box filled with carefully dyed layers of sand. A series of devices was buried in the sand to send electrical signals to a tape recorder in response to even slight movements or stresses. By displaying the signals on the screen of an oscilloscope, the strength and location of the tiny "noises" preceding the slide could be determined.

It also seems likely, the geologists report in *SCIENCE* (Dec. 1), that the tension cracks and noises located behind the true failure surface indicate the development of potential, though ultimately more stable, shear surfaces.

Networks of seismic listening devices on the ground, according to John D. Cadman and Richard E. Goodman of the University of California, Berkeley, "may be able to define the geometry of an impending landslide even before it occurs."

GLACIOLOGY

Russians Worry Over Melting Glaciers

Soviet scientists, concerned over the rapid melting of glaciers, have established a research station above cloud level on the Abramov glacier in the Pamir-Alayskiy mountain range.

The station, 12,470 feet above sea level, is equipped with 50 tons of instruments to measure the glacier's heat balance, mass changes and other characteristics. The data will be used in hydrological forecasts, of particular importance to Central Asia, whose rivers are fed by glacial waters, according to the U.S. Department of Commerce's Bulletin (#168) on *SOVIET-BLOC RESEARCH IN GEOPHYSICS*. . . .

OCEAN RESOURCES

Sea-Mining Study Grows

The Bureau of Mines' program to boost industrial development of undersea mineral resources has been joined by a fourth major industrial firm. The program, operated on a cooperative basis, was begun early this year at the Bureau's Marine Minerals Technology Center in Tiburon, Calif.

The latest company to join is the Amerada Petroleum Corp., Tulsa, Okla. Other firms in the program are Getty Oil Co., United States Steel Corp., and Humble Oil and Refining Co. Each involved company contributes \$25,000 to the Center and provides a representative to take part in the Bureau's research program.

The Center operates three oceanographic research vessels and a land-based laboratory, and is concerned with sea-bottom sampling, data analysis, and testing of potential undersea mining systems and equipment.