earth sciences

GEOPHYSICS

Winds and magnetic disturbances

Geophysical studies in Wales show strong evidence of an association between winds in the earth's troposphere —the lower seven to ten miles of the atmosphere—and solar or magnetic disturbances.

The data definitely suggest a slight increase in average wind speed two days after magnetic storms. For years of high solar activity there seems to be a clear decrease in wind speed following a period of magnetic calm.

The studies found strong evidence of a direct local influence of tropospheric wind on the degree of magnetic disturbance, but there are reasons to doubt a cause-and-effect relationship.

The physical interpretation of the results is not yet clear, report W. J. G. Beynon and E. H. Winstanley of the University College of Wales in the June 28 NATURE, although some interaction is definitely indicated.

OCEANOGRAPHY

Crucial top millimeter

The top millimeter of the ocean is an extremely important and puzzling layer. Little has been known about the ways in which heat is transferred up through this film of water to the surface. Yet knowledge about the final temperature profile in the top millimeter is critical to many areas of research.

Infrared measurements of sea surface temperature taken from satellites and aircraft, for example, will differ from the bulk water temperature by an amount depending on this factor.

Now an analysis of a number of different studies on the subject shows that three different means of heat transfer dominate within different regions of the top millimeter. Under suitable weather conditions, radiation dominates within the upper micron. From there down to half a millimeter, heat is transferred almost entirely by conduction.

At depths greater than 0.5 millimeter, turbulence is the dominating mechanism. The new calculations provide the strongest evidence yet for the existence of the in-between conduction layer.

Drs. E. D. McAlister of the Scripps Institution of Oceanography and William McLeish of the ESSA Sea-Air Interaction Laboratory reported the findings in the June 20 JOURNAL OF GEOPHYSICAL RESEARCH.

NUCLEAR POWER

SNAP underwater

Two compact 10-watt nuclear power generators are now in operation in shallow water off California's San Clemente Island.

The SNAP-21 radioisotope-powered generators were implanted for the Atomic Energy Commission during the last week of June. The 700-pound prototype units, placed initially at depths of 60 and 130 feet, will be monitored continuously during the next two years to determine their ability to operate in the ocean over an extended time. A third generator is to be implanted later this summer. Their fuel is strontium 90.

The units have been developed by the AEC to serve as power sources for underwater navigational aids, sonar beacons, seismological stations and other equipment needing reliable power for long periods. They are designed to operate at depths of 23,000 feet for periods of five years or more.

PETROLEUM GEOLOGY

Submarines for oil exploration

A California-based company, Marine Resource Consultants, Inc., has purchased three 1,000-ton submarines from the Royal Swedish Navy for offshore oil exploration in the Canadian Arctic.

Submarines offer the only economical approach to oil searches in the Arctic, the company says. In summer they will surface in patches of open water. In winter they will operate close to man-made, sonar-equipped openings in the ice. The subs will be modified and equipped with geophysical gear before they are put into use in mid-1971.

ATMOSPHERIC PHYSICS

Making an artificial aurora

A small electron accelerator carried aloft by an Aerobee rocket has created an artificial aurora visible from the ground.

The experiment, launched from Wallops Island, Va., points to the possibility of making an electron beam from a rocket in one hemisphere impinge on the atmosphere in the other hemisphere. This would allow the determination of conjugate points—the places where opposite ends of magnetic lines of force touch the earth—and would be helpful in studies of the field lines.

Dr. Wilmot N. Hess of the National Aeronautics and Space Administration reports the experiment in the June 27 SCIENCE.

MAN-IN-SEA

Resisting the deep-ocean cold

Five divers were to be locked into hyperbaric chambers at Duke University last week to begin a six-day period at the pressures and temperatures found 600 feet beneath the ocean surface.

The men, according to Cmdr. James K. Summitt, the medical officer in charge of the experiment, will undergo the most extensive biomedical testing ever performed on divers at any depth.

The primary purpose of the simulated dive is to test their physiological reactions to 45-degree F. waters while using Navy equipment designed to let them function for extended periods underwater. The necessary refrigeration equipment was added to the hyperbaric chamber this spring.

The divers will test the Navy's Mark IX underwater breathing system designed for deep dives and salvage work at depths of 600-850 feet. They also will test a combination of water-heated underwear and a dry suit filled with a nitrogen-oxygen mix as insulation. Seven days of decompression will follow their six days at the simulated 600-foot pressure.