

Submarine Shows Sub-Ocean Pressures

Geophysics

Pressures along the floor of the Atlantic Ocean force Porto Rico up and the ocean bottom north of it down to form the great Nares deep. This is indicated by observations of the intensity of gravity in this region just made from the submarine S-21. Dr. F. A. Vening-Meinesz, of the Netherlands Geodetic Commission, who was in charge of the work, told about the investigations at a meeting of the Washington Academy of Sciences, the U. S. Navy Department and the Carnegie Institution of Washington. Dr. F. E. Wright, who, with E. B. Colline, of the Navy Department, accompanied Dr. Vening-Meinesz, spoke about the results and described some of the details of the trip. It lasted about two months and covered also the Gulf of Mexico and the Caribbean Sea.

Gravity measurements are made for two purposes, Dr. Vening Meinesz explained. One is to ascertain the exact shape of the earth, while the other is to study the behavior of the crust of the earth.

The only way of measuring the intensity of gravity with the required accuracy is by timing the swings of a pendulum. A pair of scales would

not show its variation because both sides of the scales would be affected equally. A pendulum, however, vibrates more rapidly the greater the gravitational pull. Previously, it has only been possible to make such gravity measurements on land, as the rocking of a ship interfered with the pendulum. Dr. Vening-Meinesz invented a method of using two pendulums. While both are affected by the sway of the ship, their motion may be combined in such a way that the result is the same as of one steady pendulum. As, however, the method can only be applied if the ship's motion does not exceed a certain limit, he made his observations from a submerged submarine, where the motion of the waves has very small effect. Two trips in a Dutch submarine from Holland to Java, in opposite directions, showed the practicability of the device. As a result of the cooperation of the U. S. Navy with the Carnegie Institution, he was extended the use of the American submarine S-21, for gravity observations in the Gulf of Mexico and Caribbean Sea.

Submarine measurements have some advantages over land observations, he said. One is that there are no local

irregularities of mass to cause disturbances, as there is nothing in the immediate vicinity of the submarine but water and air. Also, erosion, by which atmospheric conditions, such as wind and rain, rapidly shift land masses, is entirely absent on the ocean bottom.

In general, the investigations confirm the theory of isostasy, by which the earth's crust is supposed to consist of masses of various densities floating on a more or less fluid mass below. However, they found a departure of equilibrium in certain regions, which reveal stresses in the ocean bottom or in the subcrustal layers. One of these regions is the central part of the Gulf of Mexico. Besides that, two great ocean deeps were studied. One is the Bartlett deep, about 22,500 feet, southeast of Cuba and between that island and Jamaica. Here they had the busiest time of their trip, for in 18 hours they made 5 separate dives and observations. Altogether 49 gravity observations, each requiring a separate dive, were made. The Bartlett deep, however, rather unexpectedly showed no great stresses. (*Turn to next page*).

Strange Stars Seen by Hoover

Astronomy

Strange stars and constellations, unknown to those of us who live in countries north of the tropics, have come into view in the evenings for President-elect Hoover and his party in South America. The sun and moon seem to move across the sky backwards, and Summer is just beginning in the countries visited.

All these things are results of the fact that the earth is a globe. The stars are distributed all around the earth as on a sphere. From any part of the earth's surface, only half of this sphere can be seen at a time. On account of this, from our position half way between the Equator and the North Pole, there is a circle of stars around the southern heavenly pole that never rises. For us they are entirely invisible. As one travels south, more and more of them come into view. At the Equator, all of the stars are visible at some time of the year. South of the Equator, the pole-star, and such familiar constellations as Cassiopeia, the Great Bear

and Cepheus, remain continually below the northern horizon. The unfamiliar groups around the South Pole take their places.

When Mr. Hoover was in Valparaiso he was as far south of the Equator as Los Angeles, Birmingham or Charleston are north of it. The star Fomalhaut, in the constellation of Piscis Australis, the southern fish, which we see now low in the southern sky, about 7 p. m., is overhead in the early evening hours. Around it are such unfamiliar groups as Pavo, the peacock; Grus, the goose; Phoenix and Indus, the Indian. Low in the southwest may be seen Crux, the famous "Southern Cross". Near it he can see alpha Centauri, nearest of all the known stars to the earth. The huge constellation of Argo, the ship, will not be visible at this time of year in the evening sky, but he can see it if he stays up until early morning hours.

Some of these southern constellations that the members of the Hoover

party will see have such queer names as Antlia Pneumatica, the air pump; Horologium, the clock; Microscopium, the microscope, and Norma, the rule. These names, so different from the mythological appellations of the northern groups, date from the eighteenth century, when astronomers began their first extensive observations of the southern stars. Finding a lot of empty spaces in the skies, they proceeded to fill them with familiar pieces of scientific apparatus of the period.

As Mr. Hoover looks to the southeast in the evening he will see the two Magellanic clouds, appearing as two detached pieces of the Milky Way. These are really systems of stars outside of our own, but are our closest neighbors in space.

When the sun moves southward, and lower in our skies, it brings winter for us. At the same time it is rising higher in southern countries, and bringing summer. Our winter solstice, on December 21, at 9:04 p. m., Eastern (*Turn to next page*)

Submarine Expedition—Continued

North of Porto Rico they studied the Nares deep, which showed great stresses at work. In the deep itself, the sides of which slope as much as 40 degrees in some cases, there was a deficiency of gravity, while to the south there was an excess. Dr. Vening-Meinesz thinks that this indicates that there is a horizontal pressure in a north and south direction in the ocean bottom in this region. This pressure causes a buckling, pushing Porto Rico up, and the deep down. The observations show that this pressure extends to even as far as East Cuba, i. e., much farther than the configuration of the ocean floor indicates.

From their studies in the Gulf of Mexico, off the delta of the Mississippi, they found no evidence that the large masses which the river is continually depositing on the ocean bottom disturb the equilibrium. Apparently as fast as this deposit is laid down, the adjustments take place.

When the computation of the results is complete some new light may also be shed on Wegener's theory that north and south America and

Europe and Africa were originally joined, but that the western continent is floating away from the eastern. In his previous observations Dr. Vening-Meinesz found an excess of gravity off the Pacific shore of Central America, which might furnish an indication that the Americas were pushing westwards. This would be in accord with Wegener's ideas. Now during this expedition, observations were made off the Atlantic coast. If these prove that there is a deficiency of gravity in this region, it would be in accord with this theory, for it would show a pull instead of a pressure on the bottom. If it proves that gravity is in excess here also, however, the theory will get no confirmation.

Dr. Vening-Meinesz expressed his thanks to the U. S. Navy authorities and the Carnegie Institution for making this scientific investigation possible. He acknowledged the wholehearted cooperation of Lieutenant Fisher in command of the S-21, of the commandant of the expedition, Lieutenant Nash, and of the officers and crew of the submarine.

Science News-Letter, December 15, 1928

Strange Stars—Cont'd

Standard Time, marks the beginning of summer in South America, South Africa and Australia. As Valparaiso is south of the tropic of Capricorn, which is the southern limit of the sun's path, the sun is always in the north. As it travels from east to west, as usual, this means that it travels across the sky from right to left, instead of from left to right, as we see it from the United States. The same thing is true of the moon. It, too, will seem to cross the sky in reverse.

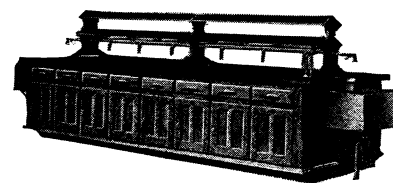
Science News-Letter, December 15, 1928

A new factory in Switzerland will manufacture glucose from sawdust.

Twenty per cent. of the automobile headlights in use are too bright, government tests indicate.

There are about 18 distinct varieties of cheese, but there are more than 400 local names for the different kinds.

A stamp vending machine tried out by the Los Angeles post office not only dispenses one and two cent stamps but returns correct change to the customer.



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