

GEOPHYSICS

Strong Atmospheric Tides

Moon causes strong tides in atmosphere similar to those in ocean. Energy equivalent of about 1,000,000 atomic bombs is stored in these tides, physicist reports.

► THE ENERGY equivalent of about one million atomic bombs is stored in the atmospheric tides caused by the attraction of the moon on the earth's outer envelope.

These lunar tides in the atmosphere are similar to those in the oceans, A. G. McNish of the National Bureau of Standards told the Philosophical Society of Washington in his presidential address. They are found both high in the atmosphere and close to the earth's surface, he reported, and are at their strongest at the equator.

At the earth's surface, the speed of these tides, known as lunar winds, is only about one-twentieth of a mile per hour, too low to be felt or measured. They can, however, Mr. McNish stated, be detected by statistical treatment of a lengthy series of meteorological data.

A study of the lunar winds, both in the upper and lower atmosphere, is leading to a better understanding of the variations in the earth's magnetism.

High tide and low tide in the air come twice daily, just as in the oceans. There are also, Mr. McNish said, high points in the atmospheric tide that are equivalent to the ocean's spring tide. These extra strong changes in the earth's lunar winds come twice in every lunar month, four days after the new moon and four days after the full moon.

From the presence of the low speed lunar winds near the earth's surface, the presence of "greatly amplified" upper atmosphere winds is inferred theoretically. Their effect can be spotted, Mr. McNish said, by charting the changes required in the wavelengths used for good reception of long distance radio under similar conditions in regions near the equator. The frequency necessary to get through clearly may vary as much as 30% in one week between the same two points, he stated.

These radio waves are reflected by ionized layers in the earth's outer envelope, and one layer, known as the F-2, has been known to rise as much as 20 miles an hour.

Often "conspicuous in a day's record," these vertical motions are associated with the moon. By a complex interaction of forces, the vertical movement is connected with the horizontal motions of the ionized layers, which run to similar velocities of about 20 miles an hour. The energy which causes this motion, Mr. McNish stated, is "pumped out" of the lower atmosphere.

The lunar winds rotate around the clock, in the Northern Hemisphere, in a clockwise direction if one could look down on the atmosphere from above. They go to the east in the morning and to the west in the evening, he said.

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SEISMOLOGY

New Vertical Seismograph

► A NEW seismograph that can follow earthquake waves eight times around the earth may settle once for all whether this planet's core is molten or solid.

Developed at Columbia University's Lamont Geological Observatory, the "Ultra-long Period Vertical Seismograph" received its first major test by recording the Kamchatka quake of Nov. 4, 1952. This earthquake, which was as powerful as the one that destroyed San Francisco in 1906, was first recorded on the seismograph 12 minutes after the first shock, 5,260 miles away.

Dr. Maurice Ewing, who designed the seismograph with Dr. Frank Press, described the earthquake as seen on the seismograph:

"For the next 20 hours our seismograph recorded the shock waves as they continued to circle the earth in both directions. We detected 15 trains of waves in all. This last group of waves had gone completely around the globe no less than eight times,

having traveled altogether about 182,000 miles. Its wavelength was over 1,000 miles and its period between 400 and 500 seconds, or about seven minutes.

"This particular wave was traveling at a speed of 2½ miles per second, and we believe it felt the earth's core."

The seismograph is designed to measure special shock waves of very long lengths that are governed by the mantle of the earth, instead of by the crust of the earth as in the case of shorter waves.

These waves, called mantle Rayleigh waves, can be used to measure the degree of solidity of the earth's core, Dr. Ewing said, and thus may finally decide the question of whether liquids or solids fill the center of the globe.

First indications from the new seismograph indicate that the earth's core is molten.

"The great interest of the longer waves is that their velocity ceases to increase with

wavelength, contrary to the trend in shorter waves," Dr. Ewing said. "Since the depth of penetration of the surface waves increases with wavelength, we interpret this failure of the longest waves to increase in velocity to mean that they are 'feeling' the liquid core of the earth. If the center of the earth were solid, we would expect a continued increase in velocity with wavelength as the transmitting medium became more dense."

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HERPETOLOGY

17-Foot Anaconda Oldest Captive Snake

► A SOUTH American anaconda holds the longevity record for snakes kept in captivity in the United States. The giant water snake, kept in the Washington zoo, was 17 feet long when he died at the age of 28 years.

Runner-up in the reptilian old-age contest is a rainbow boa, still alive in the Staten Island zoo, 27 years and 4 months old, reports Dr. C. B. Perkins of the Zoological Society of San Diego in a list of 60 longevity records for snakes.

Other records:

A cobra, in the San Diego zoo, 23 years and 3 months; an American corn snake, 21 years and 9 months, Philadelphia zoo; and a reticulated python, 20 years even, at the St. Louis zoo.

The oldest rattlesnake is a Texas rattler, 15 years and 7 months, in the St. Louis zoo.

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AERONAUTICS

Turbocompound Engine To Outfly British Jets

► THE SUPER Constellation transport now on Lockheed's assembly line "is the plane the jet has got to beat," company officials have declared in what is believed to be a challenge to Britain's jetliner.

The Super Constellation can cruise 350 miles an hour, powered by four turbo-compound engines that create 13,000 horsepower. Its "unusually long range, coupled with extra speed of the turbo-compound, enables them to outfly jets by avoiding refueling stops," the company said. The new plane can carry 99 passengers.

Britain's much-talked-about Comet jetliner now cruises 350 miles an hour and carries 36 passengers. Powered by four de Havilland engines, the plane has a 1,500-mile range.

The de Havilland Aircraft Company is now under contract to Pan American World Airways to build three modified Comets for delivery in 1956. The Comet III, as it is called, is to cruise 500 miles an hour, powered by four turbojet engines. Each plane is to carry 58 first-class passengers or 76 tourists, and is to have a cruising range of 2,700 miles.

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