GEOPHYSICS

Radiation Dates Meteorite

Scientists have developed a new method for dating meteoritic material, based on detecting tracks of plutonium 244, a radioactive material now extinct.

➤ A NEW METHOD of dating meteorites, the only known visitors from space found on earth's surface, was reported to the American Geophysical Union meeting in Washington, D.C.

The method for exploring the early history of the solar system is based on detecting tracks of a radioactive material now extinct, plutonium 244. The detection technique is "simple and is applicable to many meteoritic minerals," Drs. R. L. Fleischer, P. B. Price and R. M. Walker of General Electric Research Laboratory, Schenectady, N.Y., have found.

From the plutonium tracks, the scientists can determine the time interval between when the elements were formed and when the cooled-down meteoritic material was formed. Half of all the plutonium 244 created at the time the elements were synthesized disappeared in 76 million years, a short span in the solar system's estimated age of 4.5 billion years.

The plutonium tracks are detected using the same techniques already developed to date minerals originating on earth. When plutonium or any other radioactive material disintegrates, charged particles are emitted. These particles leave tracks showing their paths, which can be found by a variety of methods, photographic film being most widely used.

Another scientist, John A. Wood of the University of Chicago, reported to the meeting that the meteorite found near Renazzo, Italy, is probably the best preserved sample of the primordial matter from which the earth was formed.

The meteorite that fell near Renazzo in 1824 differs from common meteorites mainly in the way iron and nickel are distributed within it. Mr. Wood heated samples of Renazzo-like meteorites in an oven at 1700 degrees Fahrenheit for up to four months. The distribution of iron and nickel changed to resemble that found in the more common meteorites.

Mr. Wood concludes that the Renazzo-type meteorites come from near the surface of the tiny planets in the asteroid belt where they remained at a low temperature.

Most meteorites that fall to earth, however, come from the interior of asteroids, where they were heated. Collisions in space broke the planets into fragments.

"Since in effect we can create common meteorites from the Renazzo type of meteorite by the simple process of heating, but cannot reverse the process in any convenient way, we may assume the Renazzo meteorite represents an earlier state of matter," as it existed when the planets were born, Mr. Wood concludes.

The Renazzo meteorite is classified as a chondrite, similar to 90% of the meteorites falling to earth.

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SPACE

Meteors Bombard Mariner

➤ THE MARS-BOUND Mariner IV spacecraft is being bombarded by more and more tiny meteorites as it gets further from the sun. During its first 3,350 hours in space, Mariner's detector was hit at least 95 times.

Mariner II, which was sent toward Venus in 1962, recorded only two hits.

One reason for the increase may be the asteroid belt, consisting of thousands of chunks of rock, ice and dust ranging from microscopic size to several miles across. The belt lies mostly between the orbits of Mars and Jupiter, and could account for the indications of much denser cosmic dust. Also, Mariner IV's cosmic dust detectors, much more sensitive than those of Mariner II, may be the reason for the apparently higher score.

The detectors are square aluminum plates wired to act as microphones. When a micrometeorite hits the plate, the loudness of the impact indicates the speed of the particle.

The results of Mariner IV's findings were reported at the 46th meeting of the American Geophysical Union. The spacecraft has traveled more than 221 million miles on its 325-million-mile trip. It will pass closest to Mars, within about 5,500 miles, a little past 9 p.m. (EDT) on July 14.

Mariner IV's instruments also detected the shock wave caused by the "solar wind" in the earth's magnetic field at a greater altitude than any previous observation had shown. On the first day of the flight, the shock wave was found as far as 154,000 miles from earth.

One of the experimental intstruments onboard, an ionization-measuring Geiger counter, may have actually been "shot down" by a solar flare. On March 3, the counting rate of the detector jumped as a result of a solar flare on Feb. 2, and then stuck, making data from the instrument useless.

Of the six experimental instruments on Mariner IV, only one, the ionization detector, is no longer working, although the solar plasma probe suffered a faulty resistor that has forced scientists to recalibrate the instrument in an effort to understand its message.

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Paired Wind Eddies Seen

➤ WEATHER SATELLITES are finding paired eddies of wind tucked behind certain islands. These eddies are too small to be observed by standard weather procedures and too large to be noticed by an observer on the earth's surface or in an airplane.

As wind blows against a tall island, it flows around both sides and circles back behind the island in two circular eddies that can persist as much as a hundred miles downwind, two scientists reported at the 46th annual meeting of the American Geophysical Union.

These eddies are made visible by patterns in stratocumulus clouds lying beneath layers of colder air from about 2,000 to 6,000 feet above the surface of the ocean, reported K. P. Chopra of MELPAR, Inc., Falls Church, Va., and L. F. Hubert of the U.S. Weather Bureau in Washington, D.C.

They are formed in the wake of islands such as the Madeira Islands that have steep sides and extend above the low-lying layer of cold air.

By analyzing such data as the diameter of the obstructing island and the wind speed, scientists can estimate the distances between the two pairs of eddies and how long they will last.

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Ocean Currents Studied

➤ IN ORDER TO DISPOSE safely of radioactive wastes into the sea, scientists should first understand more of the constant undersea currents caused by silt and sediment slowly slipping into the ocean off the continents, a scientist told the 46th annual meeting of the American Geophysical Union.

By knowing the rate of flow of these undersea eddies, the patterns they form and their locations, scientists can also study fallout dispersion from nuclear testing, said Dr. Takashi Ichiye of the Lamont Geological Observatory, Palisades, N.Y.

These ocean eddies are formed when tiny particles of silt and sediment accumulate in offshore waters near the continents and the heavily laden water slowly slips down the continental slope. Other turbid currents can occur along the sloping ocean shelf when the movement of suspended sediment along the bottom is triggered by an earthquake or another disturbance.

Measuring these deep undersea currents is one of the most difficult tasks of oceanography, Dr. Ichiye pointed out. Deep under the ocean, the gradients of temperature and concentrations of salt and other chemicals are so small that it is difficult to record their fluctuations. Manipulating an instrument at these depths is also difficult.

A new instrument called the nephelometer has recently been used to determine vertical distributions of suspended matter along the continental shelf of the North Atlantic Ocean. This instrument measures the turbidity or "muddiness" of water by determining the effects of light scattered by the suspended matter.

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