GEOPHYSICS

Mars Atmosphere Cooler

Mariner 4 measurements show that electron density at different levels of the Martian atmosphere is lower than predicted, indicating that the atmosphere is cooler than thought.

➤ THE ATMOSPHERE OF MARS is both thinner and cooler than previously believed, a team of scientists have reported after several weeks spent analyzing data from the Mariner 4 spacecraft.

On July 15, Mariner passed "behind the edge" of Mars and transmitted a series of radio signals through the Martian atmosphere to earth. By checking the signals against accurate measurements of the spacecraft's trajectory and speed (which has been measured to within 1.5 millimeters per second), astronomers are learning a great deal about atmospheric temperature, density, electron density and other features.

Electron density at different levels of the atmosphere was shown by Mariner 4 to be lower than predicted, which indicates that the atmosphere "is considerably cooler than previously anticipated."

Previous models of Mars' atmosphere indicated nitrogen as the main constituent. Mariner, however, has shown carbon dioxide to be abundant, meaning that radiative cooling is more effective in the upper atmosphere than was believed.

Temperatures in earth's main ionospheric layer are about "an order of magnitude" higher than in the Martian layer.

Surface temperatures, according to Mariner, are probably between about minus 135 degrees F. and minus 150 degrees F.

The density of the atmposphere at the surface, measured by its effect on Mariner's signal, probably ranges from 4.0 to 7.0 millibars of pressure. This is far less than on earth, between 0.00039 and 0.00069 times the pressure at sea level.

Data on Mars' atmosphere is important not only to space scientists, but also to meteorologists. Strangely enough, Mars, unlike earth, has almost no magnetic field. Earth's field plays havoc with incoming charged particles. It also traps high-energy particles that are a source of heat and ionization; it stirs up the ionosphere, and it provides a partial shield from the solar wind.

All of these phenomena make study of the basic mechanics of the atmosphere difficult.

Therefore, scientists have a relatively unspoiled test bed in the Martian atmosphere, which could provide valuable information unobtainable on earth.

The report, which appears in Science 149:1243, 1965, was prepared by a six-man team representing the California Institute of Technology, Pasadena, Stanford University, Stanford, Calif., and Cornell University, Ithaca, N.Y. California Institute of Technology's Jet Propulsion Laboratory managed Mariner's flight.

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Martin Company

MICROBES ON MARS—Organisms that might survive on Mars are examined at Martin Company's Research Institute for Advanced Studies in Baltimore, Md. A system for detecting life in space is being developed by Martin for the National Aeronautics and Space Administration.

SEISMOLOGY

Earthquake Areas Mapped

➤ A NEW KIND OF MAP allows scientists to judge more accurately where earthquakes are likely to occur.

Developed by the California Institute of Technology in Pasadena, the maps are contoured to show strain in the earth's crust. Some of the results do not agree with popular ideas on earthquake activity.

On the basis of data taken from some 10,000 earthquakes that have occurred in southern California in the past 30 years, seismologists at the Institute conclude that big earthquakes do not necessarily occur where there have been many small ones. In fact, an area free of quakes in recent years but lying along a historically active fault is most likely to erupt in a big rumble.

This means that a line extending several hundred miles northwest of the city of San Bernardino, across the Sierra Nevada foothills to the coast, heads the list of possible major quakes, said Dr. Clarence Allen, interim director of Californa Institute of Technology's seismological laboratory.

Small earthquakes (about magnitude 3) and slippage along faults are thought to reduce earth strain and the likelihood of a big readjustment, Dr. Allen said. Continual slippage has occurred in Central California, as evidenced by the concrete floor of a winery there. The winery sits on top of the great 600-mile San Andreas fault. Its floor is cracked, with the western half creeping north at a rate of some three-quarters of an inch a year.

Though slippage is difficult to measure, California Institute of Technology reports that new concrete slabs in the San Bernardino region are being watched carefully for cracks. Much of the San Andreas fault has been peculiarly quiet in recent years, the study showed. For example, the concrete lining of an aqueduct carrying water to Los Angeles has not cracked at the fault since 1913 when it was built.

Seismologists have been expecting a major southern California earthquake for some time.

Two other areas of the fault have been suspiciously quiet. They are central Owens Valley (east of Yosemite National Park) and the Banning-Mission Creek zone, 100 miles east of Los Angeles.

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TECHNOLOGY

Simple Solar Still Yields Survival Water in Desert

➤ A SIMPLE SOLAR STILL that will yield sufficient water to assure survival in the desert can be made by anyone from a sheet of plastic about six and a half feet square and a piece of aluminum foil.

A yield of one and a half quarts a day of potable water was obtained from one such survival still, two scientists reported in Science 149:377, 1965.

Ray D. Jackson and C. H. M. van Bavel of the U.S. Department of Agriculture's Water Conservation Laboratory, Tempe, Ariz., developed the simple device. It uses the sun's energy to distill water from the soil or from plants, especially cactus.

The still is basically a half globe, three feet in diameter and a foot and a half deep, scooped out of desert sand and covered with a sheet of plastic. A stone in the center keeps the plastic in a conical shape.

The sun's heat evaporates moisture from the soil which then condenses onto the underside of the cooler sheet, where it runs down to the center of the cone and drips into a container made of aluminum foil or some other waterproof material. The center of the hole should be dug out an additional eight inches or so to make room for the container, which should hold from two to four quarts.

Cut-up cactus or some vegetable matter can be placed in the still to increase the moisture available for condensation.

A piece of plastic tubing about five feet long can be used to suck the water from the container without disturbing the still.

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