SPACE

U.S. Space Activities

More than 1,000 space vehicles, such as balloons, rockets and satellites, have been launched during the past year to probe into the mysteries of the universe.

➤ U.S. SPACE vehicles are constantly giving us information about the sun, the radiation belts surrounding earth, the amount of material flying through space, and other space details, as scientists probe deeper into the mysteries of the universe.

During the past year, the United States launched more than 100 high-altitude balloons to study the earth's atmosphere, more than 900 rockets to study the composition of the upper atmosphere; and 19 satellites and space probes for scanning the earth's surface and for communications research.

From the vast amount of information recorded and sent back to earth from these probes, five special topics deserve special mention, Dr. Richard W. Porter, head of the U.S. delegation to the Committee on Space Research of the International Council of Scientific Unions (COSPAR), told the annual meeting in Warsaw, Poland.

1. SOLAR PHYSICS. The sputtering, flaring sun is being closely analyzed by instruments from orbiting solar observatories and high-altitude rockets. Changes in temperatures, flares and intensities of ultraviolet, X-ray and gamma rays are observed by instruments designed and built by many scientists, Dr. Porter said in his frank report to the world about U.S. space activities.

2. TRAPPED RADIATION, THE MAGNETOSPHERE AND INTERPLANETARY SPACE. Satellites and high-altitude rockets are counting the number and intensities of particles in the Van Allen radiation belts relatively close to earth, and out to and past the boundary between the magnetosphere (where earth's magnetic field is effective) and interplanetary space. Many scientists now regard the interplanetary medium as an extension of the solar atmosphere, Dr. Porter of General Electric Company said.

Explorer XII and Explorer XIV have reached even farther distances. Data from instruments on these probes have shown that the boundary of the magnetosphere is not spherical, but is ogival—like the front end of a somewhat blunt bullet. This sphere is closest to the earth in the direction toward the sun, but it streams out behind the earth away from the sun, pushed into this shape by the solar wind.

3. MEASUREMENTS OF VENUS. On Dec. 14, 1962, the probe Mariner II passed within 24,000 miles of Venus and reported back to earth scientists some of her secrets. The disc of Venus was scanned three times by magnetometers, low-energy particle flux detectors and other instruments that measured the radiation of the atmosphere and recorded temperatures of approximately 800 degrees Fahrenheit at the surface.

4. CHANGES IN EARTH'S UPPER ATMOSPHERE. As the sun's activity decreases from time to time, the upper atmosphere of the earth cools off and contracts, so that the average scale height is considerably diminished. Information obtained from recent rocket flights indicates that the general cooling and shrinking of this atmosphere bring about an overlapping of a lower atmospheric region with oxygen concentration and a higher region with hydrogen concentration.

5. DENSITY OF MICROMETEORITES IN INTERPLANETARY SPACE. Statistics on the mass and velocity distribution of bits of meteors in space are most important for designers of spacecraft intended to operate for long periods of time in space. Scientists now believe that concentration of these micrometeorites is three times greater in the immediate neighborhood of the earth than in interplanetary space.

In his report to the COSPAR meeting, Dr. Porter mentioned that more than 60 countries are now cooperating with the U.S. Space Administration in experiments involving rocket or satellite flights in ground-based supporting activities, or in cooperative educational and training programs.

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Earth's Magnetic Field

➤ THE MAGNETIC FIELD around the earth is shaped like the front end of a somewhat blunt bullet. Scientists call this shape "ogival," meaning that it has the form of a Gothic arch.

The magnetic field in space is pressed closer to earth in the sun's direction—about 39,630 miles away, or as scientists state, 10 earth radii (the radius of the earth is 3,963 miles at the equator).

On the side away from the sun, the magnetic field flows away with a tail whose length is yet undetermined, but whose boundary is at least 16.5 earth radii from the earth.

The new model of the earth's magnetosphere was described by Drs. L. A. Frank, J. W. Freeman Jr. and James A. Van Allen of the State University of Iowa in a paper presented at the Fourth International Space Science Symposium held in Warsaw, Poland.

Information on the magnetic fields, supplied the satellites Explorers XII and XIV, is providing new foundations for the physical description of the earth's magnetic field, which acts like a giant bar magnet to trap streams of atomic particles flowing from the sun. Scientists are also gaining information on large periodic bursts of solar plasma and continuous solar winds.

The Space Science Symposium was sponsored by the Committee on Space Research (COSPAR) of the International Council of Scientific Unions.

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U.S. Navy

ASTEROID BETULIA—A 20-minute exposure of Betulia by the 40-inch reflector at the U.S. Naval Observatory, Flagstaff Station, was made on May 16. The image is slightly trailed because of mechanical limitations in the equipment. Scale of enlargement is 9.6 inches per millimeter.

ASTRONOMY

Asteroid Came Close To Earth During May

➤ THE ASTEROID Betulia has just come within 14.6 million miles of the earth—a "near miss" by astronomers' calculations since it approached closer than any planetary body in recent years.

Photographs of the asteroid were taken by astronomers at the U. S. Naval Observatory at Flagstaff, Ariz. Drs. E. J. Opik, visiting professor at the University of Maryland, and Elizabeth Roemer of the Observatory staff were hoping to find a faint tail associated with the asteroid. Like all asteroids Betulia is just a faint pinpoint of light.

They believe that some of the asteroids, which have properties differing greatly from the other pygmy planets orbiting the sun, may actually be related to comets. However, the photographs they took of Betulia did not show even a faint cometary tail.

The photo shown above is slightly trailed because the ephemeris was not good enough to permit precise calculation of the motion and the scientists were unable to guide on the asteroid.

Betulia's movements were of special interest to Dr. Samuel Herrick of the University of California, Los Angeles, because the minor planet is named after his wife.

Following the May 21 close approach, Betulia will not approach the earth as closely again until 2042.

Dr. Herrick, who devised a new method for calculating the paths of asteroids of space vehicles, was invited to name the little "flying mountain" after its discovery in 1950 by Dr. E. L. Johnson, a South African astronomer.

The method Dr. Herrick devised is now in general use and has wide application in rocket flights as well as in determining the tracks of natural objects.

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