

SPACE

Glenn Effect Seen in 1954

New evidence from stereo pictures taken by rocket eight years ago backs up theory that the glowing particles seen by Astronaut Glenn were snow crystals, Tove Neville reports.

► A ROCKET shot into space eight years ago has provided evidence that the glowing particles Astronaut John H. Glenn Jr. and Cosmonaut Gherman S. Titov saw in space may have been snow crystals.

Stereo photographs taken from a Viking rocket launched in 1954 showed glowing particles similar to those described by the two space men. The particles appeared every time the peroxide rocket jets, similar to those on Astronaut Glenn's capsule, were fired.

The particles were determined to be large snow crystals up to half an inch in size. Lt. Col. Glenn reported the particles he saw varied from the size of a pinhead to three-eighths of an inch.

The difference in size could be accounted for by the greater amount of water vapor ejected from the Viking control jets than from Astronaut Glenn's capsule jets. This explanation was given to SCIENCE SERVICE by Otto E. Berg, physicist at the Naval Research Laboratory and now at Goddard Space Flight Center.

In support of the observations made in the day sky experiment, Mr. Berg has observed that water droplets, when placed in a vacuum system that is pumped down to a high vacuum will freeze and remain as ice crystals for many minutes without evaporating or sublimating (turn to gas). This proves water can turn to ice and exist as ice in space.

At the time these unusual stereo photographs were made, Mr. Berg was conducting an experiment in a Viking rocket to determine the brightness of the day sky at high altitudes and to determine if clouds of particles existed at these high altitudes as claimed by other rocket experimenters.

The photographs were taken by two cameras, spaced a foot apart, using red, blue and polaroid filter. Some shots were also made without filters, he said. The NRL scientists determined that the brightness of the sky at 135 miles was less than 50,000 times dimmer than at sea level. Clouds of particles alleged to exist at this altitude were not detected.

Scientists agree that Glenn's observations of the glowing particles were accurate. Snow crystals would have appeared as bright yellowish-green when the sunlight shone through them. Glenn also believed the firefly-like particles were snowflakes when he first saw them. But, when he failed to produce snowflakes by working the thrusters of the capsule's jets, he discarded the idea.

Astronaut Glenn related further that the particles looked white when close to the capsule window in the shade away from the sun. He noted that the particles were

six to ten feet apart and appeared to be coming from the direction of the sun.

He saw particles on each of the three sunrises he saw on his orbital journey.

As the astronaut turned the capsule around to look at the direction from which the particles seemed to be coming, most of them disappeared in the bright sunlight but he could still see a few of them coming toward the capsule, he later reported.

Glenn said that, in relation to the particles, his capsule was moving about three to five miles an hour, which means the particles were traveling more than 17,500 miles an hour. This indicated that the particles should have some association with the capsule as they would be going at a much different speed from the capsule if they had another origin.

One possible answer to the puzzle is that as the water vapor from the capsule was ejected in space at night, it formed ice crystals around the capsule that were not

visible to Glenn in the darkness. Then, as the capsule emerged from the earth's shadow into the sunlight, the ice crystals became visible to the astronaut. Shortly afterwards, radiation from the sun sublimed, or evaporated, the ice particles.

It is possible that the water vapor from which the particles would form could have come either from the jets of the capsule or from the air-conditioning system of the space capsule.

Glenn might have been able to see the particles form around the capsule during the night in the light from the night sky and the moon if his eyes had been "dark adapted." However, the dark adaptation filter had fallen from his face.

By the time the capsule moved into the morning sunlight, Glenn was able to see the particles which had collected during the night until they had evaporated from the energy of the sunlight or moved backward as they were not able to keep up with the spacecraft.

Glenn's first observation that the particles were snowflakes therefore seems correct. Another assumption that they were the lost cloud of "needles" sent aloft by satellite to form a belt around the earth for communications was discarded.

Astronaut M. Scott Carpenter, the astronaut scheduled to repeat Astronaut Glenn's flight, will also try to observe the glowing particles.

• Science News Letter, 81:325 May 26, 1962

SPACE

Global Authority Needed

► THERE APPEARS to be a growing need for an international authority to rule on the validity of space experiments challenged on scientific grounds.

This need for a science referee to call the shots on way out projects is underscored by the mounting controversy among scientists here and abroad over the proposed high-altitude H-bomb shot with which United States scientists plan to strike into the Van Allen radiation belt this June.

Sir Bernard Lovell, director of Britain's Jodrell Bank radio-telescope station and one of the world's foremost radio astronomers, voiced his dismay at the proposed June shot which has been described as "American roulette 500 miles up." He and other science notables abroad have charged that such an explosion will interfere with and set back space research in radio astronomy by a decade.

Cosmic ray experts, among them Dr. James A. Van Allen, discoverer of the radiation belt, and Dr. Herbert Friedman, U.S. Naval Research Laboratory, doubt that the bomb explosion will have any serious or lasting effect on the radiation zone. Both men, specialists in cosmic rays and solar research, believe the explosion will yield important scientific knowledge about radiation and cosmic phenomena.

In another scientific controversy last year, the 38-nation International Astronomical Union opposed Project West Ford, a U.S.

experiment designed to spread a band of 350,000,000 copper needles around the earth, because of possible interference with astronomical observations.

Despite the opposition, the United States issued a policy statement stating its intention to go ahead with the experiment. The needles were lost in space, and the controversy disappeared with them.

What has remained, although dormant until the announcement by U.S. officials of the June H-bomb experiment, is the question whether national science experiments should yield to international science judgments.

Dr. Friedman, a member of the Committee on Space Research (COSPAR) for the Third International Space Science Symposium in Washington, D. C., told SCIENCE SERVICE that the United States, through the National Academy of Sciences, submits its proposals for space experiments to COSPAR.

Dr. Friedman explained that in considering any space experiment, a competent group of U.S. scientists weighs the knowledge expected to be gained against any of the risks which may result in interfering with other areas of scientific research. When the gains overbalance the risks, the decision is made to experiment.

COSPAR committees currently are investigating the proposed June nuclear test. A final decision is expected soon.

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