ASTRONOMY

Maps for Moon Landing

The first known photogeologic study of the moon identifies many distinctive features—craters, fracture patterns, faults, anticlines and monoclines.

➤ THREE MAPS to be used for selecting landing sites on the moon have been drawn by the Deparment of Interior's Geological Survey. They indicate the moon's surface is softer and less craggy than was once thought.

The maps and a table, produced for the U.S. Army Engineers, represent the first known photogeologic study of the moon. They will also be used as an aid in designing telemetering instruments and a lunar surface vehicle.

Some astronomers may disagree with some of the Geological Survey's conclusions concerning how lunar formations occurred. Other Survey conclusions, such as that the craters were formed by meteors smashing into the surface, are generally accepted.

One map shows the physiographic regions of the moon, each one named and outlined. Many distinctive physical features are also identified and named.

Another map is a generalized photogeologic map of the moon, showing craters and such structural features as fracture patterns, faults, anticlines and monoclines.

A third map depicts the prominent lunar "rays," which look through a telescope somewhat like cracks in glass. The rays are interpreted as splashes of crushed rock derived from the impact of large fragments thrown out at the time of meteoric impact. Some rays extend hundreds of miles from their craters of origin.

Among the factors of lunar environment considered in the study were that the moon's gravity is only one-sixth that of earth, that there is no water or atmosphere and therefore no erosion, and that temperature changes are extreme.

One of the possibly controversial conclusions is that the level maria, or seas, resulted from tremendous outflows of lava. Another is that dust on the moon is only a very thin layer, less than an inch thick.

The table includes an evaluation of the difficulties of landing and movement, and of construction, at various selected regions. Research and compilation for the study were done by Arnold C. Mason and Robert J. Hackman, who used three-dimensional viewing to examine lunar photographs.

Another new map of the moon will soon be published by the U. S. Naval Observatory in Washington, D. C. This contour map shows the 300-mile-wide band that is only occasionally visible from earth since the moon does not always present exactly the same surface to earth. The Naval Observatory moon map was prepared under the direction of Chester B. Watts, who was also consulted by the U. S. Geological Survey.

• Science News Letter, 78:131 August 27, 1960

AERONAUTICS

High Altitude Jump Made

➤ THE HIGH ALTITUDE Project Excelsior balloon flight and parachute jump Aug. 16, by Capt. Joseph W. "Red" Kittinger Jr. (USAF), set new world records. He stepped down from an open gondola 102,800 feet above the earth; fell freely 85,300 feet; opened his chute at 17,500 feet; and reached ground safely in 13 minutes and 8 seconds.

The 32-year-old, red-haired parachutist broke his own previous jump record of 14 miles. He also broke the world record for manned balloon flight set three years ago, almost to the day (Aug. 19, 1957) in the Air Force Man High II ascent by Col. David Simons, Holloman Air Force Base, New Mexico. Capt. Kittinger's more than 16-mile free fall through space before opening his parachute broke his own previous free fall record of 66,400 feet (approximately 13 miles). The combined time of the ascent and jump was less than two hours.

Project Excelsior is a special "manned space probe" designed to test man's endurance and his ability to ecape from high-flying aircraft.

Going up in the balloon-suspended open gondola, Capt. Kittinger was exposed for more than an hour to all the physical hazards of space except weightlessness. High-altitude pressures above 60,000 feet are such that his blood would have boiled and his lungs have ruptured if he did not have the protection of an oxygen-equipped, pressurized space suit.

His protection from the more than 60 degrees below zero temperatures were the long-johns worn under the pressure suit, topped off with a quilted two-piece garment and an intermediate flying suit; electrically heated wool socks; electrically heated flying gloves; and a heated space helmet "to prevent fogging." Full body protection against the cold would have meant adding to the 155 pounds of bulky suit, parachute and special equipment Capt. Kittinger had to carry with him, in addition to his own weight of 150 pounds.

"It is more important that I be able to move and perform the necessary escape functions efficiently than that I be comfortably warm," Capt. Kittinger said. "At any rate, I believe I have demonstrated that if hands, feet and face are warm, man can endure extremes of cold for long periods of time without peril."

Air Force parachutists have conditioned themselves to the low temperatures of high-altitude jumps by being lashed to a cot and exposed for seven minutes to 100-mile-per-hour winds at 65 degrees below zero temperatures, protected by space and flying suits that are not heated.

This preparation is done at the huge "weather factory" at Eglin Air Force Base Climatic Center Hangar in Florida, Capt. Kittinger's home state. Both men and materials may be exposed here to all extremes of weather to measure survival limits.

Prior to take-off Capt. Kittinger breathed oxygen for almost four hours. In the days before the scheduled jump he was fed a special low-residue diet. If it was on the skimpy side, it was so on Capt. Kittinger's orders.

"I'd rather be a little hungry than an over-stuffed, inefficient astronaut," he explained.

Before Project Mercury, the man-in-space program of the National Aeronautics and Space Administration, Capt. Kittinger was among those men of the Air Force considered qualified by training and motivation for the hazards of pioneer space flight.

He is an experienced jet pilot, trained parachutist and balloonist, and a veteran of more than four years of extensive and highly stressful tests. He is attached to Wright Air Development Division, Wright Field, Dayton, Ohio, and works under the direction of Col. John Paul Stapp, a pioneer in aerospace medicine.

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PROJECT EXCELSIOR—Capt. Joseph W. Kittinger Jr., first to make an ascent to 102,800 feet, wears the space suit that protected him from fatal exposure.