

GEOLOGICAL SURVEY

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GEOLOGIC TERRAIN "PHOTOMAP" MADE FROM SPACE PHOTOGRAPHY

A map showing the geologic terrain within an 830-mile-zone along the United States-Mexico border has been prepared by interpretations of color photographs taken during the GEMINI 4 and 5, and APOLLO 502 mission earth-orbiter flights, according to the Geological Survey, Department of the Interior.

This synoptic (broad scale) map of parts of Arizona, New Mexico, and Texas, prepared by the U.S. Geological Survey in cooperation with the National Aeronautics and Space Administration at a scale of 1:1 million (1 inch equals about 16 miles), demonstrates the feasibility of recognizing different types of surface geologic materials on small scale photos taken from space and provides information useful for land-use planning and engineering construction.

The new map was plotted on a photographic base of the southwestern United States compiled early in 1968 from space photography, covering an area from the Pacific Ocean north of San Diego, California, to Abilene, Texas.

Roger Morrison, a USGS geologist at the Survey's Denver, Colorado office, and project chief, described the new map as "another practical benefit to be derived from the Nation's space program," adding that "these views from space provide a framework for relating the few published geologic maps in Arizona and Texas.

"In addition," Morrison said, "the map lends further support to plans for developing a series of earth resource survey satellites."

The new map was made primarily from interpretation of photos taken at altitudes ranging from about 115 to 200 miles above the earth's surface. Ground control for the photo-interpretive mapping was provided by numerous field traverses in Arizona, by a few field traverses in southwestern New Mexico, and also by the available published reports and maps. During the field traverses, numerous profiles of surficial deposits were measured, and samples collected.

The Survey spokesman said that features that can be determined directly from the photographs are topographic-geomorphic relations and color of the surficial deposits. "Geomorphic and geologic features that are readily distinguished on the space photographs," Morrison said, "include sand-dune areas, areas dominated by bedrock exposures, flood plains, and ancient marine beaches and spits. Subtle color distinctions in the red to brown part of the spectrum are well displayed and make it possible to recognize distinctions in surface soils."

"An experienced geologist photo-interpreter," Morrison said, "can use these distinctions along with other associated features - such as local topography and relief, climate, drainage, vegetation, surficial deposits, and bedrock units - to develop guides for classifying the land."

"However," Morrison noted, "there are important features that cannot be determined directly from the photographs. These include the presence or absence of significant accumulations of calcium carbonate, the color and thickness of any layers underneath the top surface, and the amount of very fine clay in the deposits. These features must be determined from the ground control, or inferred from terrain analysis and climatic data."

Morrison said that the new photomap will be "refined and reviewed" before being published. "Perhaps its best value at this time," he said, "is that it reflects one of several feasibility tests being conducted by the USGS and NASA aimed at defining the uses of data that will eventually be obtained from earth-orbiting satellites to help in studies of earth resources and features from space."

A smaller scale version of the map, "Interagency Report, NASA No. 111," may be examined at the following U.S. Geological Survey Libraries: G.S.A. Building, Washington, D.C. 20242; Federal Center, Denver, Colorado 80225; Pacific Coast Center, 345 Middlefield Road, Menlo Park, California 94025; and the Center of Astrogeology, Flagstaff, Arizona 86001.

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