

U.S. Geological
Survey
Flagstaff Field
Center



 **USGS**
science for a changing world

Flagstaff Field Center

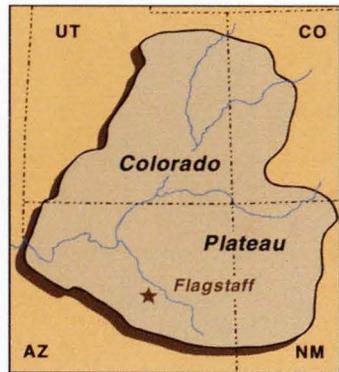
BACKGROUND

The United States Geological Survey Flagstaff Field Center was founded by the late Eugene Shoemaker in 1963 as a research site for the new science of planetary geology. Flagstaff's clear air and high elevation made it a desirable location for telescope observations of the Moon and planets, and nearby Meteor Crater was a superb training ground for the Apollo astronauts. There, and in the volcanic fields surrounding Flagstaff, astronauts tested equipment and were taught to look at the Moon through the eyes of a geologist.



Astronaut training, Dec. 1968.

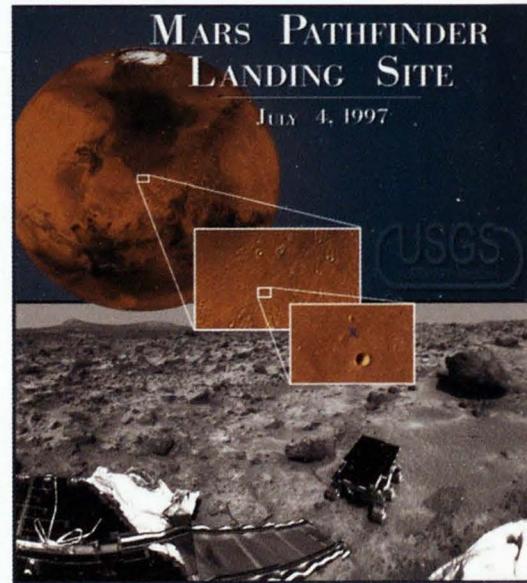
While the initial focus of the Flagstaff Field Center was Lunar and Planetary studies, our location near the San Francisco Peaks and on the Colorado Plateau made it a magnet for a variety of studies related to the region. The southern Colorado Plateau is a semi-arid setting bordered by deserts. The Grand Canyon of the Colorado River is its most spectacular landmark, along with an abundance of other dramatic geologic features. The Plateau and adjacent deserts support a varied and fragile biological system which is continually shaped and is now being threatened by population growth and economic activities in the southwestern United States. The



region also contains a large number of National Parks and other Federal- and State-managed public lands. The USGS in Flagstaff and its partners provide scientific research for management of these resources.

FIELD CENTER RESEARCH

In planetary exploration and mapping, the USGS provides a unique and valuable service to the National Aeronautics and Space Administration (NASA). Geologic, topographic, and shaded relief maps of the planets and their satellites are produced in Flagstaff. The NASA scientific community uses these maps and images for a wide range of research from landing site selection for the Pathfinder Mission to geologic, hydrologic, climatological, and cratering research of planets and their moons. Virtually every planetary image ever collected by U.S. space probes can be found in the Flagstaff Field Center Planetary Data Facility.



USGS participated in the Mars Pathfinder Mission—creating the first new images from the planet since 1976.

Flagstaff is the headquarters for studies of ground- and surface-water resources of the northern half of Arizona. The familiar USGS streamflow gages can be seen along major waterways throughout northern Arizona. Flagstaff USGS personnel are in action during floods to measure streamflow, monitor water conditions and observe associated hazards. USGS hydrologists, geologists, and biologists are active in providing vital information on the ecology of the Colorado River basin, particularly as it is impacted by dams and other engineering works. Decisions on water releases from dams along the Colorado River are guided by collaborative work between USGS scientists and those of the Grand Canyon Monitoring and Research Center, which is housed at the Flagstaff Field Center. USGS scientists also are active in helping northern Arizona municipalities develop their ground-water resources in an environmentally sound manner.



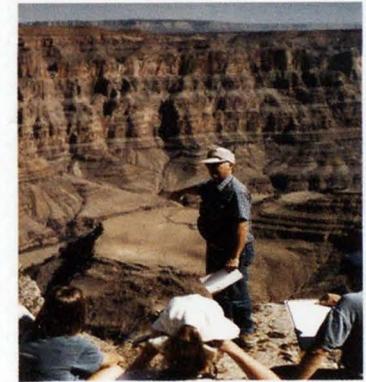
Hydrologists measuring river discharge.

USGS biologists form a vital thread of an intricate web of Federal, State, and university scientists concerned with the management and preservation of plants and wildlife in the American Southwest. They provide data on the occurrence and distribution of the entire range of plant and animal species to assist wildlife and resource



managers in making the best possible decisions regarding environmental and development concerns. They also help government decision makers by providing high-quality data regarding the habitat and range of endangered and threatened species. Other USGS scientists work in concert with biologists to establish baselines from which to track environmental changes related to climate shifts and human activity. This is of particular importance for the Colorado Plateau as well as in the fragile desert environment to the south and west of Flagstaff, where seemingly minor changes in weather patterns or land disturbance can have enormous impacts on the ecosystem.

Regional mapping conducted from Flagstaff has resulted in many exciting discoveries concerning the origin and evolution of major geological features of the American Southwest. In particular, cooperative work with the National Park Service has produced new geologic interpretations that allow Park Rangers and geologists to better demonstrate and fully explain the spectacular landscape.



A geologist explains the evolution of the Grand Canyon.

Flagstaff-based USGS scientists have traditionally been active in mapping occurrences of minerals and trying to explain their origins. As the mining industry increasingly moves to foreign locations, much of the emphasis of mineral research has shifted from exploration and extraction to understanding the long-term effects of past mining activities and to designing strategies for remediating those effects.

Although much of the Earth-based research at the USGS Flagstaff Field Center concerns Flagstaff and the surrounding region, some Flagstaff scientists operate much farther afield. The cartographic and image processing techniques developed for planetary studies are applied to a large variety of problems on Earth. Remote sensing techniques that use satellite images help to identify and monitor environmental problems on the land and in coastal and interior waterways. Image processing and remote sensing techniques also are being used to develop special purpose maps to meet the unique needs of Federal and State agencies.



Landsat thematic mapper color composite image. Vegetation is red.

In addition, Flagstaff-based scientists study volcanic activity over the entire western United States and in Hawaii. Similarly, they conduct research into earthquakes and faulting, geothermal energy, and nuclear waste storage.

The Flagstaff Field Center is a major source of outreach for the USGS in the southwestern United States. The USGS Library System, established in 1882, has one of the largest Earth Science collections in the world. The Flagstaff branch of the library system serves USGS scien-

tists and visiting researchers. The library's holdings provide one of the most complete collections of materials related to space and planetary research, as well as a sizable inventory of publications relating to solid-Earth topics and southwestern geology. The library is open to the public for reference use, and materials may be borrowed through interlibrary loan. Reference librarians are available to assist in locating information.

Scientific outreach includes displays and educational materials in the Field Center hallways. Tours are available for schools and other interested groups. The Field Center also hosts an annual workshop and field trip for Flagstaff area high school teachers and participates in the yearly Flagstaff Festival of Science. USGS scientists regularly deliver lectures to interested educational and civic groups.

OUTLOOK

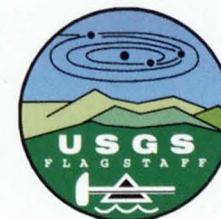
The USGS in Flagstaff will continue to be a major component of both planetary and Earth-based geologic studies into the 21st century. The concentration of expertise and supporting facilities for such studies at Flagstaff is unique in the world. Various plans are already being formulated for possible human travel to Mars and again to the Moon, as well as for instrument probes into the outer parts of the Solar System to gather more data about planets and their satellites.

While the need for continually updated information about energy, mineral, and water resources will persist in the future, Earth-bound research at Flagstaff is likely to see more emphasis on studies of climate and human impacts on the natural environment. Early recognition of environmental changes and strategies to minimize possible adverse effects on people are of public concern. These problems are not just regional and national in scope. As with all future human endeavors, our scientific research will reflect the increasingly global nature of society's needs and problems.

To learn more about the Flagstaff Field Center please call us at: (520)556-7000 or visit our URL at: <http://www.flag.wr.usgs.gov/>

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