Flagstaff and the History of the Apollo Moon Missions
By Gerald G. Schaber, Astrogeologist

In the decade from 1963 to 1973, a group of young geoscientists working for the U.S. Geological Survey (USGS) Branch of Astrogeology in Flagstaff, played a major role in one of Mankind’s greatest achievements—the six Apollo expeditions to the Moon. July 20, 2019, will mark the 50th anniversary of the day astronauts Neil Armstrong and Buzz Aldrin landed their spacecraft “Eagle” on the surface of the Moon. Flagstaff, and its surrounding landmarks, were a vital part of the Apollo missions’ success.

The Study of Astrogeology Comes to Flagstaff
The City of Flagstaff and its local environs have long played a distinguished role in hosting the development of the relatively new science of “Astrogeology”—the geologic study of the Earth and other solid bodies in the Solar System. The brilliant geologist Eugene M. Shoemaker (1928-1997), who coined the term “Astrogeology”, first established the U.S. Geological Survey’s Astrogeologic Studies Unit in Menlo Park, California, in 1960. By 1963, Shoemaker had moved the Branch’s permanent headquarters to Flagstaff, Arizona.

While exploring for Uranium on the Colorado Plateau during his early years with the USGS, Shoemaker fell in love with Flagstaff and decided that the quiet little town in the mountains was the perfect place to headquarter his new “Branch of Astrogeology”.

Shoemaker had strongly weighed the fact that Flagstaff had important additional attributes. It was centrally located near a number of natural landmarks which would be well-suited for training NASA’s astronauts in general geologic field procedures. The region provided an unparalleled first-hand study of landforms resulting from volcanic and impact cratering. The landmarks within easy reach of Flagstaff included Meteor Crater, Sunset Crater, Cinder Lake and Hopi Buttes. In addition, 

Continued >
well-established observatories like Lowell Observatory further established that Flagstaff was the logical place to build a telescope for the Branch of Astrogeology, one designed specifically for lunar geologic observing and mapping.

The United States Geological Survey (USGS) had been involved in the exploration of the moon for several years before the Apollo missions. The USGS had a long history of lunar research, dating back to the discovery of Pluto by Clyde Tombaugh in 1930. The massive impact crater, Meteor Crater, 35 miles east of Flagstaff, was a perfect location for Apollo astronaut field training.

The Scientific Community Takes Notice

Flagstaff began receiving scientific media attention in the last decade of the nineteenth century as a result of the rigorous scientific investigations of nearby Meteor Crater by the U.S. Geological Survey's Grove Karl Gilbert (1843-1918), and the telescopic observations of Mars and its proposed "Martian Canals" by Sir Percival Lowell (1855-1916). Northern Arizona would again attract astrogeologic interest during the somewhat more well-known investigations of Meteor Crater carried out by mining engineer Daniel Moreau Barringer (1860-1929), and later with the discovery by Clyde Tombaugh in 1930 of Lowell's mysterious planet X, later given the name, Pluto.

In the early 1960s, Flagstaff became a contemporary focus of the scientific media primarily due to two major lunar activities in the area. The first was the lunar cartographic maps being prepared for NASA under the auspices of the U.S. Air Force Aeronautical Chart and Information Center (ACIC) located on the grounds of Lowell Observatory. The second were the activities starting in 1963 that were related to: (1) lunar geologic mapping, (2) support of NASA's unmanned lunar missions, (3) field development and testing of manned lunar surface exploration methodologies and vehicles, and (4) the geologic field-training of astronauts being conducted for NASA by the U.S. Geological Survey's Branch of Astrogeology.

On May 25, 1961, Project Apollo was boldly set into motion when President John F. Kennedy gave his stirring "we will go to the Moon" speech to a joint session of Congress. It was Kennedy's goal that the nation land a man on the Moon by the end of the decade. It was the beginning of the manned lunar exploration era, and of training in the Flagstaff area for the future astronauts.

Field Training for Lunar Exploration

These pioneering lunar research activities conducted for NASA largely in and around Flagstaff prepared NASA's astronauts very well to handle the geologic tasks they were to perform on the lunar surface. Between January 1963 and November 1972, Branch of Astrogeology scientists based in Flagstaff would plan and lead 200 separate geologic field-training exercises for NASA's astronauts. A large number of these training exercises were carried out near Flagstaff in the areas of Sunset Crater and Cinder Lake, Meteor Crater, and in the Hopi Buttes on the Navajo Nation, north and east of Winslow, Arizona.

Branch of Astrogeology personnel also constructed for NASA a terrestrial field-training version of the Apollo Lunar Roving Vehicle (LRV) that was being developed for use during the last three (JSeries) Apollo lunar landings. This training Rover, nicknamed "Grover" for Geologic Rover, was used by the prime and backup astronaut crews assigned to Apollo missions 15, 16 and 17 during all of their geologic field-training exercises carried out for NASA by Branch of Astrogeology personnel. Grover can today be seen on display at the USGS Astrogeology Science Center in Flagstaff.

Flagstaff's Hometown Astronaut

In July 1964, Gene Shoemaker hired geologist Harrison (Jack) H. Schmitt to work for the Branch of Astrogeology and to relocate to Flagstaff. In June 1965, Schmitt was selected to become a scientist and astronaut for NASA, and was subsequently assigned as Lunar Module Pilot on the final lunar landing mission, Apollo 17. In December 1972, he became the only geologist to date to walk on and explore the surface of the Moon. Since 1972, he has been a planetary geologist for NASA. In November 2007, he was honored at the White House by President George W. Bush for his contributions to the exploration of the Moon. Between January 1963 and November 1972, Branch of Astrogeology scientists based in Flagstaff would plan and lead 200 separate geologic field-training exercises for NASA's astronauts. A large number of these training exercises were carried out near Flagstaff in the areas of Sunset Crater and Cinder Lake, Meteor Crater, and in the Hopi Buttes on the Navajo Nation, north and east of Winslow, Arizona.

Branch of Astrogeology personnel also constructed for NASA a terrestrial field-training version of the Apollo Lunar Roving Vehicle (LRV) that was being developed for use during the last three (JSeries) Apollo lunar landings. This training Rover, nicknamed "Grover" for Geologic Rover, was used by the prime and backup astronaut crews assigned to Apollo missions 15, 16 and 17 during all of their geologic field-training exercises carried out for NASA by Branch of Astrogeology personnel. Grover can today be seen on display at the USGS Astrogeology Science Center in Flagstaff.

Field Testing for Lunar Exploration

These pioneering lunar research activities conducted for NASA largely in and around Flagstaff prepared NASA's astronauts very well to handle the geologic tasks they were to perform on the lunar surface. Between January 1963 and November 1972, Branch of Astrogeology scientists based in Flagstaff would plan and lead 200 separate geologic field-training exercises for NASA's astronauts. A large number of these training exercises were carried out near Flagstaff in the areas of Sunset Crater and Cinder Lake, Meteor Crater, and in the Hopi Buttes on the Navajo Nation, north and east of Winslow, Arizona.

Branch of Astrogeology personnel also constructed for NASA a terrestrial field-training version of the Apollo Lunar Roving Vehicle (LRV) that was being developed for use during the last three (JSeries) Apollo lunar landings. This training Rover, nicknamed "Grover" for Geologic Rover, was used by the prime and backup astronaut crews assigned to Apollo missions 15, 16 and 17 during all of their geologic field-training exercises carried out for NASA by Branch of Astrogeology personnel. Grover can today be seen on display at the USGS Astrogeology Science Center in Flagstaff.

Flagstaff's Hometown Astronaut

In July 1964, Gene Shoemaker hired geologist Harrison (Jack) H. Schmitt to work for the Branch of Astrogeology and to relocate to Flagstaff. In June 1965, Schmitt was selected to become a scientist and astronaut for NASA, and was subsequently assigned as Lunar Module Pilot on the final lunar landing mission, Apollo 17. In December 1972, he became the only geologist to date to walk on and explore the surface of the Moon.

Field Testing for Lunar Exploration

These pioneering lunar research activities conducted for NASA largely in and around Flagstaff prepared NASA's astronauts very well to handle the geologic tasks they were to perform on the lunar surface. Between January 1963 and November 1972, Branch of Astrogeology scientists based in Flagstaff would plan and lead 200 separate geologic field-training exercises for NASA's astronauts. A large number of these training exercises were carried out near Flagstaff in the areas of Sunset Crater and Cinder Lake, Meteor Crater, and in the Hopi Buttes on the Navajo Nation, north and east of Winslow, Arizona.

Branch of Astrogeology personnel also constructed for NASA a terrestrial field-training version of the Apollo Lunar Roving Vehicle (LRV) that was being developed for use during the last three (JSeries) Apollo lunar landings. This training Rover, nicknamed "Grover" for Geologic Rover, was used by the prime and backup astronaut crews assigned to Apollo missions 15, 16 and 17 during all of their geologic field-training exercises carried out for NASA by Branch of Astrogeology personnel. Grover can today be seen on display at the USGS Astrogeology Science Center in Flagstaff.

Flagstaff's Hometown Astronaut

In July 1964, Gene Shoemaker hired geologist Harrison (Jack) H. Schmitt to work for the Branch of Astrogeology and to relocate to Flagstaff. In June 1965, Schmitt was selected to become a scientist and astronaut for NASA, and was subsequently assigned as Lunar Module Pilot on the final lunar landing mission, Apollo 17. In December 1972, he became the only geologist to date to walk on and explore the surface of the Moon.

From Downtown Flagstaff to the Moon

Detailed geologic mapping of the selected Apollo landing sites, planning of the Apollo surface traverses, and planning and production of the photomap packages taken to the surface of the Moon were all completed for NASA by Branch of Astrogeology personnel in Flagstaff. The (then) Arizona Bank Building in downtown Flagstaff, located at 125 E. Birch Avenue, served as the main offices of the Branch. Today, the USGS Branch of Astrogeology remains headquartered in Flagstaff at the "Shoemaker Building" (dedicated in 2002) and USGS Astrogeology Science Center on McMillan Mesa.

The Exploration of Space Continues

Today, scientists with the USGS Branch of Astrogeology are still actively participating in NASA's ongoing and planned unmanned missions to various planets and satellites in the Solar System, in addition to the planned manned Mars exploration programs. Also significant are the ongoing planetary research projects by the scientists at Lowell Observatory including the Horizons mission to Pluto.

Man's greatest adventure was an amazing feat, not only to engineer the massive and technologically complex space vehicles, but to prepare men both scientifically and emotionally to explore the surface of the Moon. Twelve men explored six areas of the lunar surface during the Apollo Era, and Flagstaff's role in their training are now part of history.

For more about Flagstaff's Lunar Legacy, visit discoverflagstaff.com/lunarlegacy.