Executive Summary

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Presenter's Name: Gary Lofgren
Presenter's Title: Lunar Curator
Presenter's Organization/Company: NASA-JSC

Presentation Title

Astronaut Training, What We Did, Why It Worked, and What Can Be Done Better

Key Ideas

The mission specific geologic training of the Apollo astronauts was centered around field exercises with a minimum of classroom study. The number of field trips varied from a single trip for the Apollo 11 crew to approximately 20 trips over a 2 year period for each of the J missions, Apollo's 15, 16, and 17. The complexity and the degree to which the field exercises mimicked the mission protocols increased dramatically from the early missions to the later J missions. The crews were taught to systematically observe everything from the far distance to the near ground and to develop a vocabulary in common with those to whom they are communicating, i.e., capcom and science back room. Most of the field exercises were focused on specific mission objectives designed to give the astronauts background to fully understand the scientific objectives and the rational to fulfill these objectives. Another equally important, but more mundane field training goal was to make the routine tasks, such as sampling and documentation, as automatic as possible. Every effort was make to visit terrestrial geologic localities that mimicked the geologic problems of the lunar landing site on the moon as well as possible. The emphasis, however, was on finding good problem solving exercises. One of the few classroom activities was to learn basic lunar rock types by direct observation of Apollo lunar samples.

Based on the Apollo experience on the moon and the advances in technology, I can think of several technologies that need to be developed to facilitate field operations at a lunar outpost and for scientific exploration. Sample documentation was one of the most cumbersome and time consuming tasks. There are several technologies that could make this task less cumbersome. Some kind of digital imaging techniques for documenting sampling and other activities in addition to improved imaging from a rover would reap high benefit in freeing astronauts to these laborious tasks. Some kind analytical tool to help astronaut discriminate rock types in the field would significantly increase the scientific return on their activities. If large boulder that exhibit complex geologic relationships are encountered, a tool that allows easy sampling of large boulders would be of great benefit, An example is the hand held drill used to extract samples at precise locations similar to what is used for obtaining orientated samples paleomagnetic studies. New sample containers that reduce the container weight are needed. Small sample containers for totally sealed samples similar to the Apollo SESC container, but with better seals are needed. Once samples are collected they need to has a s working area (glover box?) to examine samples and to hi-grade for return to Earth. The use of high quality imaging and a simple analytical tool such as XRF would be efficient and could involve scientists on earth to assist in the hi-grading.