

## Lunar Science: Letting Bygones Be Bygones

In the years between the first and the last manned lunar landings, the scientists who built their research careers around the Apollo program had a number of serious, occasionally bitter, disagreements with the engineers who managed it. The issues varied from one mission to the next, but they usually revolved around what was called the "science content" of the program. Where, for example, would astronauts be allowed to land and for how long? What combination of whose instruments would fly on a given mission? Who would determine how the precious hours on the lunar surface would be divided among doing "housekeeping" tasks, setting up experiments, and actually exploring the moon?

Such questions were resolved in more orderly fashion for the last three landings than for the first three. But the end of manned lunar exploration at the peak of Apollo's scientific productivity was cause for special regret, and it marked the beginning of a new concern: Would the National Aeronautics and Space Administration see fit to spend sufficient money in the future to ensure adequate protection and study of the moon rocks, the Apollo photographs, and the wealth of data still streaming back from five scientific stations on the moon?

The answer, space agency officials are saying now, is assuredly yes. In an opening speech to the lunar science conference at Houston earlier this month (see p. 1313), NASA's deputy administrator George M. Low told some 600 scientists that his agency was "firmly committed" to spending "substantial" sums in support of lunar science. The scientists, for their part, responded with some unusual testimonials of gratitude—first with a statement approved by conference attendees praising NASA's "brilliant and successful" management of the moon program, then with a banquet honoring NASA staff high and low who had helped put science aboard Apollo.

Low's speech was a welcome surprise to many who viewed cuts in the budget of the Manned Spacecraft Center as a portent of worse trouble ahead for lunar science. Predicting a "decade of fruitful analysis, integration, and synthesis" of the Apollo samples, photos, and data, Low went on to say that, "We at NASA have a firm commitment, first to preserve and protect the resources we already have at hand, and second to set aside substantial funding to support the scientific effort of lunar analysis. . . ."

In addition, Low promised that NASA would sponsor a fifth in the series of lunar rock festivals at Houston next year so that scientists could continue to exchange and debate new results of their work face-to-face.

Some observers interpreted Low's remarks as an acceptance by the space agency of a 10-year research program proposed last December in a report of the Lunar Science Institute (*Science*, 22 December 1972). The LSI, a university-run facility with close links to the Manned Spacecraft Center, maintained that NASA should be prepared to spend as long cataloging and studying the Apollo program's harvest of rocks and data as it did mounting and flying the moon missions. At the same time, however, Low said nothing about a proposal—advanced in the LSI report—for one last, un-

manned mission to place a remote sensing satellite in polar orbit around the moon. To lunar scientists, a polar-orbiting satellite's appeal is that it would extend Apollo's wealth of chemical geophysical information far beyond the narrow equatorial belt to which the manned flights were confined. Space agency sources say that its chances of flying in the near future are very slim, however, in view of the vast amount of lunar data already in hand and stiff competition from other planetary projects.

But Low's omission was hardly enough to dampen what some saw as a notable spirit of amity between lunar scientists and NASA's engineer-managers. Indeed, during the conference, about a dozen of the researchers who figured most prominently in the planning of Apollo missions dug into their own pockets to throw a banquet in honor of those whom the scientists regarded as having stood on the side of the angels through the years of infighting. The dinner also provided an opportunity for lobbying in behalf of support for lunar research, but this, one organizer insisted, was a secondary objective.

"Some of us tried very hard to get good science done, and there was much bloodshed along the way," said one Caltech scientist, who asked not to be named. "We just wanted to say thanks to some of the higher people who played ball and to some of the lower echelon people—beautiful guys who would come along at the right time, stand up to their bosses, and help us get an experiment on board."

The selection of experiments for each mission was always a divisive issue, but the cancellation of Apollos 18 and 19 in late 1970 made the selection process for Apollo 17—the last lunar landing—all the more agonizing. Many of the instruments earmarked for the two cancelled flights had never been flown in space. Were these now simply to be abandoned in favor of instruments of proven reliability and scientific value?

In the end, NASA settled on a compromise potpourri of new and untried instruments and a few of proven success. The early signs from this month's conference at Houston suggest that the gamble is not paying off handsomely. Setting up the new instruments took an inordinate amount of the Apollo 17 crew's time, so much that it cut into their geologic traverses. One of the untried instruments, an elaborate gravimeter, failed at the outset, and others were turning out data flawed by "first flight" ambiguities. Moreover, a number of geoscientists complained that the new instruments had little bearing on the principal questions of lunar evolution that are now emerging, whereas at least one proven instrument bumped from Apollo 17—a passive seismometer—was directly relevant.

In spite of such disappointments, the conferees seemed willing to let bygones be bygones. On 5 March they adopted a motion that acknowledged some "awkward moments" over the years but which also lavished praise on the space agency for its execution of a venture that has "already revolutionized ideas of the solar system's evolution."

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