Published online 24 April 2009 | Nature | doi:10.1038/news.2009.397
Corrected online: 29 April 2009

News

Apollo scientist dusts off 'lost' lunar data

A fresh look at the sticky problem of Moon dust may help the next generation of lunar explorers.

Lucas Laursen

A new analysis based on an Apollo scientist's copies of lost NASA data seeks to determine how sticky, abrasive moon dust will affect lengthier future lunar missions.

Recovered Apollo data could help plan future Moon missions.
NASA

The author of the new study, Brian O'Brien, was the principal investigator for the dust detectors left behind in 1969 by the first two manned missions to the Moon, *Apollo 11* and *Apollo 12*. At the time, O'Brien was a professor of space science at Rice University in Houston, Texas.

Abrasive Moon dust was sent flying by the rockets of the Apollo lunar modules as they blasted off from the surface, sometimes scouring equipment more than 100 metres away from the landing site. "In the future we are planning to build an outpost on the Moon, and we're going to be returning to the same place many times," says Philip Metzger, a NASA scientist at the John F. Kennedy Space Center in Florida. "So we need to protect the outpost from damage." Metzger and his colleagues are trying to model the interaction between a rocket's exhaust and the lunar surface.

In 2006, O'Brien learned from a friend that NASA had lost its original data tapes of his dust-detection experiments. "So I telephoned [NASA curation scientist] Dave Williams," he says, who confirmed it.

O'Brien, now an independent environmental consultant in Perth, Western Australia, then dug up his own copies of the 7-track magnetic tapes, which NASA had sent him following the Apollo missions. As NASA's 7-track tape reader broke down a few years ago, O'Brien is working with data-storage firm SpectrumData, based in Perth, to extract the tape data. Fortunately, he printed some 100 pages of data when he first received the tapes, so was able to carry out a preliminary analysis. His findings will be published in a May issue of *Geophysical Research Letters*.

Exhausting the possibilities

O'Brien's dust data are a welcome addition, says Metzger. The first dust detector was positioned 17 metres from the blast-off site of *Apollo 11* 's lunar module, but the second was left more than 100 metres from that of *Apollo 12*. O'Brien analysed the energy produced by the three solar panels on each of the two dust detectors during and immediately after the departure of both *Apollo 11* and *Apollo 12* from the Moon. The rocket blasts appeared to have piled soil onto some of the solar panels, but not onto neighbouring panels, suggesting that the Moon's soil is not thrown evenly by rocket exhaust. "This provides them with hard, continuous data at two different distances they didn't have before," declares O'Brien.

"Astronaut suits sitting in storage for close to 40 years are still black from dust."

Metzger says that a recent look at pieces of the unmanned Surveyor 3 probe, which was near *Apollo 12* 's landing site, showed similarly "clumpy" soil scouring. Given that recent finding, Metzger says, "it makes sense why Brian has such dramatically different results on the solar cells."

Although dust would fall off the cells owing to lunar gravity, it wasn't clear why it fell off some solar cells quicker than others. O'Brien suggests in his paper that Moon dust might get clingier during the course of the 710-hour lunar day as sunlight knocks electrons loose and creates static electricity. He thinks this might explain why the solar cell that got the least direct sunlight was able to shed its dust covering soonest as the sun set.

The Apollo astronauts arrived and left during the relatively cool lunar morning, when shadows were useful for navigating. Future missions will stay through the lunar day and may need to find ways to live with even clingier dust, if O'Brien's analysis is correct.

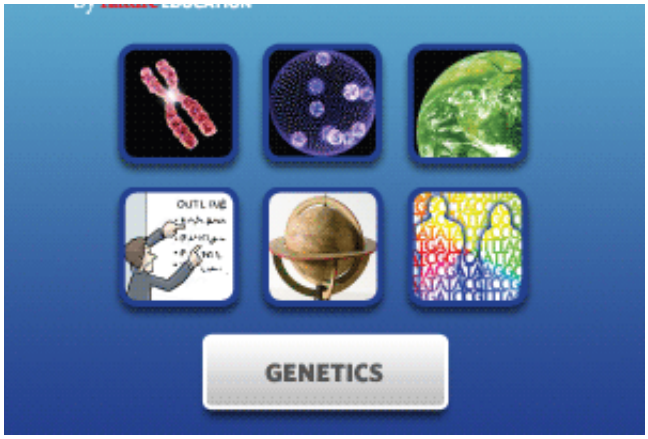
"Astronaut suits sitting in storage for close to 40 years are still black from dust," says Mihály Horányi, a physicist at the University of Colorado in Boulder. But not everybody agrees with O'Brien's interpretation of his dust-sensor data, says Horányi. "I think the data presented in this paper will be well received, [but] the theoretical arguments seem in need of further work."

Data capsule

Curators at The National Space Science Data Center at NASA's Goddard Space Flight Center in Greenbelt, Maryland, began seeking orphan data sets from the Apollo programme not long after the latest Moon missions were announced some 3 years ago, says David Williams, the curation scientist who O'Brien contacted in 2006. Normally the centre handles routine data handovers from NASA-supported investigators, he says.

"Back in the Apollo era there wasn't any such systematic agreement," Williams says, and although many investigators did share their data, others never got around to it, and NASA had no formal policy to request it. Data from later Apollo experiments was less likely to reach NASA, he says, "especially because Apollo was cut off fairly quickly".

Williams's office continues to receive boxes of tapes from Apollo scientists, such as a set of heat-flow experiment tapes recently found at the Lamont-



Doherty Earth Observatory at Columbia University in New York. The data formats vary widely and often arrive with little explanation, he adds, and it can be "a bit like detective work" finding people who can help interpret it. "Of course, we want to do this before everyone retires or worse," Williams says.

Once the data is read — a process that has involved mailing tapes to a Canadian company since NASA's reader broke down — Williams and his colleagues add it to a publicly available Internet database. "I think a lot of people want to look at the raw data to get a chance to come to their own conclusions," he says.

O'Brien hopes that future mission planners will learn both from his data and from the bigger lesson about data storage. "It was difficult doing science on Apollo," he says, "because it was still in an exploratory mode. I hope the second generation will have science and engineering much more integrated."

CORRECTED: We incorrectly stated that the three solar panels were powering the dust detector in an earlier version of this story. In-fact the panels comprise the detector itself.

Comments

*If you find something abusive or inappropriate or which does not otherwise comply with our **Terms** or **Community Guidelines**, please select the relevant 'Report this comment' link.*

Comments on this thread are vetted after posting.

There are currently no comments.

Add your own comment

This is a public forum. Please keep to our **Community Guidelines**. You can be controversial, but please don't get personal or offensive and do keep it brief. Remember our threads are for feedback and discussion - not for publishing papers, press releases or advertisements.

You need to be registered with Nature to leave a comment. Please log in or register as a new user. You will be re-directed back to this page.

Log in / register

Nature ISSN 0028-0836 EISSN 1476-4687