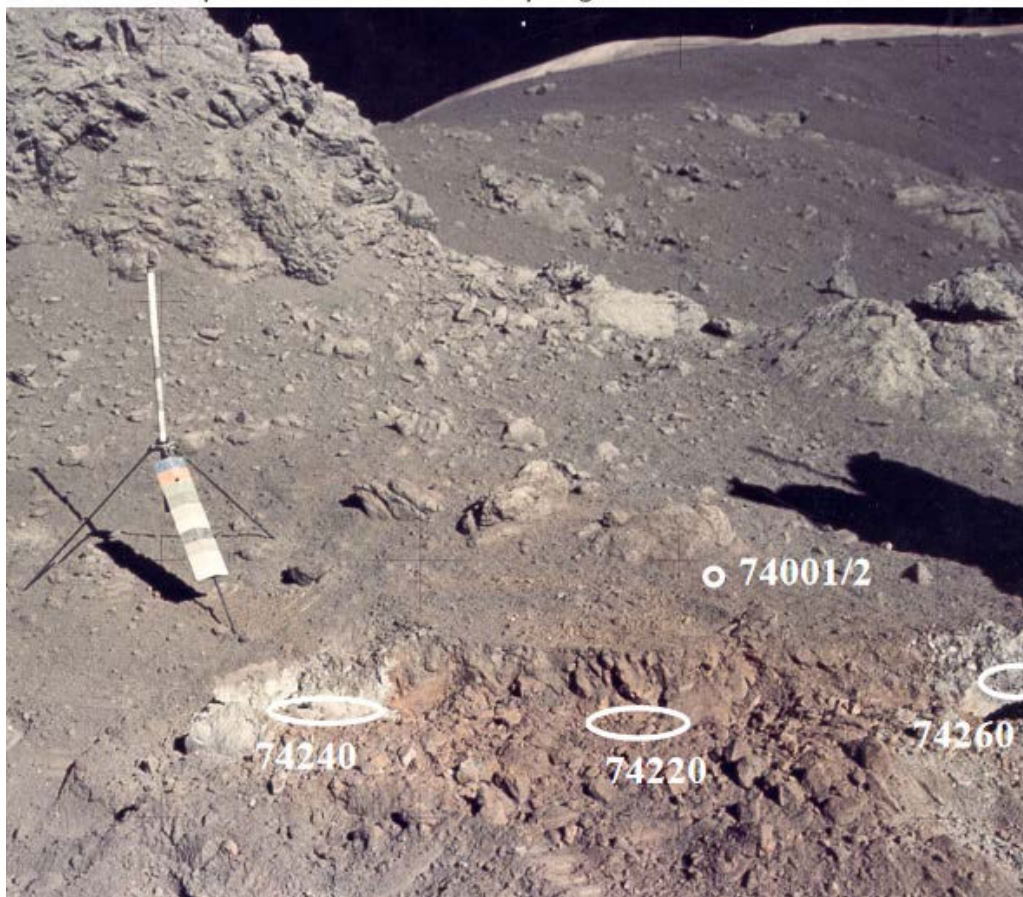


Lunar Orange Glass Beads

As we approach the 50th anniversary of the Apollo 11 Moon landing (July 20, 1969) PSRD celebrates the collection of lunar samples returned to Earth by highlighting current research and the new analyses that increase our knowledge of the Moon and our Solar System.

Products of the ancient volcanic activity on the Moon include the submillimeter-sized orange glass beads collected by Astronaut Harrison H. "Jack" Schmitt from a trench he dug at the rim of Shorty Crater at the Apollo 17 site. Previous geochemical data demonstrated the glass beads were produced from a volcanic fire-fountaining (*pyroclastic*) event on the Moon. An international team of researchers, led by Hejiu Hui (Nanjing University) with colleagues from the US, Germany, and New Zealand, has now measured the heat capacities of the beads in sample 74220 to estimate a cooling rate of 101 *Kelvin* per minute.

Apollo 17 Photo of Sampling Location of 74220



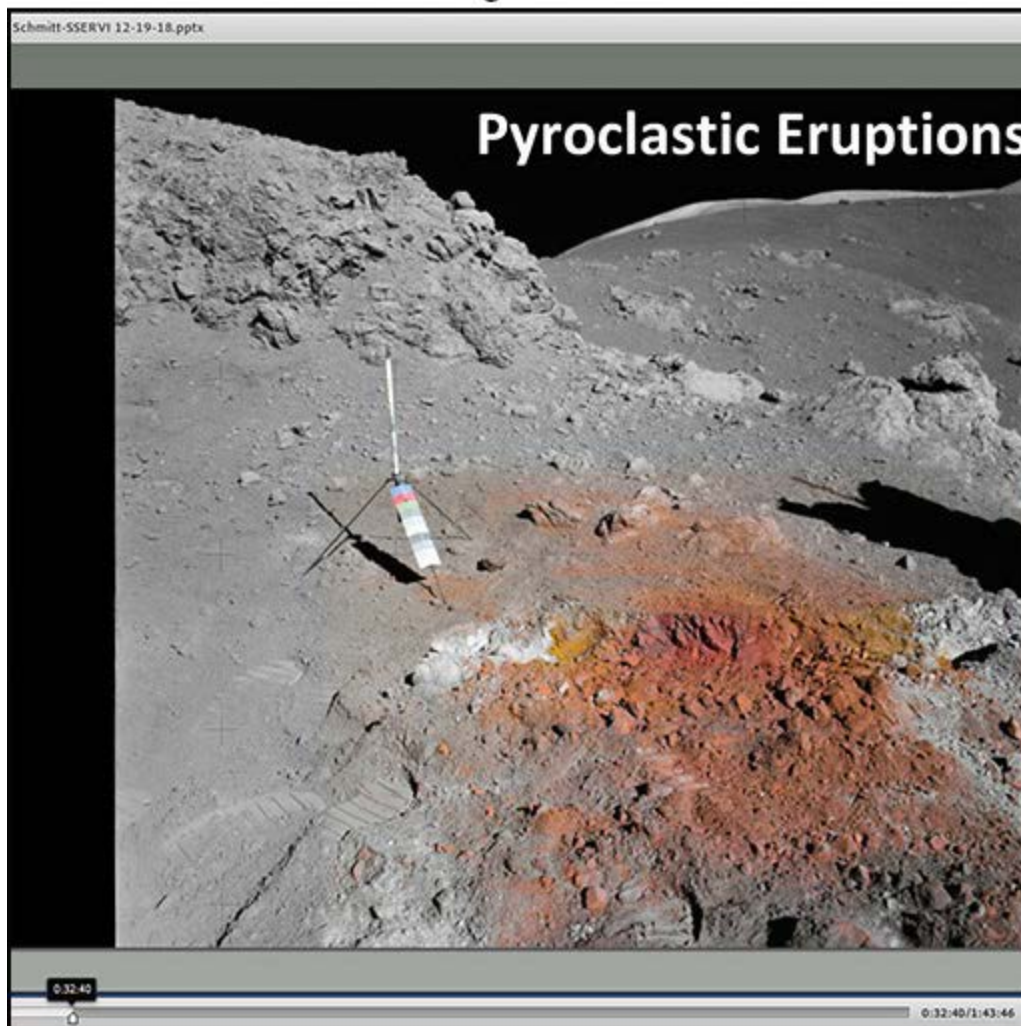
NASA AS17-137-20990 curator.jsc.nasa.gov/lunar/lsc/74220.pdf

This Apollo 17 field photograph shows the trench dug into orange soil at the rim of Shorty Crater and the sampling location of 74220 orange glass. NASA photo AS17-137-20990.

Hui and coauthors compared their calculated cooling rates of the lunar glass beads with terrestrial volcanic glasses and concluded that the 74220 orange glass likely quenched in a gaseous environment (gases released locally from volcanic eruption) rather than in the vacuum that now surrounds the Moon. This interpretation by Hui and colleagues suggests that this volcanic event, around 3.5 billion years ago, was part of a series of eruptions over 500 million years that supported a short-lived or temporary lunar atmosphere, see **PSRD** article: [Volcanism and an Ancient Atmosphere on the Moon](#).

Another interesting development in the orange-glass story is the color-balancing of the Apollo Ektachrome film – the color-balanced image, shown below, was presented by Dr. Harrison H. Schmitt during the graduate course on "The Origin and Evolution of the Moon," sponsored by the NASA Solar System Exploration Research Virtual Institute (SSERVI).

From SSERVI Course "Origin and Evolution of the Moon"



(December 19, 2018 www.planetary.brown.edu/html_pages/geo2870_2018-2019_schedule.html)

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Courtesy of Tranquillity Enterprises, s.p.

The "Origin and Evolution of the Moon" course was organized and led by SSERVI teams at Brown University ([SEED](#)) and the Lunar and Planetary Institute Center for Lunar Science and Exploration ([CLSE](#)). The 14 weekly sessions (September–December, 2018) featured lectures by leaders in the field of lunar science, with a capstone lecture by Harrison H. "Jack" Schmitt. Shown here is a screen shot from the capstone lecture of the color-balanced Apollo 17 field photograph. Derivative photograph copyright 2018 by Tranquillity Enterprises, s.p. Courtesy of Tranquillity Enterprises, s.p. (See the reference to Wells and Schmitt, below, for more information.) All lectures are available for on-demand streaming: [see the lecture schedule](#).

See Reference:

· Hui, H., Hess, K.-U., Zhang, Y., Nichols, A. R. L., Peslier, A. H., Lange, R. A., Dingwell, D. B., and Neal, C. R. (2018) Cooling Rates of Lunar Orange Glass Beads, *Earth and Planetary Science Letters*, v. 503, p. 88-94, doi: 10.1016/j.epsl.2018.09.019. [[abstract](#)]

See also:

- [Glass spherules from Apollo sample 74220,286](#) in plane and crossed-polarized light from the interactive Virtual Microscope for Earth Sciences.
- [Photography During Apollo](#) from the NASA History Program Office.
- Wells, R. A. and Schmitt, H. H. (2018) Color-Balancing of *in situ* Documentation Photographs of the Apollo 17 Orange and Apollo 15 Green Volcanic Ashes, Paper No. 166-11, GSA Annual Meeting, [[abstract and slides](#)].

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