Geologists expect Chang'e-6 lunar surface samples to contain volcanic rock and impact ejecta

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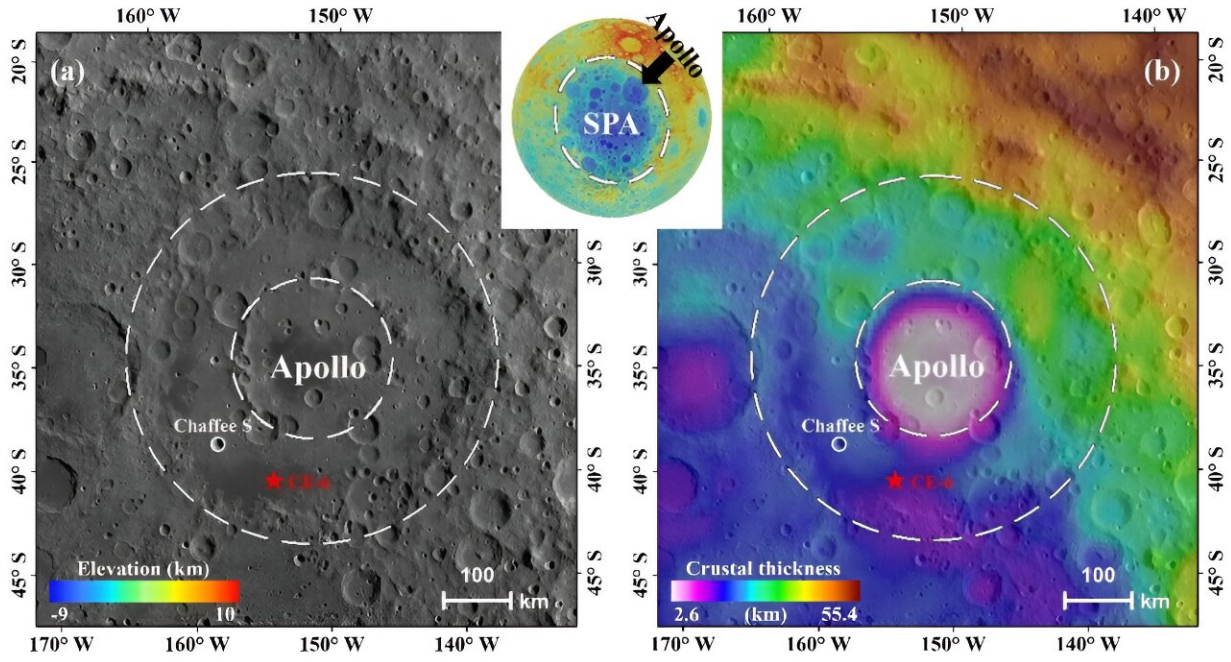

This graphical abstract depicts the landing site of lunar probe Chang'e-6. Credit: Yue et al./The Innovation

On June 25, China's Chang'e-6 (CE-6) lunar probe is set to return to Earth, carrying the first surface samples collected from the farside of the moon. In anticipation of this historic event, scientists from the Institute of Geology and Geophysics at the Chinese Academy of Sciences are

publishing their predictions for the unique materials that may be found in the CE-6 samples in the journal *The Innovation*.

Based on the geological characteristics of the probe's landing site, the researchers anticipate that the returned surface samples will consist of 2.5-million-year-old volcanic rock combined with small amounts of material generated by nearby meteorite strikes. There is also the possibility that evidence of distant impacts will be found in the samples.

"There are significant differences between the farside and the nearside of the moon in terms of lunar crustal thickness, volcanic activity, composition, etc., especially considering that CE-6 landed on the South Polar-Aitkin (SPA) basin, the special terrane of the moon," says first author Zongyu Yue, a geologist at the Chinese Academy of Sciences.

"The CE-6 samples, being the first obtained from the farside of the moon, are expected to answer one of the most fundamental scientific questions in lunar science research: what geologic activity is responsible for the differences between the two sides?"

On June 2, 2024, CE-6 landed in the Apollo Crater, located at the edge of the largest depression on the moon known as the SPA basin. The probe used core drilling and surface scooping to collect rocks and minerals that are likely to contain traces of early meteorite impacts. The data will reveal how far ejecta from early collisions spread across the moon and whether there are any differences compared to what's been recorded on the asymmetrical nearside.

"My greatest hope is that the CE-6 samples contain some impact melts (fragments generated when smaller bodies crashing into the moon) from the Apollo Crater and the SPA basin, which can provide crucial constraints on the early impact flux of the moon," says Yue. "Once this information is obtained, it will not only help clarify the role of early

lunar meteorite impacts on the moon's evolution, but also be of great significance in analyzing the early impact history of the inner solar system."

With 10 successful lunar sample return missions conducted on the nearside of the moon, the CE-6 lunar probe samples represent the first collected from the farside of the moon. Researchers expect their analysis in the coming months and years to contribute to a more comprehensive understanding of lunar evolution.

More information: Zongyu Yue et al, Geological context of Chang'e-6 landing area and implications for sample analysis, *The Innovation* (2024). doi.org/10.1016/j.xinn.2024.100663

Scientists eager for Chang'e-6 lunar farside samples to bring new discoveries, *The Innovation* (2024). www.cell.com/the-innovation/fu … 2666-6758(24)00098-5

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