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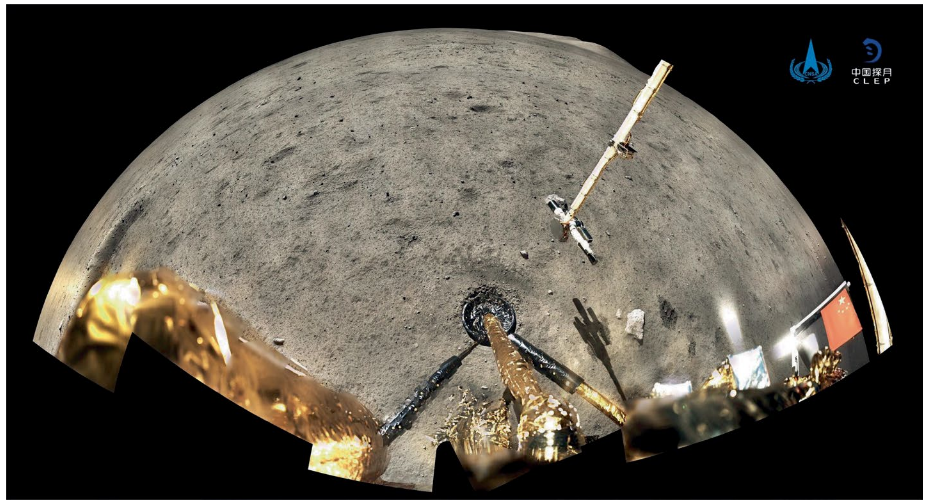
Planetary science blasts off in China

There is much science to extract from mission data if China's growing planetary science community is supported.



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A decade ago, we remarked on the emergence of planetary exploration in Asia[1]. Japan's Hayabusa asteroid sample-return mission had been a success, as had India's Chandrayaan-1 lunar orbiter, which detected water ice on the Moon[2]. Meanwhile, China's space programme was ramping up, and fast. The Chang'e-1 and Chang'e-2 lunar missions were mostly engineering demonstrations, but China's plans were ambitious. A decade on, the China National Space Administration (CNSA) is delivering missions with promising scientific payload — including findings reported in two studies in this issue. With vast national investment and interest, planetary science in China has ascended rapidly. Space races may blow with political winds, but China's planetary research community must be nourished with international collaborations and sustained with long-term investment to reap the scientific rewards of mission successes.

China's government has named planetary science a national priority and supported an ambitious exploration roadmap[3]. Much like the early progression in the USA and Soviet Union, CNSA's missions have progressed from technology-focused to scientific. When Chang'e-4 touched down in 2018, it was the first soft landing on the far side of the Moon[4]. Two years later, Chang'e-5 returned the first lunar samples since the Apollo era, revealing basalts younger than previous samples[5]. In 2021, the Zhurong rover landed on Mars to search for evidence of water activity. The new datasets have brought excitement.

Planetary scientists working in China a decade ago were few and far between. In contrast, the inaugural Chinese Planetary Science Conference in 2021 attracted over 1,000 researchers from over 100 institutions[6]. That 50% of conference attendees were students[6] reflects a young and growing field. The community consists of home-grown researchers educated in recently-launched university programmes, converts from earth science, and planetary scientists trained abroad who[3] bring international experiences and collaborators.

Such growth comes with growing pains. It has been essential to build up research knowledge, experience, and skills, including analytical capabilities to carefully handle and extract precious information from returned samples. International collaborations are key to developing state-of-the-art expertise. Given that the scientific objectives of CNSA missions are complementary to those of other space agencies[7], these partnerships can be mutually beneficial.

Coordination within a rapidly developing community and with a young space agency comes with challenges. In contrast to well-defined mission teams and publication and data strategies of NASA and ESA missions, the CNSA missions operate differently. The Chang'e-5 samples, for example, have been spread to many research groups, with overlapping analyses and research focus. This has led to competition between groups that may have been better collaborating. Here, again, international partnerships can help build up expertise.

With national investment, the short-term outlook for this new community is rosy. There are three more Chang'e lunar sample return missions planned, including to the south polar region, and CNSA has missions to other planetary bodies in the works. These include a Mars sample return mission and outer solar system missions. Meanwhile, although the fate of its Zhurong rover is unclear at this time[8], the Tianwen-1 orbiter remains active.

Some planetary scientists in China, however, worry about whether the government will invest in their research in the long-term[9]. Planetary scientists often pivot to the latest exploration target – following funding and data – but this can make building and maintaining expertise difficult, especially if the missions dry up. For example, a lull in NASA's lunar surface exploration led to knowledge and experience gaps between Apollo-era workers and the next generation of lunar scientists needed for upcoming missions[10].

The Article in this issue by Luo et al. on the evolution of the Chang'e-5 lunar basalts and the Article by He et al. on water stored in impact glass will undoubtedly be followed by many more papers from this mission. More than 50 years later, the Apollo samples are still yielding insights; the Chang'e sample return programme has the potential for the same longevity. For that, planetary science in China will have to do more than grow, but mature and be sustained by both international partnership and domestic support.

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