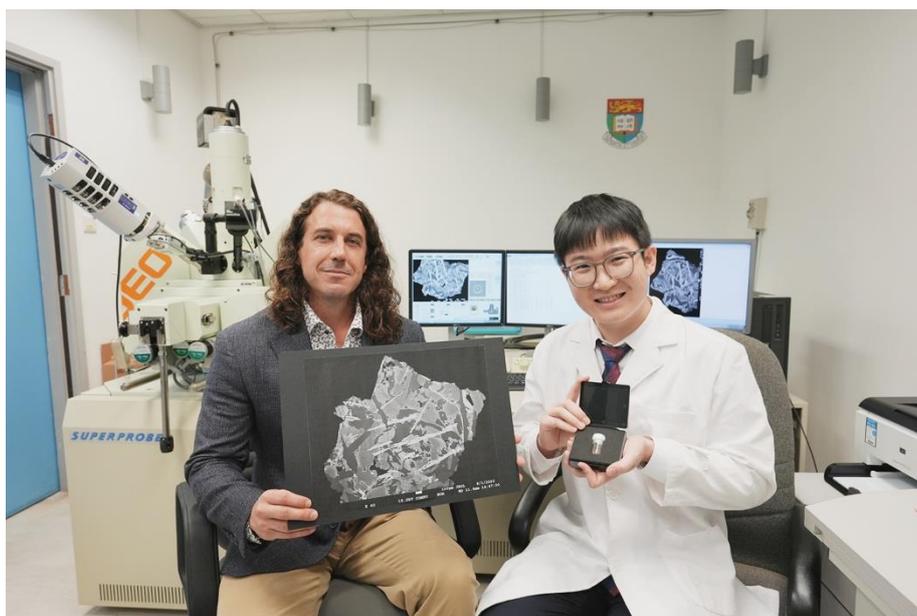


Press release

For immediate release

## Geologists Team at HKU Becomes First in Hong Kong to Retrieve Lunar Samples Set to Unveil the Mysteries of the Moon's Volcanic History

7 August, 2023



*With the support of Dr Joseph MICHALSKI of HKU Department of Earth Sciences, Postdoctoral Fellow Dr Yuqi QIAN formed a team to apply for the lunar samples. The team obtained approval from the China National Space Administration's Lunar Exploration and Space Engineering Centre to study the lunar soil samples.*

The geologists at The University of Hong Kong (HKU) have achieved a historic feat by obtaining lunar soil samples collected by the Chinese lunar probe Chang'e-5 in 2020. This marks the first time that a Hong Kong research team has secured such samples.

Led by postdoctoral fellow Dr Yuqi QIAN from the Department of Earth Sciences, Faculty of Science, the team obtained approval from the China National Space Administration's Lunar Exploration and Space Engineering Centre to study the lunar soil samples. Dr Qian personally travelled to Beijing to retrieve the samples, which weigh 822.6 milligrams in total. These lunar samples offer valuable insights into the Moon's geological and thermal history and its connection to the formation and evolution of planetary bodies in the Solar System. The achievement by the HKU team underscores the university's growing contributions to China's lunar and planetary exploration efforts.

'This is a dream come true for us and Hong Kong's space science community,' said Qian, who is eager to analyse the samples using state-of-the-art instruments at the university. 'We hope to reveal the secrets of the Moon and gain insights into the early Earth, which could have important implications for our understanding of the Solar System and beyond.'

## Previous Study on the Chang'e-5 Landing Site Paves the Way

Dr Qian is making waves in the field of planetary geology with his exceptional research on the Chang'e-5 landing site. Having published the first paper documenting the site and constructing a complete picture, he has been focusing on different aspects such as regolith properties, volcanic history and the provenance of lunar soils. His research work has been published in top-tier journals and widely cited, with over 400 citations, solidifying his position as an emerging expert. Recently, Dr Qian joined HKU as a postdoctoral fellow after obtaining his doctoral degree in Planetary Geology from China University of Geosciences.

Drawing on years of research on the Moon, the most exhilarating moment of his research career was an exciting discovery regarding the latest volcanic activity on the Moon's surface – he discovered that the eastern part of the pre-selected Chang'e-5 landing region contained one of the youngest mare basalts on the Moon. Recognising the scientific significance of this finding, he proposed that Chang'e-5 should explore this region to collect these young basalts, which were younger than any previously returned lunar basalts.

In 2020, Chang'e-5 successfully landed on the lunar surface within the Procellarum KREEP Terrane, a chemical anomaly province known for its elevated heat-producing elements and lunar volcanic deposits. Upon analysing the samples collected from this region, scientists were stunned to discover that the basalts were 2.0 billion years old - almost 1 billion years younger than any previous lunar volcanic samples collected by Apollo or Luna missions. This ground-breaking discovery confirmed Dr Qian's prediction and has reshaped our understanding of lunar history. It has also raised the question: how did the young volcanism originate?

Dr Qian had been working tirelessly on this question, using remote sensing techniques to explore the volcanic history of the Chang'e-5 landing site. His previous research proposed that the Chang'e-5 basalts originated from the source vent of Rima Sharp, whose channel is only ~15 km from the landing site. Rima Sharp is a lunar sinuous rille whose formation required tons of lavas and was highly likely to be sampled by Chang'e-5.

## Gearing up for Insights into Moon's Volcanic History and Evolution of Planetary Bodies in the Solar System

After joining HKU, Dr Qian recognised the potential of the support and resources available at the university to make progress in understanding young lunar volcanism with samples. When Dr Qian learned about the sixth batch of lunar research samples is open for application earlier this year, he swiftly mobilised scientists in the department to join his application. 'I knew this was an opportunity we could not miss for the further development of lunar science at HKU and with our collaborators throughout Hong Kong,' said Dr Qian.

With the support of Dr Joseph MICHALSKI of the Department of Earth Sciences, an expert with extensive experience in planetary geology and mineralogy, Dr Qian formed a team to apply for the lunar samples. Other members of the department included Professor Guochun ZHAO, a renowned geologist specialising in tectonic processes and the evolution of the Earth's lithosphere; Dr Weiran LI, a volcanologist specialising in magmatism, volatile cycling, and volcanic hazards; Professor Min SUN, a prominent geochemist focusing in the evolution of old continents; Professor Jian ZHANG, a structural geologist with expertise in crustal growth and tectonic evolution; and Dr Yiliang LI, an astrobiologist whose research centres in the search for life beyond Earth.

As the Deputy Director and member of the Laboratory for Space Research (LSR) respectively, Dr Michalski and Dr Qian fulfill one of the laboratory's research foci centres around Lunar and Planetary Sciences.

Now, armed with the returning samples and his previous research, Dr Qian and the team can link remote sensing and laboratory studies to unravel the secrets behind the lunar basalts and address the question that has puzzled scientists about the origins of young volcanism on the Moon. The team aims to use petrological-volcanological and spectroscopic techniques to reconstruct and study lunar magmas' generation, ascent, and eruption, focusing on the evolution of volatiles in the lunar soil samples. By analysing the volatiles in the samples, the team hopes to gain insights into the history of lunar late volcanism and the distribution and evolution of volatiles in the Moon's magma system, providing valuable information about the Moon's geological and thermal history and its connection to the formation and evolution of the Solar System in the future.

Dr Qian's supervisor Dr Joseph Michalski established the Planetary Spectroscopy and Mineralogy Lab at HKU, with the aim of providing laboratory support for space missions. He stated that the successful acquisition of lunar samples from the Chang'e-5 mission proved the value of the laboratory and expressed his hope for future collaborations in sample research. He said, 'We are also proud to work with our collaborators at the Hong Kong Polytechnic University and other universities in HK to build a strong space research community, that might help with our future collaborations and explorations.'

Dr Qian expressed that he is thrilled to be part of the effort to explore the Moon, Mars, and beyond. He stated, 'I believe that space exploration is crucial for humanity's future. It is an exciting time to be involved in this field, and I hope our research will inspire future generations to continue exploring and expanding our knowledge of the vast space.'

In addition to studying the samples collected by Chang'e-5, Dr Qian eagerly anticipates the upcoming Chang'e-6 mission to the lunar farside. He hopes to conduct further research on lunar geology based on China's future lunar missions, especially the crewed ones and the International Lunar Research Station, which could provide valuable insights into the formation and evolution of the Moon and lead human's way to other worlds.

More information about Dr Yuqi Qian: <https://yuqiqian.com>

More information about Dr Joseph Michalski: <https://www.clays.space>

Learn about Dr Qian's EPMA Analysis of Lunar Samples in this Video: <http://bit.ly/HKULunarSamples2023>

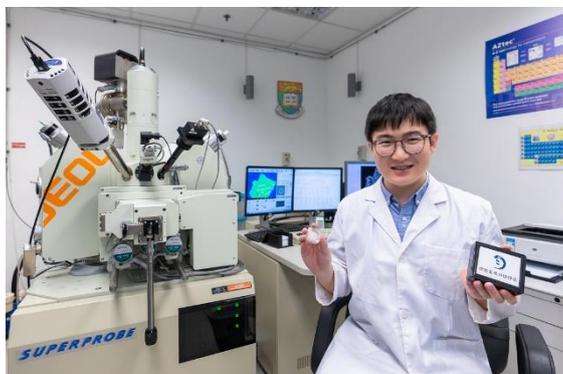


Image 1. Dr Yuqi QIAN and his lunar team will be using the Electron Probe Microanalyzer (EPMA), a highly advanced analytical tool located in HKU Department of Earth Sciences, to study the chemical composition of the lunar sample. This tool is capable of providing accurate and precise measurements of elements in the sample, making it a valuable asset for the team's research.

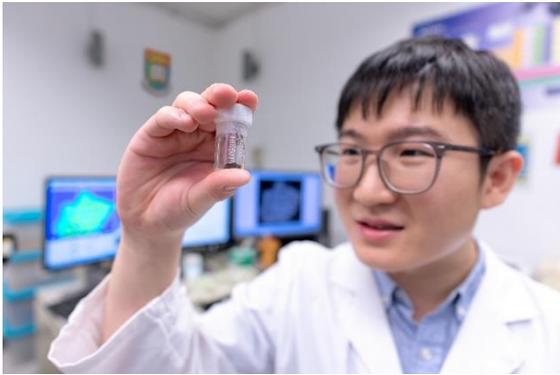


Image 2. Lunar samples can provide valuable information about the lunar environment and formation of soil, as well as the early history of both the Moon and Earth.



Image 3, On July 31<sup>st</sup>, Dr Yuqi QIAN of HKU Department of Earth Sciences travelled to the National Astronomical Observatories, Chinese Academy of Sciences in Beijing to collect lunar samples in person.

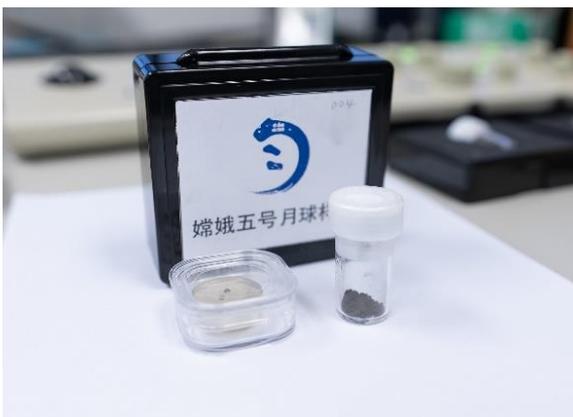


Image 4 and 5: HKU Department of Earth Sciences is currently home to these lunar samples, which were collected by China's Chang'e-5 lunar probe in 2020 and weigh a total of 822.6 milligrams.

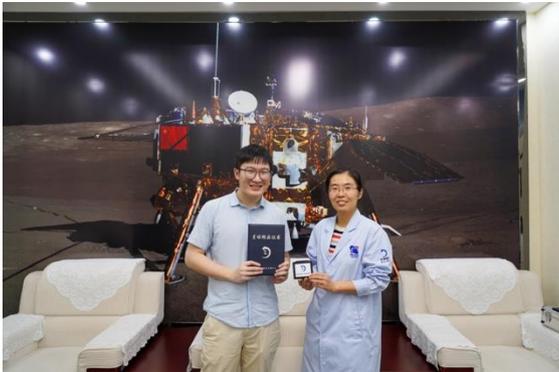


Image 6: Dr Yuqi QIAN of HKU Department of Earth Sciences received the lunar samples from an official at the National Astronomical Observatories of the Chinese Academy of Sciences in Beijing.

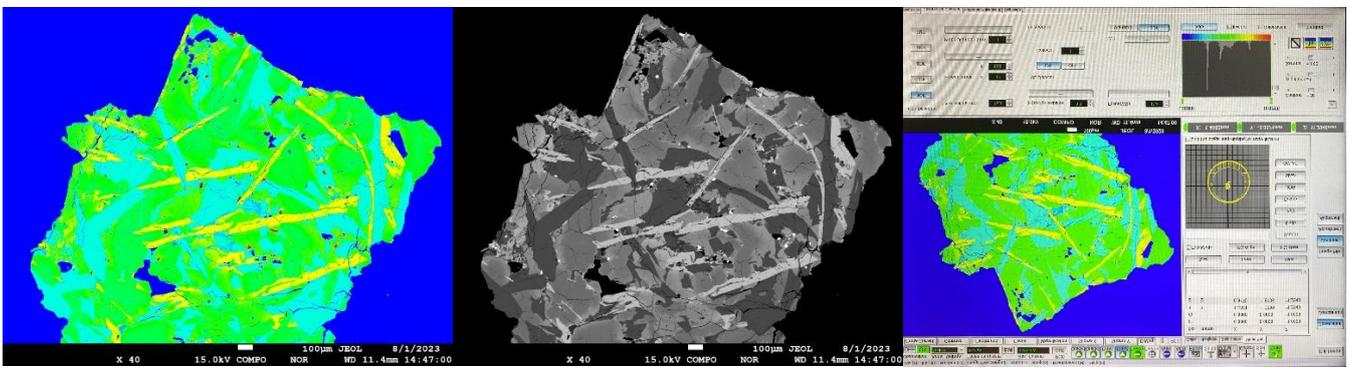


Image 7 - 9 Images of the lunar samples captured by the Electron Probe Microanalyzer (EPMA) at HKU Department of Earth Sciences.



Image 10 The team obtained approval from the China National Space Administration's Lunar Exploration and Space Engineering Centre to study the lunar soil samples.

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Image and video for download: <https://bit.ly/LunarSamples2023PC>