PRESS RELEASE
Paris-Saclay, 5 November 2025

The asteroids Ryugu and Bennu exhibit the characteristics of the same class of primordial objects

By analysing samples returned from the carbonaceous asteroids Ryugu and Bennu, an international team led by scientists at the Institut d'Astrophysique Spatiale (Univ. Paris-Saclay/CNRS) has identified a class of primordial objects that may have contributed to the formation and early evolution of the Solar System.

Carbonaceous asteroids are valuable remnants from the Solar System's formation, around 4.5 billion years ago. They preserve traces of the processes that shaped its early evolution and may have delivered minerals and chemical compounds critical to the evolution of the Earth and other terrestrial planets.

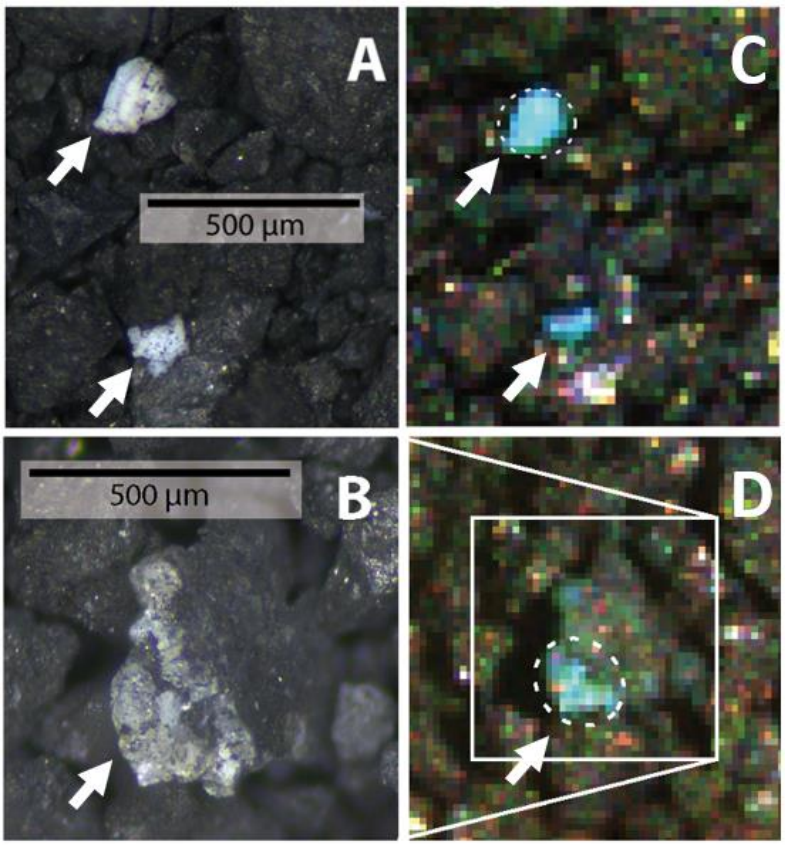
The return of samples from the asteroid Ryugu by JAXA's[1] Hayabusa2 mission, followed by those from the asteroid Bennu by NASA's OSIRIS-REx mission, has for the first time made it possible to analyse in the laboratory the material composing these bodies, free from terrestrial alteration. By comparing the samples from these two objects, the study recently published in *Nature Communications* has shown that Ryugu and Bennu originate from the same class of primordial objects, whose key properties have now been characterised.

These analyses were carried out in the "curation" laboratory (dedicated to preservation and analysis) at ISAS[2], near Tokyo in Japan, where the samples returned from Ryugu - as well as a fraction of those from Bennu - are stored and kept free from any contamination or contact with the Earth's atmosphere. Within this laboratory is a French instrument, MicrOmega, an infrared hyperspectral microscope designed and developed at the Institut d'Astrophysique Spatiale with the support of CNES. It is jointly operated by teams from the Institut d'Astrophysique Spatiale and the Institute of Space and Astronautical Science (Sagamihara, Japan), who are responsible for analysing its data. Coupled with an optical microscope and a point spectrometer operating in the mid-infrared range, MicrOmega thus contributes to an extensive combined analysis of the samples, starting from the curation phase.

Analysis shows that samples from Ryugu and Bennu have very similar near-infrared spectral properties, down to scales of a few tens of microns. In both cases, a wide variety of diagnostic compounds were detected within the phyllosilicate-rich matrix, including phosphorus-bearing compounds with high biochemical potential.

Although minor differences exist, the findings suggest that Ryugu and Bennu share a similar origin and evolutionary path. Their main properties therefore appear to characterise a single class of primordial objects, whose contribution may have been significant in the evolution of bodies within the Solar System.

[1] Japan Aerospace Exploration Agency
[2] Institute of Space and Astronautical Science (ISAS), one of the three pillars of the Japan Aerospace Exploration Agency.



Examples of compounds detected within the Bennu sample matrix: water and ammonium-rich magnesium phosphates ('HAMP') (A: optical image, C: RGB MicrOmega) and iron-rich magnesite-type carbonates (B: optical image, D: RGB MicrOmega). Credit: Pilorget et al., Nature Communications, 2025.

Reference :

Pilorget, C. et al. Bennu and Ryugu constituents from samples: IR analyses and potential source of terrestrial planets' ingredients. *Nature Communications*, *Nov.* 2025. DOI : 10.1038/s41467-025-65438-z.

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Université Paris-Saclay was born from the shared ambition of French universities, grandes écoles and national research organizations. As a leading university in Europe and the world, it covers the fields of science and engineering, life sciences and health, and humanities and social sciences. The university's science policy closely intertwines research and innovation, incorporating both basic and applied science to tackle major societal challenges. Université Paris-Saclay offers a varied range of undergraduate to doctorate level degrees, including programmes with its grandes écoles, all of which are focused on achieving student success and employability. The university prepares students for an ever-changing world where the ability to think critically, remain agile and renew one's skills are crucial. Université Paris-Saclay also offers a comprehensive range of lifelong learning courses. Located to the south of Paris, the university extends across a vast and rich local area. Its location strengthens both its international visibility and its close ties with its socio-economic partners (major companies, SMEs, start-ups, local authorities, charities).
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ABOUT THE CNRS

The Centre National de la Recherche Scientifique (CNRS) is one of the most recognised and renowned public research institutions in the world. For over 80 years, it has upheld a standard of excellence in recruitment and has developed multidisciplinary and interdisciplinary research across France, Europe, and internationally. Committed to the common good, it contributes to scientific, economic, social, and cultural progress in France. At its core, the CNRS comprises 33,000 men and women across 200 professions. Its 1,000 laboratories, most of which are joint units with universities, schools, and other research organisations, involve more than 120,000 people; they advance knowledge by exploring life, matter, the Universe, and the functioning of human societies. The close link it forges between research activities and their transfer to society makes it a key player in innovation today. Partnerships with industry form the foundation of its technology transfer strategy. This is exemplified by more than 200 joint structures with industrial partners and the creation of around one hundred start-ups each year, demonstrating the economic potential of its research. The CNRS also ensures that research outputs and data are accessible; this sharing of knowledge targets diverse audiences, including scientific communities, media, policymakers, economic actors, and the general public.
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ABOUT THE CNES

CNES (Centre National d'Etudes Spatiales) is the public establishment responsible for proposing French space policy to the Government and implementing it in Europe. It designs and puts satellites in orbit and invents the space systems of tomorrow; it promotes the emergence of new services that are useful in everyday life. CNES, created in 1961, initiates major space projects, launchers and satellites and is the natural partner of industry for pushing innovation. CNES has nearly 2,400 employees, men and women who are passionate about space, which opens up infinite, innovative fields of application; it intervenes in five areas: the Ariane launcher, scientific research, observation, telecommunications and defence. CNES is a major player in technological innovation, economic development and industrial policy in France. It also establishes scientific partnerships and is involved in numerous international projects. France, represented by CNES, is one of the main contributors to the European Space Agency (ESA).