



PRESS RELEASE

11 May 2020

PR056-2020

FRANCE WORKING WITH JAPAN ON INITIAL ANALYSIS OF SAMPLES COLLECTED FROM ASTEROID RYUGU

On the night of 5 to 6 December 2020, samples collected from asteroid Ryugu by the Hayabusa2 space probe, operated by the Japan Aerospace Exploration Agency (JAXA), landed back on Earth after a journey of nearly one year. This historic moment for the world's scientific community marked the first time fragments had been collected in situ from a primitive carbonaceous asteroid and returned to Earth for analysis. Samples were collected in February and July 2019 when Hayabusa2 performed a daring 'touch-and-go' manoeuvre on the surface of the asteroid.

The samples will be analysed in three steps: preliminary analyses are already underway at JAXA's curation facility in Sagami-hara, Japan, where the samples are being stored and preserved. More detailed analyses by six teams will start this summer and last for about a year before the international community is invited to submit proposals to join the science effort.

France is the only foreign partner involved in the initial analysis phase with the MicrOmega infrared hyperspectral microscope instrument developed by the IAS space astrophysics institute (CNRS/Paris-Saclay University) and supplied by CNES. MicrOmega is being used at the curation facility to perform pioneering non-destructive molecular and mineralogical analysis on all of the extraterrestrial samples and individual grains of material at sub-millimetre scale, complementing remote analyses done with the probe's NIR3 instrument and those conducted in situ by the French-German MASCOT lander. The IAS team is working virtually due to the COVID-19 pandemic at every stage of the process from data acquisition and processing through to interpretation. This phase, for which MicrOmega is characterizing the samples' composition to provide context, a basis for selection and to guide future analyses, as well as to compile a catalogue for inclusion with the future requests for proposals, is planned to continue through 2022.

MicrOmega has already yielded an extremely rich first series of science results, which were presented recently in a briefing to the Japanese press. The results concern analysis of bulk material before extracting grains for further analysis. The material is mostly very dark, exhibiting a mean reflectance of no more than 3%. At this bulk scale, it shows two strong signatures of compounds containing the OH radical as well as organic phases. MicrOmega's imaging capabilities have also revealed small amounts of grains providing clear insights into the processes behind Ryugu's formation and evolution, with signs of primordial alteration.

Certain grains will be selected for their specific properties and then extracted and distributed to the analysis teams to start work this summer. More than 20 French scientists from seven research laboratories attached to the French national scientific research centre CNRS and its partners (CRPG, IAS, IJCLab, IMPMC, IPAG, IPGP, UMET¹) will be taking part in this phase.

¹ CRPG Earth and planetary sciences laboratory (CNRS/University of Lorraine), IAS space astrophysics institute (CNRS/Paris-Saclay University), Irène Joliot-Curie laboratory of the physics of the two infinities, (CNRS/Paris-Saclay University), IMPMC mineralogy, materials physics and cosmochemistry institute (CNRS/MNHN/Sorbonne University), IPAG planetology and astrophysics institute in Grenoble (CNRS/Grenoble Alpes University), IPGP Earth physics institute in Paris (CNRS/University of Paris), UMET materials and transformations research unit (CNRS/University of Lille/ENSCL/INRAE).

The involvement of French scientists and CNES in analysing samples from Ryugu at this early stage of characterization work at the curation facility marks a significant new step in the close space cooperation between France and Japan.

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