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Toward Artemis sample curation in JAXA - Developing techniques for cold sample curation.

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A curation of a sample return (SR) mission is essential to achieve scientific objectives of the mission. JAXA has curated samples returned from S-type asteroid Itokawa and C-type asteroid Ryugu without exposing to air, both of which contributed to better understanding of asteroids and early solar system evolution [1, 2]. Now JAXA starts preparing curation of the samples returned by future SR missions, such as the Martian Moons eXploration (MMX) [3, 4], the Artemis [5], and the next generation SR (NGSR) missions [6].

Among them, the Artemis mission, the international mission mainly led by NASA, plans to return several tens kilograms of samples from Permanently Shaded Regions (PSRs) of the lunar south pole, where are kept under 110K and water ice was detected [7, 8]. Thus JAXA is now considering how to curate cryo-samples, as developing cold clean rooms, cold sample handling, description and preservation, and division methods for rock samples, in order to establish them in early 2030's.

For developing cold clean rooms, we had tours for ice core storages in National Institute of Polar Research (NIPR) and Institute of Low Temperature Science (ILTS) of Hokkaido University, and cold sample storage in Japan Agency of Marine-Earth Science and Technology (JAMSTEC) to learn about operations of cold curation facility.

If the sample should be kept under -40˚C, they could not be handled using gloves operated by human, but should be handled with machine-operated stage and robotics technologies. We had a tour for Hitosugi Laboratory in the University of Tokyo for machine sample handling in vacuum chambers, aiming to develop sample handling utilizing robotics. We will present more detail about preparation status of cold sample curation.

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