# Update of the initial descriptions and distributions of individual Ryugu samples and preparation for curation of OSIRIS-REx returned samples

Yada T.[1], Abe M.[1], Miyazaki A.[1], Yogata K.[1], Nagashima K.[1], Hatakeda K[2]., Nakato A.[1], Hitomi Y.[2], Sugiyama Y.[1], Tahara R.[1], Nakano A.[1], Ojima T[1], Nishimura M.[1], Okada T.[1], Tsuchiyama A.[3], Michikami T.[4], Sakamoto K.[1], Kanemaru R.[1], Kumagai K.[2], Soejima H.[1], Fukai R.[1], Ishizaki T.[1], Sugahara H.[1], Suzuki S.[1], Sugita S.[5], Cho Y.[5], Yumoto K.[5], Yabe Y.[5], Mori S.[5], Aikyo Y.[5], Furuichi K.[5], Bibring J.-P.[6], Pilorget C.[6], Brunetto R.[6], Riu L.[6], Loizeau D.[6], Lourit L.[6], Hamm V.[6], Lequertier G.[6], Carter J.[6], Le Pivert- Jolivet T.[6], Lantz C.[6], Tachibana S.[5], Usui T.[1], and Fujimoto M[1]

1. JAXA, 2. Marine Works Japan, 3. Ritsumeikan Univ., 4. Kindai Univ., 5. Univ. Tokyo, 6. Institut d'Astrophysique Spatiale

After the return of Ryugu samples by Hayabusa2 in Dec 2020, they have been described in the Extraterrestrial Sample Curation Center (ESCuC) of JAXA and distributed to the initial analyses and phase-2 curation teams for further detailed analyses. In order to provide fundamental information of the samples to researchers, a series of initial descriptions on bulk and individual Ryugu samples has been conducted non-destructively under purified nitrogen condition such as optical microscopic observations, weight measurements, infrared spectral measurements with an FT-IR, an infrared microscope MicrOmega, and visible spectral measurements using a monochronic microscope with six filters [1, 2]. These initial descriptions data are open to the public at the website of the Ryugu Sample Catalog (https://darts.isas.jaxa.jp/curation/hayabusa2/).

So far, 604 individual Ryugu grains are handpicked and described, which comprise nearly 40wt% of bulk samples recovered from the Chamber A and C. As noted previously [1], Chamber A samples corresponds to those from the first touchdown site and Chamber C corresponds to the second one where is close to the artificial crater produced on the asteroid by the Small Carry-on Impactor of Hayabusa2 [3]. Their mass distributions are shown in Fig. 1. The power index of the cumulative mass distribution of both Chamber A and C is -1.28, which is slightly steeper than the result of catastrophic impact experiments (-0.4 to -1.1) [4]. This indicates fragmentation after the past catastrophic disruption of the Ryugu parent body and re-accretion to the Ryugu body may have occurred on Ryugu's surface. The infrared spectral results with FT-IR (264 grains) and with MicrOmega (174 grains) are under detailed evaluations. So far, 202 grains have been analyzed for their visible spectra with the monochronic microscope with six filters. Their data are detailed in [5].

The first announcement of opportunity (AO) for Ryugu samples was announced from last Dec. In the 1st AO, 57 proposals were submitted and 40 of them were selected for sample distributions. The distributions of Ryugu samples to the selected PIs will be finished soon. The application of proposals for 2nd AO will be closed in the beginning of this Nov. After a series of reviewing and selection processes, the sample distributions to the selected PIs will start in the beginning of next year.

Based on the Memorandum of Understanding (MOU) between JAXA and NASA, JAXA will receive 0.5wt% of returned samples (estimated to be approximately 1.25g [6]) by the OSIRIS-REx. In order to curate the allocated OSIRIS-REx samples, a new clean room has been prepared in the ESCuC, and new clean chambers, which are designed based on the Hayabusa2 clean chambers, will be installed in the next fall. The initial analyses and subsequent distribution of the OSRIS-REx samples are still under discussion, though we aim to primarily focus on comparative studies between Ryugu and Bennu samples.

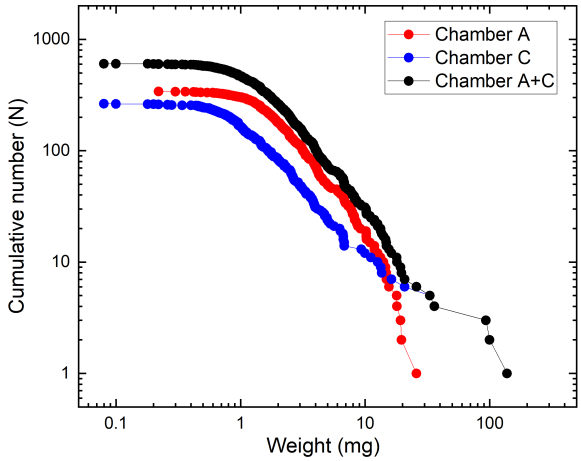


Fig. 1. A cumulative mass distribution of individual Ryugu grains from Chamber A, C, and A+C. The cumulative mass distribution from Chamber A shows a regular straight distribution whereas that from Chamber C appears irregular in >10mg weight range. This might indicate that the SCI impact by the Hayabusa2 might have disturbed the weight distribution of surface regolith on 2nd touchdown point [3].

**References**

[1] Yada T. et al. 2022. Nat. Astron. 6, 214. [2] Pilorget C. et al. 2022. Nat. Astron. 6, 221. [3] Arakawa M. et al. 2020. Science 368, 67. [4] Michikami T. et al. 2016. Icarus 264, 316. [5] Yumoto K. et al. 2022. this meeting. [6] Lauretta D. et al. 2022. Science 377, 285.