

### The Curatorial Database System for Hayabusa2-returned Samples from C-type near-Earth Asteroid Ryugu.

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**Introduction:** The JAXA's Hayabusa2 spacecraft explored C-type near-Earth asteroid (162173) Ryugu and successfully returned its reentry capsule on December 6, 2020. Particles exceeding ~5 grams in total were safely extracted from two sample chambers in the clean chamber system dedicated to Ryugu samples [1, 2].

After a six-month preliminary examination without exposure to the air by the JAXA Astromaterials Research Group (ASRG), a part of Ryugu samples have been studied by the initial analysis team led by the Hayabusa2 project [3]. Some samples have also been characterized by Phase-2 curation teams outside ASRG [4].

The rest of the samples are continued to be investigated in the clean chamber to be catalogued in a curatorial database system (DBS), which will be archived to the community in early 2022 for the announcement of opportunity (AO). In this presentation, we report the aim and features of the curatorial DBS for Ryugu samples (Ryugu DBS) and the status of its development.

**Database and its construction timeline:** The Ryugu DBS has been designed and built to provide the Ryugu sample catalog with the research community and to help the researchers make the sample request through the announcement of opportunity.

The concept design of the Ryugu DBS was made in mid 2019 based on lessons-learned from the operation of DBS for Itokawa samples (Itokawa DBS) [5]. A mockup was first made to check the web interface and the user-friendliness of the system in early 2020. The database system was then developed based on the feedback from the mockup review in Oct. 2020. The system has been used by limited members for further feedback, and a major update was made once. A supplemental system such as a data input system was also developed. The Ryugu DBS is run using open-source technologies, such as PHP, PostgreSQL, and Apache, and data servers on Data ARchives and Transmission System (DARTS) at ISAS/JAXA.

The Ryugu DBS provides the information on each individual grain (typically larger than 1 mm along the longest dimension) and on aggregate samples. Because of the presence of large amount of fine particles (relative to Itokawa particles), fine grains are planned to be examined as an aggregate sample put in a single dish.

The basic information listed in the DBS includes photomicrographs, weight, size, and spectroscopic data, all of which are obtained in the clean chamber system without exposure to the air. The spectroscopic data can be downloaded with the CSV format. Along with such basic information, the analysis history and data obtained in previous analysis can also be found for each sample. The data obtained by the project-led initial analysis and that from curation work outside JAXA will also be archived in the future.

When a sample was divided into multiple pieces, each piece is recognized as a sub-piece, so that users can easily find the relation among different samples in the list.

The web interface has three different view modes: Table style, Thumbnail style, and Detailed list style. Users can select the view mode depending on their purposes. The DBS also has a search function.

The final update of the Ryugu DBS prior to the release is planned this winter to increase database fields, to include more data obtained at ISAS/JAXA, and to meet Digital Object Identifier (DOI) demands. The release of the Ryugu DBS to the community will be in early 2022.

**Acknowledgments:** The Ryugu DBS was developed by Youworks Co., Ltd. Servers of the Ryugu DBS are being operated by Center for Science-satellite Operation and Data Archive (C-SODA) at ISAS/JAXA.

**References:** [1] Tachibana S. et al. (2021) *LPS, XXXXXII*, Abstract #1289. [2] Yada T. et al. (2021) *LPS, XXXXXII*, Abstract #2008. [3] Tachibana S. et al. (2021) submitting for Hayabusa 2021 symposium. [4] Ito M. et al. (2021) submitting for Hayabusa 2021 symposium. [5] Uesugi M et al. (2016) *Journal of Space Science Informatics Japan: Vol 5*, 59-70.

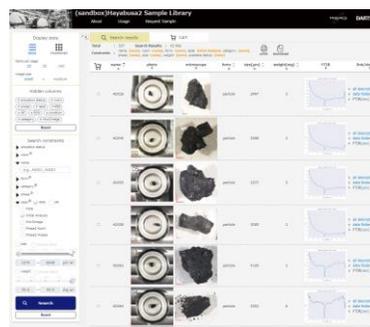


Fig. 1. The web interface of the Ryugu DBS