

Guidebook for application for the Ryugu Reference Project Measurement Definition Team (RRP-MDT)

June 6, 2024

Key milestones for the applications for Ryugu Reference Project Measurement Definition Team (RRP-MDT)

- Call for applications: June 6, 2024
- Submission of application due: July 5, 2024
- Decision announcement: No earlier than July, 2024 (TBD)
- Expected completion of tasks: ~6 months after selections

1. Introduction

The Hayabusa 2 mission returned ~5.4 g of sample from the C-type asteroid Ryugu. The sample was stored in a sealed container during cruise and recovery operations until finally transported to the Hayabusa 2 clean chamber in the Institute of Space and Astronautical Science (ISAS), Japan Aerospace Exploration Agency (JAXA) clean room facility (Tachibana et al., 2020). JAXA's Phase 1 curation team processed the sample following the protocols described in Yada et al. (2021, 2023) and distributed fractions to the Hayabusa 2 initial analysis team, Phase 2 curation teams and researchers selected through the Announcement of Opportunity for Hayabusa 2 Samples (https://curation.isas.jaxa.jp/ryuguao_accepted_proposals). The curation and initial analysis teams showed that the returned sample represents the surface of Ryugu and possesses similarity to the Ivuna-type (CI) chondrites in terms of petrology, mineralogy, and inorganic/organic chemistry (e.g., Ito et al., 2022; Nakamura E. et al., 2022; Nakamura T. et al., 2023; Naraoka et al. 2023; Noguchi et al. 2022; Yabuta et al. 2023; Okazaki et al. 2023; Pilorget et al. 2022; Yokoyama et al., 2023a). Further, the migration and evolution of Ryugu's parent body have also been reconstructed based on the analyses of Ryugu particles.

The similarity to the CI-chondrites has the potential to significantly increase the scientific value of the Ryugu sample because the CI-chondrites best represent the chemical compositions of non-volatile in the Solar System (e.g., Lodders, 2021). The chemical compositions of CI-chondrites provide a reference for Solar System compositions and are widely used in geochemistry. However, these meteorites have suffered from terrestrial alteration, which has modified their original chemistry, particularly for the volatile elements. In contrast, the Ryugu sample has experienced minimal terrestrial alteration, making it a unique and valuable resource for research, although the sample amount available for research is limited.

The Ryugu sample could potentially serve as another reference for Solar System compositions, supplementary to the CI-chondrite-derived reference. However, one should reassess the potential of the Ryugu sample as a new reference. JAXA previously received a voluntary report from the community, with a preliminary investigation of the feasibility and merit of using the Ryugu sample for the reference (Yokoyama et al. *submitted*). The investigation showed that the Ryugu sample's heterogeneity yielded a variation in elemental and isotopic compositions among the individual small fractions (typically <20 mg) (See also Nakamura E. et al., 2022; Nakamura T. et al., 2023; Yokoyama et al., 2023a, 2023b). Furthermore, these fractions were insufficient to analyze some isotopes (e.g., Ru, W), resulting in the absence of these isotopic compositions in the Ryugu data sets.

To this end, JAXA invites individuals to apply for membership in a new science team – *the Ryugu Reference Project Measurement Definition Team (RRP-MDT)*. RRP-MDT will work on the tasks briefly outlined below:

- 1) Define the scientific goals and objectives of the Ryugu Reference Project (e.g., list of elements, isotopes, and chemical species in the Ryugu Reference; accuracy and precision required for the Ryugu Reference),
- 2) Recommend the analytical protocols that meet the project requirements (e.g., amount of Ryugu sample, means for producing an uncontaminated powder, instrumentation, and number of analytical runs, etc.),
- 3) Develop an MDT final report that will be provided to JAXA for publication as a community white paper.

Based on the MDT report, JAXA will evaluate the significance and scientific merit of proceeding with Ryugu Reference Project.

To respond to this RRP-MDT solicitation, please send a letter of application by July 5, 2024, following the guidelines below. A Q&A session for potential applicants is held on Mid-June, 2024. Please also visit the RRP-MDT website for more information.

2. Expected Processes

2.1 Selection and activity period

The RRP-MDT shall comprise approximately ~15 members tasked with the abovementioned responsibilities. The panel appointed by the Hayabusa 2 sample allocation committee (HSAC) will select the RRP-MDT members based on an open, international, competitive call. The chair will be selected from the RRP-MDT members. The expertise being sought is in geochemistry and cosmochemistry. Additionally, we welcome experts in mineralogy, petrology, planetary physics, astronomy, solar system formation, statistics, and related fields. Early career researchers are encouraged to apply. It is anticipated that the study and subsequent report will take approximately 6 months, that RRP-MDT activities will take place via video conferencing, and that no in-person meetings will be planned.

2.2 Application process

Applicants are required to submit an applications by email (jaxa-curation-rrp@jaxa.jp) before the deadline of July 5, 2024 at 12:00 (JST). Applications for the RRP-MDT require

the submission of an application form (details in Section 2.2.1 and 2.2.2) and a current CV. Once the evaluation processes are completed, all applicants will be notified of the results.

2.2.1 Application documents

The application forms must be written in English and submitted in PDF format. The minimum font size for the main text shall be 11 points, and the text shall be single-spaced. Text within figures and tables may use a smaller font as long as it is legible. The forms must be on A4/US letter-size paper and not exceed three pages (including figures). The template of the application forms will be available on the RRP website (https://curation.isas.jaxa.jp/rrp/rrp-mdt_application_template.doc). Any form of CV is acceptable.

2.2.2 Elements required in the application forms

The application forms should state:

- 1) the reasons for your interest in this opportunity,
- 2) the specific experience/expertise/capability that you could contribute that would be most relevant to the success of the RRP-MDT,
- 3) any analytical methodologies or modern laboratory instrumentation with which you have expertise.

2.3 Application review and selection

2.3.1 Panel review

Following the deadline for the submission of applications, the RRP-MDT selection panel shall convene to review the applications. The panel will consist of approximately five scientists with broad expertise in the field of cosmochemistry, including chemistry, mineralogy, petrology, volatiles, and organics.

2.3.2 Notification of selection results

The selected applicants will be informed via email, and a list of RRP-MDT will be published on the RRP website.

3 General conditions and Confidentiality

- This Call for Applications is open only to individuals. Group applications will not be considered. Additionally, collaborations and teams will not be considered.
- The issuance of this Call for Applications does not obligate JAXA to accept any of the applications. Any costs incurred by an applicant in preparing a submission in response to this Call are the responsibility of the applicant.
- Meetings will be conducted via teleconference. It is the responsibility of the individual's funding institution to provide honoraria and per diem for participation in meetings.
- The selected applicant shall comply with the obligation to maintain the confidentiality of the data, knowledge, and information communicated in the framework of the activity.

References

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