

RRP

RYUGU REFERENCE
PROJECT

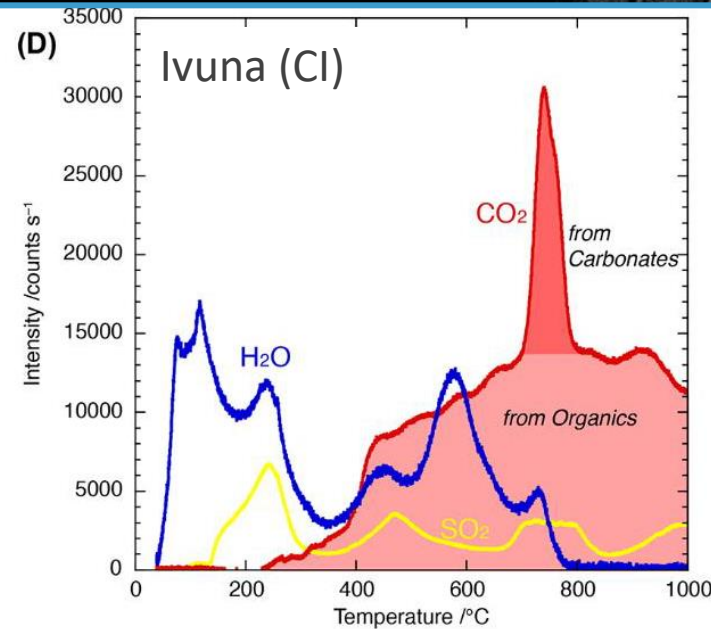
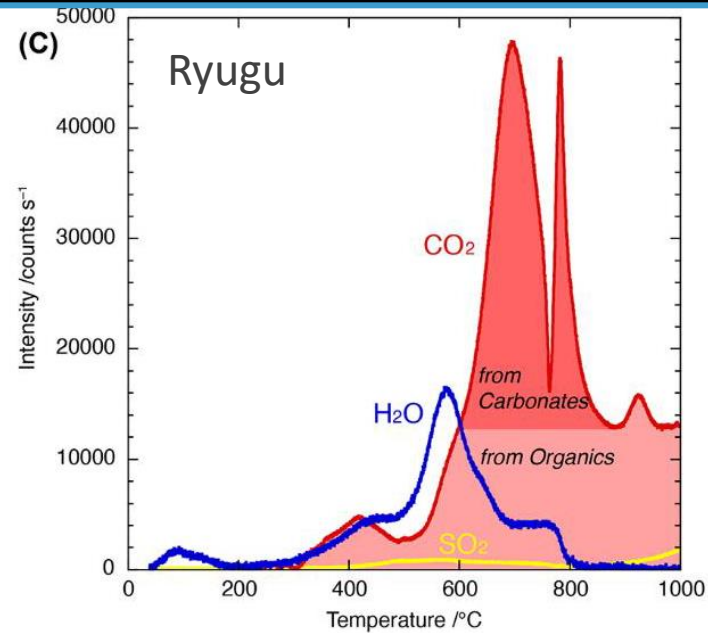
RYUGU REFERENCE PROJECT

Q&A Session for Applicants
June 18, 2024 21:00(JST)-



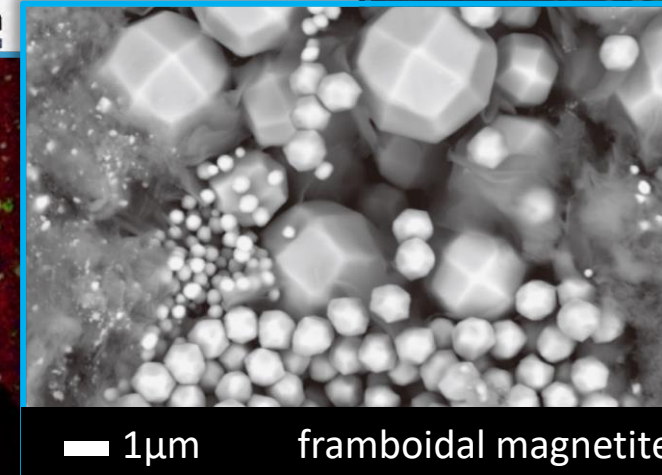
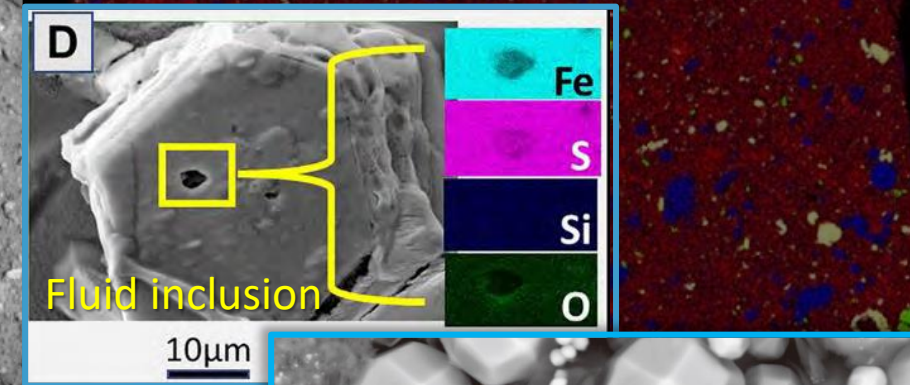
First Accurate Estimate of Water Content in C-type Asteroid

TG-MS data of Ryugu and CI chondrite (Ivuna) (Yokoyama+ 2023)



Abundant “primary” phyllosilicate but no terrestrial alteration products (e.g., hydrous sulfate)

A variety of observations for the water/rock/organic reaction
(Nakamura E+ 2022; Nakamura T+ 2023; Yabuta+ 2023)



Phyllosilicate

Carbonate

Magnetite (Ito+ 2022)

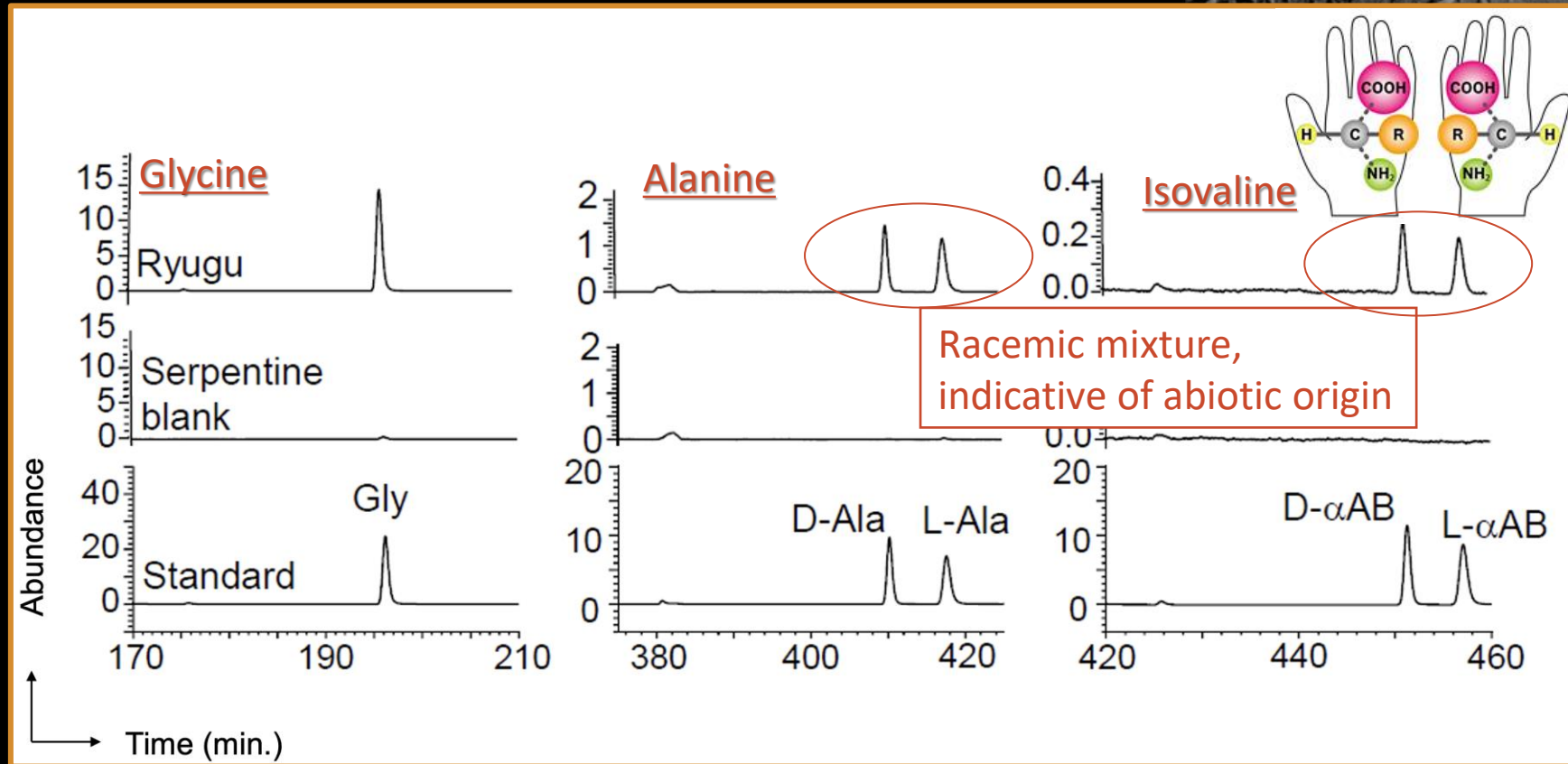
100 µm

~7 wt% indigenous water
~5 wt% carbon (carbonate & organics)

High (~13-20 %) water contents in carbonaceous meteorites due to alteration on Earth

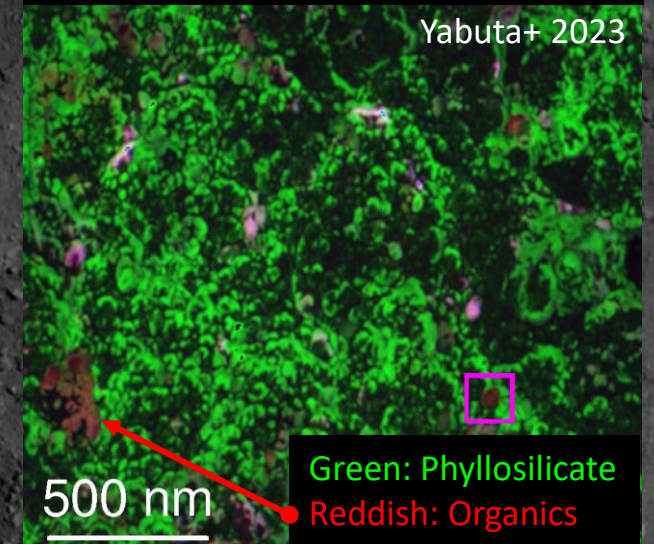
20,000 Types of Organic Molecules Found in Ryugu Sample

Amino acids detected in the Ryugu sample (modified after Naraoka+ 2023)



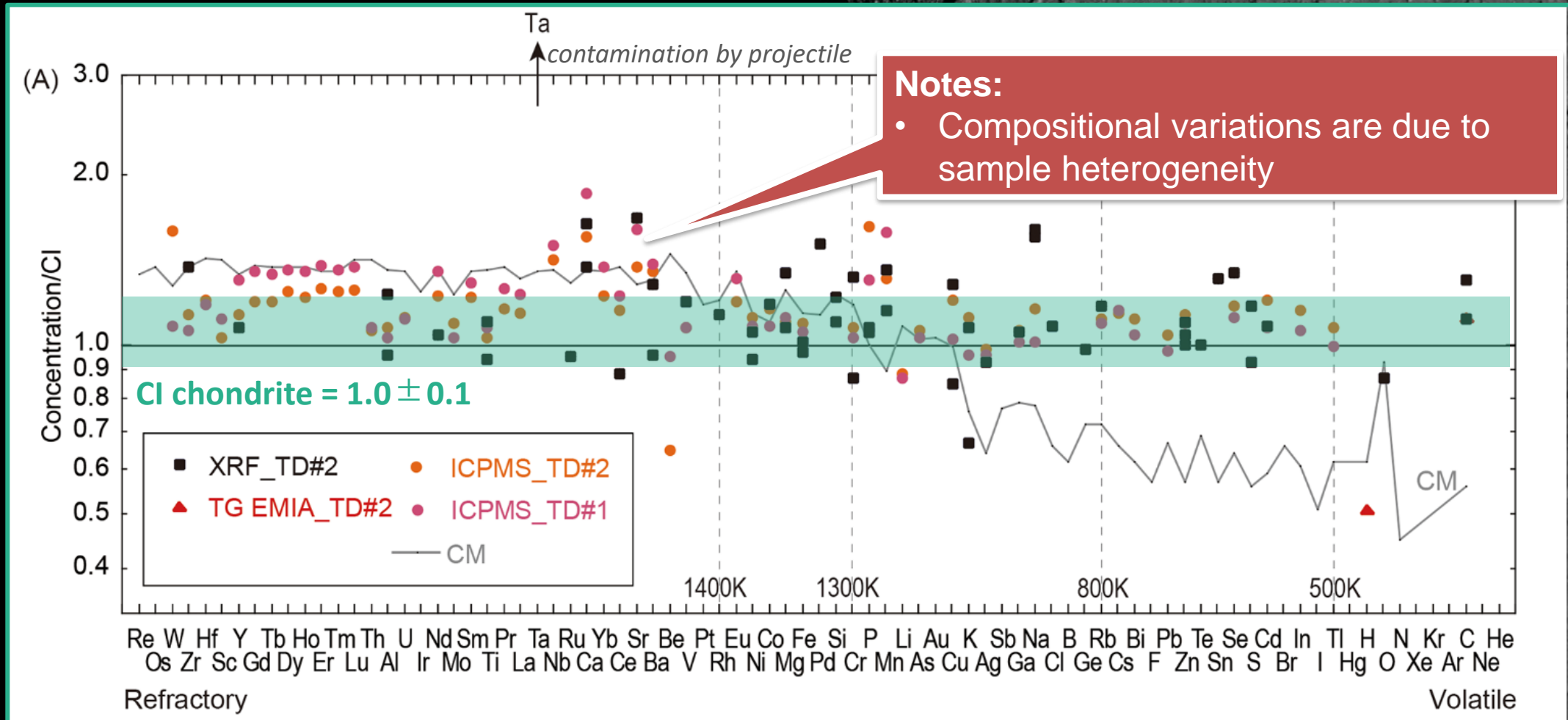
A variety of observations for the water/rock/organic reaction
(Yabuta+ 2023; Nakamura E+ 2022; Ito+ 2022)

Composite AFM-IR images



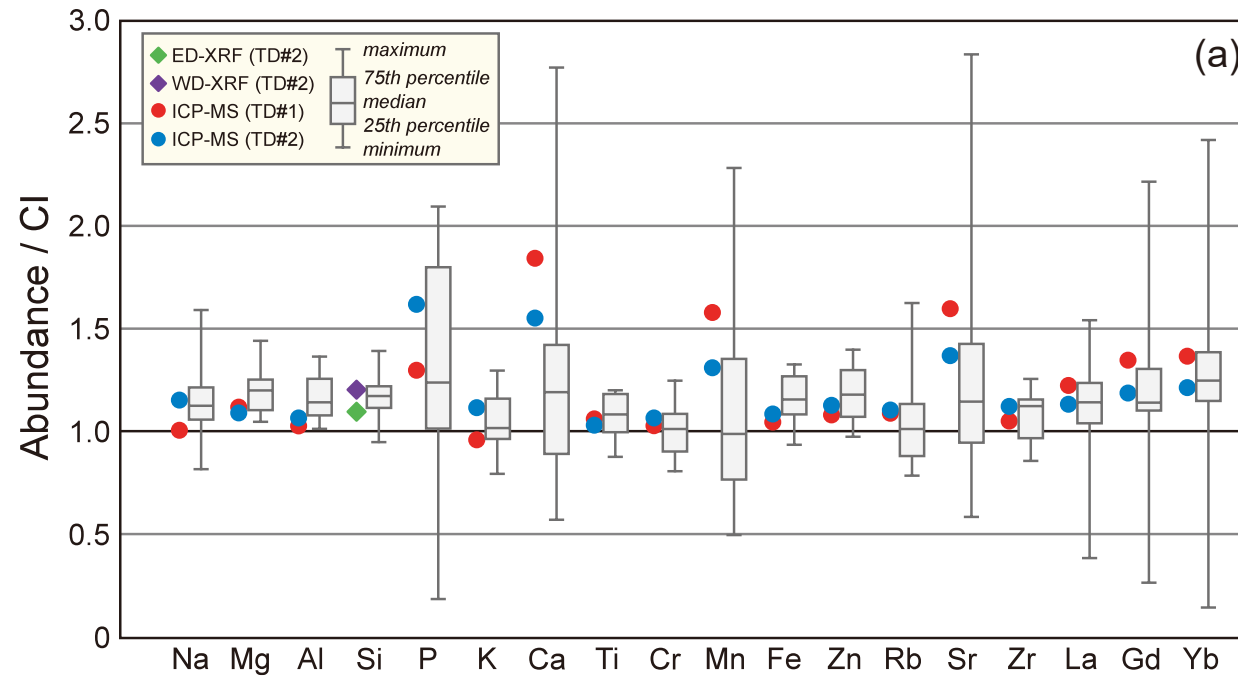
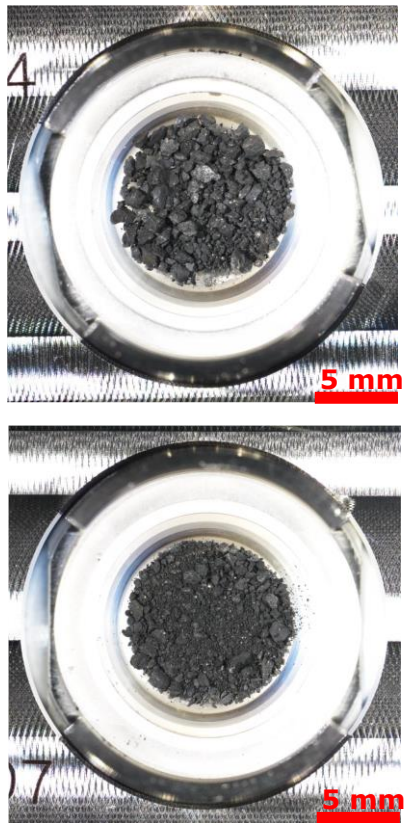
Ryugu Represents the Solar Abundance (\sim CI chondrite) without terrestrial alteration

Elemental abundance of Ryugu normalized to CI (Yokoyama+ 2023)

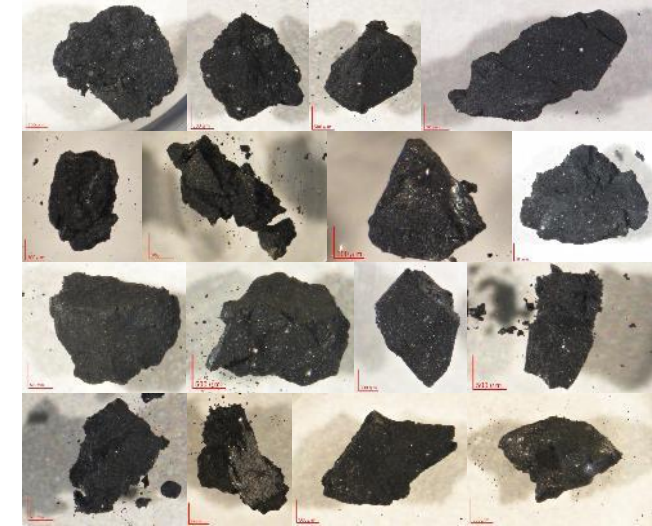


Chemical heterogeneity in Ryugu samples

Aggregate samples
(~25 mg)



Small particles
(0.2–3 mg)



Data source:
Yokoyama et al (submitted)
Yokoyama et al. (2023)
Nakamura E. et al. (2022)
Ito et al. (2022)

Small Ryugu particles are heterogeneous for some elements (nugget effect)

Ryugu Reference Project

Background

- The Ryugu sample is unique in that it resembles the CI chondrite and **represents Solar abundances in chemistry with minimal terrestrial contamination.**
- The HYB2 initial analysis and Phase 2 curation teams found a chemical variation within the studied "small (<30 mg)" fractions. Moreover, these fractions are insufficient to analyze key isotopes.
- **JAXA launches the Ryugu Reference Project (RRP).**

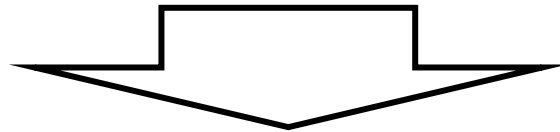
Key discussion points

- **How much do we need** to guarantee the solar abundance? Even the grams of homogenous Ryugu powder may not represent the Ryugu bulk or the Solar abundance.

Team structure

Ryugu Reference Project Measurement Definition Team

- 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, uncontaminated powdering process, instrumentation, number of analysis runs).
- 3) File an MDT report with JAXA to publish as a community white paper.



Ryugu Reference Project Consortium

- 1) *Measure allocated fractions and provide the data to the JAXA database; target elements/species/isotopes for the individual members are defined by the MDT's white paper*
- 2) *Contribute to data interpretation and write a consortium paper.*

Call for Measurement Definition Team (MDT)

- Purpose

- Report the white paper on sample selection, processing, and analysis for the Ryugu Reference Project

- Measurement Definition Team Organization

- ~10-15 experts in petrology, mineralogy, cosmochemistry, organic geochemistry, theoretical researchers on Solar System formation & curation
- A chair will be selected from the successful applicants
- Program Executive (JAXA curation)
- Facilitation & technical support (JAXA curation)

How to apply?

Q&A Session for Applicants

A Q&A session for potential applicants will take place from 21:00 JST (12:00 UTC) on June 18th. Please register in advance using the form below. Participation in the Q&A session is optional and not a requirement for application.

[Registration Form](#)

Today's video (explanation only) and Q&A (PDF) will be available here at a later date.

Documents for Applicants

For more information on the call for applications for the Ryugu Reference Project Measurement Definition Team (RRP-MDT), please refer to the guidebook below. Please send all necessary documents for application to [the RRP Administration Office](#).

PDF

[Guidebook for application for the RRP-MDT](#)

DOCX

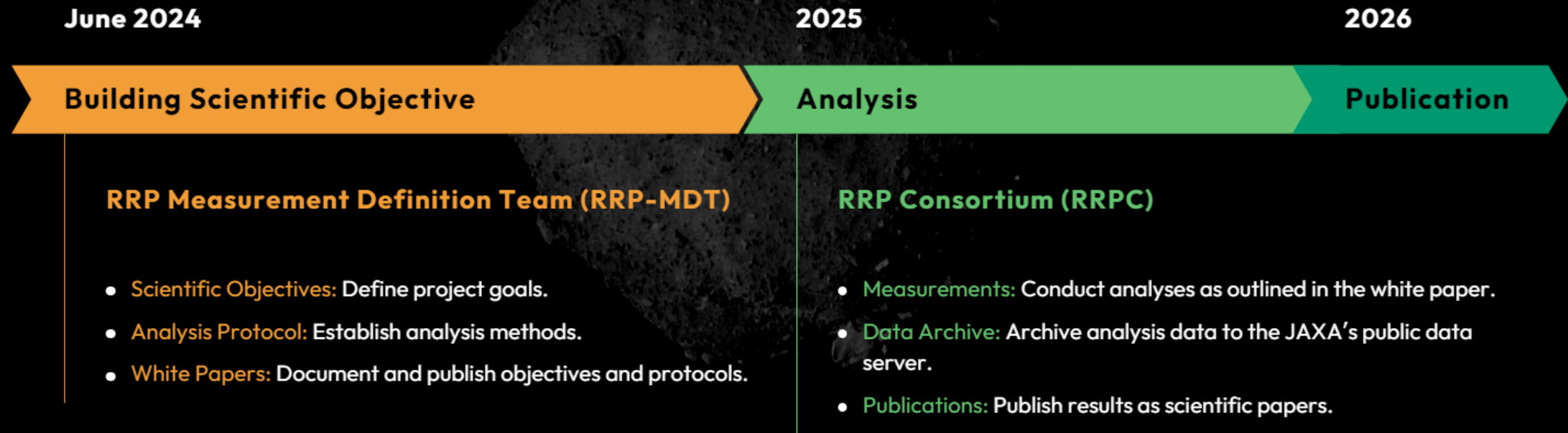
[RRP-MDT Application template](#)

Please read the guidebook carefully and submit your application (using the template) and CV.



Contact us:
jaxa-curation-rrp@jaxa.jp

Project Flow



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

- Call for applications: June 6, 2024
- **Submission of application due: 12:00(JST), July 5, 2024**
- Decision announcement: No earlier than July, 2024 (TBD)
- Expected completion of tasks: ~6 months after selections