Enhancing Visibility of Hayabusa2 Mission Data

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Introduction:

Following the successful completion of its primary mission to (162173) Ryugu, Hayabusa2 has transitioned into its extended mission phase, referred to as Hayabusa2# [1]. Concurrently, as samples from the nominal mission are disseminated globally for laboratory analyses, our focus shifts towards amplifying the visibility of Hayabusa2 mission data. The in-situ observations of asteroids by spacecraft are an unique opportunity, and thus it is important to utilize the data properly and exploit the scientific information as much as possible. As the instruments are more and more matured and sophisticated, the dataset has various potential to be analyzed. Our objectives are threefold: 1) to open access to the data, 2) to promote its utilization, and 3) to maximize the scientific yield from the mission. In this presentation, we report our current activities and future plans. The framework can serve as a model case for future missions.

Opening Access to Data:

We are actively working on archiving data in both the Data Archives and Transmission System (DARTS; https://darts.isas.jaxa.jp/) by JAXA and the PDS (Planetary Data System) Small Bodies Node (https://sbn.psi.edu/pds/) by NASA. Currently, data from the main remote-sensing instruments and the MASCOT lander from the nominal mission are accessible. Higher level products, such as Thermal InfraRed Imager (TIR) and the laser altimater LIDAR L3 and L4 data, are under preparation and will be available through DARTS and PDS too. Furthermore, we are working on archiving data from additional instruments such as DCAM3, MINERVA II, and CAM-H.

Promoting Data Utilization:

Given that the available data are primarily at a low level, and sometimes the profound knowledges of the instruments and/or the mission are required to look for and decode the data, especially when the data is separated from the geographic information. we are implementing two strategies to encourage their utilization. Firstly, we are developing a user-friendly searching and downloading system designed for intuitive access to desired data, exemplified by the JAXA Asteroid Data Explorer (JADE; https://jade.darts.isas.jaxa.jp/) [2]. Currently JADE works only for Optical Navigation Camera (ONC) images, but in the next version of JADE the instrumental data will be incorporated by the end of March 2025.

Second, we are creating high-level products in the GIS format, including global and local basemaps derived from ONC images [3], formatted in GeoTIFF for seamless integration with GIS softwares, such as QGIS and ArcGIS. These basemaps can be served not only for mapping geomorphological features, but also for comparison between different observation dates or illumination conditions. We are currenly generating GeoTIFF-based spectral maps using data from the near-infrared spectrometer NIRS3 and brightness temperature maps using TIR images, facilitating easy analysis in tandem with the ONC data. Additionally, the vector style dataset is also being prepared to keep the original spectral information of NIRS3. We will use the GeoPackage format [4], which contains both footpring geographic information and spectral information. These products will be open for public after the appropriate reviews under PDS or scientific journals.

Maximizing Scientific Outcomes:

To foster broader engagement within the Planetary Science community, we organize an international workshop dedicated to introducing the Hayabusa2 dataset. This workshop will feature presentations on the dataset and hands-on sessions for dataset analysis.

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References

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