## Open Science and Data/Sample Management in the Fields of Space Science

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ISAS/JAXA is carrying out space science research in cooperation with other universities and institutions. In 2016, the Advisory Committee on Space Science and Engineering submitted "A proposal for the handling of data held by ISAS." The proposal consists of seven main statements: 1. Useful data should be made public and stored for a long time. 2. Those data that will be evidence of published results should be made public. 3. Status of the non-public data should be reviewed after the proprietary period. 4. Establish a storage system for important non-public data. 5. Actively make necessary decisions and negotiations regarding data. 6. Establish a committee by experts to discuss various issues related to data. 7. Support research communities and universities to restore/process ISAS data. With these proposals put into action, ISAS is constructing open space science archives.

Based on the above proposals, the "Science Data Committee" was established in ISAS and released the "ISAS Data Policy". From the viewpoint of "open science" in space science, the critical points of the data policy are explained below.

This policy applies to data acquired by ISAS, but it is expected to be respected by other parties related to ISAS data. The "data" covered by this policy is "information that has scientific value in a broad sense and can be used for a long period without depending on a specific physical medium." Therefore, the so-called "sample" is not included in the data, but the digitized analysis result is treated as data. The evidence data of the published results should be made public. The reasons for making data "undisclosed" are limited as follows: When there is an issue of protection of personal information or public safety; when the processing is not incomplete; and when the research team is granted a certain proprietary period.

The policy of the public (open) data is as follows: Appropriate data processing and explanation should be provided so that people can use the data with only general knowledge. Public data should be kept available for an extended period (30 years or more). Use identifiers such as DOIs to make data citation easy. The rule for using public data complies with CC-BY 4.0 and the Government Standard Terms and Conditions (version 2.0). Consequently, the public data can be used for free of charge, and the purpose of the data usage is not questioned (commercial use is allowed), as long as the origin of the data is indicated as ISAS/JAXA.

With the establishment of the data policy, proper data management is being in place at ISAS. First, it became clear what is data and what is not. For what classified as data, it was decided to be public or proprietary. For the proprietary data, as long as the proprietary period and the person in charge were determined, the data are securely stored (e.g., SMILES and Kaguya L0 / 1 data). For those data which also belong to other organization, the negotiation was made to make it public inventing specific rules (e.g., "KAGUYA" HDTV data). If unprocessed raw data had accumulated at the end of the satellite operation, higher-order processing was made with additional budget (e.g., "Akari"). For some data, DOIs are being assigned (e.g., SMILES, Akatsuki). In some cases, universities are taking initiative in processing and publishing ISAS satellite data (e.g., "Arase").

Since the FY2016, past ISAS mission data kept at universities have been collected, processed, and released. An open call was made, and ISAS supports budgets for accepted proposals. Approximately 20 data types have been prepared and published in this manner.

Today, ISAS commonly highly processes the data obtained by ISAS satellites, so that anyone can use them only with general knowledge ("open data archive"). On the other hand, ISAS cannot take responsibility for the integrity of the "personal" data processed by researchers based on their intentions. We expect that research will progress if these personal data are also made open. However, we have not established a framework for archiving those personal research data. That is an issue not only for ISAS but also for national and global open science.

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