DATA SELECTION AND CONVERSION TOOL OF JAPANESE LUNAR ORBITER KAGUYA FOR INTEGRATED SCIENCE ANALYSES. M. Ohtake, H. Otake, J. Haruyama, M. Hareyama, and K. Hohjyoh
Planetary Science Department, Japan Aerospace Exploration Agency, 3-1-1 Yoshinodai, Sagamihara, Kanagawa, 229-8510, Japan (ohtake.makiko@jaxa.jp).

Introduction: The Japanese lunar orbiter Kaguya (SELENE) was successfully launched by an H2A rocket on September 14, 2007. Kaguya (SELENE) consisted of three spacecraft: a three-axis-controlled main orbiter, and two spin-stabilized subsatellites (Okina (Rstar) and Ouna (Vstar)). Kaguya reached its nominal 100km circular polar observation orbit on October 19. The two subsatellites were released into elliptical orbits with 2400km and 800km apolune; both elliptical orbits had 100km perilunes. Scientific data was acquired for 10 months in the nominal mission and 8 months in the extended period.

Fifteen science experiments and observations [1] were selected for the Kaguya mission [2-15]. The scientific instruments were categorized into the following five groups depending on their purposes: (1) x-ray spectrometer (XRS) and gamma-ray spectrometer (GRS) to determine the element abundances; (2) multi-band imager (MI) and spectral profiler (SP) to determine the distribution of mineral abundances; (3) terrain camera (TC), lunar radar sounder (LRS), and lunar laser altimeter (LALT) to measure the topography of the lunar surface and subsurface; (4) relay satellite transponder (RSAT) and very long baseline interferometry (VLBI) radio source (VRAD) to measure the gravity field of the lunar farside and nearside; and (5) charged particle spectrometer (CPS), lunar magnetometer (LMAG), plasma energy, angle, composition experiment (PACE), radio science (RS), and upper atmosphere plasma imager (UPI) to determine the impact of cosmic radiation and/or solar wind on the Moon and the Earth.

In addition to the science instruments, Kaguya carried an onboard high-definition television (HDTV) used for public outreach [16].

Data archive status: Since November 2, 2009, the Kaguya team has archived its science data and made it available to the public at the SELENE data archive [17] (http://l2db.selene.darts.isas.jaxa.jp). Data preparation and archive procedures are being developed by each instrument team. About 80 different products have been classified; some of them have been released and others are scheduled to be released. The SELENE data archive system enables us to search and download data sets of each instrument in the original data formats from the vast stored data sets.

However, it is not simple to combine multiple-instrument data sets and to implement integrated science analyses because of the different characteristics of each instrument data set such as spatial resolution, data type, and data dimensions. Therefore, we are developing a data selection and conversion tool (integration

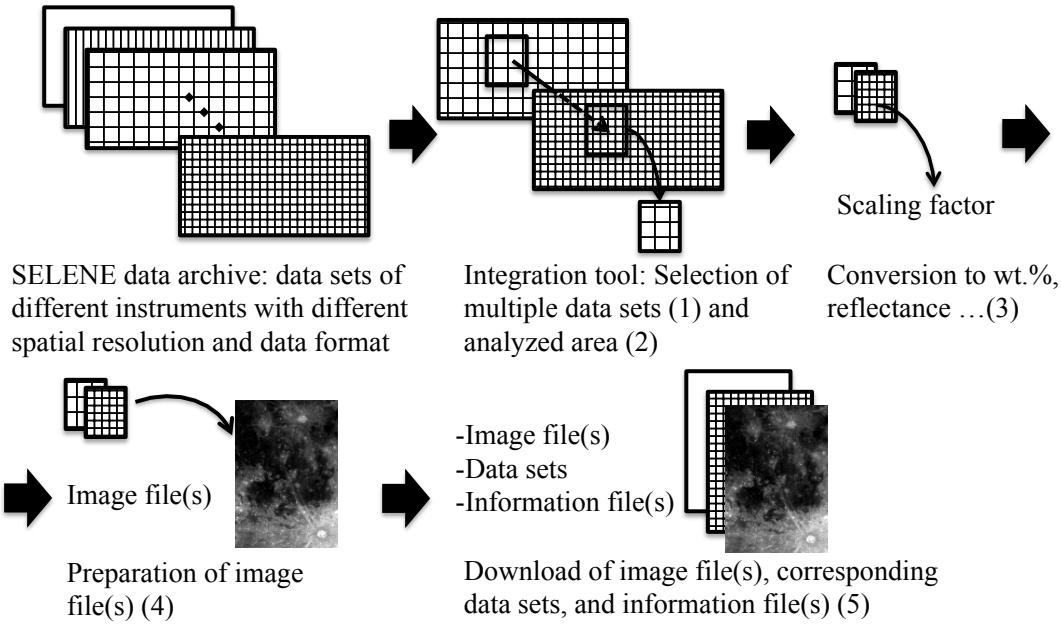

Fig. 1 Schematic image of the Kaguya integration tool.
Each step except the first one which describes SELENE data archive system corresponds to the tool function discussed in the text.

tool) to handle Kaguya data sets stored in the SELENE data archive to promote scientific analyses by combining multiple-instrument data sets for advanced scientific analyses. Our tool will support members of the science community including those who are unfamiliar with remote-sensing data in implementing integrated science analyses as well as non-researchers such as individuals in educational fields and students of any field.

Functions of our integration tool: The main purpose of our integration tool is to provide an easy interface for users to access individual Kaguya products (data sets), visualize and grasp their content, and combine results of analyses by using multiple-instrument data sets. We therefore designed the tool to have the following functions (Fig. 1): (1) data set selection; (2) area selection from image base maps; (3) data conversion (scaling factor application) of the selected area from original raw file values (as available in the SELENE data archive) to physical values; (4) preparation of image file(s) of the area; (5) downloading the generated image file(s) (TIF format) and corresponding original data sets with a separate data information file including location, data unit, and data source file name used to generate the image files. The third function (data conversion) includes the four basic arithmetic operations users may need to perform simple calculations for the requested data sets. The fifth function is very useful for comparing the combined data sets as image files.

Current status of the tool development: We have finished designing a trial version of the tool, which includes only part of the data sets but all the basic functions listed above. The trial version development is partially finished. The development will end within a few months, and the tool will then be tested and evaluated. In addition to developing the trial version, we are going to decide the functions of the final version of the tool through discussions with potential users. The final version of the tool will be available to the public within a few years through a website after the evaluation test.

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