

**Data Visualization System and Data Utilization Promotion Activities of SELENE (KAGUYA).** K. Ishidate<sup>1</sup>, A. Yamamoto<sup>1</sup>, E. Koizumi<sup>1</sup>, H. Otake<sup>2</sup>, H. Yamazaki<sup>2</sup>, S. Maruoka<sup>2</sup>, M. Hareyama<sup>2</sup>, and K. Hojo<sup>2</sup>, <sup>1</sup>Remote Sensing Technology Center of Japan (RESTEC), TOKYU REIT Toranomon Bldg. 2F, 3-17-1, Toranomon, Minato-ku, Tokyo 105-0001, Japan., <sup>2</sup> Japan Aerospace Exploration Agency, JAXA Space Exploration Center, 3-1-1 Yoshinodai, Chuo-ku, Sagami-hara-city, Kanagawa 252-5210, Japan. (koizumi\_eisuke@restec.or.jp).

**Introduction:** “SELENE(KAGUYA)” was launched on September 14, 2007 from Tanegashima Space Center in Japan. After successfully completion of nominal and extended missions, KAGUYA was impacted to the south-east of near side of the Moon on June 10, 2009 (GMT) under the control of the operation. KAGUYA has 15 instruments to observed the Moon and those obtain various scientific data of the moon. The processed observation data (called Level-2 data) are archived in the Level-2 Data Archive and Distribution system (L2DB) located at JAXA Sagami-hara Campus in Japan. Level-2 data were opened to the public from Nov. 2009 [1].

**Data Utilization Promotion Activities:** In addition to data archive system, JAXA is promoting the utilization of KAGUYA data through (1) setting up the order desk (data order and user help counter), (2) training for teachers of elementary school and junior high school, and (3) providing data visualization systems.

As for data visualization system, SELENE project prepared two web-based data visualization system. One is “KAGUYA image gallery” and the other is “KAGUYA 3D GIS” [2,3]. Many scientific results are provided by visualized image data with plain writing for public through “KAGUYA image gallery” website at [4]. “Kaguya 3D Moon Navi (KAGUYA 3D GIS)” is a kind of web-based GIS system for the purpose of promotion for both research and EPO (Education and Public Outreach). The visualized observation data is stored in the KAGUYA Web Map Server (WMS) and released using GIS browsers “Kaguya 3D Moon Navi (KAGUYA 3D GIS)” at [5]. To use this “Kaguya 3D Moon Navi”, users had to be connected by internet access because of Web GIS system, however, recently we developed “stand-alone” type of this service.

This is an effective way to disseminate the observation data for the public and the educational use. Also it is useful for the scientific research derived from the integrated data of various instruments because it allows scientists to make a map, to overlay and to share the data of multiple instruments easily.

**KAGUYA 3D Moon Navi (KAGUYA 3D GIS):** To construct a web-based GIS, we are developing the KAGUYA Web Map Server (WMS) which adheres to OGC (Open GIS Consortium) standard, and “KAGUYA 3D GIS” which is a client application for WMS (3D image viewer). “Kaguya 3D Moon Navi

(KAGUYA 3D GIS)” was developed as the 3D viewer for KAGUYA image contents based on the NASA World Wind JAVA (NWWJ) application [6]. English and Japanese version are available on the website. This application is written in JAVA programming language, and is able to be run on multi-platform (Windows, MacOS, Linux).

As of Jan. 2013, the data listed in Table.1 are ingested to WMS and already opened to public. There are 13 types of global maps and 23 local mosaic images by using 7 instruments as Terrain Camera (TC), Laser ALTimater (LALT), Gamma Ray Spectrometer (GRS), Relay Satellite (RSAT), Lunar MAGnetometer (LMAG), Multiband Imager (MI) and High Definition TeleVision camera (HDTV). Overviews of each instruments are available in the website SELENE project of JAXA [7]. The lunar base map image data is created from TC ortho mosaic data (about 230m/pixel around the equator). The lunar elevation data is prepared as DTED (Digital Terrain Elevation Data) format from LALT topographic shape file data. All data except for HDTV data can be downloaded from “SELENE data archive” [1] with PDS (Planetary Data System [8]) like format.

Recently, we prepared “Stand-Alone” type of “Kaguya 3D Moon Navi (KAGUYA 3D GIS)”, which enable the users to use this Web GIS based application without internet access. Application and all data were stored into a DVD, and you can set up the application and data from DVD and enjoy all KAGUYA WMS data.

Now “Kaguya 3D Moon Navi (KAGUYA 3D GIS)” become more familiar application and is the application to understand what is the Moon like observed by “KAGUYA”. As moving the Moon by using a control panel or a mouse on your PC, you can easily enjoy and understand main features of Moon observed by the various instruments on “KAGUYA”. We will provide more contents so that you can enjoy the Moon furthermore.

Furthermore, because JAXA is conducting the promotion of data utilization through, for example, the SELENE (KAGUYA) order desk, data accessibility and utilization of SELENE (KAGUYA) will be familiar, more and more.

Table 1. Registered data in the KAGUYA WMS

	mission
1. Basemap	TC
2. global topographic map (color)	LALT
3. global topographic map (gray scale 1)	LALT
4. global topographic map (gray scale 2)	LALT
5. global gamma ray count rate map (K, U, Th)	GRS
6. global free air gravity anomaly map	RSAT
7. global bouguer gravity anomaly map	RSAT
8. global magnetic anomaly map (4 directions)	LMAG
9. local mosaic map (5 maps)	TC, MI
10. strip mosaic map (18 maps)	HDTV
11. HDTV coverage map	HDTV

**References:**

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