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ABSTRACT SUBMISSION FORM

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Title of the Paper WebGIS-based collaboration environment using scientific data of the moon
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ABSTRACT(800-1000 words) [5],[6]

Japanese lunar explorer “Kaguya” (SELENE) was launched on September 14, 2007. Now (as of October 20, 2007), Kaguya is decreasing its altitude to the nominal orbit with 100 kilometers in altitude. Kaguya will take an initial checkout phase in November, and will start nominal observation from mid-December. The nominal mission phase will continue through one year.

Kaguya has a camera/spectrometer system called LISM (Lunar Imager and SpectroMeter). LISM is composed of the following three instruments:

1. Multiband Imager (MI). MI has nine bands from visible to near-infrared spectral area. It has approximately 20 meters (visible) and 60 meters (near-infrared) in spatial resolution and takes global spectral image, and obtained data will be analyzed to clarify composition of surface minerals and identification of rock types.
2. Spectral Profiler (SP). SP is a sensor to obtain the spectral profile of the lunar surface. It has a very high resolution in wavelength domain, 296 bands between 520 nm and 2600 nm. Combining with data obtained by MI, the data will contribute to the clarification of precise analyze of mineral composition and identification of rock types.
3. Terrain Camera (TC). It has an approximately 10 meters in spatial resolution and takes global stereographic image. It will bring high-level data compared to one obtained by Apollo and Clementine and lead to better understanding of lunar local and global topography.

As LISM is a key component of Kaguya and will produce large amount of data (approximately 10 TB during nominal mission period), a platform for analysis is necessary. Moreover, scientists are anticipating that, combining data produced by 15 onboard instruments, they will be able to make “integrated science”, which will gain the comprehension of lunar geology. To conduct integrated science, the data analysis platform should provide understandable analytical method and basic features, such as layering display and basic analytical tools. Also, the scientists involving in Kaguya projects are distributed all over Japan, and it will be difficult to gather and exchange their result and knowledge frequently.

<system features>

According to these requirement, we are now developing the analytical platform complying the above-mentioned requirements. The system has the following features:

o WebGIS-based. It is most suitable to adopt WebGIS system for the data handling over the Internet. Every participant can access with his/her browser and make analysis through data browsing in their browser. Authentication function for data access will be also provided.

o Collaboration over the network. As the users are distributed over the network, it is difficult and inconvenient to collect analyzed data in local machines to upload servers and share. Instead, our system can share the analyzed data as well as data products such as geologic maps, topographic charts and mineral distribution map. By using collaboration feature implemented on this system (online chat, simple conference, and voice teleconferencing if possible), users can share not only their data but the derived knowledge and discussion result. And, using the logging facility, users can review the process of the analysis and, if needed, rewind and undo analysis and starts back again. Some access authentication function will be implemented.

o Speedy operation. As this system handles several terabytes of data, the system performance of the system is a pressing issue. Through the fine tuning of the database engine and web servers and refinement of the system performance, our system will have sufficient performance even if plural members are logging in to analyze. Technologies will include cutting-edge software technology such as ajax and XML-based schema.

o Provision of basic function. Scientists are tend to use their own analytical tools to apply to the data. However, these individual tools cannot assure repeatability of their results as others cannot attempt. Our system offers basic data handling function (rotation, image calculation and data extraction) and this will make joining scientists assure making common products. Also, considering demands of scientists who want to extend the tool for their fine analysis, some extension function using scripting language (not yet determined whether we use existing languages) will be provided.

<hardware>

As for the hardware, this system is composed of two servers and one storage. The storage has more than ten terabytes of capacity which is sufficient to store Kaguya's scientific data. And this storage is directly combined to the two servers.

We prepared two servers for the load balancing. One server provides data access function using web server and a FTP server. Access authentication will be made by this server. Another server will have WebGIS backend engine. We are taking a hope view on the using of open software based system. Backend engine will be PostgreSQL powered by PostGIS. Some software customization and fine tuning for these servers will be made.

<implementation plan>

Currently (October 2007), we are in the procurement phase of the hardware. In the late of this year, we will start the implementation. We expect we will be able to confirm fundamental function of the system within the JFY 2007 (Japanese Fiscal Year, starts from April and ends in March).

In the next JFY year (JFY 2008), we will conduct the implementation of basic functions and extend the availability of the WebGIS system. Through the repeating questionnaire for the researchers, system will modify according to their request. The basic development of the system will finish in this JFY.

In JFY 2009, we will make validation of the effect brought by the system. This includes some efficiency comparisons with online analysis and remote analysis. Updates of the system will continue.

☐ This paper would like to apply for the Young Author's Award [7]
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