

**A Prototype of Online Conference System for Collaborative Mapping Works.** <sup>1</sup>Hirohide Demura, <sup>1</sup>Manabu Kan-zawa, <sup>1</sup>Naru Hirata, and <sup>1</sup>Noriaki Asada, <sup>1</sup>Dept. Computer Software, The University of Aizu (Aizu-Wakamatsu City, Fukushima 965-8580, JAPAN, E-mail: [demura@u-aizu.ac.jp](mailto:demura@u-aizu.ac.jp), [s1110068@u-aizu.ac.jp](mailto:s1110068@u-aizu.ac.jp))

**Introduction:** The goal of this study is development of an online conference system that supports collaborative works on lunar and planetary missions. The first potential target is the SELENE (SELEnological and ENgineering Explorer) to the moon, whose launch is scheduled in summer of 2007. This system should be characterized by collaborative analysis by geographically dispersed researchers at their own home institutes, and the outputs are preliminary thematic maps such as geologic maps.

The SELENE mission will bring back raw image data over 2 TB, and the amount of their derived products such as digital terrain models, mineral maps, and element distribution maps, will be over 20 TB. Although the derived products are going to be calibrated and geo-referenced, they should be processed with certain mapping procedures in order to make geologic maps. Such thematic maps are drawn after many discussions on the data. Here we propose an online conference system as an alternative. Participants of the online conference can join a discussion at their own home institute without any waste of time and travel expenses.

We have already many remote conference systems or software solutions from a simple chat system to large video conference systems. However, they are developed to satisfy a general purpose of common meetings, and not adequate for the scientific online discussions with notes on remote sensing data. Here we show a prototype of communication system with some images with manual notes, that particularly focuses on collaborative analysis and discussion on the planetary mappings.

**System Outlines:** Requirements of this system are summarized as follows: (1) Text based real-time communication between authorized participants of the conference, (2) Sharing a common display of target raster data by the participants, (3) Functions for image manipulation on the displayed raster data including scroll, overlay by vector graphics, and general image processing functions, and (4) Recording logs of discussion and related image operations. In order to fulfill these requirements we developed a preliminary system based on the client-server model with Java. Its snapshot of the client is shown in Fig. 1. Its system diagram is also displayed in Fig. 2. The type of client-server model has much advantage to others. Consistency of data-handling is controlled at the server side. Because thumbnail images just only for viewing are exchanged

via Internet, working materials can be shared among clients easily. The real-time communication between the server and the clients is implemented with socket connection, of which API is provided by the Java 2 Platform, Standard Edition, version 1.5.0\_03.

Once a connection between the server and a client is established, the client gets a log of the conference to join the proceeding conference from the server. Therefore, a new participant can join discussion with the display synchronized with other participants. All manipulations on the client-side are sent to the server as commands, and stored in the log. They are also transferred to all other clients to synchronize the displays in real-time. In case of image processing command, Image data are generated on the server side.

Because the target image is usually large compared with a window of the client application, only a portion of the image is displayed within the window with scroll bars. Each participant can move a displaying area of the image as one's discretion. On the other hand, any participants can issue a command to forcedly synchronize the displaying area of all clients. The clients also have functions for image manipulation that are common on applications for image, such as band math and contrast/brightness adjustment. The user can draw overlay diagrams on the displayed image to point a region or a feature of interest of discussion to the other participants. All local manipulations are sent to the server, and then each client application redraws the window with commands from the server. These functions are implemented to port the standard work-flow on production of thematic maps from offline to online.

**Summary:** We propose a prototype of the online conference system for collaborative analysis based on lunar and planetary mapping data. It supports discussion among researchers remotely placed at their own home institutes. This system is implemented as a client-server model. This will support SELENE analysis.

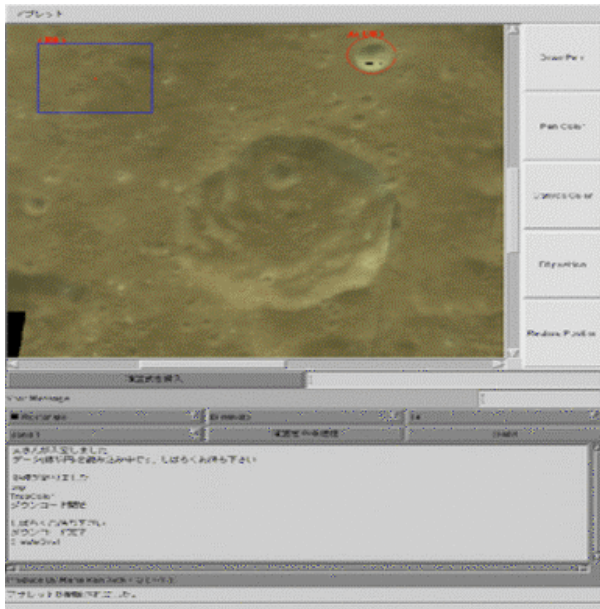


Fig. 1. Snapshot of the client application of this system. A target data is displayed within the window of the application with a text-based discussion board and buttons for image processing functions. Any participants can draw overlay diagrams that share all client displays.

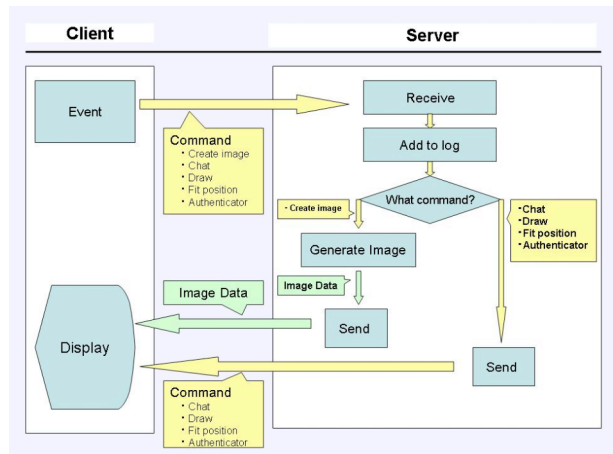


Fig. 2. Block diagram of the system