

WISE-CAPS: DATA ARCHIVING, BROWSING AND ANALYZING ENVIRONMENT FOR LUNAR AND PLANETARY DATA: CURRENT ENHANCEMENT AND FUTURE PROSPECT. J. Terazono¹, R. Nakamura², S. Kodama², N. Yamamoto², H. Demura¹, N. Hirata¹, Y. Ogawa¹ and T. Sugawara¹, ¹The University of Aizu (Tsuruga, Ikki-Machi, Aizu-Wakamatsu, Fukushima 965-8580, Japan; terazono@u-aizu.ac.jp), ²National Institute for Advanced Industrial Science and Technology (AIST).

Introduction: Recent lunar and planetary explorations produce vast amount of scientific observation data. These data are now reaching several hundreds of terabytes order, as realized on Lunar Reconnaissance Orbiter data archive [1]

These data are beyond our ability to check, analyze and understand one by one by human resources, and some assists by information technology is strongly required to promote scientific understanding of data obtained by the missions.

We started development of archiving, browsing and analyzing environment foreseeing handling of such “big data”. The system is called “WISE-CAPS” (Web-based Integrated Secure Environment for Collaborative Analysis of Planetary Science) [2][3], with capability of layered data browsing and data additions by users. Unique features of this WISE-CAPS includes user-based security function and open system architecture which complies open standards of data exchange.

This presentation shows current enhancement of WISE-CAPS and future prospects.

Current Enhancements: We made current enhancement for capability of WISE-CAPS described below since its opening in 2009.

- Confirmation of interoperability: WISE-CAPS makes use of open-standard protocol, WMS (Web Mapping Service) [4] and WFS (Web Feature Service) [5] for data exchange. These protocols are widely used in earth observation field. Servers which support these protocol should be able to exchange their data, images and geophysical objects. We tested the capability and compatibility of WMS implementation at WISE-CAPS by exchanging data between other server. The data exchange has been made between a data server located in JAXA Sagami-hara Campus used for Kaguya data archive, with slight modification for test suite. Upon this test, we confirmed successful data exchange between two servers, JAXA and WISE-CAPS, and it proved we have perfect WMS compatibility.
- Implementation of multi-layered display system of Kaguya image data: Kaguya had three image-related instruments, MI (Multiband Imager), SP (Spectral Profiler) and TC (Terrain Camera). Data obtained by MI and TC are in raster format (conventional image design), while SP data are spectral plots with location data. Due to the difference of data

type, usual GIS cannot display three data in one window. We created simultaneous display system of these three types of data at WISE-CAPS.

This system is composed of two major functions: raster data display using WMS function and layering by OpenLayers [6] utility; Spectral data plot: WFS function and database coupling, OpenLayers function to plot the location, and Dygraph [7] function to plot spectral data. Using this system, users can display three types of data in one window, and by clicking arbitrary spot of SP data acquisition, they can see its spectral curve.

- Data uploading function: One of major drawback for use of WISE-CAPS is complicated procedure for data registration, particularly data uploading. Several file uploading steps are required to put the data in WISE-CAPS. We are currently implementing data upload component, only using web browsers. In this system, users do not need any other tools than browsers to upload, modify and register the data for WISE-CAPS.

Future Prospects: We believe that fundamental function of WISE-CAPS is ready and also ready to start close testing for limited users. The next step is improvement of usability and implementation of data analysis function.

Usability betterment is essential for wider usage of WISE-CAPS, and it includes introduction of Wiki-based front-end (user customizable), more easy-to-use data uploading function and overall review of map display page design.

We are also starting discussion of basic concept of data analysis system. Its key is to how to adapt variety of users' demand. It is true that programmable scheme is mandatory, however, too complex framework makes users refrain from using this system, instead of their desktop analysis tools. The balancing between usability and customizability is required for WISE-CAPS data analyze function implementation.

References: [1] <http://geo.pds.nasa.gov/missions/lro/> [2] Terazono J. *et al.* (2010) *LPS XLI*, Abstract #1516. [3] Terazono J. *et al.* (2010) *DIEW 2010, LNCS 6193*, 58-68. [4] <http://www.opengeospatial.org/standards/wms> [5] <http://www.opengeospatial.org/standards/wfs> [6] <http://www.openlayers.org> [7] <http://dygraphs.com>