

# Japan Geoscience Union Meeting 2011

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MGI031-01

Room:201A

Time:May 25 11:45-12:00

## Geophysical fluid data publication, search, visualization, and interactive knowledge accumulation: Gfdnavi

Takeshi Horinouchi<sup>1\*</sup>, Seiya Nishizawa<sup>2</sup>, Chiemi Watanabe<sup>3</sup>, Shigenori Otsuka<sup>4</sup>, Akinori Tomobayashi<sup>5</sup>, Tsuyoshi Koshiro<sup>6</sup>, Yoshi-Yuki Hayashi<sup>2</sup>, Eriko Nishimoto<sup>4</sup>

<sup>1</sup>Hokkaido University, <sup>2</sup>Kobe University, <sup>3</sup>Ochanomizu University, <sup>4</sup>Kyoto University, <sup>5</sup>Shoganji, <sup>6</sup>Meteorological Research Institute

In recent years, many data centers and research groups provide data on geophysical fluids such as the atmosphere and oceans through the Internet along with on-line visualization. However, their services are not available once data files are downloaded. This paper presents open-source software named Gfdnavi developed to reduce the limitation and to support data handling beyond initial quick-looks. Gfdnavi extracts metadata from scientific data and stores them in a database. They can be accessed with web browsers for search, analysis, and visualization. It supports a wide range of usage such as public data services, group data management, and desktop use. As its unique feature, Gfdnavi supports writing and archiving documents based on knowledge obtained through data analysis. The documents are linked with the original data and analysis/visualization procedures. It has a wide variety of applications such as interdisciplinary- and collaborative-study support, a realization of falsifiability, and educational use.

Keywords: Data server, Geophysical fluid, Visualization, Web application, Knowledge archive

# Japan Geoscience Union Meeting 2011

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MGI031-02

Room:201A

Time:May 25 12:00-12:15

## Programmability in Web server software for geophysical fluid sciences, Gfdnavi

Seiya Nishizawa<sup>1\*</sup>, Takeshi Horinouchi<sup>2</sup>, Chiemi Watanabe<sup>3</sup>, Yuka Isamoto<sup>3</sup>, Akinori Tomobayashi<sup>4</sup>, Shigenori Otsuka<sup>5</sup>

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In recent years, increasing amounts of scientific data on geophysical and environmental fluids, e.g., in the atmosphere and oceans, are being available. Further, there is increasing demand for web-based data services. Several browser-based data servers, on which geophysical-fluid data can be analyzed and visualized, have been developed. However, they are suitable only for initial “quick-looks” and not for subsequent research processes. As a solution, we developed data server software named Gfdnavi. One of its important features is that it provides extensive support for programming (scripting). With Gfdnavi, users can easily switch between operations using a web browser and operations using scripts or command lines. This paper describes its network features: web services, which is an important part of Gfdnavi’s programmability, and the functionality to search across multiple Gfdnavi servers. To develop the web services, we adopted the REST architecture. We also developed a client library to ensure access to web services in the programming language Ruby. Using this library, data can be analyzed and visualized on either the server side or client side. It also enables data handling on multiple servers. Search across multiple web servers is made possible by a simple peer-to-peer network with a central server, with the peer-to-peer communication based on web services.

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MGI031-03

Room:201A

Time:May 25 12:15-12:30

## ERG-Science Center: Development of Integrated Data Analysis System for Geospace Research

Yoshizumi Miyoshi<sup>1\*</sup>, Kanako Seki<sup>1</sup>, Tomoaki Hori<sup>1</sup>, Yukinaga Miyashita<sup>1</sup>, Tomonori Segawa<sup>1</sup>, ERG-Science Center Task Team<sup>1</sup>

<sup>1</sup>STEL, Nagoya University

The ERG project is a geospace exploration mission consisting three teams, ERG-satellite, ground-based observations, and integrated studies group. Besides these research teams, the ERG project has the science coordination team and the ERG-science center. The integrated data analysis tool is a key tool for the project because various kind of data are subject for the analysis. Therefore, we are developing the integrated analysis tool as well as the interactive web analysis tool for the project. In this presentation, we will report the current status of the science center activity.

Keywords: ERG project, integrated data analysis, meta data

MGI031-04

Room:201A

Time:May 25 12:30-12:45

## Physics of Seismic Wave Propagation Inferred from the 4D Volume Visualization

Kazuhisa Iwai<sup>1\*</sup>, Takashi Furumura<sup>1</sup>, Takuto Maeda<sup>1</sup>, Shunsuke Takemura<sup>2</sup>

<sup>1</sup>CIDIR, the University of Tokyo, <sup>2</sup>ERI, the University of Tokyo

Earthquakes are 4D (3D space + time) complicated phenomena which involve the radiation of seismic waves from the earthquake source fault, the propagation through subsurface structure and the amplification on sedimentary layers. In order to investigate physics of seismic wave propagation to predict strong ground motions and take countermeasures against earthquake disasters, it is indispensable to understand the earthquake phenomena correctly and quantitatively. The dense network of strong ground motion station across Japan enables us to compare the observations and result of the simulations. Supercomputers can simulate the seismic wave propagation accurately by solving equations of motion with a high-resolution structural model. As the size of simulations has been larger, the visualization of seismic wavefield has been getting more and more important because output data include a lot of features we have to categorize. The appropriate visualizations are required not only for students of earthquake to comprehend the complex phenomena of the propagation of seismic waves from the hypocenter through heterogeneous structure to the surface of the ground and give intelligible explanations for them but also for the public to raise the awareness of earthquake disaster prevention.

In this study we applied one of the visualization methods called volume rendering for various earthquakes and made animations to explore the effect of subsurface structure on the seismic wavefield. We provided learning tools of the important phenomena of earthquakes such as the radiation of seismic waves, the refraction and reflection of them and the generation and propagation of diffracted and surface waves. The volume rendering can show 3D space at a time by coloring each pixel with proper transparency corresponding to the intensity and space variation of energy. This is one of the advantages of the volume rendering which makes it possible to render waves of small amplitude such as scattered and refracted waves. Since the amplitude of waves in the area far from the source is quite small because of geometrical spreading, we should enhance small-amplitude waves to visualize them clearly. For example, the Mid Niigata Prefecture Earthquake in 2004 raised the amplification of ground motion at basin structures and generated a long-period ground motion which shook high-rise buildings. The volume rendering animation of this earthquake showed 1) the basin structure beneath Chuetsu region generated the surface wave and 2) it propagated along the surface layer slowly to the Kanto Plain and 3) the basin structure of the Kanto Plain amplified it and 4) ground motion lingered because the waves were trapped in the basin.

The study concluded that the 4D volume visualization reconstructed a variety of phenomena concerning earthquakes well and it is useful to comprehend the complex phenomena and to give adequate explanations for them.

Keywords: earthquake, visualization, simulation, volume rendering

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MGI031-05

Room:201A

Time:May 25 14:15-14:30

## Inter-university Upper atmosphere Global Observation NETwork (IUGONET) project

Tomoaki Hori<sup>1\*</sup>, Hiroo Hayashi<sup>2</sup>, Yukinobu Koyama<sup>3</sup>, Yoshimasa Tanaka<sup>4</sup>, Masato Kagitani<sup>5</sup>, Satoru UeNo<sup>6</sup>, Daiki Yoshida<sup>3</sup>, Shuji Abe<sup>7</sup>, Takahisa Kono<sup>1</sup>, Naoki Kaneda<sup>6</sup>, Atsuki Shinbori<sup>2</sup>, Hiroyasu Tadokoro<sup>4</sup>

<sup>1</sup>STE lab., Nagoya Univ., <sup>2</sup>RISH, Kyoto Univ., <sup>3</sup>WDC for Geomag, Kyoto, Kyoto Univ., <sup>4</sup>NIPR, <sup>5</sup>Dep. Of Geophys., Tohoku Univ., <sup>6</sup>Kwasan and Hida Obs, Kyoto Univ., <sup>7</sup>SERC, Kyushu Univ.

The Inter-university Upper atmosphere Global Observation NETwork (IUGONET) project (2009-2014) is an inter-university program by the National Institute of Polar Research (NIPR), Tohoku University, Nagoya University, Kyoto University, and Kyushu University to build a database of metadata (that is, data of data, such as observation period, type of instrument, location of data, and so on) for ground-based observations of the upper atmosphere since the IGY in 1950s. The IUGONET metadata database archiving such information of a variety of observations by radars, magnetometers, optical sensors, helioscopes, etc. in different locations all over the world and in various altitude layers from the troposphere up to the heliosphere will be of great help to researchers in efficiently finding and obtaining observational data they need. This should also facilitate synthetic analysis of multi-disciplinary data, which will lead to new types of research in the upper atmosphere. The IUGONET project is currently in the third year, and the development team is working on (1) creating metadata of archived observation data at each institution, (2) building the IUGONET metadata database system on the basis of a repository software, named DSpace, and (3) producing an integrated data analysis tool for our observational data with the TDAS (THEMIS Data Analysis Software) IDL libraries. Recently we have started a test location of the metadata database as well as a beta release of the developed data analysis tool for the community. We call for the comments on both of them from the researchers and thereby continue to improve toward the final release at the end of this year. The progress reports and future plan of the project will be presented.

Keywords: Upper Atmosphere, metadata, IUGONET

MGI031-06

Room:201A

Time:May 25 14:30-14:45

## System Implementation and Operation of WISE-CAPS, data browsing, sharing and analysis platform for lunar and planetary e

Junya Terazono<sup>1\*</sup>, Ryosuke Nakamura<sup>2</sup>, Shinsuke Kodama<sup>2</sup>, Naotaka Yamamoto<sup>2</sup>, Hirohide Demura<sup>1</sup>, Naru Hirata<sup>1</sup>, Yoshiko Ogawa<sup>1</sup>

<sup>1</sup>The University of Aizu, <sup>2</sup>AIST

More and more data are produced as the progress of lunar and planetary exploration these days. Also, more and more researchers and engineers are participating for lunar and planetary exploration. These situation demands data analysis and sharing platform in the exploration group.

We developed the system called WISE-CAPS, Web-Based Interactive Secure Environment for Collaborative Analysis of Planetary Science, from this point of view. Its aim is to establish more efficient and smooth data browsing, sharing and analysis.

As the name of system says, all communication between system and user are web-based, via web browser. This means users do not need to install new special tools or software for using WISE-CAPS. The system is web-based, and display of maps and images are made by Web-GIS tools.

Currently, development of data browsing system are actively ongoing on WISE-CAPS, centered on data obtained in lunar exploration. Clementine data are used for base layer, and some image data captured by Kaguya mission can be browsed.

The unique feature of WISE-CAPS is user access control mechanism. Based on user ID and password, WISE-CAPS can understand digital certificates issued by proxy server receiving them. Thanks to this function, users can control access to resource in WISE-CAPS, and also form a group and grant access to the members inside the group. This feature also enables fine data control which is useful for collaborative writing of papers and research which is conducted individually.

Keywords: GIS, lunar exploration, planetary exploration, web, data sharing

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MGI031-07

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## Development of virtual reality visualization software

Akira Kageyama<sup>1\*</sup>, Kaori Murata<sup>1</sup>, Daisuke Meno<sup>1</sup>, Ken-ichi Yoshizaki<sup>1</sup>

<sup>1</sup>Kobe University

Visualization is a key step in computational geosciences. Researchers can find structures and dynamics that are hidden in the "sea" of numerical data. In accordance with the exponential growth of computer hardware and simulation methods, complexity of the output data and, therefore, the difficulty of their visualizations are rocketing up these days. A new technology for visualization is strongly required and will be more in future. The modern virtual reality (VR) technology, especially the so-called CAVE system, provides an answer to this challenge. We have been developing, in these several years, visualization tools for CAVE-type VR systems and combined them into a framework, VFIVE. We have applied VFIVE to analyze various types of geophysical simulations. Recent study of our VR visualization will be reported. New visualization methods implemented in VFIVE are (i) Interactive Time Line Method for frozen-in vector fields, and (ii) Interactive Force Line Methods for general vector fields. We have also started to implement our VR visualization framework on a new API, VR Juggler. The status of the development will also be reported.

Keywords: visualization, virtual reality, CAVE

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MGI031-08

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## Development of Volume Visualization Software of 3-D Simulation Data for Google Earth

Shintaro Kawahara<sup>1\*</sup>, Takeshi Sugimura<sup>1</sup>, Fumiaki Araki<sup>1</sup>, Keiko Takahashi<sup>1</sup>

<sup>1</sup>JAMSTEC

We are promoting a project "EXTRAWING" to effectively express geophysical and environmental fluid simulation data using the Google Earth technology, and to send this information to the general public. Results of this project have already been exposed as a Web application. In this application, users can freely observe the visualization results of simulation data using Google Earth API. Users can also view plain descriptions about the visualization result on Web browser.

In the presentation, we will describe the visualization technique is used in this project. In this project, volume rendering method using layered color contour images is used as one of the methods to express the visualization results of simulation data to represent on Google Earth. To represent visualization results by this method on Google Earth, the file format must be KML and COLLADA. However, when converting simulation data into KML/COLLADA, it is necessary to determine various parameters (transfer function, numbers of color contour images, and so on), and it requires much skill. Therefore, we developed a GUI-based content creation software. By using this software, it becomes easy to determine various visualization parameters, and we aimed to streamline content creation for Web application. In the presentation, we will do a demonstration of content creation using developed software, and introduce its technical content.

Keywords: Volume visualization, Google Earth, EXTRAWING



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MGI031-09

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## New visualization tool for volume data, for both quick 3D-texture rendering and ray tracing.

Takaaki Takeda<sup>1\*</sup>

<sup>1</sup>National Institute of Natural Science

Visualization of simulation/observation data is important not only for research but also for public outreach.

The tools of scientific visualization are often designed for the former purpose. However, visualization for outreach purpose with these tools have often difficulties, because they often lack the functions such as camera work editing or drawing of modelled objects, texturing, etc. On the other hand, using general purpose 3DCG softwares, it is easier to visualize objects with higher quality. However, converting the data to the format which can be read by these softwares requires skills of computer graphics, and researchers do not have it in general.

We are now developing a GUI application to visualize volume data.

Our intension is to connect between these visualizations with different purposes.

For quick visualizations for research, we adopt video-board based volume rendering with 3D-texture, while automatically making Pov-Ray scene files for higher quality rendering with ray tracing.

We named it Oosawa. Oosawa implemented following features.

Support for multi-channel time sequence data, and time line based parameter settings, enabling us camera-path editing with dynamically moving data.

Partial support for octo-tree based high resolution data.

Filter stacking, such as blurring, level-adjustment, tracking, data-clipping, etc.

Making and exporting of isosurface mesh.

GUI settings for ray tracing options for Pov-Ray (radiosity, photon mapping, focal blur, etc.)

With these features, both quick visualization and time-consuming high quality rendering are achieved with single procedure. On the now, Oosawa is not implemented with the features for multiple values (such as combinations of temperature and density), or visualization of vector fields. We will add these features to Oosawa as the future works.

The binary and source code is published to the web. <http://th.nao.ac.jp/~takedatk/COMPUTER/OOSAWA/oosawa.html>

Keywords: Visualization

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MGI031-10

Room:201A

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## Examinations on NICT Science Cloud

Ken T. Murata<sup>1\*</sup>, Shinichi Watari<sup>1</sup>, Keiichiro Fukazawa<sup>1</sup>, Kazunori Yamamoto<sup>1</sup>, Yasuhiro MORIKAWA<sup>1</sup>

<sup>1</sup>NICT

Main methodologies of Solar-Terrestrial Physics (STP) so far are theoretical, experimental and observational, and computer simulation approaches. Recently "informatics" is expected as a new (fourth) approach to the STP studies. Informatics is a methodology to analyze large-scale data (observation data and computer simulation data) to obtain new findings using a variety of data processing techniques.

At NICT (National Institute of Information and Communications Technology) we are now developing a new research environment named "OneSpaceNet". The OneSpaceNet is a cloud-computing environment, which connects many researchers with high-speed network (JGN: Japan Gigabit Network). It also provides the researchers rich resources for research studies, such as super-computer, large-scale disk area, licensed applications, database and communication devices. What is amazing is that a user simply prepares a terminal (low-cost PC). After connecting the PC to JGN2plus, the user can make full use of the rich resources via L2 network. Using communication devices, such as video-conference system, streaming and reflector servers, and media-players, the users on the OneSpaceNet can make research communications as if they belong to a same (one) laboratory: they are members of a virtual laboratory.

We present two initial results using the OneSpaceNet for large-scale computer simulation data transfer and virtual observation data transfer system.

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MGI031-11

Room:201A

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## Metadata Technology in WMO Information System

Eizi TOYODA<sup>1\*</sup>

<sup>1</sup>Japan Meteorological Agency

The World Meteorological Organization (WMO) is working to organize the WMO Information system (WIS), which is the single coordinated global infrastructure responsible for the telecommunications and data management functions of all programs of WMO. It will be core component of the GEOSS Information System of Systems for weather, water, climate.

According to agreement in the Fifteenth World Meteorological Congress in 2007, WIS is developed in two parallel parts. The Part A is evolution of the Global Telecommunication System (GTS), which has served for time-critical and operation-critical data since 1960s. The Part B is newly-extended information services through flexible data discovery, access, and retrieval to authorized users, as well as flexible timely delivery services.

The WIS network consists of three kinds of centers: the Global Information System Centre (GISC) relays data for global distribution, and centralizes metadata of entire WIS to provide online catalog (clearinghouse); the Data Collection and Product Centre (DCPC) is a hub of regional data distribution and/or provider of specialized product; and all WMO members operates the National Centre (NC). Technical developments for online catalog involves ISO 19115 standard, OAI-PMH and SRU protocols.

This talk will also present lessons from experiences in Japan Meteorological Agency.

Keywords: Meteorology, WMO, Telecommunication, Clearinghouse, Metadata, GEOSS

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MGI031-12

Room:201A

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## ICSU World Data System (WDS)

Takashi Watanabe<sup>1\*</sup>

<sup>1</sup>STELAB, Nagoya University

The ICSU World Data System (WDS) has been created through a decision of the 29th General Assembly of the International Council for Science (ICSU) held in October 2008. WDS builds on the 50-year legacy of the ICSU World Data Centre system (WDC) and the ICSU Federation of Astronomical and Geophysical data-analysis Services (FAGS), but WDS will cover wider disciplines ranging from natural sciences to social sciences. The new WDS will support the mission of ICSU and objectives, ensuring the long-term stewardship and provision of quality-assessed data and data services to the international science community and other stakeholders. Goals of WDS are (from the Constitution of WDS):

- Enable universal and equitable access to scientific data and information
- Ensure long term data stewardship for ICSU programs
- Define agreed data standards
- Establish and oversee the procedures for the review and accreditation of existing and new WDS facilities
- Facilitate better access to data
- Strive for simpler access to data
- Provide quality-assured data and information
- Reduce the digital divide

The WDS Scientific Committee (WDS-SC) has been appointed by ICSU to implement and administer the activities of the WDS. In early 2011, WDS-SC will accept applications from data centers to be members of WDS (<http://icsu-wds.org/>). The WDS International Program Office (WDS-IPO) will be established in Japan at National Institute of Communications Technology (NICT) in FY 2011. The WDS Conference, which will be the first international meeting of WDS, will be held in Kyoto, on 3-6 September 2011 (<http://wdc2.kugi.kyoto-u.ac.jp/wds2011/>).

Keywords: Data, Data Center, ICSU, WDS

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MGI031-P01

Room:Convention Hall

Time:May 25 16:15-18:45

## Analysis of geomagnetic day-to-day variations by using the Solar Terrestrial Analysis and Reference System (STARS) [1]

Manabu Kunitake<sup>1\*</sup>, Ken T. Murata<sup>1</sup>, Tsutomu Nagatsuma<sup>1</sup>

<sup>1</sup>NICT

Solar-Terrestrial data Analysis and Reference System (STARS) is the system which realizes the crossover search and integrated analyses of ground-based and satellites observations of solar-terrestrial physics. We have implemented new functions concerning geomagnetic data handling and plotting. New functions consist of some pre-processing functions, user-friendly Graphical User Interface (GUI) and well organized plotting functions, for an example, time-shifted overlay plotting.

As an example of the usefulness of the new functions, we show the applying process of the functions to geomagnetic data at many observatories and preliminary results of our analysis of day-to-day geomagnetic variation.

[Acknowledgements]

The results presented in this paper rely on data collected at magnetic observatories. We thank the national institutes that support them and INTERMAGNET for promoting high standards of magnetic observatory practice ([www.intermagnet.org](http://www.intermagnet.org)).

We thank the World Data Center for Geomagnetism, Kyoto for providing 1-minute digital data from many observatories. We thank the national institutes that support the observatories.

Keywords: geomagnetic variation, day-to-day variation, time-shift, overlay

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MGI031-P02

Room:Convention Hall

Time:May 25 16:15-18:45

## Analysis of real-time simulation data of Earth magnetosphere using space weather cloud system

Shinichi Watari<sup>1\*</sup>, Ken Tsubouchi<sup>1</sup>, Yasuhiro MORIKAWA<sup>1</sup>, Hisao Kato<sup>1</sup>, Takashi Tanaka<sup>1</sup>, Hiroyuki Shinagawa<sup>1</sup>, Ken T. Murata<sup>1</sup>

<sup>1</sup>NICT

Space Weather Cloud has been constructed in National Institute of Information and Communications Technology (NICT). The Space Weather Cloud contains a high performance computer (NEX SX-8R), distributed mass storage system, and so on. The data obtained by simulation is important to cover geo-space because in-situ data observed by spacecraft are limited. Data from the real-time magnetosphere simulation are stored in the Space Weather Cloud. This enables not only event analysis but also data analysis corresponding to various solar wind conditions.

In the Space Weather Cloud, observation data and simulation data can be handled using the STARS (Solar-Terrestrial data Analysis and Reference System). It is possible to check data using data plots by the STARS.

We will report several examples of analysis using real-time magnetosphere simulation such as variations of geomagnetic field at geostationary orbit.

Keywords: space weather cloud, simulation, magnetosphere

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MGI031-P03

Room:Convention Hall

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## Metadata database of Virtual Data Center for Earth and Planetary Sciences

Daiki Yoshida<sup>1\*</sup>, Yukinobu Koyama<sup>1</sup>, Masahito Nose<sup>1</sup>, Toshihiko Iyemori<sup>1</sup>

<sup>1</sup>WDC for Geomag. Kyoto, Kyoto University

For the promotion of interdisciplinary sciences, a system by which we can locate necessary information without the help by an expert is desirable. To have such system, construction of a metadata database is essential. There exist several international efforts of master directory construction and proposals of standards of metadata format. However, it is not so easy to find necessary information of different fields, and many small databases on research base seem not to be included. We planed to include those datasets and develop a system to find necessary information more easily. In this paper, we will introduce current status of our metadata database.

Keywords: metadata, database, interdisciplinary sciences

MGI031-P04

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Time:May 25 16:15-18:45

## Integrated visualization system of spectral data sets of Kaguya

Wataru Kawamae<sup>1\*</sup>, Dang Tuan Anh<sup>1</sup>, Shin Sato<sup>1</sup>, Kyosuke Isozaki<sup>1</sup>, Hirohide Demura<sup>1</sup>, Naru Hirata<sup>1</sup>, Junya Terazono<sup>1</sup>, Noriaki Asada<sup>1</sup>

<sup>1</sup>Graduate school of Aizu

Spectral observation had been performed by Multi-band Imager (MI) and Spectral Profiler (SP) onboard the Kaguya. MI mapped lunar surface with nine wavelength bands to obtain multi-spectral images. Although SP is not an image sensor, it has high spectral resolution than MI because it observes continuous reflectance spectra from the lunar surface. Data sets of SP can be used to direct mineralogical discrimination/identification of observation points.

Currently, data analysis for MI and SP are conducted separately, but researchers want to retrieve spectral information for both of data sets efficiently to find relationship between the multi-spectral image and the continuous reflectance spectra. However, there is no systematic tool to fill the requirement.

We developed a web system for overlapping visualization of SP data on MI data to solve this situation. With this system, user can browse a map of MI data, select SP's observation displayed on the map, and gets the continuous reflectance spectra of SP data.

The backbone of this system is map creation and transmission mechanism though web with Web-GIS tools provided from Wise-Caps system developed in the university. It provides a platform for data browsing, sharing and analysis. MI ratio images are applied to the frameworks of Wise-Caps system. For overlapping of SP data on MI ratio image, we created a mechanism to visualize the observation points and plot the continuous reflectance spectra from location information of SP observations and SP data sets with Web-GIS tools and some web-based technologies. As observation points of SP amount to tens of missions, we used RDBMS as backend in the system to handle huge data of SP.

User can know mineral composition from the continuous reflectance spectra on interested location that is represented as geological maps of the lunar surface. Comparison of the continuous reflectance spectra between several locations is also available. We will explain overview of this system architecture and Web-GIS framework to implement this system.

Keywords: Kaguya, GIS, Spectra, Database, Visualization



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MGI031-P05

Room:Convention Hall

Time:May 25 16:15-18:45

## e-Space Weather: A New Space Weather Web

Ken T. Murata<sup>1\*</sup>

<sup>1</sup>NICT

At NICT (National Institute of Information and Communications Technology) we are now developing a new research environment named "OneSpaceNet". The OneSpaceNet is a cloud-computing environment, which connects many researchers with high-speed network (JGN: Japan Gigabit Network). It also provides the researchers rich resources for research studies, such as super-computer, large-scale disk area, licensed applications, database and communication devices. What is amazing is that a user simply prepares a terminal (low-cost PC). After connecting the PC to JGN2plus, the user can make full use of the rich resources via L2 network. Using communication devices, such as video-conference system, streaming and reflector servers, and media-players, the users on the OneSpaceNet can make research communications as if they belong to a same (one) laboratory: they are members of a virtual laboratory.

We present web applications for space weather working on the OneSpaceNet. A variety of web-based services are in progress on the OneSpaceNet. Demonstrations for these web will be at our poster board.

Keywords: NICT, Space Weather, Web Application

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MGI031-P06

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## Development of a database system of planetary seismology

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From 1969 to 1972, first seismic network except the Earth had been deployed on the Moon in NASA Apollo program. The seismic observation on the Moon has been continued until September, 1977, and the real-time seismic data have been sent to ground-based stations. The observed data was processed and archived in magnetic tapes at NASA Johnson Space Center and The University of Texas Institute for Geophysics (UTIG). Then, the archived data was moved to 8-mm video cassette tapes and computer hard-disk drive for long storage and data analysis by UTIG and Institute of Space and Astronautical Science (ISAS) during 1990's. Currently, these digital-data is archived and opened to the public in NASA National Space Science Data Center (NSSDC) and Incorporated Research Institutions for Seismology (IRIS).

However, since these opened data is archived with original format and the status information of the observation is not archived together, the public users are hard to process the archived data. For the reason, we are developing a new database system to archive all of planetary seismic data with the status information, the characteristics of the seismometers and parts of current results of the data analysis in ISAS. In this database, all digital data is archived with ASCII format, and the users may convert the format to general ones for the seismic study such as SEED, WIN and SAC formats. Our archived data will be opened to Web system, and the users will be able to download the required data using graphical interface on the Web browser. We can compare between the observed waveform and the engineering data of the seismometers in same time series using this interface system.

Our database system includes the active seismic data performed by the astronauts at 1971 and 1972 and the passive listening data observed by the seismometers used for the active seismic experiment from 1976 to 1977, not only the passive seismic data from 1969 to 1977. In these seismic data, many lunar seismic events are included and they are identified and cataloged by (Nakamura, 2008) even now. We are creating a system to search, display and download the required lunar seismic events using information on (Nakamura, 2008). Then, the Martian seismic data observed by the seismometer deployed on Mars from 1976 to 1978 is decoded and archived in our database now to aggregate all of planetary seismic data in our system.

The archived seismic data remain a matter of analysis since their initial analysis. If we use current analysis technique and computer processing ability, we can expect that new important scientific results will be discovered. In addition, we will obtain the useful information for future lunar and Martian seismic experiments by comparing the seismic data with the engineering data and the other geophysical data, which observe the surrounding environment near the seismometers. In this presentation, I will report the overview and current status of the database system and the plan of data analysis using our database.

Keywords: Planetary Seismology, Data Base, Data Archiving, Moonquake, Mars quake, Planetary Seismic Exploration

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## International Programme Office of ICSU World Data System and NICT geophysics databases

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Establishment of World Data System (WDS) of ICSU (International Council for Science) was decided at the ICSU General Assembly in 2008. The WDS was discussed in context of existing stand-alone WDCs (World Data Centers) and individual FAGS (Federation of Astronomical and Geophysical data-analysis Services) services, and now, its concept is to incorporate WDS facilities which ICSU-WDS is open for, and is to review, proposals from data centers, data archives, data services who wish to join the WDS system. The new system aims at creation of a common globally interoperable distributed data system, or a system of data systems, incorporating emerging technologies and new scientific data activities. WDS is designed to set up the WDS International Programme Office (WDS-IPO).

NICT (National Institute of Information and Communications Technology) of Japan submitted a proposal that NICT will host IPO, and the ICSU Executive Board decided to accept the offer at its meeting (29-30 October 2010). The WDS-IPO will manage and coordinate the establishment and operations of the WDS, and take responsibility for outreach and promotion activities. The IPO will act under the guidance of the ICSU World Data System Scientific Committee.

Keywords: ICSU, WDC, WDS, science information, data