Japan Geoscience Union Meeting 2013
(May 19-24 2013 at Makuhari, Chiba, Japan)

MGI34-01 Room:301A Time:May 19 11:00-11:15

Japan Archaeomagnetic Database

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Geomagnetic field generated by the MHD geodynamo processes in the Earth's outer core has a complicated change both in temporal and special dimensions and there is little or no evidence for a periodic fluctuation. In order to obtain the ancient geomagnetic field behavior, therefore, it is necessary to measure the magnetization remaining in rocks and ancient objects with paleomagnetic procedures as well as the manual magnetic observations which can track back to several hundred years. In case of paleomagnetic investigations for the past hundreds to thousands years, it is powerful way to use archaeological remains. Archaeological samples baked by early humans such as clay vessels, tiles and kilns in which they were baked are able to be carriers of stable and highly reliable thermoremanent magnetization, so that they are likely suitable for good paleomagnetic targets. Archaeomagnetism, meaning such province of academic, has been well developed in Japan from 1950s. However there was no publication of archaeomagnetic database for worldwide purpose of geomagnetic secular variation studies after Hirooka (1983). So now we have a project to construct a new archaeomagnetic database including reliable direction and intensity datasets with reliable independent dating both before and after Hirooka's work. Moreover, we are also constructing a new web-based database and its online services not only for geomagnetic researchers but also for archaeologist and people who are interested in archaeology. Here we will introduce the Japan Archaeomagnetic Database online version, which has been implemented since 2012.

Keywords: database, archaeomagnetism, archaeology, geomagnetic secular variation, geodynamo

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MGI34-02 Room:301A Time:May 19 11:15-11:30

Digitization of analog magnetograms and creating the database

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One-minute data of geomagnetic fields at Kakioka Magnetic Observatory have been released since 1976. Older data are one-hour values read by hand from analog magnetograms with torsion magnetic variometers. No one-minute data before around 1970 are published in the world.

We have developed a method to automatically convert from images of magnetograms to numerical data, and we are now extracting one-minute digital data from 1924 to 1975. That digitized data have been released via website of Kakioka Magnetic Observatory and of World Data Center for Geomagnetism, Kyoto. In this talk, we will introduce the procedure of digitization, assessments of the precision and database specifications.

Keywords: geomagnetism, database, historical data, Kakioka Magnetic Observatory, digitization

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MGI34-03 Room:301A Time:May 19 11:30-11:45

The study of the linkage between Metadata DB for upper atmosphere and author identifier

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The Inter-university Upper atmosphere Global Observation NETwork (IUGONET) has released the metadata database for upper atmosphere to the public (http://search.iugonet.org/iugonet/).

This Metadata DB has not only the information about observation data but also the information about human resources. In this presentation, we will report the possibility the linkage between the Human Resources and Author ID.

Keywords: metadata, author ID, ORCID, data publication

Japan Geoscience Union Meeting 2013
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MGI34-04 Room:301A Time:May 19 11:45-12:00

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

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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 (”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 (MDDB), which archives the information on 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 ?nding and obtaining observational data they need. This should also facilitate synthetic analyses of multi-disciplinary data, leading to new types of research in the upper atmosphere. Since the official release of the MDDB in early 2012, the number of registered metadata has reached nearly 8 millions and still been counting up. We started registering metadata of the observational data from other institutes outside IUGONET. Our continuous effort is also made to have more IUGONET data supported by UDAS, which is the integrated data analysis platform developed by IUGONET. The achievements of the project with some scientific results are presented in the talk.

Keywords: metadata, IUGONET, data analysis tool, upper atmosphere

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MGI34-05 Room:301A Time:May 19 12:00-12:15

Long-term variation of radio noise detected from ionospheric observation

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We NICT has been operating ionospheric observation for more than half century since IGY (International Geophysical Year: 1957) in domestic and Antarctic observatories. These information are used for stable operation of telecommunication, broadband and satellite positioning. We transmit/receive HF radio wave from 1 to 30 MHz including artifitial noise near the observatories. We think that we can detect long-term variation of city noise from these dataset. We use 10years data set observed at four domestic observatories (Wakkanai, Kokubunji, Yamagawa and Okinawa). As an initial results we found that the low frequency noize (1-3 MHz) in Kokubunji extremely increased since 2013. Some reports show that some new devices e.g., LED, are possible noise sources so we will discuss the possibilities.

Keywords: radio propagation, radio noise, ionosonde, long-term variation

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MGI34-06 Room:301A Time:May 19 12:15-12:30

Beyond the kHz and seismology - 10 kHz continuous seismic observation

Makoto OKUBO[1*]

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Okubo and Saiga (2012; JPGU) proposed the high frequency continuous observational seismology to resolve detailed seismic structure and its time variation. In past, high frequency observation had been done by Iio (1992) at the aftershock area of western Nagano earthquake.

Using the high frequency phenomena (near field blasting), Saiga and Okubo (2012; SSJ) reported 10 times accurate velocity structures, and Okubo *et al.* (2012; SSJ) estimated time variations (˜4%) of the seismic velocity caused by water pressure changes. These studies are supported by mass data by high frequency sampling. For example, if we want to estimate 10 times accurate seismic velocity, more than 100 times data will be required in time domain. Additionally, in order to guarantee waveform correlations with 10 times faster sampling, 10 times dense observation networks will be also required.

In the 90s seismology increased observation data by real time and multi channels. The second generation data big bang will begin inflating in seismology. We will introduce the idea of the high frequency observational seismology, and will report some scientific results, worries of data management, and shining futures.

Keywords: High frequency observational seismology, 10kHz contineous observation, strorage management

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MGI34-07 Room:301A Time:May 19 14:15-14:30

High-speed 3D Rendering of Geogical Map Huge Data Using Google Earth and Tiles– Seamless Geological Map 3D –

Yoshiharu Nishioka[1*], Kaoru Kitao[2], Juri Nagatsu[1]

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We devised SmartTile system architecture to improve a conventional JavaScript and an indication system in the Web of the geologic map using the pyramid tile.

Keywords: Seamless Geological Map, 3D, KML, Google Earth, Tile

Japan Geoscience Union Meeting 2013
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MGI34-08 Room:301A Time:May 19 14:30-14:45

Distributed data mining from time-series satellite imagery using Hadoop -experimental study for modeling of GIMMS NDVI-

Kou Nishimae[1*], Rie Honda[1]

[1]Kochi University

A large amount of time-series images have been stored in the data archive in the field of remote sensing of the Earth and planetary bodies. We examined Hadoop and MapReduce, a framework for distributed data system, aiming at construction of a large-scale spatio-temporal data mining system in the Earth and planetary science filed,

In the experiments, we used GIMMS (Global Inventory Modeling and Mapping Studies) that is normalized difference vegetation index (NDVI) provided as a time-series imagery available for 25 years spanning from 1981 to 2006. The data set is derived from imagery obtained from the Advanced Very High Resolution Radiometer (AVHRR) instrument onboard the NOAA satellite series.

We examined two major processes of spatio-temporal data mining with this data: (1) extraction of time series data from time-series images and (2) temporal modeling using logistic function via Maximum likelihood (ML) method. These processes were implemented on the distributed system using MapReduce on Hadoop system composed of one master machine and 50 client machines and examined their scalability. The method is basically is same with our previous study (Nishimae and Honda 2012), however the number of client machines is 10 times larger than the previous study and the experimental condition is selected more carefully. The efficiency of the distributed system was examined as the ratio of execution time for single machine with single core to that with multiple client machines.

Experimental results showed that the efficiency was increased almost linearly with the number of client machines and cores in the case of modeling using ML method, however in the case of extraction of time-series data, the efficiency was not increased after a number of client machines exceeded 30. Furthermore, the number of core does not affected to the efficiency of the system in the data extraction. However, the efficiency of the whole system is expected to increase with number of clients and cores because the execution time for modeling is two orders of magnitude larger than the execution time for extraction.

In addition, we have examined higher knowledge discovery process such as clustering by using Mahout that is a library for machine learning available on Hadoop and MapReduce. Preliminary results will be shown in the presentation.

Keywords: Hadoop, distributed, spatio-temporal, data mining, vegetation index

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MGI34-09 Room:301A Time:May 19 14:45-15:00

The current situation of implementation of WISE-CAPS: browsing, sharing and analyzing environment for lunar and planetar

Junya Terazono[1*], Naru Hirata[1], Ryosuke Nakamura[2], Yoshiko Ogawa[1], Naotaka Yamamoto[2], Hirohide Demura[1], Shinsuke Kodama[2]

[1]The University of Aizu, [2]National Institute of Advanced Industrial Science and Technology

We are now developing information environment called WISE-CAPS (Web-based Integrated Secure Environment for Collaborative Analysis of Planetary Science). The system will have capability for data browsing, sharing and analyzing for lunar and planetary data through the web browsers. The environment is based on Web-GIS with additional softwares, and these are fully open-source based. The WISE-CAPS aims for fully web-based environment which can conduct all operation for scientific analysis on the web browsers, different from conventional data analysis in lunar and planetary science. The goal of this system is non-local data transfer (uploading and downloading) and full operation of scientific data manupilation in servers, including data analysis, post-analysis data browsing and sharing. This system shares similar concept with cloud computing which is popular in current computing platform, and we set the destination for WISE-CAPS development to include specific needs and requirements often occurs through data analysis and evaluation in lunar and planetary science.

In this lecture, we will report current situation of implementation of WISE-CAPS centered on newly implemented items since the last year. We are now bringing new features such as Web API and in-page programming environment in WISE-CAPS. Also, we are tackling improvements on existing functions of WISE-CAPS. Also, enhancements of the system is underway to make system more robust and powerful. The latest achivement will be reported in this lecture.

Also, we will address the future direction of such cloud-based analysis environment.

Keywords: lunar exploration, planetary exploration, data analysis, data curation, data archive, cloud computing

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MGI34-10 Room:301A Time:May 19 15:00-15:15

Development of a repository for knowledge of planetary science serving by the Center for Planetary Science (CPS)

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We provide a repository for knowledge of planetary science, in other words, a digital library of lectures as one of the services for planetary science communities at CPS (Center for Planetary Science). We record lectures in seminars and workshops and publish the lecture videos and presentation files on the Internet. The repository contributes to the inter-university and international education and research. In order to promote the service, we have been arranging equipment and establishing work procedure for recording and publication of seminars and workshops, and a design and development of an on-line system for our repository have been performed. In this study, we explain the system, equipment, and work procedure, and report of our experiences in operating the system.

The repositry system is web-based applications and developed as module of XOOPS (http://xoopscube.jp/). The system contains ”register”, ”list”, and ”viewer” pages. The ”register” page is designed to be used by administrator, which provides an interface of the database MySQL for registration of file names and seminar information. The ”viewer” and ”list” pages are designed to be used by user, which provide lecture videos, presentation files, and seminar information. These pages supports standard PC operation systems, such as Windows, Mac, and Linux. In order to improve usability, a search engine and a function, which makes it possible to play necessary part of the lecture videos, are implemented. HTML5 and Adobe Flash are used for IOS and the other operation systems to play lecture videos, respectively.

We adopt extremely simple equipment configuration and always maintain the online manual on our web site. One digital video camera is used to record both the presentation on screen or whiteboard and lecturer’s move. Real-time encoding is performed by using bundled software (QuickTime) in Mac OSX. The recorded characters on the screen and whiteboard have enough resolution. Because many people’s questions and comments have to be recorded, several microphones and a mixer, which adjusts recording levels, are prepared to ensure quality of sound.

By having arranged the simple work procedure and the on-line system, even a non-expert is able to publish lecture video and presentation file in a short time. The lectures of the CPS seminar, which is held once every week, are published within the day. Other seminars and workshops sponsored or cosponsored by CPS are also published using the on-demand system. More than 1400 lectures recorded in 12 years from 2001 can peruse with presentation files, and these lectures can be searched with a lecturer, a title, etc.

Reference: https://www.cps-jp.org/˜mosir/pub/

Keywords: A repository for knowledge of planetary science