Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

U004-01 会場:304 時間:5 月 26 日 10:45-11:05

”サイエンスコモンズ ”の構築の作法
How to construct ”science commons” together

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1. Introduction

In order to get a solid foundation for constructing ”scientific commons”, we need to evaluate the feasibility with respect to physical, engineering, economical, social/cultural and political aspects and to make a well-balanced collaborative frameworks for experts to work together. Physical and engineering feasibilities to deal with huge, various kinds of multi-disciplinary data balancing quality of data and data services from data capture to open access by taking advantage of available e-infrastructure have been enlarged quantitatively thanks to evolutions of ICT (Information and Communication Technology). However, such qualitative and semantic issues as data models, standardization, metadata/ontology, qualification of analysis tools and also legal/economic issues like open access, IPR and collaboration schema of different stakeholders have been remaining timeless subjects not so easy to overcome for us all. In this paper, the latter challenging issues are briefly discussed for productive collaborations.

2. Can we set out the guidelines for collaboration?

The process of establishing an inventory of data sets-scientific commons- with an open and inclusive manner for everyone requires us to share an image of wholeness on the final outcome, where and when we need to be flexible and adaptive for the spontaneous evolution of the inventory. We need to work with ”neighborhoods” with practical information infrastructures to interact successfully with one another, and to form successful wholes. The necessary guidelines which allow infrastructures for all committed members or stakeholders are to be designed, used and maintained. The infrastructures are expected to give all members ”comfortable”, ”healthy” and ”pleasant” space for communication with neighborhoods, and some experts call them ”Cloud” which is something beyond traditional information systems and web-based systems.

Many scientists are struggling to manage fresh and ever-growing data of diversity and depth by taking advantage of complex ICT. Databases are as valuable as the quality of the data they store, but there is a problem who pays for the quality. In the nowadays business world, data warehousing are common approaches to improve business information systems, often under labels like CRM, ERP and Supply-chain management, but scientific data are thought in principle as public goods to be shared by everyone. Externalizing data has implications on data access, security, timeliness and availability thus data quality and interoperability may be expected to encompass. There a data governance function is to be established with a recognition of the above important aspects for data services, but the data and information quality require intensive commitments and interactions of data producers and data users coordinated by data service experts.

Into modern architectural concepts such as cloud computing and/or other data services, available data resources are to be re-implemented inheriting valuable contents with a harmonization to the continuously added new data in an ecological and sustainable manner. The deep philosophical semantics and structure in things and processes are to be concerned, which is responsible for the human connection in the world. It requests the origin of the spiritual human dimension to work together with virtual neighborhoods in terms of which gives each person a solid underpinning for step by step actions towards these difficult realms.

3. Our Role

Today people have agreed to enhance cooperation on climate change, clean energy, and the environment overcoming many discrepancies and conflicts in the world, where we need to share high quality data for fruitful discussions and consequent actions. Data activities have become more and more important, and we scientists are expected to contribute to our society through close collaboration to create ”science commons” together.

キーワード: データベース, 知的基盤, CODATA, コモンズ, 学術連携, データ活動
Keywords: database, knowledge infrastructure, CODATA, commons, academic collaboration, data activity

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国際科学会議（ICSU）世界データシステム
ICSU World Data System

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ICSU（国際科学会議）では、国際地球観測年（IGY) 以来 50 年以上にわたって活動してきた World Data Center (WDC) と Federation of Astronomical and Geophysical data-analysis Services (FAGS) とを統合して、ICSU 傘下の新しい国際データセンター組織として、2008 年 10 月より World Data System (WDS) を設置した。WDC と FAGS は主に天文・地球科学系のデータ活動を行ってきたが、WDS では扱うデータの範囲を自然科学全般から人文・社会系科学分野まで拡大することを目指している。WDS では以下の目標を掲げている。

＊科学データ・情報提供・利用の平等性の確保
＊データ・情報の安定した提供により、ICSU が推進する事業をサポート
＊データの品質標準を定める
＊ WDS に参加するデータセンター等の評価システムを作る
＊データ利用システムの整備
＊データ利用の簡便化を図る
＊品質管理されたデータ・情報の提供
＊国際的な情報格差の軽減

現時点では約 100ヶ所のデータセンターが関心を示しており、正式な加入申請が開始されたところである。また 2011 年より WDS の国際事務局（WDS-IPO) が情報通信研究機構（NICT) に設置されることになっており、同年 9 月 3-6 日には、京都市において WDS の科学シンポジウム（http://wdc2.kugi.kyoto-u.ac.jp/wds2011/) が開催される予定である。
Keywords: ICSU, Data, international collaboration

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U004-03 会場:304 時間:5 月 26 日 11:25-11:45

ICSU 世界科学データシステムの国際プログラムオフィス設立について
ICSU World Data System: Hosting International Programme Office in Japan

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Yasuhiro Murayama[1*], Ken T. Murata[1], Mamoru Ishii[1], Narihisa Doi[2], Shuichi Iwata[3], Takashi Watanabe[4], Toshihiko Iyemori[5], Hideki Kashioka[1], Toshio Iguchi[1], Hiroshi Kumagai[1]

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World Data System (WDS) of ICSU (International Council for Science) was decided to be newly established at the ICSU General Assembly in 2008, incorporating legacy of WDS (World Data Center) system and FAGS (Federation of Astronomical and Geophysical data-analysis Services) services. The new system aims at creation of a common globally interoperable distributed data system, or a system of data systems. NICT (National Institute of Information and Communications Technology) of Japan offered hosting International Programme Office (IPO) of WDS in response to ICSU's announcement to call for a institute hosting WDS-IPO. The ICSU Executive Board decided to accept the offer at its meeting in the end of 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. Also NICT is proposing a technical contribution to WDS, incorporating NICT's potential of network and information system technology, as well as legacy of data archiving activities including NICT's original atmospheric, ionospheric, and other radio science/space physics databases. In the paper NICT's perspective will be reviewed to targeting cooperation with Japanese science data community as well as the world wide community of WDS and related bodies.

キーワード: 国際科学会議, WDC, WDS, 科学情報, データ
Keywords: ICSU, WDC, WDS, science information, data

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データ統合・解析システム (DIAS) の概要
Introduction for the data integration and analysis system (DIAS)

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「データ統合解析システム (DIAS)」は，第３期科学技術基本計画の国家基幹技術「海洋地球観測探査システム」の一翼を担うプロジェクトとして 2006 年に開始された．DIAS は地球観測データや数値モデル，社会経済データを効果的に統合し，情報を融合するデータインフラを構築し，地球環境問題を解決に導く知を創造し，公共的利益を創出する．そのため，DIAS はデータや情報の相互運用性を高め，異なる分野間でデータや情報を相互に利用できるデータ基盤を構築し，分野を超えて共有できる知の創造を目的の１つとしている．

地球環境分野では，非均質な情報源から超大容量，超多様で複雑な関連性を有するデータを効果的に扱わなければならない．DIAS は，超大容量データストレージシステムを効果的に用いて，データのライフサイクル管理，データ品質管理，データ検索，情報の探索，科学的解析，データの部分取得などの支援機能を有するデータ統合・解析コアシステムや，データの相互利用性の改善のために，専門用語・概念や地理空間に関する共通知識（オントロジー）情報を用いたデータ間連携情報システムを開発する．これを支援するために，既存の各種データベースを横断的に検索するシステムを開発して，データベースに関する実装情報等を蓄積する．

キーワード: 地球観測データ, データ統合, 情報融合, 大容量データストレージシステム, オントロジー情報
Keywords: Earth observation data, Data Integration, Information Fusion, Large data storage system, Ontology

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The Space Physics Archive Search and Extract (SPASE) Project and the Heliophysics Data Environment

The Space Physics Archive Search and Extract (SPASE) Project and the Heliophysics Data Environment

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The Heliophysics division of NASA has adopted the Space Physics Archive Search and Extract (SPASE) Data Model for use within the Heliophysics Data Environment which is composed of virtual observatories, value-added services, resident and active archives, and other data providers. The size of the data sets and the overall data environment has increased tremendously over the past few years. The SPASE Data Model provides a unifying metadata approach to this complex environment. SPASE has also been adopted by the Canadian Space Science Data Portal (CSSDP), NOAA's National Geophysics Data Center (NGDC), and recently by Japan's Inter-university Upper atmosphere Global Observation NETwork (IUGONET). Europe's HELIO project harvests information from SPASE descriptions of resources. The Planetary Plasma Interactions (PPI) Node of NASA's Planetary Data System (PDS) is working to map planetary metadata to SPASE for cross-system exchange. All of the data sets in the Heliophysics Data Environment are intended to be described by the SPASE Data Model. Many have already been described in this way. The current version of the SPASE Data Model (2.2.0) may be found on the SPASE web site at http://www.spase-group.org. SPASE data set descriptions are not as difficult to create as it might seem. Help is available in both the documentation and the many tools created to support SPASE description authors. There are now a number of very experienced users who are willing to help as well. The SPASE consortium has advanced to the next step in the odyssey to achieve well-coordinated federation of resource providers by designing and implementing a set of core services to facilitate the exchange of metadata and delivery of data packages. An example is the registry service database shown at http://vmo.igpp.ucla.edu/registry. SPASE also incorporates new technologies that are useful to the overall effort, such as cloud storage. A review of the advances, uses of the SPASE data model, and role of services in a federated environment is presented.

キーワード: SPASE, metadata, heliophysics, interoperability, informatics
Keywords: SPASE, metadata, heliophysics, interoperability, informatics

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WMO 情報システム
WMO Information System

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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 I9115 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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極域データマネージメントの現状：国際極年の経験より
The state of polar data management; the IPY experience

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Masaki Kanao[1*], Akira Kadokura[1], Masaki Okada[1], Takashi Yamanouchi[1], Natsuo Sato[1]

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The International Polar Year (IPY 2007-2008) was the world's most diverse international science program. It greatly enhanced the exchange of ideas across nations and scientific disciplines. This sort of interdisciplinary exchange helped us to understand and address grand challenges such as rapid environmental change and its impact on society. The scientific results from IPY only now begin to emerge, but it is clear that deep understanding will require creative use of myriad data from many disciplines. Japan established a national committee for the IPY 2007?2008 in the Science Council of Japan in 2004. A total of 63 projects endorsed by the IPY/IPO (International Program Office) had been planned with Japanese participants. Many of the projects are still under serving as a coordinating platform for post-IPY activities. In the Science Meta-Data Base (SMDB) in the National Institute of Polar Research, Japan (NIPR), a total of 148 metadata sets were accumulated so far with regard to the IPY. Metadata relating to the above IPY endorsed projects, together with other Japanese original and international projects, have been compiled to the IPY Portal in the GCMD (Global Change Master Directory) in NASA (National Aeronautics and Space Administration). In the IPY Portal of GCMD, a total number of metadata descriptions (DIFs: Directory Interchange Format) is more than 90. In the Science Meta-Data Base in the National Institute of Polar Research, Japan (SMDB/NIPR), a total of 148 metadata sets were accumulated so far. The format of metadata is original one, but it includes the items listed in DIFs of AMD (Antarctic Master Directory). There are also links to the corresponding metadata in the AMD for each metadata of the SMDB/NIPR. The SCAR data and information management have worked strongly with the IPY community, and subsequently with the Polar Information Commons (PIC) to help establish the framework for long-term stewardship of polar data and information.

キーワード: International Polar Year, data management, national data center, Antarctic/Arctic Master Directory, SCAR/IASC, Polar Information Commons
Keywords: International Polar Year, data management, national data center, Antarctic/Arctic Master Directory, SCAR/IASC, Polar Information Commons

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多次元地球情報の国際標準とテストベッド
International standards and the testbeds for multi dimensional geoinformation

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地理情報など 2 次元に投影するシステムと共に，情報処理技術の進展で，多次元な地球情報を直接処理可能となりつつある．そのための国際標準の試みやテストベッド作成が開始されている．ここでは，各国の地球情報公開とそれを支える GML や GeoSciML にみられる国際標準化とメタデータ，及び，One Geology などのテストベッドの試みを紹介し，地球惑星科学への寄与を考察する．

キーワード: 多次元データ, 地球情報, 国際標準, メタデータ, テストベッド
Keywords: Multi dimensional data, geoinformation, international standard, metadata, testbed

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地球地図第 2 版整備の取組
Activities for the development of Global Map Version 2

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Takayuki Nakamura[1*], Hidehisa Takahashi[1], Takeshi Iimura[1], Noriko Kishimoto[1], Miho Takagi[1], Shuhei Kojima[1], Masaki Suga[1]

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地球地図プロジェクトは世界各国の国家地図作成機関が協力して全球の基盤的地理空間情報である地球地図を整備するプロジェクトである。地球地図は、境界、水系、交通網、人口集中域、標高、土地利用、土地被覆、植生の 8 項目からなる解像度 1km の統一仕様のデータである。2008 年に全球陸域をカバーする地球地図第 1 版が公開され、気候変動、災害、生物多様性、教育など様々な分野で活用されている。

地球地図は地球環境の変化を継続的に把握するため、5 年に 1 度更新することとしている。現在、2012 年完成を目標に地球地図第 2 版の整備を行っている。地球地図第 2 版では、ISO に準拠したデータフォーマット（GML3.2.1）やメタデータを採用するとともに、いくつかのデータ項目や属性を追加するなど、データの利活用促進のために仕様を改訂した。また、国土地理院は、地球地図国際運営委員会事務局として、データ整備マニュアルやメタデータエディタ、データチェックツールを作成するなど、データ整備を支援している。

当日は、地球地図プロジェクトの概要や第 2 版整備の取組について報告する。

キーワード: 地球地図第 2 版, GML, 地球地図プロジェクト, 仕様
Keywords: Global Mapping Version2, GML, Global Mapping Project, specifications

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ヴァーチャル天文台：その構築と成果
Virtual Observatory in Astronomy: Its Construction and Outputs

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世界の多くの国に天文台がある。一般的に天体は、電波からガンマ線までの多波長で放射をしているため、各種天体現象の本質を知るために、多波長データの活用が求められてきた。すなわち、宇宙の諸現象を深く理解するためには、世界中のデータを総合する研究基盤が必須である。しかし、天文データアーカイブが世界の主要天文台等で構築されているにもかかわらず、その活用のための環境が整っていたとは言いがたい状況にあった。

一方、1990 年代後半からの情報通信技術（ICT）の急激な発展により、高速ネットワーク環境が容易に利用できるようになり、また高機能な計算機が安価に購入できるようになった。このような状況のもとで、ICT を利用すれば世界中の天文アーカイブを連携でき、そして研究に必要な観測データを容易に収集・解析することが可能になるだろう、という発想が、世界各地で自然発生的に浮かび上がってきた。これが「バーチャル天文台 (Virtual Observatory = VO) 構想」である。その構築をめざして、世界の主要国が協力して相互の資源を活用するための標準プロトコルを定めてきた。これらの標準化活動の結果、国立天文台が構築した Japanese Virtual Observatory (JVO) では、2011 年 2 月現在、1 万を超える日米欧の主要な天文台やデータセンターにあるリソースが VO インターフェースを通じて相互に接続され、既に成果論文も多数出版されている。

我々は、JVO の利用をさらに高めるため、JVO の機能向上を継続的に進めている。最近では、大量の天文データ（画像、スペクトル、カタログ）は、そもそも天球面上に分布している。天球面上のどこにどのようなデータが存在するかを可視化することができれば、研究者は検索したい領域を容易に指定することができる。そこで、Google Sky API を利用して、天球面上にどのような観測データが存在するのかを可視化し、そこから既存の検索システムに検索要求を投入する機構 (JVOSky) を構築した。

バーチャル天文台においては、　データ検索、　データ取得、　データ解析　をネットワーク上で行う。データ解析の結果を踏まえて、さらに別のデータを取得して新たな処理を行うこともある。データ検索範囲が空間的（最大、全天を対象とする）もしくは波長（周波数）方向に広範囲にわたる場合、従来のように 1 台の VO ポータルマシン自身が検索先を探して順次検索命令を発行するのでは非効率的となる。この問題を解決するためわれわれは、大規模データの分散アプリケーションをサポートするとされる Hadoop を利用し、スケーラブルかつ負荷分散が可能なデータ格納やデータ解析を実現する機構を試験的に構築し、従来方式に比べて約 70 倍速い処理が実現できることを示した。

キーワード: 多波長天文学, データベース, 情報基盤システム
Keywords: Multi-wavelength Astronomy, Database, Information Infrastructure System

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宇宙研における科学衛星データベースの長期アーカイブ化
A challenge to development of long-term archive for space science data at ISAS/JAXA

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At ISAS/JAXA, the public service of scientific spacecraft data download via the Internet for space science research community has started since 1998. The ISAS/JAXA's scientific missions cover extensive fields of space science, e.g. astronomy (X-ray, infrared, radio), solar physics, solar-terrestrial physics, and planetary sciences. At present, datasets from 12 mission projects launched after 1987 archived in the database system, namely, DARTS (Data ARchives and Transmission System). Since major subject of the data service has been the project team use, missions under the operation/development had higher priority of data service implementation. Consequently, the information acquired from the service is sometimes not enough for the general users because the system implicitly suppose the user's knowledge.

However, in recent years, since some missions unexpectedly continues the operation for a long period or terminated, the perpetuation of datasets or the development of a long-range-data archive becomes a challenge to be solved before the loss of all the important information for the data usage. The collection of the information is also necessary for any users in future. We have begun the activity to achieve the long-term archive of space science data in DARTS, surveying scientific and/or technical backgrounds of each science community in space science. We will present our activity concerning the long-term archive and discuss problems around the data.

キーワード: 科学衛星データ, 長期アーカイブ
Keywords: space science data, data archive

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超高層大気長期変動の全球地上ネットワーク観測・研究
Inter-university Upper atmosphere Global Observation NETwork (IUGONET)

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The upper atmosphere is considered as a compound system consisting of the mesosphere, thermosphere, ionosphere, and magnetosphere. Although the different atmospheric layers are often referred to as independent regions, they are closely coupled by exchange of materials, momenta, and energies through complicated physical processes. To examine the mechanism of long-term variations in the upper atmosphere, we need to combine various types of ground-based observations made at different locations and altitudes. Each database of such observations, however, has been maintained and made available to the community by each institution that conducted the observations. That is one of the reasons why those data have been used only for studies of specific phenomena. For the same reason some of the observational data have been used by only researcher groups who were involved in the observation campaign and are not easily accessible from the other researchers.

A six-year research project, Inter-university Upper atmosphere Global Observation NETwork (IUGONET), started in 2009 to overcome such problems of data use by the five Japanese research institutes (NIPR, Tohoku Univ., Nagoya Univ., Kyoto Univ., and Kyushu Univ.) that have been leading ground-based observations of the upper atmosphere for decades. We are collaborating to build a database system for the metadata of various kinds of observational data acquired by the global network of radars, magnetometers, optical sensors, helioscopes, etc. The metadata database (MDB) will be of great help to researchers in efficiently finding and obtaining various observational data we have accumulated over many years. The MDB system will significantly facilitate the analyses of a variety of observational data, which we believe will lead to more comprehensive studies of the mechanisms of long-term variations in the upper atmosphere. Moreover, we expect that researchers will become familiar with not only data in their area of expertise but also data from different disciplines by using the MDB. This could promote new interdisciplinary studies of earth and planetary sciences.

The outline of the IUGONET project, along with the current development status and future plan, will be presented.

キーワード: メタデータ, データベース, 解析ソフトウェア, 超高層大気, 地上観測, 学際研究
Keywords: metadata, database, analysis software, upper atmosphere, ground-based observation, interdisciplinary study

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U004-13 会場:304 時間:5 月 26 日 16:30-16:50

寒冷圏データベース
Cryosphere Data Archive Partnership (CrDAP)

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The Eurasian cryosphere is an important element of an earth climate system, glacier, frozen ground and snow elements such as large fluctuations in recent years has been focused. IPCC AR-4 Report also describes a number of following and is especially great concern about the social impact. Now in the world snow and ice data are promoted the development by the data center of the United States such as NSIDC (National Snow and Ice Data Center) and NCDC (National Climate Data Center). The actual condition is that frozen ground and snow data does not have an international organization about the data of WMO etc., and present condition grasp and change research do not often become since the international and systematic data archive is very weak. For a better understanding of cold regions of Eurasian cryosphere, it is important to share data over a large area. Eurasia cryosphere, especially in cold regions there are several countries, in order to understand the wide variations in the cryosphere are data management needs of international organizations. The IGOS-Cryosphere and IPY and also has been pointed out the need for it. GEOSS data archiving functions to help improve.

This project is to reveal the reality of global environmental change in Eurasian cryosphere, promoting data collection and catalog information to the public so far has not caught on, clarifying the status of past observations and their data, which aims to make the data public through widespread digitization of data. This project not only in Japan, for the cold regions of Eurasian country, as well as establish a system to promote the release of these data and published research to take over the observed data set, data catalogs and data to researchers widely provide a wake-up.

キーワード: 寒冷圏, データベース, メタデータ
Keywords: Cryosphere, Database, Metadata

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基盤地図情報と電子国土 Web システム
Fundamental Geospatial Data and Digital Japan Web system

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国土地理院は，地理空間情報活用推進基本計画の主要施策である基盤地図情報の全国的な整備を平成 19 年度から推進している。基盤地図情報は，電子地図上における位置の基準であり，13 項目（道路縁，建築物の外周線など）からなる。基盤地図情報は，平成 20 年 4 月から国土地理院のホームページにおいて無償提供されている。基盤地図情報は，初期整備にあたり都市計画区域内では縮尺レベル 2,500 以上の精度で，都市計画区域外では縮尺レベル 25,000 の精度で作成されている。

国土地理院の電子国土 Web システムは測量成果の閲覧の役割を担っており，誰もが基盤地図情報などの地図データを背景に，地理空間情報を重ね合わせられるようになっている。さらに，地図データをスクロールし，あるいは縮尺を変えることができる。国土地理院では現在，地理空間情報活用推進基本法の理念にのっとり，国・地方公共団体に向けてその利用を普及し，地理空間情報の活用や流通を促進しているところである。

当日は、これらの概要について説明する予定である。

キーワード: 基盤地図情報, 電子国土, GIS
Keywords: Fundamental Geospatial Data, Digital Japan, GIS

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eSciences approach in Solid Earth Science
eSciences approach in Solid Earth Science

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Recent progresses in observation equipments, analytical techniques and high performance computing technologies have produced huge amounts of geoscience data in various disciplines. However, the data acquisition tools and the data management applications are inherently different among research fields, which eventually produce different data formats even though the observed data might have similar attributes such as longitude, latitude and elevation. Those might be a large barrier to promote cross-disciplinary studies which could give us new insights into the Earth's dynamics. In this presentation, we introduce examples of eSciences approach in geosciences to handle this problem.

For multidisciplinary data visualization, it is needed to analyze each data format and to acquire a skill to use unfamiliar presentation tools which are not free in general. Here we propose Google Earth as the visualization platform. We have developed tools to help displaying various geoscience data on Google Earth. We have developed software to convert the original data files to a KML file, called "KML generator". These generators allow us to visualize various data together on Google Earth without any complicated procedures. We show KML generator for seismic tomography model as an example of our approach. Seismic tomography represents 3-D seismic velocity distribution in the Earth. Lateral heterogeneities of seismic velocity in the mantle are generally assumed to be correlated to temperature anomalies, which can be interpreted as a pattern of mantle convection. Our KML generator visualizes any vertical and horizontal cross sections of the mantle tomographic models, which is useful to understand mantle dynamics.

Our KML generator for seismic tomography model accepts users to submit their own tomography model at our website to generate KML file for their model. To submit tomographic model, we adapt JSON format, which is proposed as the common data format as tomography model by Federation of Digital Seismograph Network (FDSN). The FDSN is an IASPEI sanctioned organization that brings together the primary operators of broadband seismograph networks throughout the world. The FDSN has successfully acted as an effective organization to coordinate activities in data exchange by introducing Standard for Exchange of Earthquake Data (SEED). The FDSN has proposed data request method based on the email, which enables virtual network data center concept, and considered as a good example of eSciences application in solid earth science.

キーワード: Google Earth, eSciences, KMZ, seismic tomography
Keywords: Google Earth, eSciences, KMZ, seismic tomography

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NICT サイエンスクラウド
NICT Science Cloud

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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.

キーワード: 情報通信研究機構, サイエンスクラウド
Keywords: NICT, Science Cloud

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JAMSTEC におけるデータカタログ情報の公開システム
Data Catalog Publication System in JAMSTEC

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（独）海洋研究開発機構（JAMSTEC）では、各種の調査・研究で得られたデータを公開しているデータベースやデータセットを包括的に検索・発見するツールとして「JAMSTEC データカタログ」を開発した。

JAMSTEC は深海を中心とした海洋および気象、固体地球、生態系等の幅広い分野での調査・観測、また地球シミュレータ等による各種シミュレーションなどを実施しており、それらの研究活動で得られたデータは種類別のデータベースや研究プロジェクト毎のデータサイト等により公開されている。調査・観測データについては Web GIS をベースとした JAMSTEC データ検索ポータル（J234-002, JpGU Meeting 2009）を構築して観測点や航海単位で一元的に検索できる体制とした。しかしデータを統合あるいは解析して作成したデータセットや各種のデータベースについては横断的に検索するシステムはなかった。

JAMSTEC 地球情報研究センター（Data Research Center for Marine-Earth Sciences：DrC）ではこれら様々な分野にまたがるデータベースやデータセットを共通に取り扱うためのメタデータ体系として、NASA の運営する Global Change Master Directory（GCMD）で使用されている Directory Interchange Format（DIF）を採用して統一的なメタデータ管理を準備してきた。DIF は幅広い分野をカバーできるよう設計されており、JAMSTEC が取り扱うデータセットの統一的管理に適している他、XML で記述されるためシステム化しやすいという特徴もある。DrC では JAMSTEC 内のデータベースやデータセットの情報を DIF 形式に整理して GCMD へ登録するとともに、同じ構造の日本語版メタデータも作成してきた。

JAMSTEC データカタログはこれらのメタデータを検索・表示するシステムである。
データカタログは、あらかじめ定義した XML スキーマ（XSD ファイル）によってデータベースを初期化した上で XML 形式のメタデータを取り込むと、全文検索エンジンが同期して検索準備を行う。ユーザはカテゴリ分類で階層化されたメタデータをツリー形式や一覧形式から選択できる他、全文検索や詳細検索により目的のデータセットを絞り込むことができる。メタデータからはデータベースやデータ公開ページへ移動が可能である他、同一メタデータの英語版ページと日本語版ページを切り替えることもできる。分類に使用するカテゴリは管理者がメタデータ項目から複数設定することができる。

さらに DIF 以外のスキーマを登録することにより異なる体系で管理されたメタデータセットを取り扱うこともできるようになっている。この機能を活かして、航海報告や技術報告、JAMSTEC の広報誌等を取り込んだ文書カタログや、シングルチャンネル・マルチチャンネル等の地球物理探査データのカタログを同じシステム上に構築している。

現在、データカタログは JAMSTEC が公開しているデータベースとデータ公開サイトを中心にメタデータを登録・公開しているが、今後は個別のデータセットへ登録対象を広げ充実させていく予定である。また、今はデータ管理者がメタデータを作成しているが、研究者自身がウェブから必要な情報を入力することで日本語版・英語版のメタデータを DIF 形式で作成することができる登録支援ツールも構築中である。

キーワード: メタデータ, XML, スキーマ, DIF
Keywords: metadata, XML, schema, DIF

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Web 上での JAMSTEC 船舶取得観測データの可視化：データベースの一機能としてのデータプレビューサイトの構築
Web-based visualization system connected with online database system for observation data obtained in JAMSTEC research

山岸 保子 [1*], 坪井 誠司 [2], 権田 博之 [3], 木下 修平 [3], 齋藤 秀亮 [2], 北山 智暁 [2]
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Japan Agency for Marine-Earth Science and Technology (JAMSTEC) has been accumulating observation data obtained in several research vessels belonging JAMSTEC. Various equipments are mounted on the research vessels, so various research data, e.g., geomagnetic data and gravity data, are obtained and accumulated. We take on responsibility for proving the observation data for scientists both in Japan and foreign countries. Database system for the observation data has been constructed and web GUI of it has been customized. Preview system of the data on Web directly connected with the database will help user to find the requirement data. For constructing the preview system, our project firstly started to develop the visualization system of the observation data, which will be stored into the database, on web platform. We successfully visualize the data on web browser by using Google Earth API. To visualize geographic data in Google Earth, the data should be written in Keyhole Markup Language (KML). We made the converter system from the observation data into KML as Java Servlet and web GUI for the system. Here, we have improved the web-based visualization system of the observation data. Search system of the data, kernel of the database system, is joined into the visualization system. Visualization has two steps of High and Low resolution. At first, user obtain low-resolution image of the selected data to obtain a certain amount of perspective of the observation results. Because some observation data are very large, it is difficult to smoothly visualize all of such data on Web. Next the data can be visualized at high resolution to understand the detailed observation results in selected area. These visual presentations will be very useful for users to select and acquire the observation data from the database system. By using this preview system, user can search and visualize the observation data on the same platform, so the preview system will improve the usability of the database system.

キーワード: 可視化, データベース, 観測データ, 観測船, Google Earth API, ウェブ技術
Keywords: visualization, database, observation data, research vessel, Google Earth API, web technology

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データ統合・解析プロダクトの利用促進に向けた取組み
Approaches to Promoting Use of Data Integration and Analysis Products

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Kazuyo Fukuda[1*], Mika Ichino[1], Ruri Funakoshi[1], Kooiti Masuda[1], Ikumi Akasaka[1]

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We at JAMSTEC (Japan Agency for Marine-earth Science and Technology) have developed and operated the following three websites 1) - 3) toward long-term sustainable services as part of the theme ”Development of Technologies for Practical Use” of the DIAS (Data integration and Analysis System).

1) FIntAn (Fruit of Integration and Analysis)
[http://www.jamstec.go.jp/drc/fintan/e/] [Contact: dias-mng [at] jamstec.go.jp]
This is an informational website on the fruits of research and development work by the JAMSTEC under the DIAS. The applied themes include ”Ocean & Fishery Resources,” ”Hydrological Cycle in Eurasian Cryosphere,” ”Hydrological Cycle in Monsoon Asia” and ”Land Ecosystem.” Among its research projects, ”Ocean & Fishery Resources” involves ocean reanalysis data including their application to fishery resource research. ”Hydrological Cycle in Eurasian Cryosphere” deals with Hydrological Process Data in Eurasia and Glacier Inventory Data. ”Hydrological Cycle in Monsoon Asia” includes Gridded Precipitation Data of the Asian Region, West Sumatra Rader-Rain Gauge Integration Dataset, Monsoon Asian Heat and Water Balance Dataset, Typhoon Tracks During the Early 20th Century and Historical Rainfall Dataset in the Philippines. Lastly, ”Land Ecosystem” provides research and data on the Link System Map of the Ecosystem. Under the theme Development of Technologies for Practical Use, it has conducted research and development into a system to widely disseminate the knowledge obtained through the research of the DIAS project, while providing the data integrated under the project. This website is an informational website which aims to introduce highly specialized data and knowledge based on the latest scientific research to more people in a more easily-understood manner, and encourage its utilization. In particular, the aim is to not only give stylized introductions regarding the data but to make an accessible website whose content can be readily understood, and to this end, columns and glossaries related to each of the research themes have also been prepared.

2) MAPS (My Atlas and Plot Service)
[http://www.jamstec.go.jp/drc/maps/e/] [Contact: dias-mng [at] jamstec.go.jp]
This is a system to provide the above-mentioned datasets. We launched the early website at 2007. We also investigated users’needs through an online questionnaire and through interviews regarding the types and quality of required data, data formats, website functions and so on. Accordingly this website has been remodeled with new datasets and new functions to meet users’needs since the fall in 2010. We have provided online mapping and plotting services with MapServer, and download services with functions of extracting digital data by selected attribute and of converting into another file type. These services provide a powerful visualization and analysis capabilities for the data products. The input items and forms in online questionnaire and Contact-Us page in our website have been refined to collect feedbacks and comments about the new website functions.

3) Inventory System of Hydroclimate Observation Data by Stations
[http://www.jamstec.go.jp/rigc/mahadis/search] [Contact: mahadis-info [at] jamstec.go.jp]
This is a system to provide inventory information of hydroclimate observation data by stations in the Asia-Pacific region and to share the information with users around the world. You can search by Data Source, Station Name, Data Source or WMO Station Number, Period, Latitude/Longitude, etc. and view search result in list view or map view. Additionally, you can download the search results in CSV format. Currently, the information of Monthly Bulletins of the Philippine Weather Bureau from 1907 to 1940 is available.

We will continue to make improvements in the future so that we can return the fruits of DIAS to everyone on a broad scale. Feel free to contact us using the contact information with any questions or requests for each website.