

International Forum on “Polar Data Activities in Global Data Systems”  
「グローバルデータシステムにおける極域データ活動」に関する国際フォーラム  
報告書

## 1. 実現できた具体的な成果・効果

この研究集会では、「グローバルデータシステムにおける極域データ活動」に焦点を当て、各国の「南極データセンター(NADC)」や国際科学会議(ICSU)下の「世界データシステム(WDS)」を構成する各データセンター担当者、並びにデータを利用する研究者側からの意見・提案を集約し、極域データを中心とした「南極データマネージメント委員会(SCADM)」と WDS の今後の諸活動の方向性、並びに学際団体間の具体的連携について、十分な時間をとり議論を行うことができた。特に、国際極年(IPY2007-2008)で新たに発足した「極域情報コモン(PIC)」、北極域のデータ活動(IASC, SAON)等、ICSU 下の関連団体におけるデータ管理体制についても、IPY や北極関係者の参加により具体的な意見交換を行った。

さらに、極域データの検索・流通に係る情報科学的成果の積極的活用を目指すために、現在、WDS 国際プログラムオフィス(WDS-IPO)が情報通信研究機構(NICT)に設置されているが、本研究集会の開催により、今後の WDS のさらなる発展と極域データ活動に関する我が国の役割の指針を決める有効な機会となった。集会の後半では、取得されたデータの公開・引用に関する情報通信技術(ITC)を用いた新たな潮流について紹介があり、今後の極域データマネージメントの方向性について熱い議論が行われた。

## 2. 基調講演等のイベントと一般学術論文発表に関する特記事項

### (a)基調講演

初日のオープニングセッション(Opening Remarks)では、主催機関である国立極地研究所、情報通信研究機構、並びに国立科学博物館の各代表(白石所長、細川執行役、林館長)による挨拶、さらに開催母体である ICSU 下の南極研究科学委員会(SCAR)、国際北極科学委員会(IASC)の両議長(J. López-Martínez, D. Hik)、及び世界データシステム(WDS)代表(B. Mister)による挨拶があった。林館長からは、国立極地研究所が1973年に国立科学博物館より分離発足したこと、また、かつて白瀬中尉が南極探検の帰国後に、本研究集会の会場である「日本館 講堂」で講演を行ったこと等、歴史的な経緯についても紹介があった。さらに、本国際研究集会の科学組織委員会(SOC)委員長(K. Finney)による集会概要の説明、並びに実行委員会(LOC)委員長(金尾)により集会運営関連の説明があった。

### (b)イベント

サイドイベントとしては、10月14日にアイスブレイカーパーティを国立科学博物館内のレストランで、15日夜にはフォーラムバンケットを上野公園内のレストランで、それぞれ行った。両日共に多数の参加があり大変盛況であった。また関連イベントとして、13日、14日の両日には第17回南極データマネージメント委員会(SCADM-17)が、16日のフォーラム終了後には WDS タウンホール会議が、「日本館」会議室でそれぞれ行われた。

### (c)パネルセッション

初日(15日)の午後には、「出版と引用に関する最善な実践例(Best Practice - Publication & Citation)」のセッションとして、パネル討論(パネラー3名+座長)が行われた。また2日目(16日)の午

後には、「データセンター・サービス提供者へのクレジット付与(Data Centre/Service Provider Accreditation)」のセッション(パネラー4名+座長)、「極域科学データマネージメントの将来展望(The Future of Scientific Polar Data Management)」のセッション(パネラー5名+座長)が、それぞれ行われ、会場からの質問応答も含めて熱い議論が行われた。パネルセッションの最後には、本集会における議論の総括として、後日に改めて宣言・発行する“Polar Forum Communiqué”の内容について議論した。

#### (d) 一般発表セッション

口頭発表は、招待講演(keynote、計7件)と一般講演(計19件)を含む7つのセッションが2日間で行われた。各セッションは、「国際極年 IPY から得た教訓」、「データ管理運営の実際」、「出版と引用の実際」、「データ共有と観測ネットワークの実際」、「データセンターのサービス」、「極域科学データマネージメントの将来展望」、に分かれており、南極(SCAR)、北極(IASC)、世界データシステム(WDS)の関係者により様々な関連講演があった。また、ポスター発表(計21件)は、昼休みの時間をコア・タイムとして、「日本館」会議室で行われた。海外及び国内発表者により、データセンター活動やデータベース等の内容を中心に、詳しいポスター説明がなされた。

### 3. 問題点及び今後の課題

国際極年(IPY2007-2008)の一大キャンペーンは、極域データの利活用と再利用のために極めて有用な機会であった。しかしながら、関係する科学者・研究者の能力は、それらのデータの有効な利活用を提供することについて十分であるとは言えず、特に極域データの相互流用性(interoperability)の促進が改めて強調された。今後もさらなる技術革新が必要であり、社会的にも技術的にも信頼されるシステム構築が継続的に望まれる。またデータの出版方法についても、しかるべく引用規範(dataset citation norm)の作成が必須である。

このような極域データ公開とその運営方法については、SCARとIASCを中心にWDSをはじめ他の学際的国際データ関連機関とも連携を保ちつつ、短期的及び長期的な計画を練る必要がある。本集会の開催により、そうした検討事項への実際の取り組みについて関係者が一堂に集まり、現況の情報交換を踏まえて今後の指針について十分な議論ができたと言える。

### 4. 今後の活用計画・方策

情報通信技術、ネットワーク、データベース等の利活用は、技術立国としてさらなる発展を目指す我が国の中心的な研究開発分野の一つである。特に、今回の研究集会で焦点とした「極域」をはじめ、地球規模での環境問題(「温暖化」等)に国際的なリーダーシップを持って積極的に取り組むためには、高い技術力と幅広い視点を兼ね備えた人材の育成が必要不可欠である。また将来的には、より多様な学際分野によるデータセットで創成される、グローバルなデータコミュニティにおける極域科学データに関する新たな国際共同研究の可能性を検討する必要がある。

SCADMやWDSの関係者、及び北極域(IASC)や地球科学を中心とするデータ関係者(研究者・データ提供者)を交えて本研究集会を実施できたことで、研究者間の連携を深めると共に、WDSの構築推進と極域科学情報の有効利用および学際領域研究を効率的な推進が期待される。また、広範な分野のデータ体制を整備する上で、複数の学界および公的組織・機関に強いインパクトを与えることが期待される。さらに、極地を含む科学データ流通のための、新たなグローバルシステム構築推進における我が国(極地研及びNICTを含む)の大きな貢献を示すことができたと言える。



**International Forum on 'Polar Data Activities in Global Data Systems'**  
National Museum of Nature and Science, Tokyo  
**15–16 October 2013**

**DRAFT PROGRAMME**

**Monday 14 October**

17:00–18:00 **Pre-registration (badges only)**

18:00–20:00 **Icebreaker**

**Tuesday 15 October**

09:00–10:00 **Registration**

10:00–10:45 **Opening Remarks**

- **Kazuyuki Shiraishi**, Director-General, National Institute of Polar Research (5')
- **Mizuhiko Hosokawa**, Senior Executive Director, National Institute of Information and Communications Technology (5')
- **Yoshihiro Hayashi**, Director-General, National Museum of Nature and Science (5')
- **Jerónimo López-Martínez**, President, Scientific Committee on Antarctic Research (8')
- **David Hik**, President, International Arctic Science Committee (8')
- **Bernard Minster**, Chair, ICSU World Data System (8')

10:45–11:00 **Scope of the Forum & Practical Information**

- **Kim Finney**, Chair of the Scientific Organizing Committee (10')
- **Masaki Kanao**, Chair of the Local Organizing Committee (5')

11:00–12:30 **Session 1: Data – Lessons Learned from IPY** (Session chair: Taco de Bruin)

**Keynote:** *Overarching Lessons from the International Polar Year on How to Create a Functional Data Infrastructure.* **Mark Parsons** (30')

- *Arctic Communities, Social Science, and Data Management: Human dimensions of an Arctic Data Coordination Network.* **Peter Pulsifer** (15')
- *The Polar Data Catalogue: Best Practices for Sharing and Archiving Canada's Polar Data.* **Julie Friddell** (15')
- *Preservation and Publication of IPY data – A Collaborative Effort of PANGAEA, ICSTII, and ICSU-WDS.* **Michael Diepenbroek** (15')

12:30–14:00 **Lunch and Poster Session** (See p.4 for the list of posters)

14:00–15:30 **Session 2: Best Practice – Data Administration** (Session chair: Wim Hugo)

**Keynote:** *Administering Antarctic Data – A Practical Use-case.* **Kim Finney** (30')

- *Establishing Korean Polar Data Policy and its Future Directions.* **Dongmin Jin** (15')
- *Design and Implementation of the Brazilian Information System on Antarctic Environmental Research.* **Rocío Zorilla** (15')
- *The Arctic Cooperative Data and Information System: Data Management Support for the NSF Arctic Research Program.* **James Moore** (15')

15:30–15:45 **Coffee Break**

15:45–17:45 **Session 3: Best Practice – Publication & Citation** (Session co-chairs: Mark Parsons & Toshihiko Iyemori)

**Keynote:** *Best Practice—Data Publication and Citation.* **Karen Visser** (30')

- *From Data to Publications: The Polar Information Spectrum.* **Shannon Vossepoel** (15')
- *Inter-university Upper Atmosphere Global Observation Network (IUGONET) Metadata Database and Possible Application for 'Polar Data Activities'.* **Akiyo Yatagai** (15')
- *Biodiversity.aq: Online Tools for Antarctic Biodiversity Data Discovery and Publication.* **Anton Van de Putte** (15')

**Panel discussion** (30')

- **Michael Diepenbroek** (PANGAEA, MARUM Centre for Marine Environmental Sciences, Bremen University. ICSU World Data System)
- **Shuichi Iwata** (Data Science Journal, ICSU-CODATA)
- **Karen Visser** (Australian National Data Service)

17:45–18:00 **Group Photograph**

18:30–20:30 **Conference Banquet**

## Wednesday 16 October

09:30–10:45 **Session 4-A: Best Practice – Data Sharing & Observing Networks** (Session chair: Akira Kadokura)

**Keynote:** *Data Sharing and Observing Networks—How can we do better?* **Lesley Rickards** (20')

- *Antarctic Space Weather Data Managed by IPS Radio and Space Services of Australia.* **Kehe Wang** (15')
- *TRANSMIT Prototype: Cross-institutional Network Approach from Geophysical Database to User Application for GNSS Science and Industry.* **Hiroatsu Sato** (15')
- *Hydrometeorological Database (HMDB) for Practical Research in Ecology.* **Alexander Novakovskiy** (15')

10:45–11:00 **Coffee Break**

11:00–12:30 **Session 4-B: Best Practice – Data Sharing & Observing Networks** (Session chair: Ryosuke Shibasaki)

**Keynote:** *Current Data Practises in Polar Institutions and Networks: A Case Study with the HIACMS Project.* **Paul Berkman** (20')

- *EXPEDITION: An Integrated Approach to Expose Expedition Information and Research Results.* **Roland Koppe** (15')
- *Assembling an Arctic Ocean Boundary Monitoring Array.* **Takamasa Tsubouchi** (15')
- *Building on the IPY: Discovering Interdisciplinary Data through Federated Search.* **Lynn Yarmey** (15')
- *GEO Cold Regions—The Interface To GEOSS For Polar And Mountainous Cold Region Observations.* **Yubao Qui** (15')

12:30–14:00 **Lunch and Poster Session** (See p.4 for the list of posters)

14:00–15:15 **Session 5: Data Centre/Service Provider Accreditation** (Session chair: Lesley Rickards)

**Keynote:** *Certification and Accreditation of Data Centres and Services.* **Michael Diepenbroek** (30')

- *ICPSR and the Data Seal of Approval: Accreditation Experiences and Opportunities.* **Jared Lyle** (15')

**Panel discussion** (30')

- **Michael Diepenbroek** (PANGAEA, MARUM Center for Marine Environmental Sciences, Bremen University. ICSU World Data System)
- **Toshihiko Iyemori** (World Data Centre for Geomagnetism)
- **Akira Kadokura** (National Institute of Polar Research)
- **Jared Lyle** (Interuniversity Consortium for Political and Social Research. Data Seal of Approval)

15:15–15:45 **Coffee break and Poster Session** (See p.4 for the list of posters)

15:45–17:15 **Session 6: The Future of Scientific Polar Data Management** (Session co-chairs: Kim Finney & David Hik)

**Keynote:** *International Polar Data Management.* **Mustapha Mokrane** (30')

- *Towards an International Polar Data Coordination Network: An Arctic Perspective.* **Peter Pulsifer** (15')
- *Creating Web of Data for Science.* **Hideaki Takeda** (15')

**Panel discussion** (30')

- **Paul Berkman** (Bren School of Environmental Science and Management, University of California, Santa Barbara)
- **Taco de Bruin** (Royal Netherlands Institute for Sea Research)
- **Mustapha Mokrane** (ICSU World Data System)
- **Mark Parsons** (Research Data Alliance)
- **Hideaki Takeda** (National Institute of Informatics, Japan)

17:15–17:45 **Session 7: Polar Forum Communique**

**Facilitator:** **Rorie Edmunds** (ICSU World Data System)

17:45–18:30 **ICSU World Data System Town Hall Meeting**

Poster presentations		
P1	Hornsund GLACIO-TOPOCLIM Database—Polish Polar Station IPY Legacy	Bartłomiej Luks et al.
P2	Harmonizing Polar Biodiversity Data for Wider Access and Integration: A Collaboration between the Spanish Polar Data Center and GBIF-Spain	Oscar Bermúdez et al.
P3	'Quantarctica': New Standalone GIS Package for Antarctic Research, Operation, and Education using Open-source Software	Kenichi Matsuoka et. al. (Presenting author: Stein Tronstad)
P4	Polar Data Tools at the Integrated Earth Data Applications (IEDA)	Frank Nitsche et al. (Presenting author: Robert Arko)
P5	A Global Environmental Database Project at the National Institute for Environmental Studies and its Contribution to DIAS/GRENE	Hideaki Nakajima et al.
P6	Web-based Technologies in Data/Information Management for Polar Data in Russian World Data Centres	Evgeny Kahrin et al. (Presenting author: Michael Nisilevich)
P7	Polar Magnetic Data at WDC Kyoto—Services under International Collaborations	Toshihiko Iyemori et al.
P8	Cosmic-ray Neutron Data held by WDC for Cosmic Rays	Takashi Watanabe et al.
P9	Observations and Data Handling at International Center for Space Weather Science and Education, Kyushu University, Japan .	Hideaki Kawano et al.
P10	Data and Science Lessons Learned from Atmospheric/Environmental Observations in Japan and Alaska	Yasuhiro Murayama et al.
P11	Japanese Contribution to Super Dual Auroral Radar Network (SuperDARN)	Nozumu Nishitani et al.
P12	Continuous Broadband Seismic Observation on the Greenland Ice Sheet under Greenland Ice Sheet Monitoring Network	Seiji Tsuboi et al.
P13	Current Status of Science Data Archives for the Data Obtained by the Japanese Antarctic Research Expedition	Akira Kadokura et al.
P14	Metadata Management at the Polar Data Center (PDC) of the National Institute of Polar Research (NIPR), Japan	Masaki Kanao et al.
P15	Data Management Plans for the Southern Ocean Observing System (SOOS)	Louise Newman et al.
P16	The NICT Science Cloud: Distributed Storage System and Parallel Data Processing Applicable for Polar Research Data	Ken Murata et al.

P17	Operation of Data Acquisition, Transfer, and Storage System for Worldwide Observation Networks	Tsutomu Nagatsuma et al.
P18	IUGONET Data Analysis Software (UDAS) for Upper Atmosphere Study	Yoshimasa Tanaka et al.
P19	Development of a Sensor Observation Service (SOS) Javascript Library	Alex Tate and Paul Breen (Presenting author: Alex Tate)
P20	Outline of Arctic Data Archive System (ADS)	Hironori Yabuki and Takeshi Sugimura (Presenting author: Hironori Yabuki)
P21	The ICSU World Data System: Trusted Data Services for Global Science	Rorie Edmunds



# International Forum on Polar Data Activities in Global Data Systems Communiqué

## Recommendations & Observations Arising From the ‘International Polar Data Forum’

*15–16 October 2013, Tokyo (Japan)*

Participants in the International Polar Data Forum (comprising of data managers, scientists, and research coordinators) share their observations about the current state of polar data activities and their recommendations for enhancing and sustaining core data services into the future.

### General Remarks

Despite the focus generated by the International Polar Year 2007–2008 (<http://www.ipy.org/>) there are still unresolved deficiencies in the way polar data are managed. These shortcomings continue to hamper our ability to discover and reuse existing and new data assets. The significant public investment in polar science made through national and international research programs is accompanied by an expectation that data should be preserved and be openly available for reuse and verification purposes. This is the responsibility of both scientists and science funders supported by data managers. Achieving these goals requires implementation of open data policies, development of long-term funding strategies to support data repositories, and a change in scientific practices to require the sharing and citation of data. In addition, the ideas and interpretations that have traditionally underpinned research publication need to be updated accordingly. Scientists must factor the costs of managing and publishing data in their research/monitoring funding proposals, and explicitly address these tasks in research/observing system plans.

The Scientific Committee on Antarctic Research (SCAR) and the International Arctic Science Committee (IASC), the two lead non-governmental organizations coordinating international polar research, are now embarking on long-term science planning activities (i.e., the SCAR Science Horizon Scan and the 3rd International Conference on Arctic Research Planning). Both organizations are committed to recommending—through their strategic-direction setting initiatives—not only that the development of robust polar data networks is seen as a science-funded activity but also that this activity has visibility in IASC- and SCAR-sponsored science plans and strategies. Through their policies and actions, IASC and SCAR member countries are encouraged to promote the funding of data management as an integral part of science implementation and to contribute to the design and development of shared global data infrastructure. Participation in the ICSU World Data System (ICSU-WDS; a global system of accredited scientific repositories and data service providers) is one mechanism for member countries to engage in such collaborative infrastructure and capability development.

### Forum Observations & Recommendations

- Improving polar data discovery, data preservation, and reusability relies in part on building more pervasive systems interoperability. This interoperability is now a commonly stated goal for polar research organizations, but it is recognized that interoperability needs to be addressed at a number of different levels and covers both social and technical aspects; the combination of which is difficult to address. Considerable investment





is required to develop robust solutions implementable across disciplines that are concurrently sustainable and cost-effective. Much of the long-term activity invested to date has been through sporadic, often-fragmented spurts of voluntary labour; making progress slow. New initiatives such as the Research Data Alliance (<https://rd-alliance.org/>) potentially offer coordinated mechanisms for addressing interoperability problems in a more efficient, interdisciplinary manner.

- 'Brokering' technology (<http://www.eurogeoss.eu/broker>) is often a good solution to unify disparate systems whilst preserving domain-specific requirements. However, the heterogeneity and inconsistency of metadata (descriptive information about data) that typically results from disciplinary differences, and which underpins such approaches, can reduce the utility of the unified system. Brokering approaches now being taken by the Global Earth Observing System of Systems and EarthCube (<http://www.nsf.gov/geo/earthcube/>) are seeking to address these brokering deficiencies, and disciplinary communities are encouraged to engage with such programs to help deliver enhanced solutions.
- Trusted systems (social and technical) must exist to build interoperability, transparency, and data reuse. This will necessitate the development of networks by the polar community. Scientific repository and service provider accreditation systems can help engender trust and can generally lift global capacity for interoperability and data reuse. Development, global harmonization and advertising of such trusted systems should be actively pursued. ICSU-WDS is taking a lead role in this area. Polar repositories and service providers can benefit by engaging in, and affiliating with, accredited networks such as ICSU-WDS.
- The scientific publication and peer assessment process, which is already in transformation and is adapting to accommodate new social forms of communication and practice, must highly prioritize the inclusion of dataset citation as a new norm. This necessarily involves developing new methods to assess data quality and validity, and these should then be encompassed in peer-based acknowledgement and reward systems.
- Being able to uniquely identify, describe, and access resources (e.g., publications, datasets, dataset components, people, organizations, places, projects) using Hypertext Transfer Protocol offers exciting possibilities to interlink currently disparate silos of information and data. This 'Linked Data' approach then has the capacity to enhance the data discovery and integration process.
- Convergence around existing standards for common and domain-based activities is a desirable goal if such standards already cover a significant percentage of requirements. We recommend that disciplinary communities stop developing standards *de novo* when collaborative efforts could be used to enhance existing standards to satisfactorily accommodate requirements.
- Despite the pervasiveness of 'open' data policies, behaviours that constrain access to scientific data are still seen by many as conferring personal, institutional, or national 'competitive advantage'. The polar community must continue efforts to change these attitudes.
- The long tail of smaller, heterogeneous, and often unstructured datasets (those without metadata, mark-up, and not in databases) usually receive minimal data management consideration by both the scientists who produce them and the repositories that manage them in the long-term. However, utilizing the inherent structure of any digital resources provides an objective framework to discover their relationship in a manner that complements existing content and context management solutions. More attention should be paid to making such data web-accessible.
- There are numerous exemplars of data management best practice both inside and outside of the polar community. Generally these 'exemplars' are willing to share their experiences and often their technologies and methods. Frequently, what are lacking are appropriate communication channels and the necessary social connections to capitalize on this best practice. Members of the Arctic community have taken the lead in setting up social media avenues (e.g., <https://arctichub.net/groups/adcn> and the Twitter feed: @ArcticDCN) to foster better communication, and are now inviting participation from across the polar community.



