

# TASK GROUP ON DATA MANAGEMENT – FIRST REPORT

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## 1. Introduction

At the WOAP-2 meeting in Ispra 28-30 August 2006, it was agreed to set up a task group on data management in the WCRP. The initial mandate of the task group was to review the current status and management of observational data and model output archives, including associated web sites within WCRP. The membership of the Task Group on Data Management (TGDM) and its terms of reference (TOR) were established in early 2007 and are included as Appendix 1 in this report.

This report presents the results of a survey of data archiving, management practices and policies within WCRP core projects and summarizes the data policies of WCRP projects and WCRP sponsoring organizations in cases where explicit statements of such are available. This addresses task 2, and aspects of tasks 3 and 5 in the TOR. The survey procedure and project data archives, as documented in the completed survey forms, are discussed in section 2. Current data management policies and practices of WCRP sponsoring organizations (WMO and IOC) and WCRP core projects are summarized in section 3 where attention is drawn to an earlier paper on data management issues for the WCRP authored by Bryant McAvaney. This paper is appended as appendix 6. We were not aware of the existence of this paper until after the Task Group was assembled.

Remaining parts of tasks 3-5 deal with longer-term issues of data management policy and practice within the WCRP and its relationship to those of its sponsors and national agencies. Some of these issues should be addressed in the context of the legacy and future of the WCRP itself, as further discussed in section 4 of this report.

The “Clearinghouse” referred to in task 4 is associated with GEO Task DA-07-06 which is directed toward improving coordination of data management approaches under the auspices of GEOSS. Discussion on the activities of this GEO task is ongoing within GEOSS. The task of maintaining contact with this GEO activity and advising the TGDM of relevant developments within it has been assigned to the JPS member of the TGDM. That position in the TGDM fell vacant with departure of Hans-Werner Jacobi from the JPS in late 2007.

## 2. Data Centres and Data Holdings Within the WCRP

In order to facilitate documenting the data holdings within WCRP projects, each project IPO was requested to complete a survey form that was designed to ascertain:

- (a) data information management practices, (names, data information description, web site addresses),
- (b) project or sub-project data centres (names, web sites, types of data, access information, existence of metadata),
- (c) regional or special purpose data (including model output if appropriate) which may have been assembled to serve the needs of specific sub-projects or tasks within the core projects
- (d) Global data sets (including model output) which may also have been assembled to serve specific sub-projects or tasks.

The survey was limited to documenting archived data that are currently generally accessible. Within all of the projects there are ongoing data acquisition and archiving activities associated with currently active sub-projects, for example in connection with IPY activities. Many of these data will

become available at a later date. Information concerning these data are not included in this survey unless they have already been entered into a stable archive and are accessible.

Completed survey forms for each of the core projects are listed in Appendix 7. (Instructions provided for completion of the form are shown in the CLIVAR survey, which was used as a template for all). These reveal that there are extensive and varied archives within the WCRP core projects. These include data from campaigns and field studies, laboratory data, and model output and analyses. Although it is beyond the scope of this interim report to discuss the contents of the archives in detail it is worthwhile to note that each of the projects have some data archives that are widely used and/or unique. Examples of these from the core projects include:

- High resolution radiosonde data archived and regularly updated at the SPARC Data Center.
- Several CLIVAR data sets including (a) the JSC/CLIVAR WGCM CMIP3 archive at PCMDI as a global modelling product, (b) the ETCCDI climate extremes indices dataset as one relating to global observations, (c) the NAME and SALLJEX datasets as relating to CLIVAR observational field programmes.
- The GEWEX Data Integration for Model Evaluation (DIME). This is a comprehensive archive associated with the GCSS (Global Cloud System Study) sub-project of GEWEX and contains case-study data sets, large-scale data and analysis products, and model output as well as analysis software.
- The GEWEX CEOP Sattelite Data Archive.
- Several widely used products listed under GEWEX such as the clouds (ISSCP), precipitation (GPCP) archives.
- The databases of the African Monsoon Multidisciplinary Analysis (AMMA) Partnership, listed in the GEWEX survey. Both CLIVAR and GEWEX are cosponsors of this international project.
- The ACSYS data base (a wide range of data including sea ice thickness and extent, Arctic runoff time series, oceanographic data for the Barents and Kara Seas)

Several of the survey forms identify data/model output archives which, though key components/products of project activities, are located in other major data centers or facilities ( e.g. the the ISSCP and GPCP data in NASA archives). However several others that may be of wider interest are confined to special purpose archives under the auspices of WCRP projects (e.g. the sea-ice archives that were built under the auspices of ACSYS). There may also be datasets that were produced in conjunction with WCRP project activities but are not listed in the tables because they reside in archives of other centers and have not been linked to any of the WCRP project data centers. No attempt has been made to track down such data sets for this survey.

In addition it is also noteworthy that WCRP projects are originators and/or custodians of archives of model output that have been of key importance in the recent IPCC and Ozone assessments. These include the model output archives assembled by the WGCM, CLIVAR's WGSIP sub-projects and the chemistry-climate model output archive assembled within the CCMVal sub-project of SPARC.

The results of the survey are presented in Appendix 7 essentially as they were received from the projects. No attempt has been made to distinguish between datasets that are observations, or results of observational analysis activities, and archives of model output. However a further effort to organize the results of the survey to better reflect this distinction across the WCRP projects may be useful. As data gathering and modeling activities are ongoing components of WCRP projects, it may also be worthwhile for the TGDM mandate to be extended to include establishing an ongoing survey of the outputs of such activities, perhaps on a yearly basis.

One of the purposes of this survey is to identify clear redundancies in the WCRP archives and/or between these archives and those in other centers (5(c) in the TOR). None are immediately apparent from this survey although, as noted above, some of the table entries refer to datasets that reside in archives of national centers. There may be good reasons for data archive redundancies in the cases where they arise. Therefore, as noted in the description in the TOR, the current purpose of this task is to carry out an initial tracking of WCRP data archives and activities. Ultimately some rationalization and elimination of redundancy among data sets may be desirable, especially for those that may be widely used indefinitely in the future. This question should be addressed in the follow-on work of WOAP and the TGDM.

### **3. Data Management policy and Practice of WCRP Sponsors and Core Projects**

WMO Resolution 40 (Appendix 2) sets the framework of free, unrestricted and timely exchange of data. These principles are also acknowledged by the IOC Oceanographic Data Exchange Policy (Appendix 3). Furthermore, the 24th Session of the IOC Assembly (19-28 June 2007) adopted Resolution XXIV-9, which sets the IOC Strategic Plan for Oceanographic Data and Information Management [1]. In this strategic plan, IOC calls for the development of an IOC integrated data management strategy, encompassing all IOC programs. It is clear that any data management policy and Practice within WCRP including that of its Core Projects needs to be compatible with WCRP sponsors' data policies. Indeed, if WCRP is to have a data policy it should be to follow those set down by its sponsors.

CLIVAR and CliC have developed their own data policies (see appendices 4 and 5). Overall these are compatible with WCRP sponsors' data policies, following the principles of free and unrestricted access to data. For most of the GEWEX data projects, several of which began before GEWEX, WMO Resolution 40 is the operative policy. In the later GEWEX Continental Scale Experiments, explicit data policies were formulated and have been included in CEOP. SPARC has not developed its own explicit data policy but sub-projects and the SPARC Data Center have developed policies and procedures for data archiving and management that are compatible with WCRP sponsors' policies.

The project offices, and in general WCRP core projects, do not engage extensively in data management activities. The project offices restrict their activities to basic data information, linking activities and sources of data from their websites. For data management, including quality-control activities, projects generally rely on expert data centers when such services are needed.

Overall interoperability standards between the core projects do not exist as such (nor even in research/observational projects within the core projects). This is a potentially important issue for observational datasets that may include data for the same geophysical variable, collected for example as part of different observational campaigns, that may be scattered through different data sets in different centers. This is not such a problem for model outputs, although standardization of metadata is always welcome. The CLIVAR DACs were established to help overcome this but success and community involvement has been mixed.

The paper by B. McAvaney (Appendix 6) recommended that "WCRP should foster interoperability by encouraging the integration of existing systems that have already 'proven their worth' and encourage national and organizational decisions about systems that have evolved and successfully occupy a 'data niche'. Imposing a "top-down" set of standards would be counter productive, given that this is currently a rapidly evolving field." Specific actions recommended were that:

1. WCRP should coordinate activities within its programs so as to facilitate a vision of data usability that is suited to the Web.
2. WCRP should encourage national funding agencies to support the development of general data management tools that benefit the entire scientific community.

- 3 Conduct a WCRP Workshop on Data Management that brings together policy advisors and software engineers so that details of a WCRP “vision” can be explored.
- 4 Require data sets stored in the various WCRP programs be easily accessible by other WCRP programs.

[1][http://www.iode.org/index.php?option=com\\_content&task=view&id=64&Itemid=107](http://www.iode.org/index.php?option=com_content&task=view&id=64&Itemid=107)

Some of the above suggested actions have been addressed in broader contexts. For example, many national institutions and major centers in Europe and North America are currently active in developing data management tools as suggested in action 2. International coordination in this area likely falls within the purview of GCOS and GEOSS. Considering the extent of its importance to the WCRP and possible future actions is beyond the scope of the TGDM at present but should be addressed by WOAP.

#### **4. Additional Issues**

As noted above, this report has a limited scope and does not directly address all of the longer-term issues laid out the TOR. Among the important issues that require attention in the near future is that of ensuring that unique and important data sets that have resulted from WCRP activities are preserved and remain accessible in stable archives. This issue should be addressed by WOAP in the context of the broader discussion concerning the future of the WCRP itself. All WCRP projects have sunset dates within the 2010-2015 period. Beyond this period they will either cease operating or operate under different terms of reference, possibly amalgamated with other projects within a new overarching program. In these circumstances ensuring preservation and access to archives assembled under the auspices of the WCRP may require not only an overall data management framework that will facilitate identifying potentially vulnerable datasets but also some mechanisms to facilitate the process of preserving them, perhaps involving arranging transfers to larger centers that have established data management capabilities and procedures.

## Appendix 1.

### Terms of Reference of the Task Group on Data Management Within the WCRP

#### Tasks

1. The Task Force will first review these draft Terms of Reference, propose changes and outline what they will actually do and what they will not do, and on what timetable. It is expected that the Task Force could recommend a follow-on group focused on a particular aspect (such as item 3) below.
2. The Task Force should foremost determine what is done in each Project Office and WCRP Working Group, if anything, related to data management and information about data and its access, and seek to provide unifying guidelines for future operations in WCRP. Recommendations about the scope of activities within the control of the WCRP should be made.
3. The Task Force will review the data policies of WCRP's sponsors and projects and recommend whether WCRP itself should have an overarching data policy and if it does so, provide a draft of such. As part of this process the Task Force should consider whether any data management policy for WCRP is within the purview of WCRP only or whether and how it can be passed to national sponsors of WCRP (and thus the agencies who can implement it), recognizing that, for instance, data sharing, data management etc have costs associated with them that may need to be built into proposals. The Task Force should particularly consider policy with respect to transmission of data to international data centers.
4. GEOSS is setting up a "Clearinghouse" which is supposed to provide a search capability of data catalogs from GEO members and participating organizations, interoperability, portals, and certain functionality that may well serve WCRP needs. The Task Force should assess this activity, comment on it on behalf of WCRP, and decide whether this is a useful way forward for WCRP.
5. As noted in item 2) above, the WCRP and its projects are expected to encourage data management through designated data centers that are tied to the science. They should also help guide scientists to access data and data catalogues. In the light of item 4), the Task Force should review the status and management of and/or access to and/or stewardship and archival of observational data and model output archives within the WCRP core projects to ascertain:
  - (a) The current status of archived data and model output (what? where? purpose? links?). What is within WCRP and what is not, and what is the appropriate mix?
  - (b) Where there are identifiable WCRP datasets (e.g., there are several CLIVAR Data Centers), then who provides support for the data activities and is this appropriate? Is there an inventory, catalog, or directory, web site, etc. to the data and metadata, and is this appropriate? Are there adequate links among projects?
  - (c) The degree of redundancy in the catalogs either within the WCRP or between WCRP and other archives (e.g. major data centers). [Note, this is to facilitate tracking of the data and how to find it.]
  - (d) Anticipated WCRP needs on future aspects of these questions and possible future resources needed for WCRP's part in data archiving and management.
6. The Task Force will report to WOAP and make recommendations as to possible actions that may be taken.

*Composition:*

One member from each of the core projects paired, where appropriate, by an IPO member, CEOP, and WMP.

*Time lines:*

Membership: December 31, 2006

Full report to JSC 29 (March 2008), interim reports as requested (e.g. for OCD meetings).

Final report: July 31, 2008.

## APPENDIX 2

### WMO POLICY AND PRACTICE FOR THE EXCHANGE OF METEOROLOGICAL AND RELATED DATA AND PRODUCTS INCLUDING GUIDELINES ON RELATIONSHIPS IN COMMERCIAL METEOROLOGICAL ACTIVITIES

#### THE CONGRESS,

#### NOTING:

1. Resolution 23 (EC-XLII)--Guidelines on international aspects of provision of basic and special meteorological services,
2. Resolution 20 (ED-XLVI)--WMO policy on the exchange of meteorological and related data and products,
3. Resolution 21 (EC-XLVI)--Proposed new practice for the exchange of meteorological and related data and products,
4. Resolution 22 (EC-XLVI)-WMO guidelines on commercial activities,
5. The report to Twelfth Congress of the chairman of the Executive Council Working Group on the Commercialization of Meteorological and Hydrological Services, established at the request of Eleventh Congress by the Executive Council in Resolution 2 (EC-XLIII),

#### RECALLING:

1. The general policies of the Organization, as set down in the Third WMO Long-term Plan (1992-2001) adopted by Eleventh Congress, which include, inter alia, that Members should reaffirm their commitment to the free and unrestricted international exchange of basic meteorological data and products, as defined in WMO Programmes (*Third WMO Long-term Plan*, Part I, Chapter 4, paragraph 127),
2. The concern expressed by Eleventh Congress that commercial meteorological activities had the potential to undermine the free exchange of meteorological data and products between national Meteorological Services,

#### CONSIDERING:

1. The continuing fundamental importance, for the provision of meteorological services in all countries, of the exchange of meteorological data and products between WMO Members' national Meteorological or Hydrometeorological Services (NMSs), WMCs and RSMCs of the WWW Programme,
2. Other programmes of world importance such as GCOS, GOOS, WCRP, and IGOS, which are sponsored and implemented in cooperation with other international organizations,
3. The basic role of WMO Members' NMSs in furthering applications of meteorology to all human activities,
4. The call by the world leaders at UNCED (Brazil, 1992) for increasing global commitment to exchange scientific data and analysis and for promoting access to strengthened systematic observations,
5. The provision in the UN/FCCC committing all Parties to the Convention to promote and cooperate in the full, open, and prompt exchange of information related to the climate system and climate change,

**RECOGNIZING:**

1. The increasing requirement for the global exchange of all types of environmental data in addition to the established ongoing exchange of meteorological data and products under the auspices of the WWW,
2. The basic responsibility of Members and their NMSs to provide universal services in support of safety, security and economic benefits for the peoples of their countries,
3. The dependence of Members and their NMSs on the stable, cooperative international exchange of meteorological and related data and products for discharging their responsibilities,
4. The continuing requirement for Governments to provide for the meteorological infrastructure of their countries,
5. The continuing need for, and benefits from, strengthening the capabilities of NMSs, in particular in developing countries, to improve the provision of services,
6. The dependence of the research and education communities on access to meteorological and related data and products,
7. The right of Governments to choose the manner by, and the extent to, which they make data and products available domestically or for international exchange,

**RECOGNIZING FURTHER:**

1. The existence of a trend towards the commercialization of many meteorological and hydrological activities,
2. The requirement by some Members that their NMSs initiate or increase their commercial activities,
3. The risk arising from commercialization to the established system of free and unrestricted exchange of data and products, which forms the basis for the WWW, and to global cooperation in meteorology,
4. Both positive and negative impacts on the capacities, expertise and development of NMSs, and particularly those of developing countries, from commercial operations within their territories by the commercial sector including the commercial activities of other NMSs,

**REMINDS** Members of their obligations under Article 2 of the WMO Convention to facilitate worldwide cooperation in the establishment of observing networks and to promote the exchange of meteorological and related information; and of the need to ensure stable ongoing commitment of resources to meet this obligation in the common interest of all nations;

**ADOPTS** the following policy on the international exchange of meteorological and related data and products:

*As a fundamental principle of the World Meteorological Organization (WMO), and in consonance with the expanding requirements for its scientific and technical expertise, WMO commits itself to broadening and enhancing the free and unrestricted (\*) exchange of meteorological and related data and products;*

**ADOPTS** the following practice on the international exchange of meteorological and related data and products

1. Members shall provide on a free and unrestricted basis essential data and products which are necessary for the provision of services in support of the protection of life and property and the well-being of all nations, particularly those basic data and products, as, at a minimum, described in Annex 1 to this resolution, required to describe and forecast accurately weather and climate, and support WMO Programmes;
2. Members should also provide the additional data and products which are required to sustain WMO Programmes at the global, regional, and national levels and, further, as agreed, to assist other Members in the provision of meteorological services in their countries. While increasing the volume of data and products available to all Members by providing these additional data and products, it is understood that WMO Members may be justified in placing conditions on their re-export for commercial purposes outside of the receiving country or group of countries forming a single economic group, for reasons such as national laws or costs of production;
3. Members should provide to the research and education communities, for their non-commercial activities, free and unrestricted access to all data and products exchanged under the auspices of WMO with the understanding that their commercial activities are subject to the same conditions identified in ADOPTS (2) above;

**STRESSES** that all meteorological and related data and products required to fulfill Members' obligations under WMO Programmes will be encompassed by the combination of essential and additional data and products exchanged by Members;

**URGES Members to:**

1. Strengthen their commitment to the free and unrestricted exchange of meteorological and related data and products;
2. Increase the volume of data and products exchanged to meet the needs of WMO Programmes;
3. Assist other Members, to the extent possible, and as agreed, by providing additional data and products in support of time-sensitive operations regarding severe weather warnings;
4. Strengthen their commitments to the WMO and ICSU WDCs in their collection and supply of meteorological and related data and products on a free and unrestricted basis;
5. Implement the practice on the international exchange of meteorological and related data and products, as described in ADOPTS (1) to (3) above;
6. Make known to all Members, through the WMO Secretariat, those meteorological and related data and products which have conditions related to their re-export for commercial purposes outside of the receiving country or group of countries forming a single economic group;
7. Make their best efforts to ensure that the conditions which have been applied by the originator of additional data and products are made known to initial and subsequent recipients;

**FURTHER URGES Members to comply with:**

1. The Guidelines for Relations among National Meteorological or Hydrometeorological Services Regarding Commercial Activities as given in Annex 2 to this resolution;
2. The Guidelines for Relations between National Meteorological or Hydrometeorological Services and the Commercial Sector as given in Annex 3 to this resolution;

**INVITES** Members to provide explanation of the WMO policy, practice, and guidelines to the commercial sector and other appropriate agencies and organizations;

**REQUESTS the Executive Council to:**

1. Invite the president of CBS, in collaboration with the other technical commissions as appropriate, to provide advice and assistance on the technical aspects of implementation of the practice;
2. Invite the president of CHy to continue his work on the issue of commercialization and the international exchange of hydrological data and products;
3. Keep the implementation of this resolution under review and report to Thirteenth Congress;

**REQUESTS the Secretary-General to:**

1. Keep Members informed on the impacts of commercialization on WMO Programmes and to facilitate the exchange of relevant information on commercialization among NMSs;
2. Report on a timely basis to all Members on those meteorological and related data and products on which Members have placed conditions related to their re-export for commercial purposes;
3. Maintain effective coordination with IOC and other involved international organizations in respect of joint programmes during WMO's implementation of the practice;

**DECIDES** to review the implementation of this resolution at Thirteenth Congress.

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\* "Free and unrestricted" means non-discriminatory and without charge [Resolution 23 (EC-XLII)-Guidelines on international aspects of provision of basic and special meteorological services].  
"Without charge", in the context of this resolution means at no more than the cost of reproduction and delivery without charge for the data and products themselves.

## APPENDIX 3

### IOC OCEANOGRAPHIC DATA EXCHANGE POLICY

The Intergovernmental Oceanographic Commission,

**1 Recalling** Resolution XX-11 on Oceanographic Data Exchange Policy (1999),

**2 Noting:**

- (i) WMO Resolution 40 (Cg-XII) which defined a policy and practice for the international exchange of meteorological and related data and is intended to promote the free and unrestricted exchange of basic data,
- (ii) The “Statement on Data Management Policy for Global Ocean Programmes” as submitted by the IOC Committee on IODE (Recommendation IODE-XIV.6, December 1992) and adopted by the IOC Assembly at its 17th Session (Paris, 25 February–11 March 1993) (para. 220 of the Summary Report of the Session),

**3 Considering** the reports of deliberations of:

- (i) The Ad hoc Working Group on Oceanographic Data Exchange Policy (Paris, 15–17 May 2000),
- (ii) The First Session of the Intergovernmental Working Group on IOC Oceanographic Data Exchange Policy (Brussels, 29–31 May 2001),
- (iii) The Second Session of the Intergovernmental Working Group on IOC Oceanographic Data Exchange Policy (Paris, 17–18 June 2002),

**4 Adopts** the IOC Oceanographic Data Exchange Policy as detailed in the Annex to this Resolution.

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Financial implications: none

## ANNEX TO RESOLUTION XXII-6

### IOC OCEANOGRAPHIC DATA EXCHANGE POLICY

#### Preamble

The timely, free and unrestricted international exchange of oceanographic data is essential for the efficient acquisition, integration and use of ocean observations gathered by the countries of the world for a wide variety of purposes including the prediction of weather and climate, the operational forecasting of the marine environment, the preservation of life, the mitigation of human-induced changes in the marine and coastal environment, as well as for the advancement of scientific understanding that makes this possible.

**Recognising** the vital importance of these purposes to all humankind and the role of IOC and its programmes in this regard, the Member States of the Intergovernmental Oceanographic Commission **agree** that the following clauses shall frame the IOC policy for the international exchange of oceanographic data and its associated metadata.

#### Clause 1

Member States shall provide timely, free and unrestricted access to all data, associated metadata and products generated under the auspices of IOC programmes.

#### Clause 2

Member States are encouraged to provide timely, free and unrestricted access to relevant data and associated metadata from non-IOC programmes that are essential for application to the preservation of life, beneficial public use and protection of the ocean environment, the forecasting of weather, the operational forecasting of the marine environment, the monitoring and modelling of

climate and sustainable development in the marine environment.

### **Clause 3**

Member States are encouraged to provide timely, free and unrestricted access to oceanographic data and associated metadata, as referred to in Clauses 1 and 2 above, for non-commercial use by the research and education communities, provided that any products or results of such use shall be published in the open literature without delay or restriction.

### **Clause 4**

With the objective of encouraging the participation of governmental and non-governmental marine data gathering bodies in international oceanographic data exchange and maximizing the contribution of oceanographic data from all sources, this Policy acknowledges the right of Member States and data originators to determine the terms of such exchange, in a manner consistent with international conventions, where applicable.

### **Clause 5**

Member States shall, to the best practicable degree, use data centres linked to IODE's NODC and WDC network as long-term repositories for oceanographic data and associated metadata. IOC programmes will co-operate with data contributors to ensure that data can be accepted into the appropriate systems and can meet quality requirements.

### **Clause 6**

Member States shall enhance the capacity in developing countries to obtain and manage oceanographic data and information and assist them to benefit fully from the exchange of oceanographic data, associated metadata and products. This shall be achieved through the non-discriminatory transfer of technology and knowledge using appropriate means, including IOC's Training Education and Mutual Assistance (TEMA) programme and through other relevant IOC programmes.

### **Definitions**

**'Free and unrestricted'** means non-discriminatory and without charge. "Without charge", in the context of this resolution means at no more than the cost of reproduction and delivery, without charge for the data and products themselves.

**'Data'** consists of oceanographic observation data, derived data and gridded fields.

**'Metadata'** is 'data about data' describing the content, quality, condition, and other characteristics of data.

**'Non-commercial'** means not conducted for profit, cost-recovery or re-sale.

**'Timely'** in this context means the distribution of data and/or products, sufficiently rapidly to be of value for a given application

**'Product'** means a value-added enhancement of data applied to a particular application.

## **APPENDIX 4**

### **CLIVAR DATA POLICY**

#### **Introduction**

CLIVAR, a global multidisciplinary climate research project, requires a wide range of data and needs data centres to ingest, quality control, archive and distribute these data. The CLIVAR data policy provides guidelines for how these data should be handled in a consistent manner so as to achieve the project's scientific objectives. The policy aims to strike a balance between the rights of investigators and the need for widespread access through the free and unrestricted sharing and exchange of CLIVAR data and metadata. CLIVAR data policy is intended to be fully compatible with IOC [1], WMO [2], GCOS [3] and GEOSS [4] data principles.

The multidisciplinary nature of CLIVAR and its subprogrammes means that the principles enshrined in the Data Policy must be applied to data in each subprogramme's implementation plan.

#### **Definitions used in the CLIVAR Data Policy**

##### **1. CLIVAR data**

"CLIVAR Data" consists of directly observed data, derived data, gridded fields, and other data products generated and/or used within CLIVAR to further its scientific goals. CLIVAR data and related products can be categorized in terms of those that are specifically sponsored or endorsed by the international CLIVAR programme, those generated by other related bodies and programmes such as the World Weather Watch of the WMO, GCOS, JCOMM, and other projects of the WCRP and those generated by relevant national and institutional CLIVAR-related projects and programmes. CLIVAR should strive to ensure that all data relevant to CLIVAR are accessible freely and without restriction, including those collected by other projects and programmes.

##### **2. Metadata**

Metadata is defined as the descriptive information such as content, quality, condition that characterizes a set of measurements.

#### **CLIVAR Data Policy and Principles**

For CLIVAR to succeed, high-quality data and metadata need to be collected, processed and exchanged without significant delay in a free and unrestricted manner. This was recognized in the CLIVAR Implementation Plan [5] in discussing 'The Principles for CLIVAR Data'. CLIVAR data policy is enshrined in the CLIVAR data principles below:

##### **1. Free and unrestricted exchange**

All CLIVAR data should be made available freely and without restriction. "Freely" means at no more than the cost of reproduction and delivery, without charge for the data itself. "Without restriction" means without discrimination against, for example, individuals, research groups, or nationality. In exceptional circumstances involving highly specialized or experimental data, principal investigators may temporarily limit access until such time as the data can be adequately validated.

##### **2. Timely exchange**

CLIVAR investigators should make data available voluntarily and with minimal delay, preferably also in real-time, to maximize their value to CLIVAR. In cases where extensive post-processing of delayed mode data is needed before a final research quality data set can be generated, early release of a preliminary version of the data is required.

##### **3. Quality control**

CLIVAR investigators retain the primary responsibility for the quality of the data they produce and distribute. Data originators and those generating climate data products are required to ensure that

their data meet international quality standards wherever possible.

#### **4. Metadata**

Metadata are required to enable the use of data without ambiguity or uncertainty. Metadata for CLIVAR data sets will be developed and managed in accordance with international standards.

#### **5. Preservation of data**

Long-term survival, integrity, and access to CLIVAR data must be preserved for future generations. Internationally agreed standards should be used for the acquisition, processing, and final archival of data and metadata. Data distributed in real and near-real time should, wherever possible, be replaced in a delayed mode after it has undergone quality control and full documentation.

#### **6. Plan for reuse in reanalysis**

While datasets will be used individually and in combination for research purposes, the sum total of all CLIVAR and CLIVAR-relevant data will have great value in reanalysis activities. To aid this, uniformity of data format and quality should be a high priority.

#### **7. Easy access**

CLIVAR encourages the use of the most recent advances in communication to ensure widespread access to data collected under auspices of the programme.

#### **8. Use of existing national and international mechanisms and centres**

Where feasible, CLIVAR will use existing national and international mechanisms for the exchange and storage of oceanic and atmospheric data, and build on the data management structure of existing programmes. In this way, the effectiveness of the data system will be improved by reducing redundancy and duplication and identifying opportunities and system economies, with financial costs minimized.

#### **9. Reporting Requirements**

Data and metadata should be submitted to recognized data assembly centers as well as to appropriate national and international archival institutions so that the collected information may be safeguarded for future analysis. Inventories of data and related information should be readily accessible and updated as needed on a routine basis.

#### **References**

- [1] IOC Data Policy (<http://ioc3.unesco.org/iode/contents.php?id=200>)
- [2] WMO Resolution 40 (Cg-XII; see <http://www.nws.noaa.gov/im/wmor40.htm>)
- [3] Implementation plan for the Global Observing System for Climate in support of the UNFCCC, 2004; GCOS – 92, WMO/TD No.1219.
- [4] Global Earth Observation System of Systems GEOSS 10-Year Implementation Plan Reference Document (Final Draft) 2005. GEO 204. February 2005.
- [5] CLIVAR Initial Implementation Plan, 1998; WCRP No. 103, WMO/TS No. 869, ICPO No. 14. June 1998.

## APPENDIX 5

### CLiC DATA POLICIES

The CLiC data and information policy has been developed with consideration for the data policies of the World Meteorological Organization (WMO), the Intergovernmental Oceanographic Commission of UNESCO (IOC), and the International Council for Science (ICSU), the WCRP, and other related programmes. The principles of the CLiC data policy are:

- Data should, in general, be available in an open and unrestricted manner for non-commercial purposes.
- Costs involved should not exceed the cost of reproduction by the data provider (i.e., a data centre, research institution, or a national agency that stores the data).
- Data should not be redistributed without authorization.
- Data shall not be used for commercial purposes unless special arrangements have been made.
- All data held in a data centre are owned by the original data provider such as a national agency or individual researcher and the user shall acknowledge the ownership of the data provider, including citation of the data source in all publications (preferably in the publication reference list or bibliography).
- The data provider holds the obligation to update and ensure the quality of data provided and has the right to replace, correct or withdraw data from a data centre.
- CLiC will follow established metadata standards (ISO 19115) and will encourage and assist users in exchanging relevant data and metadata.

CLiC considers that relevant data should be submitted to a recognized data centre for storage immediately after data collection, along with metadata to assist with the location and use of the data. (It is important to note that this does not lead to the data collector losing control of the data, but merely ensures that it is secure for future use.) Whenever possible these data should be made available for distribution at the same time, although restriction of access may need to be considered in special circumstances. Such restriction should be as short as possible, and should not generally exceed two years. CLiC will maintain expertise for provision of advice on data and information management to the cryosphere/climate scientific community and other projects and programmes as appropriate.

## APPENDIX 6

### THE DATA MANAGEMENT ISSUE FOR WCRP (2003)

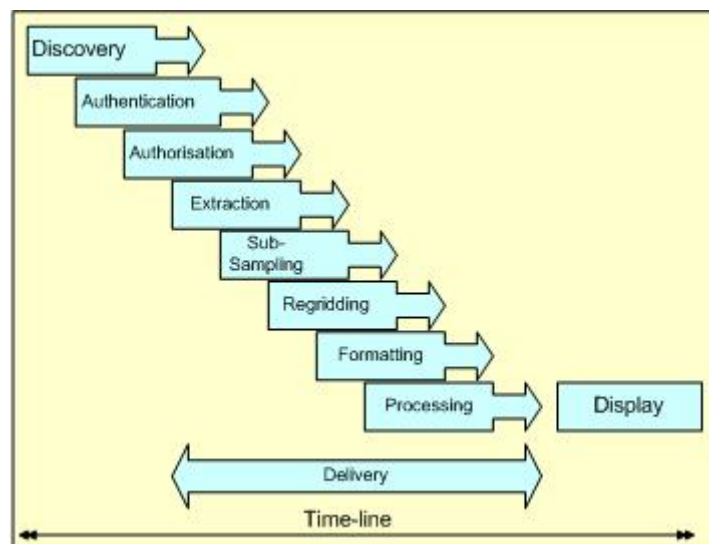
*Bryant J. McAvaney (JSC/CLIVAR WGCM)*

#### Introduction

The complexity of the climate system is reflected in the huge volume of data that is collected and stored at a large number of different locations under the WCRP umbrella. In order to utilise this data in an efficient and timely manner there is a great need for a data infrastructure that spans the many countries, agencies and institutions involved.

Within the WCRP, a huge range of technologies from huge relational databases to files on an individual scientist's PC is found in the climate data archives. The data is often relevant to a wide range of scientific disciplines despite often having been collected on behalf of quite narrow specialist domains. As Earth Systems Science continues to evolve, the requirement for inter-disciplinary data access will increase. Individual scientists and individual research groups will increasingly need better means of locating data and having it delivered, than exist at the moment. A major problem is that data is becoming more and more distributed but there is a lack of interoperability between different data archives so that data access is becoming increasingly difficult and frustrating. What is needed is coordination of data structures and data management that extends far beyond traditional organisational and national boundaries.

All scientific data users go through a number of steps outlined in Figure 1 [1] in order to utilise digital data. While not all steps may be needed in any one application and the order may vary, each of the steps can itself consist of a complex set of operations. This is especially so in the steps from discovery to extraction and those from processing and display. More often than not more than one data set is used, requiring different tools at each step. Perhaps the most difficult step of all is getting started. Data discovery often relies on word-of-mouth to find out about new or newly reprocessed data. Even when sources of data are known, the user must usually find and locate specific files or databases of interest and then go through the process of learning/converting data formats and or appropriate data base schema before using the data for scientific purposes. Much data is simply not used outside of the local generation site because of the huge overheads of locating, accessing and converting it. Too much of a trained scientist's time is spent "reinventing wheels", manipulating data to make it usable.



**Figure 1 – The data discovery and usage chain**

## **A vision of Data Usability**

At the present time the situation with regard to data is similar in many ways to the state of access to documents before the advent of the Web and its search engines. In pre-Web days, access to documents involved locating them, transferring the needed files, converting from one format to another and transforming document excerpts into common forms suitable for reading or merging into papers, presentations or reports.

In the not-too-distant future, access to data for analysis and visualization could be almost as simple as access to documents is today through a Web browser interface. Just as our networks and web browsers now interoperate to support location transparency, so our programs should be able to access, analyse, visualize, and integrate data from either local or remote sources. In the same manner that HTML has become the lingua franca of the web that enables anyone to publish documents, a standard metadata architecture could allow for the development of standard protocols and interfaces to data. This will provide the means by which our important datasets could be easily published for access by local and remote applications, catalogued by search-engine services, and found by web browsers and other applications.

The existence of the Web and browsers provided benefits that encouraged the use of HTML and web servers which multiplied as use of the web became more widespread. Similarly a "data Web" constructed from existing component protocols and formats for remote data and metadata access could be combined into a framework that would increase benefits as usage increased. The data web will only become a reality when it is as easy to publish data with metadata and data services that make it as useful as it is currently to publish documents on the Web. WCRP could (and should) play a role in catalyzing such a vision.

A continuing problem is of course the resources needed to realise the vision. This is particularly difficult in the current context since funding agencies tend not to support activities that provide highly general solutions that are reusable in other contexts even though the construction of such generally useful frameworks is a very challenging task. Similarly data providers usually have no incentive to provide the extra metadata information and organisation of their data that would make it useful in unanticipated contexts. WCRP could alert national funding agencies to the importance of general solutions and ensure the interoperability of the various data servers currently being developed.

## **Strategy**

There are a number of initiatives being taken that address many of the issues outline above [2] [3] [5] [6] [8]. There are also a number of significant efforts taken by organisations to provide portals, catalogues and gateways to environmental and atmospheric data resources. Links to some of these (mostly USA) can be found from Unidata [7]  
<http://www.unidata.ucar.edu/staff/russ/dmwg/portals.html>

A very important consideration is how WCRP should interact with these various national and organisational efforts. Two extreme approaches would be to 1) promote the centralised development the necessary infrastructure with a unified collection of data assets and services, or 2) promote the continuation of separate and nearly autonomous activities, each with their own tailored data standards and policies for sharing data.

The first extreme would standardize access to the diverse data assets within the WCRP programmes by promoting a single WCRP wide format and virtual data portal, independent of discipline boundaries or user requirements, making it possible to monitor usage, standardize protocols, and encourage metadata standards and policies across all WCRP programmes. Such an effort would develop an organized data collection from numerous existing collections of observational data, model outputs, field experiments, and derived, value-added, data. It would require not only organizing existing data assets, but also constraining new data assets and

services to fit within a WCRP integrated data management standard framework that emphasized interoperability.

At the other extreme, which resembles the status quo, each WCRP programme responsible for data assets would make data available individually to other appropriate organizations, disciplines, and users independently of other efforts within WCRP. Rather than choosing global standards for the representation of metadata or interfaces for data access, use of standards most appropriate for each specific data resource or service would be encouraged. For example, archived climate data would be made available through servers and application programming interfaces most familiar to climate researchers, whereas real-time data from a field experiment would be provided in a form most useful to the investigators involved with the experiment. The fact that WCRP programmes make both types of data sets available would not influence the technical decisions that determine how those data sets were organized.

The first extreme represents a level of centralization and standardization that is neither practically achievable nor desirable. Constructing or selecting suitable standards to encompass all the data within WCRP is an almost impossible task; by the time all existing WCRP data collections were moulded to make them conform to selected standards, those standards might be obsolete and the cost in terms of personnel time would very large. The provenance of data is an important data attribute, but it should not be the primary attribute determining the organization or representation of the data, especially when the effort to do so stifles innovation.

The second extreme, complete data autonomy, is also undesirable for several reasons. It requires every group and project responsible for data within WCRP programmes to design and implement their own means for making that data available to others, including awareness of the best practices for metadata representation for discovery and use, knowledge of how to make the data useful to a larger set of current and future uses than the specific project that generates the data, and resources for providing all the data services that are needed for efficient access to the data. Data autonomy and lack of resources lead to lack of awareness of beneficial connections among the data collections, and no way to readily determine how to access data from other groups and other organizations. The scientific scope in research projects is broadening, not becoming more focused. To remain in concert with the scientific needs WCRP must further integrate our available data resources.

Instead of either of these extremes, encouraging the loose combination of legacy systems while encouraging the development of new ways to support data access to WCRP data assets would permit national agencies to continue to work on the cutting edge of distributed data systems. To achieve this interoperability, significant effort will be required from programmers and scientists throughout WCRP programmes.

### **Specific Requirements**

WCRP should foster interoperability by encouraging the integration of existing systems that have already 'proven their worth' and encourage national and organisational decisions about systems that have evolved and successfully occupy a 'data niche'. Imposing a "top-down" set of standards would be counter productive, given that this is currently a rapidly evolving field.

### ***Data Discovery and Data Extraction***

Supporting data discovery is a complex task and depends on the existence of metadata. In its broadest sense metadata are simply "*a range of structured ancillary information about data*" which describes the attributes of an information resource. One simple example is the description of products in a hardware catalogue. For a climate researcher an example is the description of the observing practice at an observational site or the header files describing the gridded output from a reanalysis.

Metadata can be conceptually classed into two general types, discovery and use. Discovery metadata addresses the information necessary to identify a data collection and determine whether it is available and appropriate for the intended application. Use metadata provides the technical information necessary to actually use the data in the collection. Of the two types, use metadata are more mature due to the creators and users of geodata converging in the last decade to a modest number of data storage formats containing reasonably well defined data descriptions. Discovery metadata has only recently become an issue as operational and science centres have begun to move from static, in-house, data archives to more dynamic, online, data services.

Efficient exploitation of massive data sets requires cataloguing and documentation through the use of metadata, i.e., data describing the primary data objects themselves. In addition, verifiability of simulation-based research requires systematic collection and maintenance of metadata that document the design and execution of a simulation or collection of simulations. Locating science information within the massive data archives is currently difficult and requires considerable intimate knowledge of the organization and structure of the archive. To facilitate discovery, metadata must be standardized and organized into databases that support a variety of query types. Different classes of queries require different types of metadata to identify information such as what data are available, the nature of the data, how they were generated, and where they are located. Current metadata conventions used in the community (COARDS, CF, CSM, GDT, SOHO-FITS, CEDAR, etc.) address primarily the description of the contents of individual files. These conventions need to be extended to encapsulate information about data collections and their derivation history. For example, environmental simulation systems are often composed as distributed applications; each component can represent a physical subsystem, such as the atmosphere, the ocean, or a level in a grid hierarchy. Each component may be responsible for its own output processing. Metadata must identify the relationships between the components to allow reconstruction of the overall simulation configuration. Similarly, data will often pass through many post-processing steps after the completion of the simulation. Each of these steps needs to be documented in the metadata. Identifying the appropriate common semantics and granularity of discovery metadata, upgrading legacy use metadata for online applications and ensuring that metadata are retained in a dynamic environment are all topics to which WCRP programmes will need to address if successful implementation of location independent data services across distributed data centres is to be achieved.

The production of metadata by a data provider (which requires commitment over and above provision of the data itself) must be rewarded in some way. Organisations and individuals will need to be gain better portals into their own data as well as that of others. WCRP can assist by promoting the role of data providers as part of an overall data services strategy. It is assumed that the aim is the provision of high quality data that is visible and available to the research community at large. Data providers need to be encouraged to take advantage of existing mechanisms and technologies to make their data more accessible and hence serve the wider community. Encouraging data providers to develop useful metadata using widely used conventions will mean that valuable information will be provided to researchers and this information can be more easily found using advanced data search tools. In many cases data providers should be encouraged to provide their data using a client/server data access model instead of a file based system; this would give the advantage that it facilitates access to datasets that is physically separate from the actual location of the data.

## **Training**

WCRP should encourage the dissemination of information regarding the need for interoperability of data provision and the relevant software engineering that is required.

## **Recommendations**

2. WCRP should coordinate activities within its programmes so as to facilitate a vision of data usability that is suited to the Web.

- 5 WCRP should encourage national funding agencies to support the development of general data management tools that benefit the entire scientific community.
- 6 Conduct a WCRP Workshop on Data Management that brings together policy advisors and software engineers so that details of a WCRP “vision” can be explored.
- 7 Require data sets stored in the various WCRP programmes be easily accessible by other WCRP programmes.

### **Acknowledgements**

This paper has benefited from many informal discussions with a wide range of people who have pointed the author to many different sources. The assistance and material provided by Glenn Rutledge, Jonathon Gregory and Bryan Lawrence was especially important during the development of this text. This paper rests on the ideas that are at the core of the NOMADS initiative in the USA, the NERC DataGrid in the UK, the Earth System Grid Project in USA and the PRISM initiative in Europe.

**APPENDIX 7.**

**SURVEY OF WCRP PROJECTS DATA AND INFORMATION MANAGEMENT**

**(a) CLIVAR Data and Information Management**

**Project name and website**

Climate Variability and Predictability (CLIVAR) (<http://www.clivar.org>)

**Project office website**

International CLIVAR Project Office (<http://www.clivar.org/organization/icpo/icpo.php>)

**Data Information management**

Please, use the table below to list links on the project's website with general information about status of observations or model studies relevant to the panel Add as many rows as necessary.

<b>Page/Panel name</b>	<b>Brief description on the data information provided</b>	<b>Data Information website</b>
Atlantic Implementation Panel	Information on past, current and future observational activities in the Atlantic region  Information on process studies in the Atlantic Sector	<a href="http://www.clivar.org/organization/atlantic/IMPL/index.htm">http://www.clivar.org/organization/atlantic/IMPL/index.htm</a>  <a href="http://www.clivar.org/organization/atlantic/IMPL/proc-stud.html">http://www.clivar.org/organization/atlantic/IMPL/proc-stud.html</a>
CLIVAR/CliC/SCAR Southern Ocean Region Implementation Panel	Information on past, current and future observational activities in the Southern Ocean region	<a href="http://www.clivar.org/organization/southern/CLIVAR_CliC_Obs.html">http://www.clivar.org/organization/southern/CLIVAR_CliC_Obs.html</a>
CLIVAR/GOOS Indian Ocean Panel	Forward plan for the integrated Indian Ocean Observing System (IndOOS)	<a href="http://www.clivar.org/organization/indian/IndOOS/obs.php">http://www.clivar.org/organization/indian/IndOOS/obs.php</a>
CLIVAR VAMOS Variability of the American Monsoon Systems	Information on process studies in the Americas	<a href="http://www.clivar.org/organization/vamos/proc-stud.php">http://www.clivar.org/organization/vamos/proc-stud.php</a>
CLIVAR VACS Variability of the African Climate System	Information on process studies in Africa	<a href="http://www.clivar.org/organization/vacs/proc-stud.html">http://www.clivar.org/organization/vacs/proc-stud.html</a>
CLIVAR Working Group on Seasonal to Interannual Prediction (WGSIP)	Information on projects related to seasonal to interannual prediction	<a href="http://www.clivar.org/organization/wgsip/projects.php">http://www.clivar.org/organization/wgsip/projects.php</a>

WGCM – CMIP (Catalogue of Model Intercomparison Projects Introduction)	Information on model intercomparison efforts	<a href="http://www.clivar.org/science/mips.php">http://www.clivar.org/science/mips.php</a>
GSOP – ocean reanalysis	Information on ocean synthesis/reanalysis efforts	<a href="http://www.clivar.org/data/synthesis/directory.php">http://www.clivar.org/data/synthesis/directory.php</a>

### Projects' Data Centres

Please use the table below to list the project Data Centre names, website, type of data and link to data server. Add as many rows as necessary.

For the 'metadata' field, please give one answer for 'metadata available' and one for 'metadata searchable', as in the example.

For data format, please state the format that the data is made available (e.g. GRIB, BUFR, netCDF, etc...). For data accessibility, examples are ftp, http, OPeNDAP, etc...

Data Centre name	Website	Type of data	Link to Data Server (if appropriate)	Metadata available/searchable	Data format/accessibility
ADCP Data Archive at the Japan Oceanographic Data Centre (JODC)	<a href="http://www.jodc.go.jp/goin/clivar.htm">http://www.jodc.go.jp/goin/clivar.htm</a>	Shipboard ADCP data	<a href="http://jdoss1.jodc.go.jp/cgi-bin/2001/feti_vector">http://jdoss1.jodc.go.jp/cgi-bin/2001/feti_vector</a>	Yes/Yes	
Hawaii Joint Archive for Shipboard ADCP	<a href="http://ilikai.soest.hawaii.edu/sadcp/clivar.html">http://ilikai.soest.hawaii.edu/sadcp/clivar.html</a>	Shipboard ADCP data	<a href="http://ilikai.soest.hawaii.edu/sadcp/main_inv.html">http://ilikai.soest.hawaii.edu/sadcp/main_inv.html</a>		netCDF
CLIVAR LADCP Data Assembly Centre, LDEO	<a href="http://ladcp.ldeo.columbia.edu/ladcp/clivar/">http://ladcp.ldeo.columbia.edu/ladcp/clivar/</a>	Lowered ADCP data			
Marine Environmental Data Service (MEDS), Canada	<a href="http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_int/CLIVAR/SVP/SVP_e.htm">http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_int/CLIVAR/SVP/SVP_e.htm</a>	SST (drifters)	<a href="http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/CLIVAR/SVP/kiel/data_e.asp">http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/CLIVAR/SVP/kiel/data_e.asp</a>		
	<a href="http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/WOCE/WOCE_UOT/UOT_e.htm">http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/WOCE/WOCE_UOT/UOT_e.htm</a>	SST profiles (XBT)	<a href="http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/WOCE/WOCE_UOT/UOT_e.htm">http://www.meds-sdmm.dfo-mpo.gc.ca/meds/Prog_Int/WOCE/WOCE_UOT/UOT_e.htm</a>		
Physical Oceanography Division, NOAA-AOML	<a href="http://www.aoml.noaa.gov/phod/dac/dacdata.html">http://www.aoml.noaa.gov/phod/dac/dacdata.html</a>	SST (drifters)			

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CLIVAR/Carbon Hydrographic Data Office (CCHDO)	<a href="http://cchdo.ucsd.edu/">http://cchdo.ucsd.edu/</a>	T and S profiles (CTD and bottles)			
British Oceanography Data Centre (BODC)	<a href="http://www.bodc.ac.uk/projects/international/clivar/moored_instruments/">http://www.bodc.ac.uk/projects/international/clivar/moored_instruments/</a>  <a href="http://www.bodc.ac.uk/projects/international/clivar/sea_level/">http://www.bodc.ac.uk/projects/international/clivar/sea_level/</a>	T and S (moorings) ADCP (moorings)  Delayed mode in-situ sea level data	<a href="http://www.bodc.ac.uk/projects/international/clivar/moored_instruments/data_inventory/">http://www.bodc.ac.uk/projects/international/clivar/moored_instruments/data_inventory/</a>  <a href="http://www.bodc.ac.uk/data/online_delivery/international_sea_level/">http://www.bodc.ac.uk/data/online_delivery/international_sea_level/</a>		
CERSAT (French ERS Processing and Archiving Centre), IFremer	<a href="http://www.ifremer.fr/cersat/en/index.htm">http://www.ifremer.fr/cersat/en/index.htm</a>	Satellite wind fields	<a href="http://www.ifremer.fr/cersat/en/data/download/download.htm">http://www.ifremer.fr/cersat/en/data/download/download.htm</a>		
The Sea Level Data Centre, Hawaii	<a href="http://uhslc.soest.hawaii.edu/">http://uhslc.soest.hawaii.edu/</a>	"fast delivery" in-situ sea level data	<a href="http://ilikai.soest.hawaii.edu/uhslc/woce.html">http://ilikai.soest.hawaii.edu/uhslc/woce.html</a>		
Surface Marine Meteorological Data Assembly Center, COAPS, FSU	<a href="http://www.coaps.fsu.edu/RVSMDC/CLIVAR/">http://www.coaps.fsu.edu/RVSMDC/CLIVAR/</a>		<a href="http://www.coaps.fsu.edu/RVSMDC/html/data.shtml">http://www.coaps.fsu.edu/RVSMDC/html/data.shtml</a>		
Global Subsurface Data Center, IFREMER, France	<a href="http://www.ifremer.fr/sismer/program/gsdcenter/homepage.htm">http://www.ifremer.fr/sismer/program/gsdcenter/homepage.htm</a>	SST profiles (XBT)			

### Regional Projects' or special purpose Datasets

Please, use the table below to list regional projects and links to their datasets. Also use this area for any special purpose datasets (e.g., lab measurements). If the project has different servers, e.g. for model, in situ or satellite data, please discriminate the links to the servers, and make clear on the column "type of data" to which dataset the link refers. Add as many rows as necessary.

For the 'metadata' field, please give one answer for 'metadata available' and one for 'metadata searchable', as in the example.

For data format, please state the format that the data is made available (e.g. GRIB, BUFR, netCDF, etc...). For data accessibility, examples are ftp, http, OPeNDAP, etc...

Regional Project name	Regional Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available	Metadata searchable
NAME – North American Monsoon Experiment	<a href="http://www.eol.ucar.edu/projects/name/">http://www.eol.ucar.edu/projects/name/</a>	Model, observational and satellite		<a href="http://data.eol.ucar.edu/master_list/?project=NAME">http://data.eol.ucar.edu/master_list/?project=NAME</a>		
MESA – Monsoon Experiment South America	<a href="http://www.eol.ucar.edu/projects/mesa/">http://www.eol.ucar.edu/projects/mesa/</a>					
SALLJEX – South American Low-Level Jet Experiment	<a href="http://www.eol.ucar.edu/projects/salljex/">http://www.eol.ucar.edu/projects/salljex/</a>	Model, observational and satellite		<a href="http://data.eol.ucar.edu/master_list/?project=SALLJEX">http://data.eol.ucar.edu/master_list/?project=SALLJEX</a>		
LPB – La Plata Basin Regional Hydroclimate Project	<a href="http://www.eol.ucar.edu/projects/lpb/">http://www.eol.ucar.edu/projects/lpb/</a>	Model, observational and satellite		<a href="http://data.eol.ucar.edu/master_list/?project=LPB">http://data.eol.ucar.edu/master_list/?project=LPB</a>		
EPIC	<a href="http://www.eol.ucar.edu/projects/epic/">http://www.eol.ucar.edu/projects/epic/</a>	Model, observational and satellite		<a href="http://data.eol.ucar.edu/master_list/?project=EPIC">http://data.eol.ucar.edu/master_list/?project=EPIC</a>		

## Global Projects Datasets

Please, use the table below to list global products and links to their datasets. If the project has different servers, e.g. for model, in situ or satellite data, please discriminate the links to the servers, and make clear on the column "type of data" to which dataset the link refers. Add as many rows as necessary.

For the 'metadata' field, please give one answer for 'metadata available' and one for 'metadata searchable', as in the example.

For data format, please state the format that the data is made available (e.g. GRIB, BUFR, netCDF, etc...). For data accessibility, examples are ftp, http, OPeNDAP, etc...

Project name	Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available/searchable	Data format/accessibility
WGSIP - SMIP (Seasonal Prediction Model Intercomparison Project)	<a href="http://www.clivar.org/organization/wgsip/smip/smip.php">http://www.clivar.org/organization/wgsip/smip/smip.php</a>	Model	Precipitation, wind, air and soil temperature and others	<a href="http://ingrid.ldeo.columbia.edu/SOURCES/WCRP/SMIP-2/overview.html">http://ingrid.ldeo.columbia.edu/SOURCES/WCRP/SMIP-2/overview.html</a>		netCDF, binary, matlab, ferret, GrADS, OPeNDAP,
WGSIP - ENSIP (ENSO Simulation Intercomparison Project)	<a href="http://www.clivar.org/organization/wgsip/projects/ensip.htm">http://www.clivar.org/organization/wgsip/projects/ensip.htm</a>	Model				
WGCM – CFMIP (Cloud Feedback Model Intercomparison Project)	<a href="http://www.cfmip.net/">http://www.cfmip.net/</a>	Model	Air temperature, fluxes and others	<a href="http://www.cfmip.net/">http://www.cfmip.net/</a>		
WGCM – CMIP3 (Coupled Model Intercomparison Project)	<a href="http://www-pcmdi.llnl.gov/ipcc/about_ipcc.php">http://www-pcmdi.llnl.gov/ipcc/about_ipcc.php</a>	Model		<a href="https://esg.llnl.gov:8443/home/publicHomepage.do">https://esg.llnl.gov:8443/home/publicHomepage.do</a>	Yes / Yes	netCDF, OPeNDAP, ftp
ETCCDI Climate Extreme Indices dataset	<a href="http://cccma.seos.uvic.ca/ETCCDI/data.shtml">http://cccma.seos.uvic.ca/ETCCDI/data.shtml</a>	Observational	Air temperature, precipitation and others		No / No	

## **(b) GEWEX Data and Information Management**

### **Project name and website**

Global Energy and Water Cycle Experiment (GEWEX) (<http://www.gewex.org> )

### **Project office website**

International GEWEX Project Office (<http://www.gewex.org/igpo.html> )

### **Data Information management**

<b>Page/Panel name</b>	<b>Brief description on the data information provided</b>	<b>Data Information website</b>
Coordinated Energy and Water Cycle Observations Project (CEOP)	Information on GEWEX hydroclimate projects.	<a href="http://www.gewex.org/projects-CEOP.htm">http://www.gewex.org/projects-CEOP.htm</a>
Radiation Panel	Information on GEWEX radiation projects.	<a href="http://www.gewex.org/projects-GRP.htm">http://www.gewex.org/projects-GRP.htm</a>
Modelling and Prediction Panel	Information on GEWEX modelling and prediction projects.	<a href="http://www.gewex.org/projects-GMPP.htm">http://www.gewex.org/projects-GMPP.htm</a>

### **Projects' Data Centres**

<b>Data Centre name</b>	<b>Website</b>	<b>Type of data</b>	<b>Link to Data Server (if appropriate)</b>	<b>Metadata available/ searchable</b>
BALTEX Hydrological Data Centre	<a href="http://www.smhi.se/sgn0102/bhdc/index.htm">http://www.smhi.se/sgn0102/bhdc/index.htm</a>	hydrological		
BALTEX Meteorological Data Centre	<a href="http://dvsun3.gkss.de/baltex/data/bmcd.html">http://dvsun3.gkss.de/baltex/data/bmcd.html</a>	meteorological		
BALTEX Oceanographic Data Centre	<a href="http://www.smhi.se/sgn0102/nodc/datahost/odcb_content.html">http://www.smhi.se/sgn0102/nodc/datahost/odcb_content.html</a>	oceanographic		
BALTEX Radar Centre	<a href="http://www.smhi.se/brdc/">http://www.smhi.se/brdc/</a>	radar		

CEOP Satellite Data Archive	<a href="http://monsoon.t.u-tokyo.ac.jp/ceop-dc/ceop-dc_top.htm">http://monsoon.t.u-tokyo.ac.jp/ceop-dc/ceop-dc_top.htm</a>	Satellite			
CEOP In-situ Data Archive	<a href="http://www.eol.ucar.edu/projects/ceop/dm/">http://www.eol.ucar.edu/projects/ceop/dm/</a>	Phase 1 Enhanced Observing Periods EOP-1, EOP-3, EOP-4, in-situ data			
CEOP Model Output Archive	<a href="http://cera-www.dkrz.de/CERA/cera2browser_CEOP/index.html">http://cera-www.dkrz.de/CERA/cera2browser_CEOP/index.html</a>	Model output			
CPPA	<a href="http://www.eol.ucar.edu/projects/cppa/dm/">http://www.eol.ucar.edu/projects/cppa/dm/</a>				
LPB – National Center for Atmospheric Research	<a href="http://www.eol.ucar.edu/projects/lpb/dm/">http://www.eol.ucar.edu/projects/lpb/dm/</a>				
GAME/HUBEX Data Center	<a href="http://rain.ihas.nagoya-u.ac.jp/HUBEX/hubex-eng.html">http://rain.ihas.nagoya-u.ac.jp/HUBEX/hubex-eng.html</a>	Reanalysis, satellite, radiosonde, radar, radiation, precipitation			
GAME AAN Data Center	<a href="http://www.suiri.tsukuba.ac.jp/Project/aan/aan-center.html">http://www.suiri.tsukuba.ac.jp/Project/aan/aan-center.html</a>	Automatic weather station data			
GAME 4DDA	<a href="http://www.hyarc.nagoya-u.ac.jp/game/phase-1/4dda.html">http://www.hyarc.nagoya-u.ac.jp/game/phase-1/4dda.html</a>	Reanalysis Data			

## Regional Projects' or special purpose datasets

Regional Project name	Regional Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available/ searchable	Data format/ accessibility
Coordinated Energy and Water Cycle Observations Project (CEOP)	<a href="http://www.eol.ucar.edu/projects/ceop/dm/">http://www.eol.ucar.edu/projects/ceop/dm/</a>	In situ, model output, satellite				
<a href="http://amma-international.org/">African Monsoon Multidisciplinary Analysis Project (AMMA)</a>	<a href="http://amma-international.org/data/">http://amma-international.org/data/</a>	Model  Satellite  In situ	Atmosphere, land surface, ocean	<a href="http://amma-international.org/data/">http://amma-international.org/data/</a>	Yes/Yes	Ascii / <a href="#">Netcdf</a>
<a href="http://www.baltex-research.eu/">Baltic Sea Experiment (BALTEX)</a>	<a href="http://www.baltex-research.eu/">http://www.baltex-research.eu/</a>	In situ  Model  Satellite	Climate, atmosphere, land surface, ocean surfaces	<a href="http://www.baltex-research.eu/">http://www.baltex-research.eu/</a>  <a href="http://www.smhi.se/sgn0102/bhdc/index.htm">http://www.smhi.se/sgn0102/bhdc/index.htm</a>  <a href="http://www.smhi.se/brdc/">http://www.smhi.se/brdc/</a>  <a href="http://www.smhi.se/sgn0102/nodc/datahost/datahost.html#BALTEX">http://www.smhi.se/sgn0102/nodc/datahost/datahost.html#BALTEX</a>	Yes/ Password Required	GRIB / BUFR / Gr FERRET
<a href="http://www.climate.noaa.gov/cpo_p/cppa/">Climate Prediction Program for the Americas (CPPA)</a>	<a href="http://www.climate.noaa.gov/cpo_p/cppa/">http://www.climate.noaa.gov/cpo_p/cppa/</a>	In situ  Model  Satellite	Climate atmosphere, land surface, ocean surfaces	<a href="http://www.eol.ucar.edu/projects/cppa/dm/">http://www.eol.ucar.edu/projects/cppa/dm/</a>	Yes/Yes	ASCII / http
<a href="http://lba.cptec.inpe.br/lba/index.php?lg=eng">Large-Scale Biosphere-Atmosphere Experiment in Amazonia (LBA)</a>	<a href="http://lba.cptec.inpe.br/lba/index.php?lg=eng">http://lba.cptec.inpe.br/lba/index.php?lg=eng</a>	In situ, Model, Satellite, Aircraft	Climate atmosphere, land surface, ocean surfaces	<a href="http://lba.cptec.inpe.br/lba/index.php?p=13&amp;lg=eng">http://lba.cptec.inpe.br/lba/index.php?p=13&amp;lg=eng</a>		N/A

La Plata Basin (LPB)	<a href="http://www.eol.ucar.edu/projects/lpb/">http://www.eol.ucar.edu/projects/lpb/</a>	Aircraft, Hydrology, Land, Model, Satellite	Climate atmosphere, land surface, ocean surfaces	<a href="http://data.eol.ucar.edu/master_list/?project=LPB">http://data.eol.ucar.edu/master_list/?project=LPB</a>	Yes/Some require registration	NWS HRAP /
Northern Eurasia Earth Science Partnership Initiative (NEESPI)	<a href="http://www.neespi.org/science/sciencedata.html">http://www.neespi.org/science/sciencedata.html</a>	Satellite Model In Situ	Land surface, ocean surfaces, atmosphere	<a href="http://www.neespi.org/science/sciencedata.html">http://www.neespi.org/science/sciencedata.html</a>	Yes/Yes	
GEWEX Asian Monsoon Experiment (GAME) <i>Note: GAME ended in 2005</i>	<a href="http://www.hyarc.nagoya-u.ac.jp/game/">http://www.hyarc.nagoya-u.ac.jp/game/</a>	In situ Model Satellite Reanalysis	Precipitation, hydrosphere, radiation, satellite, GPS, wind, soil moisture, cloud	<a href="http://gain-hub.mri-jma.go.jp/index.html">http://gain-hub.mri-jma.go.jp/index.html</a>	Yes/Yes	
Mackenzie GEWEX Study (MAGS) <i>Note: MAGS ended in 2005</i>	<a href="http://www.usask.ca/geography/MAGS/index_e.htm">http://www.usask.ca/geography/MAGS/index_e.htm</a>	In situ Model Satellite	Climate, atmosphere, land surface, ocean surfaces	<a href="http://www.usask.ca/geography/MAGS/index_e.htm">http://www.usask.ca/geography/MAGS/index_e.htm</a>	Yes/Yes	W
GABLS	<a href="http://www.met.wau.nl/projects/Gabls/index.html">http://www.met.wau.nl/projects/Gabls/index.html</a>	CASES99, model				
GEWEX Cloud System Study (GCSS) Data Integration for Model Evaluation (DIME)	<a href="http://gcss-dime.giss.nasa.gov/">http://gcss-dime.giss.nasa.gov/</a>	Satellite, In situ, model forcing data from analyses	Cloud properties, radiative fluxes, precipitation, temperature, humidity	<a href="http://gcss-dime.giss.nasa.gov/">http://gcss-dime.giss.nasa.gov/</a>	Yes/No	A

## Global Projects Datasets

Project name	Project website	Type of data	Data Fields	Link to dataset (if appropriate)
BSRN	<a href="http://www.gewex.org/bsrn.html">http://www.gewex.org/bsrn.html</a>	In situ	Radiation, meteorology, aerosol	<a href="http://www.gewex.org/bsrn.html">http://www.gewex.org/bsrn.html</a>
GACP	<a href="http://gacp.giss.nasa.gov/">http://gacp.giss.nasa.gov/</a>	sattelite	aerosols	<a href="http://gacp.giss.nasa.gov/">http://gacp.giss.nasa.gov/</a>
GPCP	<a href="http://precip.gsfc.nasa.gov/">http://precip.gsfc.nasa.gov/</a>	Satellite, in situ	precipitation	<a href="http://precip.gsfc.nasa.gov/">http://precip.gsfc.nasa.gov/</a> <a href="http://lwf.ncdc.noaa.gov/oa/wmo/wdca/met-ncdc.html">http://lwf.ncdc.noaa.gov/oa/wmo/wdca/met-ncdc.html</a>
ISSCP	<a href="http://isccp.giss.nasa.gov/">http://isccp.giss.nasa.gov/</a>	Satellite, in situ	Cloud properties, temperature, humidity	<a href="http://isccp.giss.nasa.gov/">http://isccp.giss.nasa.gov/</a>
SRB	<a href="http://www.gewex.org/srb.html">http://www.gewex.org/srb.html</a>	satellite	Radiative fluxes	<a href="http://eosweb.larc.nasa.gov/PRODOCS/srb/table_srb.html">http://eosweb.larc.nasa.gov/PRODOCS/srb/table_srb.html</a>
GSWP	<a href="http://grads.iges.org/gswp/">http://grads.iges.org/gswp/</a>	???	soil moisture	
ISLSCP	<a href="http://islscp2.sesda.com/ISLSCP2_1/html_pages/islscp2_home.html">http://islscp2.sesda.com/ISLSCP2_1/html_pages/islscp2_home.html</a>	???	land surface	
NVAP	<a href="http://eosweb.larc.nasa.gov/PRODOCS/nvap/table_nvap.html">http://eosweb.larc.nasa.gov/PRODOCS/nvap/table_nvap.html</a>	Satellite, in situ	Water vapor	<a href="http://eosweb.larc.nasa.gov/PRODOCS/nvap/table_nvap.html">http://eosweb.larc.nasa.gov/PRODOCS/nvap/table_nvap.html</a>
GPCC	<a href="http://www.dwd.de/en/FundE/Klima/KLIS/int/GPCC/GPCC.htm">http://www.dwd.de/en/FundE/Klima/KLIS/int/GPCC/GPCC.htm</a>	Satellite, in situ	precipitation	
GRDC	<a href="http://grdc.bafg.de/servlet/is/Entry.987.Display/">http://grdc.bafg.de/servlet/is/Entry.987.Display/</a>	???	runoff	
GLDAS	<a href="http://ldas.gsfc.nasa.gov/">http://ldas.gsfc.nasa.gov/</a>	model	Various	



### (c) ACSYS-CliC Data and Information Management

#### Project name and website

a) International Arctic Climate Systems Study (ACSYS - 1994-2003)

b) International Climate and Cryosphere (CliC) Project (2001-present)

#### Project office website

<http://clic.npolar.no> and <http://acsys.npolar.no>

#### Data Information management

Page/Panel name	Brief description on the data information provided	Data Information website
ACSYS	<b>1998 aircraft measurements to study boundary layer structures in case of on-ice air flow off Spitsbergen</b> The objective of the ACSYS 1998 field experiment was to investigate the atmospheric boundary layer over ice in case of on-ice airflow in wintertime. Data were collected by the research aircraft FALCON during 6 flights with a sampling rate of 10 and 100 Hz. The data are quality controlled, with checks made for gaps and spikes.	<a href="http://www.awi-bremerhaven.de/ATM/ARTIST/datapres.html">http://www.awi-bremerhaven.de/ATM/ARTIST/datapres.html</a>
ACSYS	<b>Arctic sea-ice thickness data base</b> Estimation of the volume flux of ice out of the Arctic Ocean in order to say something about climate change.	Under development
ACSYS Historical Ice Charts Archive (1553-2002)	<b>Historical Ice Charts Archive (1553-2002)</b> Maps of the sea ice edge in the Nordic Arctic Seas from a variety of historical sources. For the earliest charts (dating back to 1553), log books and diaries from sailing vessels were used. In more recent times observations from ships, aircraft and eventually satellites became available. The data here are in the form of GIS shape files and also in Quick look jpeg files. The data is complemented with a user guide, as well as a report describing data sources and observation accuracy issues.	<a href="http://acsys.npolar.no/ahica/gis.htm">http://acsys.npolar.no/ahica/gis.htm</a>  More details on CD obtainable from the CliC International Project Office. The data has been submitted to data centers in Norway and the US.

ACSYS	<p><b>Arctic Precipitation Data Archive (APDA)</b>  The main objective of the data archive is to support an observational basis for studies concerning the freshwater input into the Arctic ocean, the climatic change studies of the hydrological regime of the Arctic basin, and for the role of the snow-albedo feedback in the functioning of the land-ocean-atmosphere system. These studies imply some accuracy of the data, which together with the extreme climate of the Arctic make it necessary to correction the systematic errors.</p>	<a href="http://www.dwd.de/en/FundE/Klima/KLIS/int/GPCC/Projects/APDA/index.htm">http://www.dwd.de/en/FundE/Klima/KLIS/int/GPCC/Projects/APDA/index.htm</a>
ACSYS	<p><b>Arctic Runoff Data Base (ARDB)</b>  Time series of river discharge data of important rivers of the world.  Initiated by World Meteorological Organisation. Validation of global/regional climate models, creation of a global runoff database, validation of GCM's with observed runoff.</p>	<a href="http://ardb.bafg.de/servlet/is/Entry.2491.Display/">http://ardb.bafg.de/servlet/is/Entry.2491.Display/</a>
ACSYS	<p><b>Barents and Kara Seas Oceanographic Data Base (Barkode)</b>  Oceanographic data collected by ocean research organizations in Russia, the USA, the United Kingdom, Germany, Norway, and Poland for the Barents, Kara and White Seas region are presented in this atlas. Declassified naval data from Norway, the USA, and the UK are also included.</p>	<p>CD-ROM and data set description (215 pp., English and Russian language) available from the CliC Project Office free of charge.</p> <p>Data information: <a href="http://acsys.npolar.no/adis/datasets/barkode/barkode.php">http://acsys.npolar.no/adis/datasets/barkode/barkode.php</a></p>
ACSYS/CliC	<p><b>Antarctic Sea Ice Thickness Project (ANSITP)</b></p>	<p>AWI Data (1990-1998):  <a href="ftp://sidads.colorado.edu/pub/DATASETS/NOAA/G01359/">ftp://sidads.colorado.edu/pub/DATASETS/NOAA/G01359/</a>  AWI moorings Sites:  <a href="http://www.awi-bremerhaven.de/OZE/ocdb/oc_java/moor/ocdb_flux.html">http://www.awi-bremerhaven.de/OZE/ocdb/oc_java/moor/ocdb_flux.html</a>  <a href="http://clic.npolar.no/disc/index.html">http://clic.npolar.no/disc/index.html</a></p>
CliC	<p><b>Data and Information Service for CliC (DISC)</b> contains general information related to cryospheric research, education and media coverage. Searchable metadata information is possible in the following categories: jobs, publications, datasets, meetings, reference materials and media information. An inventory of web links to related cryospheric</p>	<a href="http://clic.npolar.no/disc/index.html">http://clic.npolar.no/disc/index.html</a>

	sites is also included.	
CliC	<p><b>GlobICE</b></p> <p>The goal of the GlobIce project is to derive information over sea ice data sets that will improve our understanding of the role of the Arctic in global climate. That includes a range of processes, which affect climate by generating information products over the Arctic at 3- to 6- day intervals. These processes include mass balance, heat transfer, and momentum transfer between the Arctic Ocean and the atmosphere. The GlobICE project will concentrate on high-resolution sea ice motion, deformation and flux products for climate research, which is in line with the objectives of WCRP and CliC.</p>	<a href="http://globice.mssl.ucl.ac.uk/">http://globice.mssl.ucl.ac.uk/</a>
Ice sheet model intercomparison project (ISMIP)	<p>ISMIP (Ice Sheet Model Intercomparison Project) arose from the Numerical Experimentation Group of CliC (Climate and Cryosphere - a core project of the World Climate Research Programme co-sponsored by the Scientific Committee on Antarctic Research).</p> <p>ISMIP aims to produce a new set of model intercomparison exercises to test the current generation of ice flow codes. It is a follow-up to the <a href="#">EISMINT</a> phases I and II, which activity inspired much of the ice-sheet model development during the nineties in laboratories worldwide.</p> <p>New model setups have now been prepared for higher-order flow models (HOM), Heinrich-type of ice-sheet instabilities (HEINO) and polar ice sheet models (POLICE).</p>	<a href="http://homepages.vub.ac.be/~phuybrec/ismip.html">http://homepages.vub.ac.be/~phuybrec/ismip.html</a>
SnowMIP	The first phase of <a href="#">SnowMIP</a> was commissioned as a working group of the International Commission on Snow and Ice.	<p><a href="http://users.aber.ac.uk/rie/snowmip2.html">http://users.aber.ac.uk/rie/snowmip2.html</a></p> <p>Participation of over 30 models, results submitted for the majority of them.</p>

	<p>Results were returned for 24 models and 4 sites without significant exposed vegetation. Results were presented at meetings of the International Glaciological Society (Davos, 2003) and the International Union of Geophysics and Geodesy (Sapporo, 2003), and published by Etchevers et al. (2004).</p> <p>SnowMIP2 was, again, commissioned by the International Commission on Snow and Ice, which has since become the <a href="#">Commission for the Cryospheric Sciences</a>. SnowMIP2 was endorsed by 20th session of the Working Group on Numerical Experimentation (Exeter, October 2004) and is an activity of the Climate and Cryosphere project (CliC) and the Global Land Atmosphere System Study.</p>	
AsPeCt sea ice thickness data set <a href="http://acsys.npolar.no/adis/adis.php">http://acsys.npolar.no/adis/adis.php</a>	Compilation of ship based observations of sea ice thickness in the Antarctic	<a href="http://aadc-maps.aad.gov.au/">http://aadc-maps.aad.gov.au/</a>  <a href="http://www.aspect.aq">www.aspect.aq</a>
ADIS data	<p><b>ACSYS Data and Information System contains:</b></p> <ul style="list-style-type: none"> <li>• Metadata from ACSYS datasets</li> <li>• Links to web sites related to ACSYS</li> <li>• References to Papers published in relation to ACSYS</li> <li>• Reports both from IACPO and WCRP</li> <li>• ACSYS and CliC Newsletters</li> </ul>	<a href="http://acsys.npolar.no/adis/adis.php">http://acsys.npolar.no/adis/adis.php</a>  Website No longer maintained

## Projects' Data Centres

Data Centre name	Website	Type of data	Link to Data Server (if appropriate)	Metadata available/searchable	Data format/accessibility
Australian Antarctic Data Centre (AU/AADC)	<a href="http://aadcm.maps.aad.gov.au/">http://aadcm.maps.aad.gov.au/</a>	Cryosphere/Antarctic		y/y	various
National Snow and Ice Data Center (NSIDC)	<a href="http://nsidc.org/">http://nsidc.org/</a>	cryosphere		y/y	various
National Center for Atmospheric Research (NCAR)	<a href="http://www.ncar.ucar.edu/">http://www.ncar.ucar.edu/</a>	cryosphere		y/y	various
Global Change Master Directory (GCMD)	<a href="http://gcmd.nasa.gov/">http://gcmd.nasa.gov/</a>	cryosphere		y/y	various
National Climate Data Center (NCDC)	<a href="http://www.ncdc.noaa.gov/oa/ncdc.html">http://www.ncdc.noaa.gov/oa/ncdc.html</a>	cryosphere		y/y	various
Global Runoff Data Center (GRDC)	<a href="http://grdc.bafg.de/servelet/is/Entry.987.Display/">http://grdc.bafg.de/servelet/is/Entry.987.Display/</a>	cryosphere		y/y	various
Data Information Center for CliC (DISC)	<a href="http://clic.npolar.no/disc/index.html">http://clic.npolar.no/disc/index.html</a>	cryosphere		y	Metadata only
NCAR Earth Observing Laboratory (EOL)	<a href="http://www.eol.ucar.edu/projects/">http://www.eol.ucar.edu/projects/</a>	Cryosphere/Arctic		y/y	Various field project specific datasets

## Regional Projects' or special purpose Datasets

Regional Project name	Regional Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available/searchable	Data format/accessibility
GLOBICE	<a href="http://globice.mssl.ucl.ac.uk/">http://globice.mssl.ucl.ac.uk/</a>	Satellite	Sea ice drift	Under development	n/n	underdevelopment

## Global Projects Datasets

Project name	Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available/searchable	Data format/accessibility
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#### **(d) SPARC Data and Information Management**

##### **Project name and website**

Stratospheric Processes and their Role in Climate (SPARC) (<http://www.atmosp.physics.utoronto.ca/SPARC/>)

##### **Project office website**

SPARC International Project Office (<http://www.atmosp.physics.utoronto.ca/SPARC/>)

##### **Data Information management**

<b>Page/Panel name</b>	<b>Brief description on the data information provided</b>	<b>Data Information website</b>
Chemistry – Climate Model Validation Activity for SPARC (CCMVal)	Notes, Errata, Updates on the CCMVal Archive, Policy regarding access to the Archive	<a href="http://www.pa.op.dlr.de/CCMVal/CCMVal_ErrataBADC.html">http://www.pa.op.dlr.de/CCMVal/CCMVal_ErrataBADC.html</a> <a href="http://www.pa.op.dlr.de/CCMVal/Guidelines_CCMValCollaborators.html">http://www.pa.op.dlr.de/CCMVal/Guidelines_CCMValCollaborators.html</a>

##### **Projects' Data Centres**

<b>Data Centre name</b>	<b>Website</b>	<b>Type of data</b>	<b>Link to Data Server (if appropriate)</b>	<b>Metadata available?</b>	<b>Metadata searchable?</b>
SPARC Data Center	<a href="http://www.sparc.sunysb.edu">http://www.sparc.sunysb.edu</a>	<a href="http://www.sparc.sunys.edu/html/RefData.html">http://www.sparc.sunys.edu/html/RefData.html</a>	<a href="http://www.sparc.sunysb.edu">http://www.sparc.sunysb.edu</a>	Yes	No

**Regional Projects' or special purpose Datasets**

Regional Project name	Regional Project website	Type of data	Data Fields		Link to dataset (if appropriate)	Metadata available?	Metadata searchable?
Gravity Wave Processes and Their Parameterizations	<a href="http://www.sparc.sunysb.edu/html/hres.html">http://www.sparc.sunysb.edu/html/hres.html</a>	US High Resolution Radio-sonde data	Pressure, Dry-bulb Temp, Dew Point, Relative Humidity, U Wind, V Wind		ftp://atmos.sparc.sunysb.edu/pub/sparc/hres	Yes	No
Stratospheric Aspects of Climate Forcing	<a href="http://www.sparc.sunysb.edu/html/clim_forc.html">http://www.sparc.sunysb.edu/html/clim_forc.html</a>	Forcing data	Ozone, Stratospheric Volcanic Aerosols, Solar Irradiance Variations		ftp://atmos.sparc.sunysb.edu/pub/sparc/clim_force	Yes	No
Rocket Sonde Data	<a href="http://www.sparc.sunysb.edu/html/rocket.html">http://www.sparc.sunysb.edu/html/rocket.html</a>	Rocket Sonde Data	Temperature and Wind	48 locations		Yes	No
Tropical Tropopause, Tropospheric and Stratospheric Climatologies	<a href="http://www.sparc.sunysb.edu/html/noaa/noaa_trop.html">http://www.sparc.sunysb.edu/html/noaa/noaa_trop.html</a>	Radio-sonde-derived	surface pressure - hPa surface temperature - C surface potential temperature - K 500 hPa height - m 500 hPa temperature - C 500 hPa potential temperature - K surface-500 hPa lapse rate - K/km surface-300 hPa lapse rate - K/km surface-LRT virtual temperature - C 850 hPa-300 hPa virtual temperature - C 850 hPa-100 hPa virtual temperature - C freezing level pressure - hPa freezing level height - m 100 hPa height - m 100 hPa temperature - C 100 hPa potential temperature - K 100 hPa sat. volume mixing ratio -		ftp://atmos.sparc.sunysb.edu/pub/sparc/noaa_trop	Yes	No

			ppmv lapse-rate tropopause height - m lapse-rate tropopause pressure - hPa lapse-rate tropopause temperature - C lapse-rate tropopause potential T - K lapse-rate tropopause sat. vmr - ppmv cold-point tropopause pressure - hPa cold-point tropopause height - m cold-point tropopause temperature - C cold-point tropopause potential T - K cold-point tropopause sat. vmr - ppmv minimum sat. volume mixing ratio - ppmv 18 km pressure - hPa 18 km temperature - C			
Quantum yields for production of O(1D) in the ultraviolet photolysis of ozone	<a href="http://www.sparc.sunysb.edu/html/QY_O1D/index.html">http://www.sparc.sunysb.edu/html/QY_O1D/index.html</a>	Coefficients and fitting expressions	Quantum yields for production of O(1D) in the ultraviolet photolysis of ozone: Recommendation based on evaluation of laboratory data	<a href="http://www.sparc.sunysb.edu/html/QY_O1D/index.html">http://www.sparc.sunysb.edu/html/QY_O1D/index.html</a>	Yes	No
Assessment of Stratospheric Aerosol Properties	<a href="http://www.sparc.sunysb.edu/asap/index.html">http://www.sparc.sunysb.edu/asap/index.html</a>	Satellite data	Aerosol extinction and derived quantities Stratospheric Aerosol Record and Climatology Stratospheric Aerosol Trends	<a href="http://www.sparc.sunysb.edu/asap/SAGE-ASAP%20Data%20Products.htm">http://www.sparc.sunysb.edu/asap/SAGE-ASAP%20Data%20Products.htm</a>	Yes	No

### Global Projects Datasets

Regional Project name	Regional Project website	Type of data	Data Fields	Link to dataset (if appropriate)	Metadata available ?	Metadata searchable ?
CCMVal Archive	<a href="http://www.pa.op.dlr.de/CCMVal/">http://www.pa.op.dlr.de/CCMVal/</a>	CCM output	Primary meteorological variables plus chemical species.	<a href="http://www.pa.op.dlr.de/CCMVal/Guidelines_CCMValCollaborators.html">http://www.pa.op.dlr.de/CCMVal/Guidelines_CCMValCollaborators.html</a>	Yes	Access by username /password

