

INTEGRATED GLOBAL DATA DISSEMINATION SERVICE (IGDDS)

(Submitted by WMO)

Summary and Purpose of Document

The present working paper introduces the Implementation Plan of the Integrated Global Data Dissemination Service (IGDDS).

The purpose of the IGDDS Implementation Plan is to describe the technical and programmatic baseline for the IGDDS. It recalls the background and agreed scope of IGDDS, lists high-level requirements, existing assets, risk factors, proposed actions and organization to implement this project. In order to ensure full consistency with ongoing developments of the WMO Information System (WIS), this Implementation Plan was prepared by the WMO Space Programme Department in consultation with the World Weather Watch Department.

Highlights of this Implementation Plan were presented to the CBS/OPAG ISS/Expert Team on WIS and GTS Communication Technique and Structure (ET-CTS) in April 2006 in Tokyo, were reviewed at the IGDDS-RARS workshop on 31 August-1 September 2006 in Geneva and presented at the joint second session of CBS/OPAG IOS/Expert Teams on Satellite Utilization and Products (ET-SUP-2) and on Satellite Systems (ET-SAT-2). The plan was further reviewed in detail by ET-SUP-2 in order to check that it adequately reflects users' expectations and that the implementation actions represent a sound way forward to which WMO Members and CGMS can be expected to adhere.

CGMS Members are invited to review and comment this Implementation Plan as appropriate, and to confirm their readiness to contribute to its actual implementation. Furthermore, CGMS is invited to note and comment the intention of WMO to establish an IGDDS Implementation Group including representatives of operators of IGDDS components, with WMO Secretariat representing IGDDS users, for which draft Terms of Reference are provided.

- Appendices:**
- I Presentation note on IGDDS and WIS
 - II IGDDS Implementation Plan
 - III ET-SUP 2 comments on IGDDS Implementation Plan
 - IV Draft Terms of Reference for the IGDDS Implementation Group.

DISCUSSION

Background

1. Background information on IGDDS is given in Appendix I and in Section 2 of Appendix II, it is therefore not repeated here.
2. Past discussions on IGDDS have allowed to clarify its scope and expected outcome, to refine the approach towards implementation of a global network of interoperable broadcasting services by telecommunication satellites (Advanced Dissemination Methods), and to further the concept and practical approach of Regional ATOVS Retransmission Services (RARS).
3. The present paper focuses on the IGDDS Implementation Plan, which is contained in Appendix II. It reports on the outcome of the 3rd IGDDS-RARS workshops and of the 2nd meeting of the Expert Team on Satellite Utilization and Products (ET-SUP-2) on this subject. Comments from ET-SUP-2 are contained in Appendix III.
4. Furthermore, in order to efficiently monitor the progress on IGDDS Implementation, to provide guidance and keep the risk under control, it is planned to establish an IGDDS Implementation Group. Draft Terms of reference for such a group are provided in Appendix IV, for consideration by CGMS. RARS issues are addressed in WMO WP-28.

Major relevant events

5. In accordance with CGMS Action 33.23, the 2nd global RARS-IGDDS workshop was held in Geneva on 1-2 December 2005 and included a session on ADM with participation of Asia-Pacific countries. It was then planned to set up a regional dissemination trial for Asia-Pacific countries, based on DVB-S broadcast complemented by Internet dissemination.
6. EUMETSAT has implemented an EUMETCAST service in C-band over the Americas, for a 3-year trial period (2006-2008). EUMETSAT furthermore proposed EUMETCAST as the backbone of a GEO-NETCast dissemination service for all GEO societal benefit areas. NOAA has made progress on the preparation for an ADM and on its contribution to GEO-NETCast.
7. The WMO Space Programme was invited as an observer at the 14th North-America Europe Data Exchange meeting on 3-5 May 2006 and the 7th Asia Pacific Data Exchange and Utilization meeting on 21-22 September 2006. These meetings are seen as efficient models for reviewing regional requirements for data exchange.
8. The 3rd global IGDDS-RARS workshop was held in Geneva on 31 August-1 September 2006. The workshop noted updates from EUMETSAT and NOAA, as well as a presentation by a representative of the GEO-NETCast initiative. The workshop expressed the need for an IGDDS Implementation Group maintaining coordination with WIS and CGMS. It reviewed the IGDDS Implementation Plan and proposed further details to its tasks. It renewed its recommendation for a regional ADM trial in Asia-Pacific. JMA informed the workshop that it had significantly increased its GTS link bandwidth and will make satellite observation data widely available to NMHSs via the Internet as of March 2007.

Implementation Plan

9. In a context of steadily improving communication capabilities and of interrelated initiatives for data dissemination, namely within the GEO GEOSS framework, it is felt essential that WMO keeps a clear record of its essential user requirements and provides a reference framework to monitor the implementation of IGDDS, taking benefit of current opportunities in a pragmatic way while ensuring that the agreed IGDDS objectives are met.

10. The IGDDS Implementation Plan contained in Appendix II is submitted to CGMS for review and endorsement. The Plan addresses the following topic:

- Background;
- Scope of IGDDS;
- IGDDS High-level Requirements;
- IGDDS Baseline;
- Current Assets;
- Implementation Actions;
- Risk Management;
- Document Plan;
- Resources;
- Project Steering;
- Implementation Schedule

11. The schedule was based on the assumption that the 3rd global RARS-IGDDS workshop would take place mid-2006 and the Implementation Plan adopted at that time. The workshop had to be postponed until September 2006 and the schedule thus slipped by at least one quarter.

12. Reviewing this draft Implementation Plan, the 3rd global IGDDS-RARS workshop suggested to assign the key actions to the following actionees:

IGDDS Implementation Plan Key Actions		Actionee
A1. Data Requirements	(A1.1 and A 1.3) Consolidate initial data requirements and estimate future data rates (A 1.2) Set up an RRR process at regional level	(A1.1 and A1.3) ET-SUP, APSDEU, NA-EUR (A1.2) RA-x WG-WWW
A2. Data Concentration	(A 2.2) Implement RARS in Asia-Pacific and South America (A 2.3) Enhance real-time access to relevant R&D satellite data (A2.4) Enhance inter-regional exchange between (Sat) DCPC	(A2.2) RARS Implementation Group – see specific RARS implementation actions/projects (A2.3) WSP + ET-SAT, ET-SUP, CGMS (A2.4) CGMS and WSP
A3. Data Dissemination	(A3.2) Complete quasi-global ADM coverage (A3.5) Ensure availability and affordability of HW and SW receiving devices (A3.3) Risk analysis and back-up arrangements to ensure robustness of dissemination architecture (A3.4) Agree harmonized formats and other standards as appropriate	(A3.2) & (A3.5): See specific ADM projects/actions (A3.3) CGMS, (ET-CTS, ET-SUP, ET-SAT) (A3.4) CGMS WG Codes, IPET-MI, ET-CTS
A4. User/Data Management and Quality of Service	(A4.1) Support user service enhancement (A4.2) Ensure compatibility with overall WIS data management requirements (metadata, catalogue standards...) (A4.3) Agree quality of service targets and monitor their achievement	(A4.1) Satellite operators running ADM, ET-SUP (A4.2) CGMS + ET-WISC (A4.3) IGDDS/RARS workshop, CGMS

IGDDS Implementation Plan Key Actions		Actionee
A5. Coordination, Information	(A5.1) Inter-regional coordination	(A5.1) CGMS, WSP
	(A5.2) Reporting to CBS, CGMS, CM	(A5.2) WSP
	(A5.3) Communication to Users and coordination with relevant GEO activities (GEO-NETCast)	(A5.3) WSP, Operators, WSP
	(A5.4) Demonstration Activities	(A5.4) Operators

13. The Implementation Plan was reviewed in-depth by ET-SUP-2, who welcomed this plan, while suggesting to detail it further on many points, as recorded in Appendix III.

IGDDS Implementation Group

14. Section 11 of the draft Implementation Plan addresses project steering mechanisms and proposes establishing a RARS-IGDDS Implementation Group.

15. It is, however, felt that RARS and IGDDS implementation are two different issues and should not necessarily be followed by the same experts. While RARS is a very specific topic to the satellite community, the IGDDS is part of a wider WIS framework and needs to be addressed by experts with a strong telecommunication focus. It is thus no longer assumed that the RARS-IGDDS Implementation group is a unique group, although there might be practical advantages in combining RARS and IGDDS implementation meetings.

16. It is considered that IGDDS Implementation Group would include experts nominated by organisations contributing to IGDDS components, with WMO Secretariat representing the user community. Draft Terms of reference for an IGDDS Implementation Group are provided in Appendix IV. Draft Terms of reference for a RARS Implementation Group are provided in WMO WP-28.

Conclusions

17. CGMS members are invited to

- note the description of IGDDS and its relations to WIS (see Appendix I);
- review the IGDDS Implementation Plan (See Appendix II) and consider how to contribute to its successful implementation;
- take into account as appropriate the comments made by ET-SUP-2 (see Appendix III);
- review the proposed Terms of Reference for an IGDDS Implementation Group (see Appendix IV) , also bearing in mind the proposed RARS Implementation Group, and advise as appropriate.

NOTE ON IGDDS AND ITS RELATIONS TO THE WIS

SUMMARY

1. The WMO Integrated Global Data Dissemination Service (IGDDS) is both a system and a project.
 - IGDDS, as a system, is the circulation scheme of space-based observation data and products for WMO programmes. It is one of the components of the WIS;
 - IGDDS, as a project, is the set of activities directed towards the definition and operational implementation of the IGDDS system.
2. IGDDS addresses different functions, as required for a consistent approach:
 - Data acquisition (raw data from satellites, high-level products, inter-regional data exchange);
 - Data dissemination (via telecom satellite broadcast, via Direct Broadcast, or, via point-to-point networks);
 - Data access, on request, allowing data discovery and delivery to authorized users;
 - Data and user management including user requirements review, interoperable catalogue, ensuring service quality and user support.
3. The baseline for IGDDS is a collection of regional* components linked in a global network for inter-regional data exchange. Each regional component will include a Data Collection and Product Centre (DCPC) as defined in WIS and will ensure routine dissemination by various means including an ADM covering its region.
4. Activities under the IGDDS project include namely the expansion of the Rolling Requirements Review process to express regional data needs, the expansion of the Regional ATOVS Retransmission Service (RARS) concept towards a global coverage, the implementation of a global Advanced Dissemination Method (ADM) coverage and the appropriate global coordination among satellite operators of the Coordination Group for Meteorological Satellites (CGMS) and WMO to ensure interoperability along WIS agreed standards.

IGDDS DESCRIPTION

5. The WMO Integrated Global Data Dissemination Service (IGDDS) is both a system and a project:
 - IGDDS, as a system, is the circulation scheme of space-based observation data and products for WMO programmes. The IGDDS concept was initially proposed by WMO satellite user expert groups and refined by satellite operators within CGMS. Since WMO has defined the concept of a WMO Information System (WIS) as an overarching framework for all its data exchange and management, IGDDS is one of the components of the WIS;
 - IGDDS, as a project, is the set of activities directed towards the definition and operational implementation of the IGDDS system.

* In the above text, the words "region" and "regional" without a capital R are understood in a general meaning, not necessarily matching with a WMO Region. The geographical extent of each region depends on technical constraints such as footprints of available telecommunication satellites.

Main functions of the IGDDS system

6. The following main functions need to be fulfilled for space-based observation data and products:

- **Data acquisition:** Raw data are acquired from satellites, higher level data or products are acquired from product generating centres, and foreign satellite data or products are acquired at inter-regional scale from retransmitting centres;
- **Data dissemination:** Routine near-real time dissemination (PUSH mode) is a core component of IGDDS. This relies on ADMs, on point-to-point message distribution through the GTS and on Direct Broadcast from the meteorological satellites;
- **Data access on request:** This includes access to data catalogues and metadata. It allows data discovery and delivering data on request (PULL mode) to authorized users;
- **Data and user management:** This includes a number of services such as running a Rolling Requirements Review process, maintaining an interoperable catalogue, ensuring service quality, administering a user database and providing user support.

IGDDS, an integral part of the WIS

7. From a user point of view, the IGDDS system is fully integrated into the WIS, since space-based observation data are an integral and central part of meteorological observation data used for WMO operational and research activities. Moreover, when dealing with “products”, i.e., higher-level processed data, the distinction between space-based and in situ data becomes less relevant, in particular when observation data are merged and analyzed through assimilation models.

8. This implies that the IGDDS system should rely on the same data distribution capabilities and mechanisms as other components of the WIS, unless there are particular needs or advantages to use specific solutions.

9. For example, the high data rates required to routinely disseminate satellite imagery has driven the use of cost-efficient, scalable, systems such as Digital Video Broadcast by telecommunications satellite (DVB-S), which are designated within the WMO Space Programme as Advanced Dissemination Methods (ADM). There is, however, evidence that these techniques are not used exclusively for dissemination of space-based data and products. They are used by WMO Members to distribute non space-based information. In most cases, space-based and non space-based information are sharing the same support.

10. Reciprocally, while the point-to-point GTS is massively used to transmit conventional (non-satellite) data, it also supports the transmission of essential space-based products such as satellite soundings or atmospheric motion vectors.

Relevance of an IGDDS project

11. Identifying the IGDDS within the WIS does not mean that it is a separate system, but that the work towards its definition and implementation is pursued as a particular project with a clear focus on addressing the specific requirements and issues posed by space-based observation data. Coordination within WMO, through the Inter-commission Coordination Group on the WMO Information System (ICG WIS), shall ensure that IGDDS is developed in full consistency with and as an integrated component of the WIS, avoiding unnecessary duplication of effort but ensuring synergy.

12. The IGDDS is addressed as a specific project within the WIS in order to take due account of:

- the commitment of satellite operators to deliver an end-to-end service from acquisition down to dissemination, and the resulting need to identify and link these functions for space-based data and products in particular;
- the established dialogue within CGMS, which helps to develop a globally coordinated approach among satellite operators and WMO;
- specific requirements such as the large volume of current and planned satellite data, which make them a sizing factor;
- the need to address, as part of IGDDS, direct broadcast systems that are totally specific to meteorological satellites.

13. An IGDDS Implementation Plan has been drafted, in coordination with the WIS project, in order to help develop a common vision and serve as a reference for activities to be pursued within the IGDDS project. The Implementation Plan (IP) lists the IGDDS requirements, lists the foreseen activities and provides a framework to control the progress towards completion of the project.

WMO high-level requirements for IGDDS

Data acquisition

- capability to access all relevant data from the space-based component of the Global Observing System (GOS [(LEO, GEO, R&D data and high-level products)]);
- capability to access data from and to any WMO Region through inter-regional data exchange arrangements.

Data dissemination

- coverage of all continents in all WMO Regions by ADMs (typically DVB-S and IP based);
- ADMs usable with openly available and affordable user terminals;
- ADMs with priority handling scheme allowing the efficient integration of multiple data flows;
- Complementary dissemination means such as Direct Broadcast and the Internet;
- Internationally agreed formats;
- Operational continuity.

Data access, on request

- Data discovery;
- Retrieval of recent or archived data.

Data and user management

- Rolling Requirements Review (RRR) process to capture evolving needs at regional level;
- Catalogue interoperability and use of WIS metadata conventions;
- Scalable dissemination content in response to user needs
- Access control;
- User services for registration and user support;
- Quality of service monitoring;
- Global coordination within WMO.

IGDDS baseline

14. The IGDDS shall be a collection of regional *components linked in a global network allowing inter-regional data exchange. Each regional component will include a Data Collection and Product Centre (DCPC) as defined in WIS and perform routine dissemination by various means including at least an ADM covering the region.

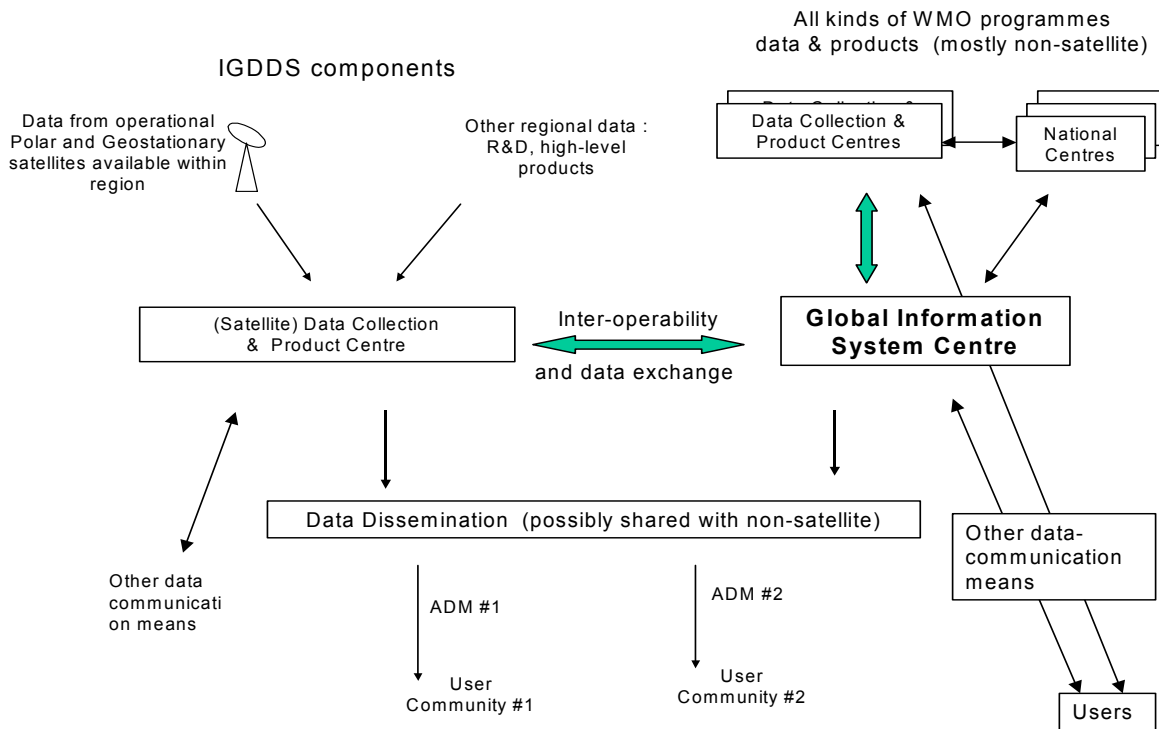


Figure 1: IGDDS within the WIS structure

Key activities of the IGDDS project

15. The IGDDS project aims at implementing a complete IGDDS system in an incremental way, building upon the existing assets already made available by several WMO Members and satellite operators. Taking into account these assets and avoiding any duplication of effort with the on-going WIS activities, the IGDDS project shall focus its activities on following tasks:

Data requirements

- Establishing a regional RRR process for expressing and reviewing regional data needs.

Data acquisition

- Enhancing Inter-regional data exchange arrangements;
- Expanding the RARS concept towards a global coverage, with interoperable standards:
 - o Primary focus on Asia-Pacific and South-American areas;
- Ensuring real-time access to relevant R&D satellites data.

Data dissemination

- Expanding the ADM network towards a global coverage, with harmonized standards.

* See Footnote in page 1

Data and user management

- Developing WMO metadata standards for space-based observation data and products;
- Developing data catalogues enabling data discovery and access;
- Implementing WIS recommendations to undertake the relevant DCPC functions;
- Supporting User Service enhancement.

Coordination and information

- Overall project overview;
- Reporting to CGMS, CBS, Consultative Meetings on High-level Policy on Satellite Matters;
- Keep WMO Members informed;
- Ensure coordination with non-IGDDS WIS activities;
- Provide input to relevant GEOSS activities.

IGDDS project control

16. IGDDS being developed and implemented on a best-effort basis, project control has to be understood as a set of measures to monitor progress, highlight risks, and evaluate compliance to the requirements. Proper linkage has to be maintained with:

- satellite operators, being the core contributors to the system;
- user communities whose requirements should be responded to the extent affordable;
- technical experts and WMO Secretariat, to support the overall project.

17. IGDDS is regularly reviewed by OPAG IOS/ET-SUP and by the CGMS Working Group on Integrated Strategy for Data Dissemination. For a more detailed monitoring, it is being considered to establish an IGDDS-RARS implementation group and an ICG/WIS IGDDS subgroup.

**INTEGRATED GLOBAL DATA
DISSEMINATION SERVICE
IMPLEMENTATION PLAN**

WMO Space Programme

June 2006

Document change record

Modification	Version	Date	Validation
First cut	Draft A	12/12/05	
Add document plan and requirements	Draft B	19/12/05	
Add risk table and preliminary schedule	Draft C	03/01/06	
Add DH comments, detailed tasks, project steering	Draft D	01/03/06	
Add JMR comments and picture	Draft E	16/05/06	
Review JL, RH, JMR	Draft F	19/05/06	
Reword § 4.3, § 4.4 and § 7 A4.2	Draft G	12/06/06	
Editorial	Draft H	18/08/06	

TABLE OF CONTENTS

1	Introduction	4
2	Background	4
2.1	Evolution of satellite data dissemination concepts	4
2.2	Principle and advantages of the ADM approach	4
2.3	WMO Executive Council references to IGDDS	5
2.4	GEO references to IGDDS	6
3	Scope of IGDDS.....	6
3.1	IGDDS definition and goal.....	6
3.2	IGDDS approach and objectives	6
3.3	Role of the WMO Space Programme for IGDDS	7
4	IGDDS high-level requirements	7
4.1	Data concentration and exchange	7
4.2	Data dissemination	8
4.3	Data access on request.....	8
4.4	Data and user management.....	8
5	IGDDS baseline	9
5.1	IGDDS architecture	9
5.2	IGDDS functions	9
6	Current assets	10
7	Implementation actions	12
7.1	Summary list of actions	12
7.2	Detailed list of actions	12
8	Risk management	16
9	Document plan	16
10	Resources.....	17
11	Project steering	17
12	Implementation schedule	18
13	List of acronyms	0

1. INTRODUCTION

The scope of this document is to describe the technical and programmatic baseline for the implementation of the Integrated Global Data Dissemination Service (IGDDS) for satellite data and products, in accordance with the WMO Space Programme Implementation Plan 2004-2007, which requested “that the coordination of the design and implementation of an IGDDS is handled as a specific WSP project.”

It builds on IGDDS implementation elements contained in the WMO Space Programme Implementation Plan 2004-2007 (WSP-IP) as well as on the outcome of the first meeting of the CBS/OPAG IOS Expert Team on Satellite Utilization and Products (ET-SUP-1) and of the 33rd meeting of the Co-ordination Group for Meteorological Satellites (CGMS-XXXIII). This document is expected to be updated as the project develops.

2. BACKGROUND

2.1 Evolution of satellite data dissemination concepts

Satellite data dissemination means are subject to regular review.

In the eighties and nineties, a lot of effort was made by WMO and satellite operators, in the framework of CGMS, to allow harmonized access to digital satellite data by direct broadcast from GEO and LEO operational satellites, which ultimately led to the HRIT/LRIT and HRPT/LRPT standards.

Since 2000, several factors drastically changed the context of satellite data dissemination:

- the progress in telecommunications technology with the wide spread development of DVB-S enabling cost-efficient broadcast of high data rates that can be received with low-cost off-the-shelf equipment;
- the increasing number of meteorological satellite systems, implemented or planned by different satellite operators, that cannot be expected to be received with identical Direct Broadcast receiving systems in spite of the standardization effort;
- the confirmed user requirement to access to all available satellite data, without limitation to those spacecraft that are in the field of view of the user.

This suggested having the dissemination function performed through satellite-based multipoint telecommunications systems that are not aboard the meteorological satellites but borne by telecommunications platforms. This concept, known as Advanced Dissemination Methods (ADM), emerged in discussions of the Expert Team on Satellite Utilization and Products and was proposed as a new baseline for data access, and Direct Broadcast would be a complement to ADM. This approach was subsequently recommended by the 13th session of the Commission for Basic Systems (CBS-XIII, St Petersburg, February-March 2005) and endorsed by EC-LVII as part of the WSP-IP.

Several satellite operators and WMO Members have now implemented ADMs.

2.2 Principle and advantages of the ADM approach

The principle of ADM is to broadcast data through commercially available telecommunications satellites, using non-specific and up-to-date telecommunications standards and technology. Current ADM services are based on Digital Video Broadcast (DVB) standard and Internet Protocol (IP) file transfer protocol. ADMs are expected to be complemented by terrestrial means including e.g., the Internet.

The advantages of the ADM approach include:

- Scalability – the communications infrastructure can be progressively upgraded to match the planned increase in data volumes;
- Accessibility – the availability of standard user terminals, which make data access affordable for a larger number of users. This greater accessibility could also alleviate the need for the internal redistribution of very large volumes of data;
- Flexibility – because of the separation of the observing satellite and the dissemination platform the dissemination scheme can be modified/enhanced without impact on the observational satellite. Reciprocally, changes occurring in the space-segment can have a minimum impact; the concept would allow seamless inclusion of new data flows such as data and products from the relevant R&D environmental satellites to complement the existing operational data and products;
- Transition planning – the transition between different generations of observing satellites will be facilitated as the same user terminals could be utilised for both generations;
- Robustness - in the event of contingencies on observing system satellites the ADM component would be unaffected in the event of problems with the DB components of the observing system satellites;
- Extension of observing system satellite lifetimes – in some cases the lifetime of observing system satellites is constrained by inclination limits associated with direct broadcasting. As ADM would be the prime dissemination mechanism, in such cases, the useful lifetime of the observing system satellite could be extended.
- Optimization: commercial systems are relying on telecommunications techniques, which may be optimized to the geographical dissemination area and specific constraints. For instance, C-band frequencies are used in inter-tropical areas to minimize heavy rain attenuation instead of Ku-band at higher latitudes
- Frequency allocation: using available telecommunications services allows disseminating higher data rates without requiring radio frequency allocations dedicated to scientific services. The protection and allocation of radio frequencies can thus be concentrated on those frequency bands that are specifically necessary to meteorological and related Earth exploration applications.

Furthermore, one characteristic of ADMs is that they are not specific to satellite data, unlike the Direct Broadcast methods. This opens the way to an integrated approach to data access. The same equipment should allow access to not only data from GEO and LEO operational satellites, as well as R&D satellites but, and with the same logic, integration can be sought with distribution of any combined products as well as non-satellite data. Furthermore, a regional dissemination service can contain data originating from any other region, as long as the relevant data flows are made available at the uplink centre. The ADM approach thus leads to the concept of Integrated Global Data Dissemination Service (IGDDS).

2.3 WMO Executive Council references to IGDDS

The IGDDS is addressed in the WSP-IP, which was endorsed by the 56th session of the WMO Executive Council (EC LVI): *“In order to ensure that [the ADM] initiatives result in a dissemination system that is optimized with respect to the needs of the global user community, it is appropriate to consider the possible shape of an Integrated Global Data Dissemination Service (IGDDS) which builds on the ADM concept.(...) The concept of IGDDS is seen as central to the vision of an integrated space-based component of the Global Observing System as it will facilitate the access to the complete range of data and products from this component of the GOS.”*

The WSP-IP suggests an outline architecture and a way forward with detailed recommendations to refine the definition and implement the IGDDS in cooperation between WMO and satellite operators, under the auspices of both CGMS and the Consultative Meetings on High-level Policy on Satellite Matters (CM). The IGDDS should be based on consolidated requirements taking due account of regional and global requirements for observational data, and of relevant obligations stemming from the WMO Information System (WIS) for example in terms of metadata standards, catalogue interoperability, data exchange protocols and data content and format. These recommendations and suggestions are taken into account in the present IGDDS Implementation Plan.

Furthermore, the necessary articulation between IGDDS and WMO Information System was addressed at the 57th session of WMO Executive Council (EC-LVII): [the EC] *“emphasizing the important role of satellite-based data-distribution systems and noting with appreciation their extensive implementation and the significant technological upgrades (e.g., DVB-S) that were achieved, urged CBS to pursue the coordinated integration of these systems, in particular, the new Integrated Global Data Dissemination Service (IGDDS), into the GTS/WIS as components for the distribution of a large volume of information.”*

2.4 GEO references to IGDDS

As access to Earth Observation data is a key aspect in the vision of the Group on Earth Observation (GEO) Global Earth Observation System of Systems (GEOSS), the GEOSS work plan for 2006 also makes explicit reference to the IGDDS and its articulation to GEO-NETCast: Task WE-06-04, as part of the Weather Societal Benefit Area, is to *“support the development of Advanced Dissemination Methods (ADM) as part of an operational Integrated Global Data Dissemination Service (IGDDS) as a component of the WMO Information System (WIS) and a contribution of the WMO Space Programme to GEO-NETCast”*.

3. SCOPE OF IGDDS

3.1 IGDDS definition and goal

The Integrated Data Dissemination Service (IGDDS) defines the satellite data and products circulation scheme that is expected to meet the needs of WMO Programmes, within the WMO Information System (WIS), in accordance with the WMO Space Programme Implementation Plan 2004-2007 agreed by WMO EC-LVI.

3.2 IGDDS approach and objectives

IGDDS stems from a vision that was developed within the CBS/OPAG IOS Expert Team of Satellite Systems, Utilization and Products and subsequently endorsed by CBS-XIII, CM-6 and CGMS, in order to meet growing needs to provide cost-efficient access to large data volumes in near real time.

Unlike an industrial project with a top-down global architectural design with detailed interface specifications, IGDDS is implemented in a pragmatic and incremental way by satellite operators in cooperation with WMO.

IGDDS shall aim at the following particular features:

- Integrated: the service shall offer unified access to the various sources of data, including operational GEO or LEO satellites, R&D satellites, or higher level products. It should be sufficiently open to be able to deliver other types of data if appropriate, thus allowing non-satellite data and products to benefit from the service as well.

- Global: in view of increasing needs to access data from the whole globe IGDDS shall provide a mechanism for inter-regional data exchange in such a way that observational data from any region could be also available in any other region.
- Data: the IGDDS shall address the communication segments supporting data transfer at any level, i.e. raw data originating from data sources, higher level data disseminated to the users, as well as low or high level data exchanged between production centres within a region or at inter-regional scale. Although not explicitly mentioned in the acronym, IGDDS may thus include data concentration and data exchange networks in addition to data dissemination means.
- Dissemination: a core functionality of the IGDDS is routine dissemination of satellite data in real time. A preferred method for this routine dissemination is to use commercially available technologies such as Digital Video Broadcast via satellite (DVB-S). This is referred to as Advanced Dissemination Methods (ADM). In order to serve the needs of different user communities and regions having different contexts, IGDDS may have to rely on different and complementary data access mechanisms. Interactive access will complement the routine dissemination by ADM.
- Service: each satellite operator within the IGDDS shall ensure and monitor a high quality of service and provide a User Service.

IGDDS shall be part of the overall WMO Information System. This will imply, in particular, a harmonized approach of data and metadata management ensuring interoperability with the Global Information Service Centres (GISC).

Having regard to the large volumes of data they are responsible for, it is expected that satellite operators will act within the WIS as Data Collection and Product Centres (DCPC) and satisfy the DCPC requirements as defined within the WIS.

3.3 Role of the WMO Space Programme for IGDDS

The specific role of the WMO Space Programme with respect to IGDDS is:

- to assist in the planning and to monitor and facilitate the implementation of the various components of IGDDS;
- to ensure that IGDDS addresses global and regional data access requirements from all WMO Regions and all WMO programmes;
- to support harmonization and the adoption of standards as appropriate towards achieving a globally coordinated system, to ensure in particular that IGDDS is included in the broader framework of the WMO Information System and consistent with WMO's strategy to contribute to GEOSS.

4. IGDDS HIGH-LEVEL REQUIREMENTS

4.1 Data concentration and exchange

- (a) Capability to concentrate data from all following types of sources:
- operational GEO systems;
 - global (recorded on-board) data from operational LEO systems;
 - regional retransmission of direct broadcast data from polar-orbiting satellites (i.e., RARS allowing timely access to polar-orbiting sounder data, and similar);
 - R&D or environmental satellite;
 - Products derived by regional or national processing centres.

- (b) Capability to include data from all regions through inter-regional exchange arrangements;
- (c) Data from every DCPC are made available to any other DCPC for inter-regional data exchange, taking due account of data ownership

4.2 Data dissemination

- (a) All continents in all WMO regions should be covered by ADM;
- (b) Coverage by ADMs or other means (direct broadcast or point-to-point lines) should be extended to the full globe (incl. Oceans, islands,..) to the extent practical;
- (c) Data from multiple sources should be integrated in a limited number of shared ADM dissemination systems;
- (d) ADM user terminals (hard- and software) should be openly available at affordable prices;
- (e) For the foreseeable future, ADM will rely on Digital Video Broadcast by Satellite (DVB-S) and Internet Protocol (IP). (With reference to the Open Systems Interconnection (OSI) model of the International Standards Organization (ISO), this requirement refers to the "Transport Layer");
- (f) Data disseminated via ADM shall be in internationally agreed formats. (With reference to the OSI model of ISO, this requirement refers to the Session and Application layers);
- (g) ADM should provide optimal timeliness through data priority-handling scheme;
- (h) Dissemination services should be reliable and continuously available as required for operational use.

4.3 Data access on request

- (a) Data discovery should be possible for any user;
- (b) Archived or recent data should be accessible on-demand for authorized users.

4.4 Data and user management

- (a) A Rolling Requirements Review process shall be established for regional data needs and inter-regional data exchange in order to plan the evolution of telecommunication links in a cost-efficient way;
- (b) A mechanism should be established to determine the agreed dissemination data content in response to the Rolling Requirements Review process;
- (c) Metadata should be associated with data in accordance with WIS internationally agreed standards;
- (d) Data catalogues should be implemented in an interoperable way to allow consultation, in accordance with WIS agreed standards;
- (e) User Service capabilities should include user registration and user support, as well as subscription for routine real-time dissemination;
- (f) Dissemination will include access control enabling to provide data and products selectively to user profiles, in accordance with the data policy of the owner of the data/products and with WMO Resolution 40 (Cg-XII);
- (g) Quality of service should be permanently monitored as per availability, continuity, error rate, timeliness;
- (h) IGDDS operation and evolution will be coordinated within WMO.

5. IGDDS BASELINE

5.1 IGDDS architecture

IGDDS shall be a global network made of a collection of regional components, the functions of which are detailed in the following section. Each regional component shall include dissemination services addressing the data needs of a particular geographical area. The geographical area of each regional component does not necessarily match with the delineation of one or several WMO Regions, but all areas taken together should ultimately cover all WMO Regions.

Bearing in mind the regional nature of user communities of operational meteorological GEO satellites, as well as the typical footprints of commercially available telecommunications satellites, it is considered that the IGDDS should be based on at least 4 regional components covering e.g., the following areas, with the possibility of some inter-regional overlap that could facilitate inter-regional data exchange:

- Europe, Africa and East-Atlantic (approx. around 0°);
- North-, Central-,South-America, East-Pacific and West-Atlantic (approx 90°W);
- East-Asia, West-Pacific and Australia (approx around 120° E);
- West- Asia and Indian Ocean (approx around 76° E).

5.2 IGDDS functions

Each regional component shall consist of the following functions:

- acquiring data;
- exchanging data with other regional component;
- ensuring data and user management, and end-to-end monitoring;
- ensuring data dissemination over its agreed area.

Each regional component shall be operated by a centre acting as a Data Collection and Product Centre (DCPC) within the WMO Information System (WIS).

For data sources that are received by the organisation in charge of the DCPC itself (NMHS or satellite operator), the data concentration segment is internal to this organisation and is out of the scope of IGDDS.

In other cases, data concentration may be achieved by establishing a link with third parties with appropriate receiving and processing capability.

This third party can be, for example, a DCPC located in another region.

Routine dissemination will be performed by the following means:

- Multicast routine dissemination over a certain area, using one or several complementary Advanced Dissemination Methods;
- Direct broadcast from meteorological satellites;
- Dissemination via other WIS components, (e.g., the GTS or its evolution).

ADMs would make use of the most cost-efficient available communications technology. In the short term, it would consist of Digital Video Broadcast via Satellite (DVB-S) by commercial telecommunications operator, complemented as appropriate by terrestrial means.

6. CURRENT ASSETS

ADM are operated by EUMETSAT over Europe and Africa and are being extended to South-and North America in 2006-2008.

ADMs are operated by NMHS of several WMO Members (France, Italy, Russia) to distribute meteorological information including satellite products to local offices and external users over Europe, Africa or Asia. Other systems are implemented for national use (e.g., by Thailand, Indonesia, Turkey).

An ADM is operated by CMA over China that includes data from multiple satellites. A trial, to be led by CMA, is planned in 2006 for an ADM covering the Asia-Pacific regions.

NOAA have made studies for an ADM covering the Americas and Pacific Islands.

A RARS is implemented by EUMETSAT to collect HRPT data from a large part of the Northern Hemisphere and to redistribute these data by satellite broadcast over Europe and by GTS worldwide.

A GTS-based RARS is being implemented over the Asia Pacific region, involving Australia, China, Japan, Korea, and possibly other partners in a later phase.

A GTS-based RARS is being planned over South-America involving Brazil, Argentina and possibly Chile and Costa-Rica at a later stage.

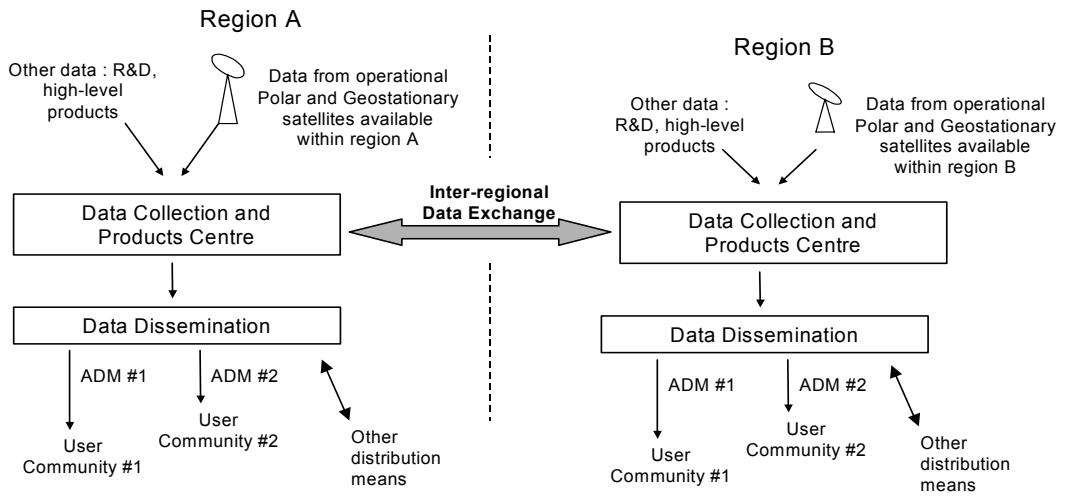
Direct broadcast is implemented on all operational LEO satellites. Direct broadcast is available on all operational GEO satellites except MSG-1 for technical reasons.

Inter-regional GEO data collection is implemented by EUMETSAT in cooperation with several WMO Members.

Requirements for inter-regional data exchange are regularly reviewed on an annual basis by the North-America Europe Data Exchange Requirements Group and the Asia-Pacific Satellite Data Exchange and Utilization meeting (APSDEU) for their respective user communities.

Several satellite operators are involved in WIS GISC pilot projects.

IGDDS regional/global implementation



Schematic diagram of IGDDS components

7. IMPLEMENTATION ACTIONS

IGDDS implementation is broken down as follows: data content, data concentration, data dissemination, management and quality of service, project coordination and information

7.1 Summary list of actions

Table 1: Summary list of tasks

Group of tasks	Task
A1	Consolidating data requirements
	A1.1 Determine initial Data content/formats for regional dissemination
	A1.2 Establish a RRR mechanism for adapting the content for future needs
	A1.3 Estimate data volumes for near-future years
A2	Data concentration networks
	A2.1 Implement operational data feeds (other than RARS)
	A2.2 RARS implementation in Asia-Pacific, Americas, Africa
	A2.3 R&D data feeds: selection and implementation
	A2.4 Inter-regional data exchange mechanisms
A3	Data dissemination architecture
	A3.1 Review existing/planned data access means
	A3.2 Determine nominal ADM footprint responsibilities
	A3.3 Risk analysis and identification of back-up solutions if relevant
	A3.4 Determine standards: interfaces, codes, formats, security handling
	A3.5 Ensure availability of affordable ADM receiving devices
A4	User and Data Management and quality of service
	A4.1 User management: registration and data requests
	A4.2 Data management: metadata and catalogue standards
	A4.3 Quality of service targets
A5	Project coordination and information
	A5.1 Inter-regional coordination
	A5.2 Reporting to CBS, CGMS, CM
	A5.3 Communication to GEO, users, ..
	A5.4 Demonstration actions

7.2 Detailed list of actions

A.1 Consolidating Data Requirements

A1.1 *Determine initial Data content/formats for regional dissemination*

The data dissemination requirements shall be consolidated for each region, taking into account:

- the requirements expressed at regional level by the relevant Regional Associations;
- the WMO requirements for global satellite observational data;
- any other regional satellite observational data for which a dissemination service is currently provided or planned to be provided;
- the formats used and/or recommended for transmitting these data;
- the possible evolution with time resulting from new satellite missions and from user preparedness to exploit these data.

A1.2 Establish a Rolling Requirements Review mechanism for adapting the content for future needs

Ensure that, for every regional service, a user representative body can regularly review the needs with the DCPC and express requirements for new products.

Ensure that a mechanism is available for the DCPC to regularly adapt its dissemination capability and update its content in order to accommodate the evolving requirement.

A1.3 Estimate data volumes for near-future years

On the basis of A1.1, the estimated data flows shall be estimated, for regional dissemination services and inter/regional exchanges, tentatively year by year.

A.2 Data concentration networks

A2.1 Implement operational data feeds (other than RARS)

Ensure timely and reliable data feed of the DCPCs with data from:

- GEO satellites over the region;
- LEO satellites with global data collected in the region;
(If the DCPC is also a satellite operator, the tasks above are fulfilled, as an internal activity, for its own satellites only)
- Products generated for regional use, by National Centres or RSMC

A2.2 RARS implementation in Asia-Pacific, Americas, Africa

Extension of the RARS network towards a global coverage:

- Identification of candidate HRPT stations contributing to a network;
- Arrangements for data concentration (e.g., via FTP over GTS or Internet) in regional or sub/regional processing centres;
- RARS operators standards addressing harmonization of processing software, product formats, quality/tagging, overall RARS service management;
- Global cooperation on product monitoring with the aim to guarantee global consistency of the data sets for global NWP
- Transmission of products to the DCPC for subsequent dissemination.

A2.3 R&D data feeds: selection and implementation

Ensure timely and reliable data feed from R&D satellite data, in accordance with priority requirements. Establish arrangements with relevant R&D space agencies.

A2.4 Inter-regional data exchange mechanisms

Based on requirements identified above (A.1) and taking into account existing mechanisms and infrastructure, identify cost/effective arrangements allowing to concentrate in each region the data required from other regions.

The WMO Space Programme will propose its participation in the North-America – Europe Data Exchange Requirements meeting and the Asia Pacific Data Exchange and Utilization meetings.

A.3 Data dissemination architecture

A3.1 Review existing/planned data access means

For each satellite programme, review the list and main characteristics of data access means that are available or planned including Direct Broadcast, Internet access etc.

A3.2 Determine nominal ADM footprint responsibilities

Taking the baseline dissemination architecture (§5.1) as a starting point, seek voluntary commitment from satellite operators, or consortia including satellite operators, to contribute to the global ADM coverage. Consider alternative dissemination architectures as appropriate, taking into account:

- commercially available telecommunications footprints;
- available data exchange networks;
- cost-efficiency;
- operators' experience;
- regional interests.

A3.3 Risk analysis and identification of back-up solutions if relevant

Carefully analyze the risk associated with the proposed architectures and propose back-up solutions or mitigation measures with a view to ensure that WMO members can rely on the IGDDS as the main source of data for their operational activities, including severe weather warning and disaster mitigation.

Analyze in particular the capability of migrating to new technology when available and appropriate.

A3.4 Determine standards: interfaces, codes, formats, security

Identify minimum standards for interfaces, codes, formats, security handling, to allow:

- Reliability;
- Compatibility with WIS;
- Wide acceptance;
- Easy inter-regional data exchange;
- Easy swap from one ADM service to another in the footprint overlap areas.

A3.5 Ensure availability of ADM affordable receivers

Encourage efforts towards availability of reliable, low-cost receiving stations (hardware and software).

Support exchange of experience and user information.

Monitor the availability and cost of such systems.

A4 User and Data Management and quality of service

A4.1 User management: registration and data requests

Recall WIS requirements for user management including:

- User registration;
- Subscription to broadcast services;
- Data request/reply (archive retrieval)
- Information on systems, products, schedules and formats;

Support the exchange of experience.

Assist the operators in information to users.

A4.2 Data management: metadata and catalogue standards

Develop WMO metadata standards for space-based observation data and products.
Develop data catalogues enabling data discovery and access.
Implement WIS recommendations to undertake the relevant DCPC functions.

A4.3 Quality of service targets

Propose QoS targets
Propose standards for monitoring QoS

A5 Project coordination and information

A5.1 Inter-regional coordination

Establish an IGDDS-RARS Implementation group for the development phase
Establish an IGDDS sub-group within the Inter-Commission Group on WIS (ICG-WIS)
Prepare transition to routine phase where coordination is achieved through CGMS and WMO appropriate entities.

A5.2 Reporting to CBS, CGMS, CM

Report to CBS/OPAG IOS ET-SUP and ET-SAT, and to ICG-WIS, report to CBS and seek guidance
Report to CGMS and seek guidance
Report to CM and seek guidance

A5.3 Communication to GEO, users

Inform GEOSS on the progress of IGDDS as a model for / contribution to/ GEONetCast
Develop a web-page on RARS
Develop a web-page describing the IGDDS and data access in general within the WSP web page.

A5.4 Demonstration actions

Support demonstration actions for: ADMs, RARS, data exchange

8. RISK MANAGEMENT

The following initial risks are identified in Table 2 below, where the status is estimated as Low, Moderate or High according to both its probability and its impact. This table shall be reviewed on a regular basis.

Table 2: identified risks and proposed measures

Ref	Nature of the risk	Mitigation measures	Status
R1	Meteorological satellite operators do not provide complete coverage of WMO Regions by January 2007	Implement IGDDS Implementation Group Address IGDDS at CM and CGMS	High
R2	Integration of all satellite data flows into few broadcast services create single point failure areas	Review architecture with shared responsibility allowing back-up	High
R3	Multiple dissemination means over the same region(s) are not cost efficient for users and operators	Review architecture (ET-SUP, IRIG)	Low
R4	Lack of integration between IGDDS dissemination services and remaining WIS dissemination architecture	Review architecture in parallel with GISC network. Use possible redundancy for back-up (see R2)	High
R5	Data management and dissemination do not meet service requirements	Establish Operators standards and review their implementation (ET-SUP, IRIG)	High
R6	Data content does not meet data requirements	Establish target data contents (ET-SUP, IRIG)	Low
R7	Access to high-level products instead of raw data, with little visibility on the processing	Provide full traceability on the product generation processing	Moderate
R8	Data access affected by data denial	Secure access to Essential Data	High
R9	Receiving devices (hard- and software) not easily available or not reliable	Trials in regional centres	Moderate
R10	User information insufficient	Trials in regional centres	Moderate

9. DOCUMENT PLAN

The following types of documents shall be prepared:

(a) Documents to be maintained and updated during IGDDS Implementation:

Name of the document	Reference	Available versions
IGDDS Implementation Plan	IGDDS-IP	V0
IGDDS- ADM Network Architecture	IGDDS-ANA	
IGDDS- ADM operators standards	IGDDS-AOS	
IGDDS-RARS operators standards	IGDDS-ROS	V1
IGDDS-RARS Requirements	IGDDS-RRQ	V2
IGDDS-Baseline data dissemination content	IGDDS-DDC	
IGDDS-Risk evaluation	IGDDS-RSK	V0

(b) Other documents:

Meeting documents	
Documents for 1 st Global Workshop	December 2004
Documents for 2nd Global Workshop	December 2005
Documents for 3rd Global Workshop	June 2006
IGDDS Technical Notes	IGDDS-TNx
ADM characteristics	IGDDS-TN1
Reports and other information documents	IGDDS-RPx

10. RESOURCES

WMO Secretariat human resources will include:

- The Chief of Space-based Systems division (part time);
- One external consultant (part time);
- Case-by-case support from WWW/ISS on issues of their competence.

WMO financial resources will include support to regional and global workshops as well as IGDDS Implementation Group meetings.

11. PROJECT STEERING

IGDDS implementation would be monitored by two bodies:

- an IGDDS and RARS Implementation Group (IRIG) nominated by CGMS members. The role of IRIG would be to:
 - review and endorse the initial Implementation Plan and its subsequent updates;
 - validate the major IGDDS Project deliverables.
- an internal WMO steering group involving D/SAT (Chairman) and D/WWW with their supporting staff. The role of the Steering group would be to:
 - monitor the progress of the project and advise on any actions necessary,
 - provide guidance and ensure that the actions of WMO Secretariat are fully coordinated across WMO programmes
 - ensure compatibility of the IGDDS project with the overall WMO strategy and its full integration into the WIS.

Relevant CBS OPAG and Expert Teams, Inter-Commission Group, as well as Consultative Meetings and CGMS, will be kept informed on the progress of IGDDS implementation and invited to discuss as appropriate.

13. LIST OF ACRONYMS

ADM	Advanced Dissemination Methods
ATOVS	Advanced TIROS Operational Vertical Sounder
CBS	Commission of Basic Systems
CGMS	Coordination Group of Meteorological Satellites
CM	Consultative Meetings on High-level Policy on Satellite Matters
DCPC	Data Collection or Product Centre (WIS)
DVB-S	Digital Video Broadcast by Satellite
EC	Executive Council
GEO	Group on Earth Observation
GEOSS	Global Earth Observation System of Systems (GEO)
GISC	Global Information System Centre (WIS)
IP	Internet Protocol
IRIG	IGDDS and RARS Implementation Group
IGDDS	Integrated Global Data Dissemination Service
ISO	International Standards Organization
OSI	Open Systems Interconnection (ISO)
QOS	Quality of Service
RARS	Regional ATOVS Retransmission Service
WIS	WMO Information System
WSP	WMO Space Programme
WSP-IP	WM Space Programme Implementation Plan

OUTCOME OF THE IGDDS IMPLEMENTATION PLAN REVIEW BY ET-SUP 2

Extract from ET-SUP-2 Final Report

1. The Joint ETSAT-ETSUP session was informed of the status of the Regional ATOVS Retransmission Service (RARS), the Integrated Global Data Dissemination Service (IGDDS) and its associated Implementation Plan (IGDDS IP). The session also was informed of the conclusions of the Second and Third Global RARS/IGDDS Workshops held in Geneva in December 2005 and August 2006 respectively, concerning RARS and IGDDS, their status in Europe, Asia-Pacific and South-America in particular, as well as plans towards a global RARS and IGDDS coverage.

2. With regard to the IGDDS IP, the session reviewed in depth the concept, goal, objectives and ongoing tasks and activities within IGDDS. A full report on the review is attached (below). The session agreed that the ultimate goal for IGDDS was to facilitate timely access to satellite data and products on a global basis by WMO Members while noting it was a specific objective assigned to the WMO Space Programme. In so doing, near-term IGDDS activities should be focused on extending regional Advanced Dissemination Methods (ADM) to an integrated global data dissemination service for operational and R&D satellites, in close coordination with the Co-ordination Group for Meteorological Satellites (CGMS).

3. The session was pleased to note that IGDDS was a component of the WMO Information System (WIS) responsible for data circulation of satellite data and products. The session also agreed that data circulation should include ADMs, GTS and Internet dissemination methods. The session noted the plans by JMA to increase its GTS link bandwidth towards improved data circulation. The session also recalled that ADMs, while providing near global coverage, would not serve all WMO Members especially in oceanic regions and thus GTS and Internet dissemination was also vitally important. The session strongly supported the need for risk analysis for IGDDS and was pleased to see that it was contained in the IGDDS IP.

4. With regard to the Third Global RARS/IGDDS Workshop held on 31 August-1 September 2006, Geneva, the session reviewed in depth its outcome. The session noted that (...) with regard to ADM, plans need to be finalized in the Asia-Pacific and the Americas. EUMETSAT's EUMETCast was fully operational and now covered Europe, Africa, Eastern America area through Ku and C band. It would continue to cover North and South-America, for the time being, until at least 2008 in C band.

5. The session also reviewed the relationship between IGDDS, RARS, WIS, GEOSS and GEO-NETCAST. Meteorological, hydrological and other environmental data handled by the WIS worldwide on an operational basis would represent a significant part of the overall amount of data of interest for GEOSS. These data being exchanged directly serve the needs of WMO Programmes and contribute as well to many GEOSS objectives, in particular for the weather, water, climate, and disaster societal benefit areas, but also indirectly in most of the other five societal benefit areas. The session noted that WMO was currently involved in two particular tasks related to data management and dissemination within the GEO 2006 Work Plan:

- "Support the development of ADM within IGDDS, as a component of WIS, and a contribution of the WMO Space Programme to GEO-NETCast" (WE-06-04);
- "GEO-NETCast an operational service delivering data and products based on the use of communications satellites" (CB-06-04).

ET-SUP-2 Review of IGDDS Implementation Plan

1. This Appendix contains the ET-SUP-2 review of the IGDDS Implementation Plan, noting the ET-SUP Terms of Reference, as defined by CBS, include the following task in respect of IGDDS:

“Extend the regional Advanced Dissemination Methods (ADM) concept and principles to an Integrated Global Data Dissemination Service (IGDDS) for operational and R&D satellites, in close coordination with the Co-ordination Group for Meteorological Satellites’ (CGMS) standing Working Group on this issue and with WMO Information System (WIS) activities aimed at harmonizing the services to the maximum extent possible”

and noting that the plan will be submitted to CGMS in November 2006.

2. The session endorsed the IGDDS Implementation Plan while noting that overall the implementation schedule was quite ambitious and therefore it was critical that close monitoring and reporting occur by the WMO Space Programme and that regular planning and coordination meetings take place organized by the Space Programme. Also the precise responsibilities need to be identified and highlighted.

3. The session examined the IGDDS Plan implementation actions in detail (see Implementation Schedule in the Plan). Overall, the actions listed represent a comprehensive and suitable list required to achieve the implementation of an operational IGDDS. To enhance the accountability and to ensure listed actions are achieved by the indicated milestones the session suggested the following improvements to the IGDDS Implementation Schedule:

- a list of responsible groups or individuals should accompany each action, including the lead officers or groups;
- each (generic) action (e.g., A1.1 etc.) should itself be subdivided into specific achievable tasks with milestones and those responsible;
- each generic action should be accompanied by a precise list of stakeholders to whom progress is reported at regular intervals.

4. The session also had a number of specific queries concerning a few actions as listed in the Plan:

- for operational data feeds other than RARS (refer A2.1), a succinct plan with goals, and a task list are needed with responsibilities elucidated;
- for R&D data feeds (refer A2.3) draft plan/goals/targets are required to be set by WSP or ET-SUP (working with RARS Implementation Group) including all R&D satellite operators;
- for data concentration networks, a succinct plan (goals/targets) is needed to describe inter-regional data exchange mechanisms (refer A2.4) and to specify the data to be exchanged on a regional scale. A number of issues influenced inter-regional exchange and these include harmonisation of both data formats and ground receiving station technology across ADMs; re-broadcast opportunities (e.g., one region broadcasts its own data and also the data from another RARS region); the requirement for generic and harmonised software for decoding so that users globally require only one reception station;
- the action A3.1 on updating the list of non ADM access means (A3.1) can be reviewed so that WSP clarifies what is meant ;
- for inter-regional coordination (A5.1) it is unclear who is responsible for achievements of that action;
- demonstration actions (A5.4) require milestones which can be extracted from RARS meeting reports.

5. The session also reviewed the risk management component of the IGDDS Implementation Plan. It was recommended that for each risk, "likelihood" and "consequences" (impact) be estimated with a subsequent estimate of the overall risk. Also those units or groups responsible for mitigation measures should be identified together with a monitoring mechanism. As for the scope and nature of risks the session made the following comments:

- the risk of lack of standardisation/harmonisation of both data formats and metadata needed to be included;
- the risk of lack of standardisation/harmonisation of DVB-S ground station hardware and software across ADMs, needed to be included;
- there is a risk that locally received data may not be input to ADMs in accord with milestones so that users would not have access to data to meet their requirements;
- lack of coverage by commercial satellites over some regions of the globe is a known risk or reality requiring management to achieve a global inclusive system;
- inadequate bandwidth for the GTS or Internet for many countries is a real risk that might inhibit inter-regional data flows;
- also for countries that already have extremely limited communications bandwidth, and especially those not under the footprint of commercial satellites, there is a high risk that data access will be compromised - that should be considered and mitigated;
- lack of agreed, comprehensive metadata and traceability are critical risks (refer R7) especially to users. This risk requires a responsible group and coordination mechanism. The overall risk level should be high.

6. Because of its close relationship to IGDDS, the session was also informed of the outcomes and proposed actions from the third meeting of the RARS/IGDDS group (31 August to 1 September 2006, WMO HQ) and noted the excellent progress being made toward implementation of a global RARS system. The EUMETSAT RARS, called EARS, is growing rapidly and has evolved considerably by demonstrating major advances, viz.:

- the number of users continues to rise by about 50 per month;
- it is providing broadcast coverage over Europe, Africa and the Americas until 2008 only, and is expanding its data scope (e.g. AVHRR, ASCAT and IASI after METOP);
- it is delivering AVHRR on a trial basis within 10 minutes using line by line processing at multiple HRPT stations; and
- now using secondary satellite broadcast by taking the signal from a primary DVB-S system and then uplinking it to another satellite which then rebroadcasts to a broader user region

Recommendation: The session noted the importance of DVB-S over the Americas to RA III and recommended its continuation, noting that the current system is provided by EUMETSAT until 2008 pending NOAA-EUMETSAT ADM arrangements.

7. The Asia-Pacific RARS is now running and data are being exchanged between major centres using ftp over the GTS. That RARS will expand by end of 2006. A clear plan has been agreed to advance the development and implementation of the South American RARS, which is a focus of priority to achieve milestones by end of 2007. Argentina and Brazil are leading that RARS. China has agreed to lead the provision of C-band DVB-S broadcast services over the Asia-Pacific Region. NOAA and EUMETSAT are continuing to progress the issue of a permanent ADM service (satellite-based and other conventional means) for the Americas.

8. The session noted a number of parallel and forthcoming meetings to continue the management and coordination of the very rapid developments with RARS and IGDDS systems.

DRAFT TERMS OF REFERENCE FOR AN IGDDS IMPLEMENTATION GROUP

1. An IGDDS Implementation Group is established by the WMO Space Programme in order to support the development and implementation of an Integrated Global Dissemination Service (IGDDS) as agreed by the Executive Council (EC LVI) who requested to consider the possible shape of an IGDDS which builds on the ADM concept [and] is seen as central to the vision of an integrated space-based component of the GOS...” and in accordance with CGMS discussions.
2. The scope of IGDDS project is to define and operationally implement the circulation scheme of space-based observation data and products meeting the needs of WMO programmes.
3. The tasks of the IGDDS Implementation Group are to monitor and provide guidance on the progress of IGDDS and more specifically on:
 - Consolidation of data requirements for each region
 - Data concentration networks, taking namely into account the outcome of RARS activities
 - Implementation and interoperability of data dissemination elements
 - User/Data Management and Quality of Service
 - Overall coordination with WIS,
 - User Information
4. The IGDDS Implementation Group shall be composed of technical experts designated by organizations contributing to IGDDS components and of WMO Space Programme experts representing in particular user communities.
5. The IGDDS Implementation group meets nominally once a year and reports on its activities to CGMS and WMO
6. Unless otherwise agreed, the IGDDS Implementation group will cease its activities when the IGDDS will be fully implemented. Thereafter operational coordination of IGDDS activities will be achieved through the relevant permanent WMO and CGMS mechanisms.