

World Meteorological Organization

XV-RA IV/Doc. 4.5

**REGIONAL ASSOCIATION IV
(NORTH AMERICA, CENTRAL
AMERICA AND THE CARIBBEAN)**

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DEVELOPMENT AND IMPLEMENTATION OF THE NEW WMO INFORMATION SYSTEM

Strategic Thrust 1: Science and Technology Development and Implementation

SUMMARY

ISSUES TO BE DISCUSSED:

1. WIS development and implementation strategy
2. Operation-critical data exchange and management, including GTS, data representation
3. Non real-time data exchange and management

ADDITIONAL FINANCIAL IMPLICATION:

None

DECISIONS/ACTIONS REQUIRED:

- (a) Guidance of WIS development and implementation in Region IV;
- (b) Guidance on development and implementation of operation-critical data exchange and management;
- (c) Guidance on development and implementation of non real-time data exchange and management.

REFERENCES:

1. *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026)
2. *Abridged Final Report with Resolutions of the Sixtieth Session of the Executive Council* (WMO-No. 1032)

CONTENT OF DOCUMENT:**Appendix for inclusion in the final report:**

Draft text for inclusion in the general summary of XV-RA IV

Appendix for information:

XV-RA IV/Rep. 4.5: Progress/Activity Report

DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF XV-RA IV

4.5 DEVELOPMENT AND IMPLEMENTATION OF THE NEW WMO INFORMATION SYSTEM (*agenda item 4.5*)

4.5.1 WIS development and implementation strategy

WIS Implementation Plan, including support to WIGOS

4.5.1.1 The Association recalled that the WIS would provide three fundamental types of services to meet the different requirements, as follows:

- (a) Routine collection and dissemination service for time-critical and operation-critical data and products;
- (b) Data Discovery, Access and Retrieval service;
- (c) Timely delivery service for data and products.

4.5.1.2 WIS implementation should build upon existing WMO information systems in a smooth and evolutionary process. The WIS Implementation Plan has two parts that would be developed in parallel:

- (a) Part A: the continued consolidation and further improvements of the GTS for time-critical and operation-critical data, including its extension to meet operational requirements of WMO Programmes in addition to the World Weather Watch (including improved management of services);
- (b) Part B: an extension of the information services through flexible data discovery, access and retrieval services to authorized users, as well as flexible timely delivery services; it would be implemented essentially through the Internet.

4.5.1.3 The Association noted the considerable progress that occurred in the development of WIS and, in particular, the major steps taken towards the implementation of the first operational Global Information System Centre (GISC) in 2009. It expressed great appreciation for the development efforts made by some RA IV Members through participation in national and/or international pilot projects. It emphasized that all these experiences should be shared among Members planning to be GISCs and/or Data Collection or Production Centres (DCPCs). It urged RA IV Members to focus special efforts and resources on further development of the following key projects:

- (a) Implementation of operational GISCs: 2009–2011;
- (b) Implementation of DCPCs, i.e., WIS interfaces at centres with agreed international responsibilities within WMO Programmes for collecting and/or generating related data and products: 2009-2011.

The Association emphasized the crucial importance of effective communication and outreach efforts to ensure NMHSs understanding of WIS and its benefits to all potential user groups and entities, and it urged the Secretariat and Members involved in the early phase of WIS implementation to invest special efforts to this effect.

4.5.1.4 The Association noted the progress made in the development of the comprehensive WIS Project Plan, including an Implementation Plan. It urged RA IV Members and technical commissions to provide early interaction and contribution at the regional level to the development and consolidation of the WIS Project Plan and WIS Implementation Plan. Noting the financial and human resources that were further needed for ensuring the proper development of WIS, the Association invited RA IV Members and partner organizations to contribute to the WIS Trust Fund. In noting the contributions made by seconded staff, even for a limited duration, to WMO as a whole as well as to individual Members, the Association encouraged Members to provide suitable staff to the Secretariat through secondments.

4.5.1.5 The Association noted that WIGOS was crucially dependant upon effective WIS support and services, e.g., the specialized data collection means, the generation, collection, management and handling of related metadata and the distribution of and access to the data. It invited RA IV Members to contribute, in coordination with ICG-WIS, the EC Working Group on WIGOS-WIS and relevant TCs activities, to ensure that the WIS elements and components required respectively for the implementation of the WIGOS pilot projects were developed and coordinated to meet the respective projects' aims and requirements.

Regulatory and guidance documentation

4.5.1.6 The Association emphasized the importance of appropriate regulatory and guidance documentation on the WIS. It noted and supported the important building blocks that were developed towards the future "Manual on WIS" including the WIS Compliance Specifications for GISC DCPC and NCs and the WIS Functional Architecture. It noted that CBS re-affirmed the high priority need for the development of the Manual on WIS, based on the experience gained through early WIS implementation.

Involvement of Regional Association IV and NMHSs

4.5.1.7 The Association stressed that the support and involvement of the Region in the WIS development was a crucial factor for ensuring a successful implementation and a shared ownership of the system. It requested its relevant regional working group to take a leading role in the regional WIS development and planning. It emphasized the need for capacity building in developing countries to enable them to participate in WIS, taking into account the capabilities, opportunities and constraints of the NMHSs of developing countries. Noting the high value of WIS pilot projects, the Association urged its relevant working groups, with the support and coordination of the ICG-WIS, to develop and promote pilot projects that facilitate the introduction of WIS functions and services. It invited NMHSs from developed countries, and in particular those participating in the early phase of WIS implementation, to support and assist in these initiatives.

4.5.1.8 Noting the progress made in WIS requirements from WMO Programmes, as reviewed in the 'Report on the WIS Rolling Review of Requirements', the Association urged its relevant working groups to actively pursue their contributions to the refinement of WIS Rolling Review of Requirements to ensure that the regional programmes requirements on WIS are taken into account.

GISC and DCPC designation process

4.5.1.9 The Association fully concurred with the Executive Council in stressing the crucial importance of an early identification of GISCs and DCPCs for the planning and implementation of WIS. It recalled that Fifteenth Congress endorsed in principle WIS procedures for the designation of GISCs and DCPCs and encouraged Members to adhere to them. It noted that, upon the request from the sixtieth session of the Executive Council, the Secretariat has requested Members to identify potential GISCs and DCPCs centres with supporting information. Members' contribution on identified GISC and/or DCPC(s) was reviewed by an ad-hoc ICG-WIS task group and by

CBS-XIV and consolidated for presentation to the sixty-first session of the Executive Council. The Association noted with appreciation that Region IV Members (USA and Canada) have identified WMC/RTH Washington as a potential GISC and several potential DCPCs associated to RA IV Centres that fulfil within specific WMO Programmes an international responsibility for the collection/generation and provision of data, forecast products, processed or value-added information (e.g. RSMCs). The Association fully supported these candidate GISC and DCPCs, and invited the Members operating these centres to make their best implementation and preparatory efforts towards demonstrations of capabilities of candidate WIS centres at the CBS Extraordinary Session (2010), with a view to a formal designation by Cg-XVI in 2011.

Coordination with related international projects (GEOSS)

4.5.1.10 The Association concurred with the Executive Council in emphasizing the important role WIS has to play as a WMO core contribution to the GEOSS. It noted the mutual benefits made available by the interoperability arrangements between WIS and GEOSS, enabling WMO Members to have access to other GEO data and products, while facilitating the further distribution of weather, climate and water data.

4.5.2 Operation-critical data exchange and management

GTS implementation and plan

4.5.2.1 The Association expressed its deep appreciation to Members for their continued efforts in upgrading and improving GTS components, including point-to-point circuits, managed data-communication networks (e.g., for the Improved MTN), satellite-based telecommunication systems (the ISCS) and data-distribution systems via satellite (e.g EMWIN). It noted with satisfaction that the International Satellite Communication System (ISCS) operated by the USA was providing effective TCP/IP-based communication services for the RMTN, supplemented by the Emergency Managers Weather Information Network (EMWIN) services which were crucial for meteorological Offices in small islands. It was also pleased that RTH Washington had the firm plan to join the Improved MTN MPLS-based Network II, leading to significant improvement in capacity, flexibility and connectivity for global and inter-regional exchange, and evolving towards the WIS core communication network. The Association reaffirmed that, as emphasized by Fifteenth Congress, the sustained GTS progress through dedicated telecommunication means was essential to WIS implementation as the core communication component for exchange and delivery of operation-critical data and products. It urged Members to pursue their fruitful efforts, and emphasized the importance of CBS continuing to provide updated technical guidance and further recommended practices, and to facilitate sharing experience gained by NMHSs, to benefit early from rapidly evolving technologies.

4.5.2.2 The Association agreed that improvement of the WIS/GTS communication infrastructure, and especially the Regional Meteorological Telecommunication Network (RMTN) should be continued taking early benefit from the fast evolution of Information and Communication Technologies (ICTs), especially data-communication technology and services, through a seamless process. The Association stressed the need for coordination between Members in managing current and new technical and contractual arrangements, and it urged Members, with the assistance and support of the Secretariat, to facilitate implementation-coordination meetings. The Association emphasized the benefit from technical coordination between the WMC/RTH and its associated NMCs for the implementation, operation and improvement of data communication techniques and procedures, including sharing experience and advice between the data-communication experts of the RTH and of the NMCs.

4.5.2.3 With respect to the use of the Internet, the Association re-affirmed the importance of CBS updated technical guidance for the efficient use of the Internet with minimized operational and

security risks. It emphasized that the Internet plays an increasingly important role for access to and delivery of a wide range of data and products and for complementing the GTS. With particular importance for smaller NMHSs, the Internet provides the means to use the WIS Data Discovery, Access and Retrieval service. The Association urged all NMCs to implement the required facilities for accessing the Internet, including VPN connections with other WWW centres, in particular the RTH.

IGDDS development and implementation

4.5.2.4 The Association supported the distribution of space-based data and products in near real-time through Digital Video Broadcast (DVB) systems within the Integrated Global Data Dissemination Service (IGDDS), as an operational component of the WIS architecture. These services were facilitating wide access to satellite data and it expressed its appreciation for efforts made for expanding the service over the Region. The Association emphasized the importance of appropriate mechanisms to ensure that RA IV Members' requirements for space-based data and products are considered by the respective operators of IGDDS infrastructure components for possible inclusion in the dissemination programmes and requested its relevant regional working group to follow up. The Association noted that such dissemination means had the potential to serve a wide range of applications and welcomed the expansion of this concept to other Societal Benefit Areas through the GeoNetCast initiative. It also recalled the important role of the GTS and the complementary role of the Internet to meet the various operational and other needs and ensure overall robustness.

4.5.2.5 The Association welcomed the progress made in expanding the Regional ATOVS Retransmission Service (RARS) global network, which resulted in a significant benefit for Numerical Weather Prediction.

Support to early warning systems and operations

4.5.2.6 The Association emphasized the effective support currently provided by the GTS for the exchange and distribution of early warning and watch messages and related data, as particularly demonstrated for hurricanes. It concurred that CBS pursue the further review of GTS exchange mechanisms with a view to improving exchange of high priority data and products in support of a virtual all hazards network within the WIS-GTS, as requested by Fifteenth Congress. The Association emphasized the usefulness of operation-oriented workshops on the GTS for effective exchange of warnings and related information and strongly encouraged donors to sponsor and organize, with Secretariat assistance, such events in areas exposed to multi-natural hazards (e.g., the Caribbean).

4.5.2.7 The Association re-affirmed the effective capabilities of the WIS-GTS, including the essential operational role of NMCs of NMHSs, as a crucial WMO contribution to the effective exchange and distribution of early warning and related information. It invited donors and RA IV Members concerned to strengthen the WIS-GTS for the benefit of all user communities. It recognized that many of the national agencies involved operationally in the provision of warning services were not NMHSs, but still required access to the GTS to effectively implement their responsibilities. The Association also agreed that the detailed GTS routing plan for early warning and related information, including for the emerging Tsunami Watch Information (TWI), should be developed, regularly reviewed and made available to all centres concerned, including on the relevant WMO Web pages. It also emphasized the importance of the role of RTH Washington in regular operational tests of the distribution of early warning and related information over the GTS with their associated NMCs.

Climate–related data exchange

Monthly CLIMAT and CLIMAT TEMP reports

4.5.2.8 The Association urged Members to further increase their efforts in providing monthly surface reports from all CLIMAT stations in a timely and regular manner as stipulated by WMO regulation standards and practices, as well as their cooperation in providing historical daily data sets needed for the compilation of the World Weather Records Data Sets.

4.5.2.9 The Association noted the thirteenth session of GCOS/WCRP AOPC-XIII (Geneva, Switzerland, April 2007) conclusion that CLIMAT TEMP have very limited value for ongoing climate research purposes and was no longer required for GCOS purposes, taking into account improvements in collection, exchange and quality control of the daily TEMP messages; the Hadley GUAN Monitoring Centre (MC) had already ceased its CLIMAT TEMP monitoring activities in 2007. The sixtieth session of the Executive Council requested CCI to assess all the impacts of a possible discontinuation of CLIMAT TEMP and, if a decision on discontinuation were reached, to notify CBS for required operational arrangements and NMHSs, users and instrument manufacturers.

Water–related data exchange

4.5.2.10 The Association noted the potential benefits that can be brought to the hydrological community by WIS and was pleased to learn of the possible use of a WHYCOS project as a pilot project for integrating hydrological data through WIS. Data and information flows under the Flash Flood Guidance System (FFGS) may also be considered as part of a WIS pilot project.

Data representation and Metadata

4.5.2.11 As regards the migration to Table-Driven Code Forms (TDCF), the Association urged all RA IV Members to finalize and implement plans for the migration in accordance with the International Migration Plan approved by Congress. Members should benefit from recent guidance, encoder-decoder software, training, and pilot projects that were developed by CBS and Members and promoted by the Secretariat to facilitate the migration. The Association stressed the need to use TDCF to fully utilize new observing systems' capabilities, in particular with a view to satisfying the requirements of advanced Numerical Weather Prediction Systems. The Association fully supported CBS activities in assessing data representation systems and consolidating a comprehensive WIS data representation systems policy, addressing both data exchange among NMHSs, and from NMHSs to outside, in view of the increasing demands of the NMHSs' user community for the use of modern industry standards for data representation (e.g., XML), including aeronautical meteorology. It urged all WMO technical commissions, and CBS as the lead Commission, to participate actively.

4.5.2.12 Noting that metadata is absolutely critical for handling data by the emerging WIS centres and enabling the use and interoperability of data, the Association supported the inter-programme Metadata activities of the CBS for further development and implementation of the WMO core profile of the ISO metadata standard, and it urged RA IV Members to actively contribute to these activities.

Operational Information Services, including Monitoring

4.5.2.13 The Association supported the continuous efforts made in improving Operational Information Services, and encouraged NMHSs in Region IV to access the updated WWW operational information, including WMO Publications Nos. 9 and 47, and monitoring results on the WMO Web server for its use, review and updating. It also urged WMC/RTH Washington to join the pre-operational phase of the Integrated WWW monitoring (IWM), as developed by CBS.

4.5.3 Non real-time data exchange and management

GISC and DCPC Data Discovery, Access and Retrieval services

4.5.3.1 With respect to the Data Discovery, Access and Retrieval services, based on request/reply “pull” mechanism operated essentially through the Internet, that were the salient extension of services that will be provided by WIS, the Association agreed that CBS and the ICG-WIS should urgently develop recommended procedures and practices, based on international standards and current technologies, for adequate authentication and authorization mechanisms to enable and manage the use of the service, at national and international levels, by authorized users.

4.5.3.2 The Association noted with appreciation the several mechanisms for data exchange, access and retrieval that were already available to NMHSs in RA IV through the use of the Internet, that were implemented by RTH Washington, including HTTP and FTP Servers, and also E-mail Data Ingest System, RTH Web-based Bulletin Input and FTP Input Service. The Association agreed that the implementation of WIS functions was expected to provide a significant enhancement in the versatility of these data access and retrieval services.

Data Management Applications

Interfacing Climate Data Management System with WIS

4.5.3.3 The Association was pleased to note that WMO is promoting and facilitating the interfacing of Climate Data Management Systems with WIS. This should enable NMHSs to achieve inter-operable interface for climate Data Access and Retrieval through WIS. The Association was pleased to note the increased collaboration between Members in and outside the Region for the provision of modern Climate Data Management Systems (CDMSs) and their installation by NMHSs. This should allow NMHSs to benefit from the increased capacity and functionalities of modern data management technology allowing better climate data management and services.

Data Rescue and Digitization of Climate Records

4.5.3.4 The Association reiterated the importance of the WMO Data Rescue project (DARE) in safeguarding, digitizing and making available historical climate archives for the benefit of the Members in the Region as well as globally. It called on all Members to continue their efforts in accelerating the digitization process of old climate records. In addition, the Association encouraged both existing and future Regional Climate Centres (RCCs) to provide, where acceptable to Members, an alternative secure database system for duplication of Members’ data as recommended by CCI. The Association took note with appreciation of the progress in rescuing and digitizing historical climate records in the Region.

Requirements from special programmes and projects

THORPEX Interactive Grand Global Ensemble

4.5.3.5 The Association recognized that the THORPEX Interactive Grand Global Ensemble (TIGGE) was paving the way towards the next generation operational forecast system and that the data transfers required to utilize TIGGE presented significant challenges for the development and implementation of WIS. It agreed that WIS should take into account the needs of TIGGE.

International Polar Year

4.5.3.6 The Association recognized and appreciated the scope of the effort during the International Polar Year to advance understanding and prediction of the components of the Earth System. It requested that RA IV Members continue to exchange appropriate IPY data sets and legacy measurements through the GTS and to archive observations, given that many of the special measurement campaigns were of short duration.

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Expected Result 5

DEVELOPMENT AND IMPLEMENTATION OF THE NEW WMO INFORMATION SYSTEM

Strategic Thrust 1: Science and Technology Development and Implementation

PROGRESS/ACTIVITY REPORT

SUMMARY

Reference: XV-RA IV/Doc. 4.5

CONTENT OF DOCUMENT:

Appendix:

- Progress/Activity Report

PROGRESS/ACTIVITY REPORT

1. WIS development and implementation strategy

WIS Implementation Plan, including support to WIGOS

1.1 The fifth session of ICG-WIS (July 2008, Brasilia, Brazil) reviewed the progress made in the development of WIS, in the light of Cg and EC decisions (see http://www.wmo.int/pages/prog/www/ISS/Meetings/ICG-WIS_Brasilia2008/documents.html and <http://www.wmo.int/pages/prog/www/WIS-Web/RefDocuments.html>). The session reviewed in particular the following:

- (a) WIS requirements from WMO Programmes including a Report on the WIS Rolling Review of Requirements;
- (b) The comprehensive WIS project and implementation plan;
- (c) WIS technical documentation, including WIS Compliance Specifications for GISC, DCPC and NCs and the WIS Functional architecture;
- (d) The development and planning of potential GISCs and DCPCs, including:
 - (i) The GISC and associated DCPCs project from DWD, Météo-France and UK Met Office with the participation of ECMWF, EUMETSAT and the NMS of Norway;
 - (ii) The Beijing and Tokyo GISC prototypes in Asia under the framework of Collaboration Alliance by CMA and JMA.

1.2 The Secretary-General has issued an invitation to potential donors to contribute to the WIS Trust Fund (and the WIGOS Trust Fund); contributions have already been received from several Members and Organizations (EUMETSAT). These contributions have been instrumental in supporting and assisting the WIS development and implementation in areas that are of common importance and beneficial to all WMO Members.

GISC and DCPC designation process

1.3 In response to the EC request to the ICG-WIS and CBS to identify potentials GISCs and DCPCs for EC LXI, an ICG-WIS ad hoc expert team has reviewed the responses in preparation for CBS XIV. With respect to Region IV, USA identified one GISC (WMC/RTH Washington) and 9 DCPCs (3 RSMCs, NODC, NESDIS, NCAR, WAFC, NGDC and GOSIC), and Canada one DCPC (RSMC).

Involvements of Technical Commissions (TCs), Regional Associations (RAs) and NMHSs (including Developing Countries and the Least Developed Countries)

1.4 An interesting capacity-building WIS pilot project is the *WIS Virtual Private Network (VPN) Pilot Project* in Regions II and V, which is coordinated and supported by JMA, that involves sixteen participating NMHSs (9 from Region II and 7 from Region V). The project assists in capacity building through the involvement of NMHS in WIS techniques to enable the discovery, access and retrieval of data via VPN techniques on the Internet, use of data portal and testing of a visualization and manipulation applications for satellite imagery.

2. Operation-critical data exchange and management

GTS implementation and improvements

2.1 The Regional Meteorological Telecommunication Network (RMTN) is implemented mainly via two-way multipoint TCP/IP-based telecommunication services through the International Satellite Communications System (ISCS) operated by the National Weather Service of the USA. There are also dedicated communication lines from RTH Washington to Regional Specialized Meteorological Centre (RSMC) Miami and to RSMC Montreal. Other communication systems are currently being used in RA IV to complement the ISCS RMTN system, as an integrated element of the RMTN. They are the Emergency Managers Weather Information Network (EMWIN) and the GOES Satellite Distributed Communication Platform (DCP) collection system, which have a crucial role for small islands. The status of implementation of the RMTN in Region IV is posted on the WMO Website under: <http://www.wmo.int/pages/prog/www/TEM/GTSstatus/R4rmtni.ppt>.

2.2 RTH Washington operates several alternate mechanisms for data exchange available to NMHSs in RA IV, which generally depend on the use of the Internet. In this respect, CBS (OPAG on ISS) had developed and keeps updated guidance and recommended practices for meteorological and related data exchange over the Internet. The detailed services implemented by RTH Washington, include HTTP and FTP Servers, E-mail Data Ingest System, RTH Web-based Bulletin Input and FTP Input Service.

2.3 The migration of the Improved MTN (Network II), based on a shared managed network service managed by the ECMWF, to the most advanced data-communication network technologies, i.e., the Multi-Protocol Label Switching (MPLS) procedures, enabling increased capacity and interconnectivity. RTH Washington will join this network as regards its MTN links with Tokyo, Melbourne, Bracknell and most likely, at a later date, with Brasilia and Buenos Aires. This new network technology provides a full interconnectivity between all connected centres.

IGDDS development and implementation

2.4 The Integrated Global Data Dissemination Service (IGDDS) addresses the handling and circulation of satellite data and products within WIS, with particular focus on the implementation of near real-time dissemination capabilities using Digital Video Broadcast (DVB) from telecommunication satellites. The FengYunCast service operated by China is providing data from FY-2 geostationary satellites and other sources over a large part of the Asia-Pacific Region of RA II and RA V. The Russian Federation has implemented satellite data dissemination over RA II through the MITRA service. Geostationary satellite data and a number of meteorological and environmental products are also available via EumetCast C-band service covering part of RA II. Japan is making all MTSAT data available via the Internet. Close coordination is maintained with the GeoNetCast initiative in the context of the Group on Earth Observations (GEO) and its Global Earth Observation System of Systems (GEOSS). The DVB dissemination services implemented in the context of IGDDS are the core component of GeoNetCast.

2.5 IGDDS is also fostering the rapid collection of polar orbiting satellite sounding data through a network of direct readout stations, the concentration of this data at regional level, and its dissemination, which is referred to as the Regional ATOVS Retransmission System (RARS) global network. The top-level objective of the RARS is to make sounding data available to NWP centres within 30 minutes. The global RARS network currently collects satellite sounding data from about 60 per cent of the globe; the Asia-Pacific RARS involves a number of stations from: Australia; China; Hong Kong, China; Japan; New Zealand; Republic of Korea; and Singapore, with plans for further extensions in the mid-Pacific; Region II provides a significant new contribution through three stations in China, two operated by Japan, one in the Republic of Korea, and plans for stations in Oman and in the Russian Federation.

Support to early warning systems and operations

2.6 A Workshop on the GTS for effective Exchange of Tsunami Warnings, related Information and other Warnings in the Indian Ocean (Bangkok, December 2007) was held in coordination with UNESCO/IOC sponsored by the NOAA/NWS of the USA. The objective of the workshop was to ensure the most effective support of the GTS for the operational exchange on use of Tsunami warnings, related information and other warnings by NMCs and RTHs in the Indian Ocean. The workshop aimed at facilitating, at NMCs and other centres concerned: the implementation of the required technical arrangements, and enhancement of the knowledge and awareness of staff concerned, based on the usual cooperation on GTS operation between NMCs and RTHs. The workshop topics included Tsunami watch and warnings messages, sea level and deep-sea level data, seismic data and other warnings, GTS related procedures, data representation and code related aspects, follow-up procedures by NMCs and building capacity. A similar workshop in the Caribbean area would be beneficial for NMHs.

2.7 The monitoring of actual distribution of watch messages (e.g. Tsunami) in real cases, as well as operational tests are regularly carried out in parts of the Globe (e.g. Indian Ocean, Pacific); these have shown a very effective support provided by the GTS, with an end-to-end latency time being less than two minutes in many cases. NMCs concerned have taken arrangements to ensure a 24H/7D operational follow-up on reception of Tsunami watch messages at national level.

Data representation and Metadata

2.8 With a view to saving time during the CBS sessions and reducing the delays in the approval of the amendments to the *Manual on Codes*, CBS is considering new procedures allowing the adoption of amendments to the *Manual on Codes* by WMO Members between CBS sessions. CBS will report on this action to the sixty-first session of the Executive Council.

2.9 Noting the slow implementation of the migration to table-driven code forms (TDCF), the Fifteenth Congress supported the initiative taken by the CBS to increase the awareness of the benefit of the migration by the NMHSs. In this respect, the Secretariat provided WMO Members with guidance to develop and implement plans for the migration.

2.10 CBS established an Expert Team on Assessment of Data Representation Systems (ET-ADRS) with the task to assess advantages and disadvantages of different data representation systems (e.g., BUFR, CREX, XML, NetCDF, HDF) for use in real-time operational international exchanges between NMHSs and in transmission of information to users outside the NMHSs. The ET also aims to develop a proposal for a CBS policy on data representation systems. All WMO technical commissions participate in the expert team. A co-joint Expert Team (CAeM-CBS/ET-ODR) addresses the requirements of aeronautical meteorology, including ICAO, for data representation systems, including issues of the migration of OPMET data to new forms of data representation.

2.11 The CBS Inter-Programme Expert Team on Metadata Implementation agreed on activities for the development and implementation of the WMO core profile of the ISO metadata standard, in particular to create supporting operational catalogues, to identify tools to support implementation of the standard, to publicize and train in the standard, including information about how to obtain data within the standard and to extend the standard to allow more detailed descriptions of data sets.

Operational Information Services, including Monitoring

2.12 The WMO Publications Nos. 9 and 47 have been distributed to WMO Members on a CD-ROM once a year. Since parts of the information contained in the CD-ROM become obsolete the next week following its distribution, the use of the CD-ROM does not satisfy the operational requirements of WWW centres. WMO Members were invited to encourage their services to access the updated WWW operational information, including the WMO Publications Nos. 9 and 47, on the WMO server for its use, review and updating. In the case that an NMHS would have difficulties in accessing the information from the WMO server, the NMHS was invited to notify the Secretariat of its requirement to continue receiving the WMO Publications Nos. 9 and 47 on a CD-ROM once a year.

2.13 CBS agreed on a new scheme for the monitoring of the WWW, leading to an integration of the existing monitoring exercises. The extraordinary session of CBS (Seoul, 2006) agreed to move from the test phase to a pre-operational phase of this Integrated WWW Monitoring (IWM) as from October 2007. The Commission stressed the key role of the RTHs in the IWM. WMO Members operating an RTH were invited to consider participating in the pre-operational phase of the IWM as from October 2007.

RA IV Working Group on Planning and Implementation of the WWW (RA IV/WG-PIW)

2.14 A one-day ad hoc session of the RA IV Working Group on Planning and Implementation of the WWW was held (Curacao, 26 March 2006, see <http://www.wmo.int/pages/prog/www/Planning-Impl/RA-4/2007-Curacao/documents.htm>). The operational status of the WWW in the Region is also reviewed on the occasion of the annual Hurricane Committee sessions

3. Non real-time data exchange and management

Data Management Applications

Data rescue of marine historical records

3.1 The climate research community has strong interests (e.g., detecting climate change signals) in extending the marine record back in time, and in identifying what newly available data records might best fill in temporal and spatial data gaps. National archives still contain many thousands of, as yet, unexamined ships' logbooks. Efforts have accelerated in recent years to locate and digitize more meteorological observations from ships' logbooks. Many new international datasets are in preparation for, or already await blending into, historical marine archives, most prominently the International Comprehensive Ocean-Atmosphere Data Set (ICOADS). There is a need to further promote and enhance such activities both nationally and internationally.

3.2 Metadata is collected for maintaining digital archives of the historical metadata for use with climate datasets. The International List of Selected, Supplementary and Auxiliary Ships (WMO Publication No. 47) relies on the regular submission of metadata from respective NMSs operating VOS programmes, nominally on a quarterly basis. The timely availability of the current ship metadata is of particular concern to the VOS operators. Also, at JCOMM-II, the National Marine Data and Information Service (NMDIS, China), had agreed to establish an Ocean Data Acquisition System (ODAS) metadata management centre for JCOMM.

Databases of extreme events

3.3 JCOMM ETMC and ETWS have jointly engaged in the development of a database of extreme wave events to validate wind wave models and satellite altimeter wave estimates, which have largely unknown characteristics at these heights. The Executive Council urged Members to provide input to the database. (More information is available at: <http://www.jcomm-services.org/JCOMM-Extreme-Wave-Data-Base.html>.)

CLIMSOFT-WIS Demonstration Project

3.4 A project has been supported by the UK Met Office to develop data and metadata interfaces for CLIMSOFT. The Project will investigate and develop an interface for data and metadata produced from CLIMSOFT which will address the developing standards for data and metadata interoperability. It will contribute to the development of schemas and other specifications required achieving the aims of WMO WIS.

Requirements from special programmes and projects

THORPEX Interactive Grand Global Ensemble

3.5 The THORPEX Interactive Grand Global Ensemble (TIGGE) is a key contribution to accelerating improvements in the accuracy of 1-day to 2-week forecasts of high-impact weather by paving the way toward the future development of a Global Interactive Forecast System (GIFS). The TIGGE archives include the ensemble forecasts generated at ten operational centres: BMRC (Australia), CMA (China), CPTEC (Brazil), ECMWF, JMA (Japan), KMA (Republic of Korea), Météo-France, MSC (Canada), NCEP (USA), and Met Office (UK). This core data is currently accumulating at a daily rate of approximately 300GB. In Phase 1 of TIGGE, data access is through three archive centres (ECMWF, the US National Center for Atmospheric Research and the CMA). In Phase 2 of TIGGE, which is still subject to funding, the requirements for massive data transfers will be alleviated by a distributed archive concept that will eventually need to rely on dedicated telecommunication lines. Limited-area ensemble prediction systems will also form an important component of GIFS. One key objective is to facilitate the use of lateral boundary conditions from various global systems by various limited-area modelling (LAM) systems.

International Polar Year

3.6 International Polar Year (IPY) 2007-2009 was established by the WMO and International Council for Science (ICSU) and WMO recently launched the International Polar Year (IPY) 2007-2008. IPY includes a cluster of ten programmes under WWRP-THORPEX that are motivated by the need to improve prediction of high impact weather in Polar Regions. Given the motivation for these experiments, the operational centers have a significant stake in these data sets.
