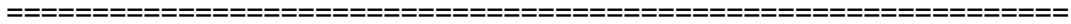


**WORLD METEOROLOGICAL ORGANIZATION**



**WMO GLOBAL RARS AND ADM WORKSHOP**

**GENEVA, SWITZERLAND**

**1-2 DECEMBER 2005**

**FINAL REPORT**



## **PARTICIPANTS**

The Participants of the workshop came from Argentina, Australia, Brazil, Canada, China, EUMETSAT, Japan and WMO. The contact details of all the participants are attached as Appendix II to this report.

Written input to the workshop was also received from Korea.

### **1. WELCOME**

Dr Donald Hinsman, Director of the WMO Space Programme, welcomed the participants to Geneva and emphasised the importance of both the RARS initiative and the Integrated Global Data Dissemination Service (IGDDS) to WMO.

### **2. INTRODUCTION**

Prior to starting the workshop, the participants reviewed the draft agenda and agreed that this should be adopted as the agenda for the workshop (the agenda is attached as Appendix I to this report). Concerning the RARS component of the agenda, it was noted that:

- as NOAA was not represented at the workshop item 9 would not be discussed;
- under item 7 the proposal for a RARS web-site would be discussed (instead of the documentation of the global RARS architecture - which is anyway implicitly addressed within the RARS website proposal);
- item 8 (proposed standards for RARS operators) would be addressed before item 7.

It was also decided that RARS issues would be addressed on the first day of the workshop and ADM issues would be discussed on the morning of the second day. In the afternoon of the second day, there would be a combined concluding session which would agree on the way forward for both RARS and ADM issues.

### **3. SUMMARY OF OBJECTIVES AND CURRENT STATUS OF THE WMO GLOBAL RARS INITIATIVE**

In his presentation, Dr Husband briefly summarized the history of the RARS initiative, its main objectives and the current status, with a particular emphasis on:

- the reference architecture for the global RARS network;
- the main results, conclusions and discussion points from the 1<sup>st</sup> global RARS workshop held in December 2004 at EUMETSAT, including:
  - the outline proposal for an RA III RARS;
  - the proposal for an Asia-Pacific RARS (together with a brief update on its current implementation status);
  - the evolution of the EUMETCast dissemination system.
- the Asia-Pacific RARS discussions at the APSDEU-6 meeting (in June 2005);
- the results and conclusions of the 1<sup>st</sup> South American RARS Workshop In Buenos Aires (in September 2005);
- the discussions at the ET SUP-1 meeting in October 2005 which recommended that all RARS data should be made available globally.

#### **4. REVIEW AND UPDATE OF RARS REQUIREMENTS AND EXISTING CAPABILITIES**

The register of RARS requirements and existing capabilities was reviewed and, based on the inputs provided at the workshop, the need for updates in a number of areas was identified.

During the discussion process it was clarified that, although the expressed requirements went well beyond ATOVS data, the focus of the current phase of the RARS initiative would be limited to the fulfilment of ATOVS-related requirements.

The workshop noted that Global NWP requirements expressed by ECMWF had been added to the initial regional requirements, and that the Expert Team on Evolution of the Global Observing System (GOS) would be invited to review these global requirements at its forthcoming meeting 7-9 December 2005.

Based on the discussions a revised table, which includes all the requested updates, is included in Appendix III of this report.

In addition to the updates identified during the workshop discussions, the written input provided by Korea has also been reflected in the updated requirements table.

#### **5. REVIEW OF RARS IMPLEMENTATION STATUS**

##### **5.1 South American RARS**

Dr Sergio de Paula Pereira and Dr Gloria Pujol summarized the current status of the South American RARS.

It was highlighted that, following the workshop in Buenos Aires, four recommendations had been passed to the President of RA III for further consideration, concerning:

- o R.1: Definition of a baseline set of HRPT stations;
- o R.2: Decision as to the location of the processing and distribution centre(s);
- o R.3: Establishment of a target schedule for trial dissemination and the adoption of a "project" approach to the implementation of the RA III RARS;
- o R.4: Appointment of an RA III RARS Coordinator.

The current working assumption is that there will be two processing and distribution centres within the region (each with its own dedicated set of HRPT stations) situated in Brazil and Argentina.

Both Argentina and Brazil expressed some concerns about the feasibility of running workstations hosting the AAPP software in remote locations with problematic communications links. In recognition of these concerns, the workshop outlined a possible architecture that did not rely on the remote use of the AAPP software.

The implementation schedule for the South American RARS was also discussed, and the following recommendation was formulated concerning both the architecture and the implementation schedule for the South American RARS.

**Recommendation 1:** Concerning the implementation of the South American RARS, it is recommended that:

- (A) A pilot South American RARS be established with the following characteristics:

- (i) Two processing and distribution centres (in Brazil and Argentina) each with their own dedicated set of HRPT stations;
  - (ii) To overcome the difficulties associated with operations of workstations running the AAPP software at remote sites:
    - Processing at the remote HRPT sites will be limited to decommutation of the HRPT data stream and extraction of the TIP data;
    - Transformation of the TIP data to AAPP level 1a and 1c will be done centrally at the processing and distribution centres;
  - (iii) 5 to 7 HRPT sites involved (3-4 in Brazil, 1-2 in Argentina and 1 in Chile (TBC));
  - (iv) Dissemination via a combination of GTS and FTP over the internet;
  - (v) Start of pilot operations by June 2006;
  - (vi) Subject to confirmation, EUMETSAT will provide support for the set up of the AAPP central processing;
- (B) Following the successful trial of the pilot RARS an Operational South American RARS be established by the end of 2007 with:
- the same processing and distribution architecture as for the pilot phase;
  - at least the same HRPT stations as for the pilot phase.

The workshop also noted that any appointment of RARS co-ordinators should reflect the architecture of the RARS in the region (i.e., there should be a coordinator for each processing and distribution centre).

## **5.2 European RARS (EARS)**

Dr Soerensen presented the status of the EUMETSAT Advanced Re-transmission Service (EARS) covering:

- the current status of EARS ATOVS;
- the new EARS services:
  - EARS AVHRR;
  - EARS ASCAT.

The planned evolution (in terms of coverage) of the EARS ATOVS service was presented as well as the results of the EARS ATOVS User Survey. In terms of past usage of ATOVS data, the survey revealed that:

- the main application using ATOVS data is Numerical Weather Prediction;
- the usage of the data is split evenly between level 1a and level 1c;
- the instrument data most used is AMSU-A followed by AMSU-B;
- most users obtain the data via EUMETCast (NCEP obtain the data via the GTS).

The beneficial effects on NWP of using EARS ATOVS data at the UK Met Office were also described.

The schedule for the introduction of the new EARS services was given as:

- start of pilot AVHRR service: December 2005;
- start of pilot ASCAT service: after the successful completion of Metop commissioning.

Following the presentation there was a discussion on timeliness, and Dr Soerensen clarified that the 30 minute timeliness requirement referred to the oldest data within a pass (i.e., the most stringent interpretation). Of this 30 minutes, around 15 minutes is consumed by data reception; leaving around 15 minutes for processing and dissemination to users.

Concerning dissemination, it was noted that AAPP level 1a and 1c are both disseminated via EUMETCast, whereas only level 1c is available via the GTS.

Concerning the new services, it was emphasised that the AVHRR user community is broader than the ATOVS user community, and dissemination via the GTS would not really be appropriate (from the viewpoints of both bandwidth and user accessibility).

### **5.3 Asia-Pacific RARS**

#### **5.3.1 Results of the APSDEU-6 Meeting**

Dr David Griersmith provided an overview of recent progress toward the establishment of the Asia-Pacific RARS, including a summary of outcomes from the recent APSDEU meeting held in Korea in June 2005. At this meeting, which is a major forum to assist in Asia-Pacific RARS matters, the main outcomes were:

- (i) The APSDEU Members endorsed the establishment of an Asia-Pacific RARS, noting the results of the 1<sup>st</sup> global RARS workshop in December 2004, and the need for a regional and global exchange system, with user requirements especially those from NWP as the driving force. It was noted that APSDEU has a major role to play in RARS planning and implementation due to its successful history in data exchange. Noting the May 2005 ITSC-14 WG on International Issues & Future Systems Recommendation to define global HRPT baseline stations for a global RARS system, the APSDEU Members agreed to progress their component. An Asia-Pacific RARS Coordinator (Dr D Griersmith) was appointed together with RARS Focal points in each participating country to develop a set of about 12 baseline Asia-Pacific HRPT stations, plus examination of around 10 more designated stations.
- (ii) APSDEU Members agreed to adhere to global standards and to address those and related issues such as data processing, formats, compression and communications via the appropriate RARS co-ordination mechanisms. It was also recommended that WMO produce a RARS Web page to inform potential users and implementers of the current status (*the proposal for a RARS website is addressed under agenda item 7*).
- (iii) The APSDEU community planned for a minimum of two intra-regional dissemination centres (nodes) namely Tokyo representing RA II, and Melbourne representing RA V. Also additional nodes in Beijing, Seoul and possibly Singapore were under consideration.
- (iv) APSDEU Members agreed to an initial dissemination mechanism as ftp over GTS, and that other mechanisms such as Internet and DVB satellite broadcast would be investigated. The Asia-Pacific Implementation Plan was divided into three phases namely:
  - Phase-1: To start experimental exchange on the GTS with up to 12 baseline stations;
  - Phase-2: To exchange data from all stations, plus possible other dissemination mechanisms;
  - Phase-3: To expand exchange to other data types.

Members agreed to start the phase-1 implementation by the end of 2005. It was planned that Phase 1 would be operational by December 2006.

### 5.3.2 Current Implementation Planning for the Asia-Pacific RARS

Dr Griersmith outlined the latest status of the Asia-Pacific RARS implementation plan which is summarized below.

**Asia-Pacific RARS Implementation Schedule**

Centre	Pilot HRPT Stations (core)	Pilot Schedule	Operational (baseline) HRPT Stations	Operational Schedule
<b>Tokyo (JMA)</b>	Kiyose (Tokyo) Seoul	To Beijing 04/06 To Seoul 03/06 To Melb. 03/06 To Washington (TBD)	Core Stns + Syowa	Core Stns 06/06 Opnl Stns 12/06
<b>Beijing (CMA)</b>	Beijing, Urumuqi, Guangzhou (Hong-Kong back-up)	To Tokyo 04/06 To Offenbach TBD To Melb. TBD	Core Stns + Lhasa (TBC) Kash (TBC)	Core Stns 06/06 Opnl Stns 12/06
<b>Melbourne (ABoM)</b>	Crib Pt 1, Melbourne Crib Pt 2 Melbourne	To Tokyo 03/06 To Exeter 04/06 To NZ 04/06 To Singapore TBD To Beijing TBD Canada- Washington 04/06	Core Stns + Darwin Perth Casey, Antarctica Alice Springs	Core Stns 06/06 Opnl Stns [plus Singapore, NZ] 12/06

It was noted that the operational schedule was believed to be realistic, however aspects of the pilot schedule were more uncertain.

In terms of HRPT stations for the operational phase, Dr Yang Jun said that Lhasa could be operational by the end of next year (2006) but Kash was not guaranteed.

For speed of implementation, it was noted that the pilot phase was in effect divided into two sub-phases (1a and 1b). In sub-phase 1a, a pilot network will be established comprising the following core HRPT stations:

- Japan – Kiyose;
- China – Beijing, Urumuqi, Guangzhou (Hong Kong as backup);
- Australia – two Crib Pt stations (south of Melbourne)
- Korea - Seoul

Around March/April 2006 it is planned that data file exchanges will take place and that for a period of one month the ftp communications over various GTS links would be examined in detail to assess the available bandwidth and the capability to meet the timeliness target of 90% of data available within 30 minutes to users.

In Sub-phase 1b these core stations would go operational around June 2006. The remaining baseline stations would be added at that time and further testing of the impact on the

GTS links would be made, with a view to the full network of baseline stations being operational by December 2006.

**Recommendation 2:** To further progress the implementation of the Asia-Pacific RARS, it is recommended that:

- (A) A pilot Asia-Pacific RARS be established comprising:
  - (i) Real time L1c ATOVS BUFR file exchange between major centres (at least Beijing, Melbourne, Seoul, Tokyo) by the target schedule date of April 2006;
  - (ii) 7-9 core baseline HRPT stations located in Australia (2), China (3-4), Japan (1-2) and Korea (1) in the pilot phase;
  - (iii) Individual HRPT stations sending level 1a processed ATOVS data to respective processing centres for central AAPP processing;
  - (iv) Trial data exchanges between major centres intra-regionally and inter-regionally (e.g. Melbourne-Tokyo, Beijing-Tokyo, Tokyo-Washington, Beijing-Offenbach, Melbourne-Exeter) scheduled for a one month intensive period starting April 2006
- (B) Following the successful trial of the pilot Asia-Pacific RARS, an operational Asia-Pacific RARS be established by June 2006 comprising the routine operational exchange of ATOVS data from the core set of 7-9 HRPT stations.
- (C) After the operational Asia-Pacific RARS is established with core baseline stations, an expanded operational RARS be established with up to 16 HRPT stations, with the target schedule date of December 2006.
- (D) In parallel with the above, the Asia-Pacific RARS Coordinator to provide all contributing RARS countries, plus WMO and EUMETSAT, with a draft project plan including details of the evolving HRPT network and country RARS Focal Points, by April 2006.

Dr Griersmith also noted there were actions for the Asia-Pacific RARS group including definition of the unique three-letter station identifier. It was agreed and recommended that EUMETSAT and WMO would in due course put that information on their web sites.

**Recommendation 3:** In order to ensure consistency and coherence of the HRPT station identifiers within the RARS network it is recommended that all RARS Operators coordinate the station identifiers with the WMO Space Programme prior to implementation, and that this coordination requirement be reflected in the standards for the RARS Operators.

## **6. COMPARISON OF RARS IMPLEMENTATION STATUS AGAINST REQUIREMENTS AND IDENTIFICATION OF ADDITIONAL ACTIONS AS NECESSARY**

Under this agenda item it was decided to review the anticipated global coverage status following the implementation of the Asia-Pacific and South-American RARS.

Based on the coverage diagrams provided by Dr Soerensen, gaps were noted over Africa and EUMETSAT informed the meeting that they had already addressed this issue with South Africa and that 3 stations had been provisionally identified to help fill part of this coverage gap [i] Pretoria, ii] Gough Island: 40 deg 20' S, 10 deg W and iii] Marion Island: 46 deg 52'S, 37 deg 51' E].

It was also recalled that, already at the first RARS Global Workshop, a detailed proposal had been submitted by the Tropical Cyclone RSMC of La Reunion to contribute to the RARS network with its HRPT station (20°53' S; 55°29' E) which would extend the coverage towards the Indian Ocean.

In addition, an HRPT station located in Nairobi could be of relevance but there was no firm indication of its operational status.

It was not clear yet if the African stations would be included within the EARS network or if they would form part of an African RARS (possibly utilising EUMETCast for dissemination).

## **7. REVIEW OF THE PROPOSAL FOR A WMO RARS WEBSITE**

Dr Husband presented the proposal for the WMO RARS Website. The participants of the workshop welcomed the proposal and endorsed its use as the basis for the content of the WMO RARS website, subject to the inclusion of:

- processing centres in the global implementation map;
- participating HRPT station details (location, reception capability etc.).

An action was taken by WMO to implement this website by the end of April 2006.

## **8. REVIEW OF THE PROPOSED STANDARDS FOR RARS OPERATORS**

The list of open issues in section 1.5 of the standards were reviewed and it was agreed that:

- (i) Any benchmarks/guidance concerning the provision of on-call support and maintenance should make a distinction between accessible HRPT stations and those in remote areas;
- (ii) Suitable text should be included within the standard to place an obligation on RARS Operators to coordinate the HRPT station identifiers with the WMO Space Programme prior to including stations within the network (see Recommendation 3);
- (iii) The acquisition schedule horizon should be 3 days;
- (iv) The availability targets should be structured according to the EARS ATOVS Operational Service Specification;
- (v) A list-server should be provided by WMO to keep participants up-to-date with developments during the operational phase;
- (vi) A 3-month grace period should be included in the standard for the introduction of the latest version of the AAPP software;
- (vii) It was beneficial to remove data overlaps (it being noted that there could be a timeliness penalty);
- (viii) Quality monitoring information was desirable and should be made available on the website.

The issue as to whether the AAPP products contain the version identifier of the AAPP software that was used in their generation was debated and WMO took the **action** to clarify this point.

File naming conventions and codes were discussed briefly, since both the Asia-Pacific RARS and South American RARS will be using ftp over GTS (and most likely Internet) as an initial



means of exchanging and disseminating AAPP-processed BUFR format ATOVS data. Hence adherence to relevant WMO GTS codes and file naming conventions is required. WMO will take action to explore this issue further and reported that CBS-XIII and three Expert Teams have been addressing the critical issue of extending the GTS file naming convention to cover WMO Information System (WIS) requirements. CBS-XIII (Abridged Final Report, page 24, para 5.2.48) asked the OPAG on ISS to urgently develop a mechanism for definition of a unique identifier for all transferred files

*(Explanatory note : Attachment 11-15 to the WMO Manual on the GTS includes a file naming convention. The procedure for the exchange of files on the GTS is based on transmission of file pairs, one file being the information file and the other being the associated metadata file. It is not compulsory to always have a metadata file. The information file name and the metadata file name should only differ from their extension field and possible wildcards. CBS-XIII also endorsed a draft WMO core profile of the ISO metadata standard, against which WMO Programmes should perform testing. RARS GTS file exchange will need to be standardised and conform with the emerging WMO standards.)*

The product level that should be distributed inter-regionally was also re-discussed and it was agreed to leave the standards unchanged (at AAPP level 1c) unless, and until, there was a formal recommendation to do otherwise (noting that the issue would be raised at the forthcoming ET-EGOS meeting).

Concerning quality monitoring, WMO took an **action** to investigate whether it would be possible for the NWP SAF to either extend its role (from the quality monitoring of EARS data) to the full global RARS network (typically for consistency checking between the global and regional datasets) and/or to cooperate with regional teams of experts involved in such a quality monitoring in each RARS.

Following these discussions, the workshop participants endorsed the contents of the Standard and agreed that it should be formally issued subject to the implementation of the agreed way forward concerning the open issues.

*At this point the RARS discussions were suspended and the ADM discussions commenced.*

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## **ADM.1 INTRODUCTION TO THE ADM DISCUSSION**

Dr Hinsman recalled the background to the ADM agenda. In particular the two actions arising out of the recent CGMS meeting in Tokyo (CGMS-XXXIII) were highlighted:

- ADM Transition Planning over South America;
- Implementation of an Asia-Pacific ADM.

The importance of these two issues to the realisation of the Integrated Global Data Dissemination Service (IGDDS) was emphasised.

## **ADM.2 OVERALL ADM REQUIREMENTS IN THE CONTEXT OF THE IGDDS, WIS AND GEOSS**

Mr Lafeuille gave a presentation to address this topic, which covered:

- the background to the ADM discussions;

- the WMO Space Programme Implementation Plan;
- the IGDDS Current Definition and Outline;
- the IGDDS Issues for this Workshop, including:
  - Actions arising from CGMS XXXIII;
  - WMO's Expectations;
  - Priority Issues.

In particular, it was noted that in the context of the WMO Space Programme Implementation Plan 2004-07 endorsed by WMO Executive Council, it is foreseen that the IGDDS will rely on 5-6 discrete dissemination service areas which collectively serve all WMO Members. The refinements to this plan agreed at the recent ET-SUP meeting were also recalled; in particular the need to establish an ADM in the Asia-Pacific region as a matter of priority.

The two actions arising from the recent CGMS-XXXIII meeting in Tokyo were also recalled:

**Action:** Within the context of RARS workshop ... WMO to invite China, Japan, Korea, Australia + partners to specifically discuss possibilities for supporting a regional ADM service for Asia-Pacific region

**Action:** EUMETSAT, NOAA, with WMO, to develop a EUMETCAST to NOAA ADM transition plan for users in South-America and report to CGMS XXXIV

It was noted that in the absence of a representative from NOAA, only the first of these CGMS actions would be addressed in the framework of this workshop (the other action would have to be addressed bilaterally).

The main WMO priority areas were identified as:

- (i) Identification of dissemination areas and responsible operators;
- (ii) Refinement of the need for (and scope of) coordination;
- (iii) Review of implementation schedule constraints.

During discussions, Dr Hinsman said that WMO was very interested in developing an ADM concept for the Asia-Pacific region. Mr Kimura asked about ADMs and sought clarification as to whether the ADM concept was confined to telecommunications satellites. In response it was clarified that other means such as Internet were also part of ADMs, and that point-to-point telecommunications were needed to concentrate data before operating any satellite broadcasting but that the main ADM distribution mechanism was expected to be by communications satellites. Mr Kimura said JMA's key interests were for regional users and JMA would consider ADM in the course of MTSAT-2 follow-on planning.

In terms of the intended ADM user community, it was also clarified that the ADM concept was the key to fulfilling the "one-stop-shop" vision of the IGDDS within the WMO Information System and was therefore intended to serve multiple user communities (and not just the NWP user community).

Dr Hinsman noted that, in terms of reception stations, the ADM concept was essential to avoid the need to provide multiple expensive, reception stations to a vast user community. The use of commercially available solutions had seen the cost of equipping the user community with reception stations plummet and this was the only viable way forward. It was also noted that there were considerable satellite lifetime savings to be obtained by separating the observing platform from the communications platform (which, in most cases, totally eclipse the cost of setting up such an ADM system), at least in the case of meteorological satellites.

Dr Jun said that in China most provinces had their own DVB receiving stations as this was a more suitable approach than terrestrial means and, as far as China was concerned, the ADM approach, integrated within the context of the IGDDS, represented the best way forward.

It was also highlighted that ADMs were not specific to satellite operators but have been implemented by several WMO Members for the day-to-day NMHS operational communications and would be enhanced in the framework of the new WMO Information System.

### **ADM.3: COVERAGE REQUIREMENTS**

Under this agenda item presentations were made by EUMETSAT, CMA and JMA.

#### **ADM.3a: EUMETSAT - EUMETCast**

A presentation on the EUMETCast system was given by Dr Williams which addressed:

- the concept behind EUMETCast and its key components;
- the coverage of the system;
- the user reception station requirements;
- the services currently carried by EUMETCast;
- service monitoring;
- data encryption and decryption;
- the evolution in the number of user stations;
- the availability of the service;
- the forthcoming use of EUMETCast for relaying MSG data to South America.

#### **ADM.3b: CMA - SHINETEK DVB-S SYSTEM**

A presentation on the CMA ShineTek DVB-S System was given by Dr Jun which addressed:

- Concept, features and technical specifications;
- Ku-band coverage;
- User terminal requirements, including:
  - authorization;
  - use of commercial software (QVIEW) for monitoring and unpacking the data, quick viewing of images and data management;
  - use of satellite data processing software packages;
  - application products;
- the current application areas and the user community.

Addressing the future under "Issues for Discussion" Dr Jun noted:

- the importance of improving access to real-time satellite data;
- the bandwidth limitations associated with terrestrial distribution mechanisms and the trend towards increased data rates with new instruments;
- the success of EUMETCast;
- the demonstration of the effectiveness of the "one-stop-shop approach" with the CMA ShineTek DVB-S System.

Bearing these issues in mind there was a clear need for an ADM in the Asia-Pacific region and the pre-requisites for the implementation of such a system were identified as:

- (i) A well-coordinated definition of requirements;
- (ii) A proper commercial satellite to provide satisfactory coverage for countries in the Asia-Pacific region;

- (iii) Several nodes to contribute data and products for uplink;
- (iv) A client platform to deal with different types of satellite data;
- (v) Mechanism for data management and system support.

Concerning coverage, Asiasat-2 was identified as a possible option, noting that it provided a good overlap with one of the EUMETCast footprints (which would facilitate inter-regional data exchange). In response to questions it was noted that this C-band beam would require a user reception station antenna size of around 2.4 metres.

### **ADM.3c: JMA**

Mr Tatsuya Kimura gave a presentation which covered:

- Direct Broadcast from MTSAT-1R;
- Receiving Status;
- Operational Schedule and Transition;
- Dissemination via Terrestrial Lines
- Some thoughts on ADM.

Concerning the ADM aspects, it was noted that:

- the ADM concept will be a very strong candidate for future dissemination of satellite data;
- consideration should be given to requirements, cost effectiveness, relationship to RARS, priorities and funding;
- terrestrial mechanisms could be used;
- MTSAT-2 follow-on could make use of such a mechanism.

Mr Tatsuya Kimura noted that NMHSs in Asia-Pacific region have just replaced, or plan to replace, receiving equipments to prepare for the coming format transfer of MTSAT-1R in 2007, following JMA's announcements in 2000 and 2004 and that JMA is apprehensive about compelling them to bear further cost for additional dissemination method.

Mr Lafeuille pointed out that providing access through an ADM could greatly expand the user community of a satellite such as MTSAT and therefore further increase the benefit of its operation.

Dr Griersmith also provided comment on the Asia-Pacific RARS and ADM issues for the region. He noted that from a national perspective broadcast via telecommunications satellite could revolutionise planning and management and operating costs of Australian satellite ground stations. For Pacific Islands not necessarily covered by telecommunications broadcast footprints, discussions indicated that JMA landline methods might serve those areas.

Dr Griersmith said that Asia-Pacific RARS needed a visionary approach. While it was true that FTP over GTS for immediate ATOVS use serves tactical requirements, there was a small specialised user base for ATOVS. Future addition of data like AVHRR and IASI would increase the volume and expand the user base. Therefore the planning of AP-RARS needed to account for that and ADM telecommunications broadcast was appropriate. With additional data types like MTSAT-1R and FY-2C the number of potential users for an AP-ADM could expand dramatically, based on experience in Europe.

Following the presentations by EUMETSAT, CMA and JMA, and to facilitate the subsequent discussion process, Dr Williams presented a diagram which illustrated the current and planned coverage of ADMs across the globe. Within the Asia-Pacific region, the C-band footprint of Asiasat-4 was noted as offering potentially good coverage of the region.

Taking due account of the written inputs provided by KMA, and noting that telecommunications satellite footprints exist within the Asia-Pacific region which could be used to form the basis of a regional ADM system (e.g., Asiasat-2 and Asiasat-4) the workshop participants developed a proposal for a regional ADM trial which is encapsulated in the following recommendation.

**Recommendation 4:** Following discussions it is recommended that telecommunications satellite footprints covering the Asia-Pacific region be further investigated with the aim of assessing their viability through regional trials, noting that:

- (i) Due account needs to be taken of the complementary nature of satellite and terrestrial distribution mechanisms (for cost effectiveness)
- (ii) CMA will take the lead and contact the other members of the Asia-Pacific community with a view to establishing a collaborative regional approach to the trials, i.e., by:
  - Including data from a variety of countries within the region,
  - Involving user stations in a number of different countries within the region,
- (iii) progress made towards the establishment of a regional trial will be reviewed by June 2006.

**ADM.4: EXCHANGE OF VIEWS ON OTHER REQUIREMENTS**

This agenda item was covered by the discussions under agenda item ADM.3.

**ADM.5: DISCUSSION: NEED FOR, AND SCOPE OF, POSSIBLE STANDARD FOR ADM OPERATORS**

This issue was briefly addressed and it was recognized that there was a need for a standard for ADM Operators as this was necessary for the proper functioning of the IGDDS. It is expected that this issue will be further addressed at the next meeting.

**ADM.6: EUMETCAST TO NOAA ADM TRANSITION FOR SOUTH-AMERICAN USERS**

In the absence of a participant from NOAA this agenda item was not addressed.

*At this point discussions commenced concerning the next steps for both RARS and ADM issues.*

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## 10. NEXT STEPS: RARS AND ADM

The Workshop reviewed the substantial progress achieved prior to and during the Workshop. It agreed that substantial activities were planned for early 2006 and that a 3<sup>rd</sup> Workshop would be necessary in the middle of 2006.

Welcoming the progress that had been achieved at the workshop concerning implementation of the global RARS network and the IGDDS, Dr Hinsman asked the participants for their views as to the appropriate mechanism to coordinate the activities.

Based on an exchange of views, it was felt that, given the rapid progress, annual workshops were too infrequent and the scope of the workshops would evolve into implementation aspects, especially to cover IGDDS., and therefore the following recommendations were made.

**Recommendation 5:** It is recommended that a 3<sup>rd</sup> RARS/IGDDS Workshop be held in Geneva in the middle of 2006 in order to assess progress in the planned activities in each of the regions (Europe/Africa, Asia-Pacific and South America).

**Recommendation 6:** In order to coordinate the implementation of the rapidly-evolving global RARS network and Integrated Global Data Dissemination Service (IGDDS), it is recommended that a RARS/IGDDS Implementation Group be formed by CGMS at its next session (CGMS-XXXIV).

## 11. CLOSURE

Dr Hinsman thanked the Participants for making this meeting such a success and an important milestone for the implementation of both the global RARS network and the IGDDS. In particular, the progress in establishing a way forward for the implementation of an ADM in the Asia-Pacific region, is of major significance to the IGDDS, as well as to other related WMO initiatives (e.g., WIS).

In closing, Dr Hinsman looked forward to the next meeting in the summer of 2006 and, in the intervening period, encouraged the participants to build upon the frameworks and objectives that had been established at this meeting.

## APPENDIX I

### AGENDA - RARS

1. Welcome
2. Introduction
3. Summary of objectives, overall status and schedule for the WMO global RARS initiative
4. Review of requirements<sup>1</sup>:
  - regional requirements;
  - inter-regional requirements.
5. Review of RARS implementation status:
  - South American RARS;
  - Asia-Pacific RARS;
  - North American RARS;
  - European RARS (EARS).
6. Comparison of RARS implementation status against requirements, and identification of additional actions as necessary
7. Review and update of the description of the global RARS architecture
8. Review of proposed standard for RARS operators
9. Assessment of the possible impact of future operational systems (e.g., NPP, NPOESS and Metop) on the RARS architecture (at both the regional and global level)
10. Next steps
11. Closure of the session

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<sup>1</sup> Based on requirements initially identified at the 1<sup>st</sup> WMO RARS workshop in December 2004 together with any subsequent updates at regional RARS workshops or regional meetings

**AGENDA - ADM**

*Welcome (common with the RARS session)*

1. Introduction to the ADM discussion
2. Overall ADM requirements in the context of the IGDDS, WIS and GEOSS
3. Coverage requirements:  
outline of the possible footprints for Asian-Pacific Region  
proposed ADM areas of responsibility
  - a. Input from CMA
  - b. Input from JMA
  - c. Input from KMA
  - d. Input from BOM
4. Exchange of views on other requirements  
  
(data content, data management, data exchange, user terminals, quality of service)
  - EUMETSAT/EUMETCAST example
  - CMA/Shinetek example
  - NOAA/NESDIS
5. Discussion: need for, and scope of, possible ADM operators standards ?
6. EUMETCAST to NOAA-ADM transition for South-American users
7. Next steps for ADMs

**Conclusions (General conclusions for the both RARS and ADM sessions)**



## APPENDIX II

### LIST OF PARTICIPANTS

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### APPENDIX III

Country	Requirements (yet to be fulfilled)						Existing Infrastructure	
	Products of interest	Regions of Interest	Satellites of Interest	Format and Level Preferences	Timeliness	Preferred Reception Mechanism	Stations	Distribution
<b>Argentina</b>	ATOVS, AVHRR	South America, Antarctica, South Pacific and South Atlantic	All polar orbiting satellites	NOAA Level 1b, BUFR, ATOVS Level 1c BUFR	30 minutes	FTP Server, GTS, Satellite DB?	2 (soon 3) HRPT stations: SMN Villa, Conae Falda., SMN-Conae Marambio	V-SAT national distribution, FTP
<b>Australia</b>	ATOVS, ASCAT, MODIS, AIRS, DMSP (e.g. SSM/IS)	Mainly global + regional from Casey in Antarctica and New Zealand	NOAA, Metop, DMSP, Envisat, NPP, NPOESS, Aqua, Terra	Mainly BUFR – possibly HDF [for ATOVS Level 1d]	Better than 2 hours	Open – but cost of access is an issue	6 HRPT Stations: [Melbourne (2), Alice Springs, Darwin, Casey, Perth]	Internet, ftp servers, GTS, SATAID...
<b>Bolivia</b>	ATOVS	South America	NOAA	Level 1c	30 minutes	GTS	-	GTS, FTP/Internet
<b>Brazil</b>	AVHRR, ATOVS and ASCAT	- Global - S-W Pacific (off South America) - N-W and Central South America - Atlantic Ocean (N-E of South America) - Antarctica	NOAA 12, 14, 15, 16, 17 and 18 + Metop  [Also MSG images!]	BUFR	Typically 30 minutes	Direct readout or FTP at INPE facilities at Cachoeira Paulista	HRPT Stations at: - Fortaleza - Natal (mid-2006) - Cachoeira Paulista/Rio de Janeiro - Cuiba/Brazilia - Manaus	FTP server GTS
<b>Canada</b>	ATOVS, AVHRR	Pacific Ocean, Asia and Southern Hemisphere	All operational polar orbiting satellites; especially those with advanced sounders	NOAA Level 1b, BUFR or format that can be processed with AAPP	Ideally 30 minutes	FTP service, GTS if data volume is reasonable, Satellite DB possible	2 HRPT Stations [Edmonton and Dartmouth]	EARS infrastructure
<b>Chile</b>	ATOVS, AVHRR	South America, Antarctica and South Pacific	All orbiting satellites	NOAA Level 1b	30 minutes	FTP and GTS	3 HRPT stations: - Santiago - Punta Arenas - Antarctica	FTP and GTS

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Country	Requirements (yet to be fulfilled)						Existing Infrastructure	
	Products of interest	Regions of Interest	Satellites of Interest	Format and Level Preferences	Timeliness	Preferred Reception Mechanism	Stations	Distribution
<b>China</b>	ATOVS, AVHRR, ASCAT, IASI	Global (regional requirements are already fulfilled)	NOAA, Metop, FY-3, NPP/NPOESS	ATOVS Level 1c, BUFR, AVHRR Level 1b	Around 30 minutes	GTS and DVB satellite direct broadcast	4 HRPT Stations: [Beijing, Guangzhou, Lhasa and Wurumuqi]	DVB direct broadcast via China-star 1
<b>France [La Reunion]</b>	ATOVS (L1a, L1c), AVHRR (L1a), ASCAT, IASI (L1a, L1c)	S-W Indian Ocean: 0-55 Deg South 20-85 Deg East [Excluding: 0-36 Deg South 40-70 Deg East]	Metop, NPP, NPOESS, FY-3, NOAA	- AVHRR/ATOVS raw or AAPP Level 1a - IASI level 1a, 1c - ASCAT BUFR	30 minutes	DVB satellite direct broadcast + GTS for data in BUFR	1 HRPT Station: La Reunion	DVB direct broadcast via RETIM (W-3 Eutelsat and Atlantic Bird-3)
<b>France [Europe]</b>	ATOVS (L1a, L1c), AVHRR (L1a), ASCAT, IASI (L1a, L1c)	Europe and N Atlantic (AVHRR, ASCAT and IASI) – [ATOVS data already available via EARS]	Metop, NPP, NPOESS, FY-3, NOAA	- AVHRR/ATOVS raw or AAPP Level 1a - IASI level 1a, 1c - ASCAT BUFR	30 minutes (15 minute goal)	DVB satellite direct broadcast + GTS for data in BUFR	1 HRPT Station: Lannion	DVB direct broadcast via RETIM (W-3 Eutelsat and Atlantic Bird-3)
<b>Japan</b>	ATOVS TBB, ASCAT Winds, IASI TBB, AVHRR TBB	- Part of sub-tropical area for typhoon analysis - around China, Korea, Russia, India and U.S. Guam for Global Analysis	NOAA, Metop, FY-3, NPOESS	AAPP Level 1c	50 minutes	GTS otherwise FTP server on internet	2 HRPT Stations: Kiyose, Tokyo and Syowa	GTS and Internet
<b>Korea</b>	ATOVS AVHRR	Region around the Korean Peninsular (TBC)	NOAA	AAPP Level 1a-1d	30 minutes (TBC)	GTS and FTP/Internet	1 HRPT station in Seoul	GTS and Internet

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Country	Requirements (yet to be fulfilled)						Existing Infrastructure	
	Products of interest	Regions of Interest	Satellites of Interest	Format and Level Preferences	Timeliness	Preferred Reception Mechanism	Stations	Distribution
<b>EUMETSAT</b>	ATOVS AVHRR ASCAT	Full Northern Hemisphere Coverage (ATOVS only)	NOAA, Metop	BUFR for ASCAT, AVHRR to be defined	30 minutes (regional) 60 minutes (outside region)	GTS and DVB satellite broadcast	5 HRPT Stations: Svalbard, Kangerlussuaq, Maspalomas, Athens, Lannion	GTS and DVB satellite broadcast
<b>ECMWF</b>	ATOVS, IASI, GRAS, GOME, CrIS, ATMS, CMIS	Global	NOAA, Metop, NPP, NPOESS, FY-3, R&D Satellites	BUFR L1 and 2 ASCAT, L2 GRAS, L2 GOME, L1c (other)	30 Min (target) 60 Min (acceptable)	GTS or DVB satellite	N/A	N/A