CGMS/WMO REGIONAL ATOVS RE-TRANSMISSION SYSTEM (RARS) WORKSHOP

EUMETSAT Headquarters, Darmstadt, Germany

16-17 December 2004

Final Report

Participants

1. Participants came from WMO Regions II, III, IV, V and VI and the full list of the contact details of Participants and Observers is attached to this report as Annex II.

2. Argentina, China and Canada, whilst not able to attend the workshop, completed the questionnaire and requested a copy of the full proceedings of the workshop (to be provided via CD-ROM and FTP internet access).

1. Welcome

Dr Hinsman, Head of the WMO Space Programme, and Chairman of the meeting, opened the meeting and invited Dr Mikael Rattenborg, the Director of Operations at EUMETSAT, on behalf of the EUMETSAT Director-General, to give the opening address.

In his address, Dr Rattenborg noted that the timely availability of ATOVS data for NWP applications is an issue of great interest to EUMETSAT's Member States. As a reflection of this interest, in 2001 the EUMETSAT ATOVS Re-transmission Service (EARS) project was initiated specifically to improve the timeliness and availability of ATOVS data within Europe. The service has proved to be very successful with the User Community and a pilot extension, to include AVHRR and ASCAT data, is in preparation.

The construction of a global RARS architecture should further improve access to ATOVS data, both regionally and globally and Dr Rattenborg thanked WMO for taking the initiative in this area, and wished all the Participants an enjoyable and fruitful stay in Darmstadt.

2. Introduction

Dr Hinsman provided an overview of WMO's activities that were of relevance to the Workshop, including the:

- WMO Structure;
- Status of the WWW's Space-based Sub-system GOS;
- WMO Space Programme;
- WMO Space Programme Implementation.

Dr Hinsman welcomed the fact that most all WMO regions were represented at this meeting. The purpose of the involvement of the WMO Space Programme in this workshop was to facilitate the creation of regional consortia around the globe with objective of implementing a RARS network.

The participants agreed the agenda, which is attached to this report as Annex I.

3. Description and Experience Gained from Existing RARS(s) [combined with agenda item 4. Establishment of Additional RARS]

Considering that, in some cases, presentations spanned both agenda items 3 and 4, it was decided for convenience to address both these topics under one combined agenda item.

Presentations were made by:

- EUMETSAT — Description and experience gained from EARS;
- NOAA — POES Overview;
- ABoM — Overview of ABoM's satellite activities and interest in RARS;
- JMA — Exchange of ATOVS Direct Broadcast Data in Eastern Asia;
- CMA — China DVB System - presented in absentia by David Lee;
- Météo-France — M-F's potential contribution to RARS and User Requirements;

- CPTEC (Brazil) Verbal presentation.

3.1 EUMETSAT

Dr Rattenborg outlined the background to EARS, including the key factors leading to its introduction. In February 2001 there was a formal request for the service from NORDMET (NMSs of Finland, Denmark, Sweden, Norway and Iceland) and the service started in November 2002 with an initial set of HRPT stations in Norway, Spain and Greenland.

Further stations were added during the course of 2003 (in Canada, Greece and USA).

Dr Anders Soerensen (EUMETSAT EARS Project Manager) then described the existing EARS configuration and the lessons learnt during its establishment.

It was also noted that it is planned to enhance EARS with two pilot AVHRR and ASCAT services in late 2005/early 2006.

In response to questions, it was clarified that the EUMETSAT direct broadcast system (EUMETCast) is flexible. Currently, the EUMETCast data rate is around 2.5Mbps and includes MTP, MSG and ATOVS data. The EARS bandwidth component is 256Kbps and this will have to be increased when AVHRR and ASCAT data is added.

3.2 NOAA

Dr Richard Walterscheid (the NOAA Representative at EUMETSAT) presented a summary of:

- the POES mission and its current status;
- the IJPS;
- ATOVS Processing;
- ATOVS Distribution.

3.3 ABoM

Dr David Griersmith provided an overview of the Australian Bureau of Meteorology's satellite activities and its interest in EARS and RARS.

The Asia-Pacific Satellite Data Exchange and Utilisation (APSDEU) meetings were identified as the natural forum for the RARS dialogue and coordination within the Asia-Pacific region. It was also noted that the 6th meeting of APSDEU (probably in May 2005) will address both RARS and ADM.

3.4 JMA

The presentation from JMA, which was given by Yoshiaki Takeuchi, addressed four main topics:

- Utilisation of AAPP processed ATOVS data at JMA;
- Status of AAPP implementation at JMA/MSC;
- Data exchange of direct broadcast ATOVS data:
- APSDEU-5 (Beijing 2004) report and the follow-up actions on ATOVS DB data;
- Background information on data exchange (e.g. GTS, Internet, LRITS).
- Proposals toward the construction of an Asian RARS.

The main elements of the JMA proposal for an Asian RARS were:

- JMA will contribute to establish a RARS together with the associated inter-regional data exchange mechanisms;
- JMA is willing to perform its part of the re-transmission functions through the GTS and/or the Internet, in co-operation with CMA, ABoM and other centres;
- The APSDEU forum should be used to co-ordinate the Asian RARS activities;
- Responsibility for implementation of functions and operations to be shared between centres.

Considering the capability of each centre, it is expected that the collaborative implementation and operation will provide great benefit for the global ATOVS user community.

It was noted that the key contact point within JMA is Hiroyuki Ichijo [Senior Assistant for R&D, Planning Division, Administration Department, JMA - email: <h_ichijo@naps.kishou.go.jp> or <h_ichijo@met.kishou.go.jp>.

3.5 CMA

Dr David Lee (EUMETSAT), in the absence of CMA, presented the Chinese DVB (Direct Video Broadcast) system which covered:

- Main purpose in terms of data distribution;
- The ground reception stations;
- The system architecture;
- The reception coverage area.

In conclusion CMA expressed the need for timely ATOVS data, and its willingness to act as an ATOVS data exchange centre using either DVB or the GTS.

3.6 Météo-France

The presentation from Météo-France was given by Mr Jérôme Lafeuille and covered:

- general background information on activities carried out at CMS Lannion;
- the possible contributions of HRPT stations in Lannion and La Réunion;
- information on the Tropical Cyclone Centre in La Réunion;
- RARS user requirements from the perspective of Météo-France and the NWP SAF.

Météo-France expressed the need for consistency between global, regional and local data (<0.1 degree K brightness temperature).

Due to HIRS calibration considerations, Météo-France also expressed the preference that processing carried out an HRPT station was limited to AAPP level 1a, and the conversion to AAPP level 1c was done at the main processing/distribution centre within a region (to ensure a better calibration result).

Concerning the Météo-France requirement for IASI products, it was noted that the NWP SAF has a plan for an AAPP-type pre-processor for IASI. It was also noted that the definition of the IASI level 1 products to be exchanged remains to be defined.

3.7 CEPTEC (Brazil)

Dr Sergio de Paul Pereira gave a verbal presentation which included an overview of Brazil's activities, including the main sites.

From both the perspective of Brazil and Argentina (who could not attend) there is a clear interest in obtaining ATOVS data over a large region covering South America and Antarctica.

Brazil expressed the willingness to take an active part in the development of a RARS for South America.

4. Establishment of Additional RARS(s)

This agenda item was covered by presentations submitted as part of agenda item 3.

5. Global Constraints/Considerations Relevant to the Establishment of a RARS

This agenda item was presented by Dr Hinsman as part of the introduction (under agenda item 2). The main points addressed included:

- the relationship between the RARS initiative and the Integrated Global Data Dissemination System (IGDDS) and the resultant constraints/considerations that need to be borne in mind when constructing a RARS;
- the need for a consistent global architecture to be defined (well-defined responsibilities for data collection, data dissemination and inter-regional data exchange);
- the areas where standards need to be defined (particularly in the area of inter-regional data exchange).

6. Working Sessions to Define Potential RARS Architectures and Associated Implementation Actions

Based on discussions and an analysis of the various requirements, contained in the questionnaire responses, it was concluded that requirements for two additional RARS had been identified:

- Asia-Pacific RARS;
- South American RARS.

Therefore, it was decided to form two working groups with the following participation:

- Asia-Pacific RARS [JMA, ABoM, Météo-France & EUMETSAT in support];
- South American RARS [Brazil, NOAA & EUMETSAT in support].

To assist the working groups, supporting information was provided in the following areas:

- Questionnaire responses and summary sheet;
- GTS Network information;
- Regional association map;
- Some satellite footprint information over Asia and South Pacific;
- HRPT Coverage Plots;
- EARS Set-up and Operational Documents;
- EUMETCast Technical description.

7. Presentation and Discussion of the Results of the Working Sessions (Proposed Architecture(s) and Associated Implementation Actions)

7.1 Asia-Pacific RARS

The Asia-Pacific RARS working group focused on three areas:

- Data Collection;
- Data Distribution;
- Standardisation.

7.1.1 Data Collection

Regarding HRPT stations, it was proposed that:

- the network should be based on existing national stations (Australia, China - including Hong Kong, Japan, Korea and New Zealand)
- the inclusion of further stations should be considered:
- Singapore, Guam, Tahiti, Fiji, La Reunion;
- additional Antarctic stations (McMurdo, Dumont d'Urville, Syowa – in addition to Casey).
- the inclusion of further stations should be subject to:
- coverage/user requirement assessment;
- network communication considerations.

In the case of Antarctica, it was noted that other regions were also interested in data from this area (e.g., South America) and the possibility existed for an integrated approach to data collection in this region.

It was also proposed that the data should only be processed to AAPP level 1a at the various HRPT station sites, with further processing to AAPP level 1c at the distribution centre(s) to ensure better calibration of the data.

The data transfer mechanism between the HRPT stations and the distribution centres was proposed to be a mixture of GTS-based FTP, Internet-based FTP and national communications (depending on circumstances).

7.1.2 Data Distribution

Concerning data distribution it was proposed that:

- regional distribution is based on a combination of Internet-based FTP and GTS - depending on available connectivity;
- the first preference for inter-regional distribution is GTS - subject to meeting timeliness targets - further tests to be conducted (Melbourne<>Tokyo, Tokyo<>Washington, Melbourne<>Exeter - ABoM will also investigate the timeliness of data from Offenbach).

It was felt that this approach reflects the specifics of the Asia/Pacific region (limited number of centres requiring ATOVS data) and builds on the existing GTS architecture.

In view of the proposed data distribution approach, at least 2 data distribution centres were proposed:

- Tokyo (approximates to Region II);
- Melbourne (approximates to Region V);

7.1.3 Standardization

In order to ensure a degree of coherence, both regionally and inter-regionally, it was proposed that standards are defined in at least the following areas:

- the use of a commonly agreed version of the AAPP software for data-exchange between regions (with the conversion to BUFR embedded in the processing software);
- the quality-tagging of data (to ensure source traceability,…);
- service management (see EARS documentation for the possible list of areas to be addressed).

7.1.4 Other Issues

7.1.4.1 Data Timeliness

It was noted that the timeliness requirements for data exchange between regions may need further consideration as it is not usually feasible to provide data inter-regionally with the same timeliness as data provided regionally.

7.1.4.2 Compatibility of the Architecture with Future Evolutions in Requirements

The proposed terrestrial distribution mechanisms of the Asia-Pacific RARS reflect the focused nature of the ATOVS user group within the region. If additional data, such as AVHRR data, were to be added to the service in the future, then the user community would be larger and more diverse, and the terrestrial dissemination mechanisms proposed may no longer be so appropriate.

Therefore, when further defining the Asia-Pacific RARS architecture at the next APSDEU meeting, it was felt important that consideration should be given to the effect on the architecture of future evolutions in requirements. This could, for example, result in the need to implement a direct broadcast system for the region; similar to EUMETCast.

On this point the WMO emphasised the cost-effective nature of the EUMETCast system which provides ready access to timely meteorological data, via cost-effective user stations, across Europe and Africa. Indeed the establishment of a limited network of reception stations, combined with a regional direct broadcast dissemination system (such as EUMETCast) offers the only economically viable method of providing timely access to data for large parts of the globe.

7.2 South American RARS

The key features of the initial proposal for a South American RARS were:

- Data collection from HRPT stations based in Brazil, Costa Rica and Argentina;
- AAPP level 1c data to be distributed regionally with a timeliness of 40 minutes using FTP;
- AAPP level 1c data in BUFR to be distributed inter-regionally with a timeliness of 1 hour using Internet and V-SAT.

It was noted that decisions on the location of processing/distribution centre(s) will depend on the results of future discussions with the concerned parties in the region.

7.3 Summary of Implementation Actions

7.3.1 Asia-Pacific RARS

A number of actions were identified in the presentation on the proposed Asia-Pacific RARS.

Bearing in mind that APSDEU-6 is the primary mechanism that will be used to implement the RARS, it was agreed that all relevant actions (with the exception of standardization) would be addressed within the APSDEU framework.

Concerning the standardization issues raised, WMO will propose an approach to address the issue of standards, in time for the next RARS workshop meeting in the latter half of 2005.

7.3.2 South-American RARS

WMO agreed to liaize with the countries in South America, who have expressed an interest in receiving ATOVS data, with a view to arranging a meeting in May 2005 to further define the proposal for a South American RARS.

7.3.3 Further Investigation of Potential HRPT Stations

In view of the number of potential HRPT stations that were identified during the course of the workshop, it was decided to split the responsibility for investigating these stations as follows:

- David Griersmith: New Zealand, Fiji, Philippines, Singapore;
- Sergio de Paul Pereira: Costa Rica, Chile, and other S-American Stns. - with input from Don Hinsman on Galapagos ;
- Don Hinsman: Vladivostok;
- Yoshiaki Takeuchi: Syowa;
- Jérôme Lafeuille: La Reunion, Tahiti, Martinique, Dumont d'Urville;
- Richard Walterscheid Hawaii, American Samoa, Guam.

8. Documentation of the Global Architectures (and associated points of contact)

Following the discussions at the workshop, a much clearer picture emerged of the possible shape of a global RARS architecture:

- the systems over Europe and North and Central America are fully operational with inter-regional data exchange already in place between these two regions;
- the proposal for an Asia-Pacific RARS is developing rapidly and the schedule for the implementation phase should be clearer after the APSDEU-6 meeting around May 2005;
- the proposal for the South American RARS is still embryonic, but progress was made during the workshop on identifying the key open points that need to be addressed. It is expected that the initial proposal will be further refined during the regional meeting planned to take place in May 2005.

In view of the on-going definition activities within the various regions it was felt that, by the end of 2005, it should be possible to construct a detailed picture of the global RARS architecture.

In view of the above, WMO took the action to arrange a second RARS Workshop towards the end of 2005.

A list of the points of contact is included in the participants list attached to this report (Annex II).

9. Possible Impact of Future Operational Systems

Under this agenda item two presentations were given

- NPP and NPOESS;
- Metop.

9.1 NPP and NPOESS

Peter Wilczynski and John Overton jointly presented the implications of NOAA's NPP and NPOESS programmes.

The presentation addressed:

- operational concepts;
- architectures;
- data latency;
- sensors;
- products;
- risk reduction (NPP);
- direct broadcast continuity;
- schedule.

The "safety net" concept for NPOESS was discussed at some length and the possible implications/need for a data collection network.

For NPP, which will have no safety net, two options for data access were discussed:

- a direct link to NOAA (data latency around 2 hours);
- a network of X-band stations which would have a similar latency to EARS (around 30 minutes).

During the discussions it was felt that, for cost reasons, any decision to implement a network of X-band receiving stations would have to be based on the NPOESS configuration rather than NPP. Any such decision on collection networks would also have to take due account of:

- the availability of NPOESS data (gathered by the safety net) directly from central sites in the USA;
- the data content of the 3.8Mbps L-band [DRO] downlink from NPOESS.

Concerning the NPOESS L-band downlink, it was noted that ancillary data will also be provided which will allow the derivation, in real-time, of 29 EDRs (Environmental Data Records). The processing software, that will be made publicly available, will be a sub-set of the central processing software.

Considering that the timely collection of data from NPOESS has been defined as an integral part of this new system, it was suggested that a possible strategy for the future evolution of RARS would be to constrain it to missions not having this in-built capability. This would also reduce the potential scheduling conflicts within the network of RARS HRPT stations.

Regarding the data exchange between Europe and the USA, it was noted that such exchanges would probably fall within the domain of the IJPS agreement.

9.2 Metop

Under this agenda item, Dr Dieter Klaes (EUMETSAT) provided a brief verbal description of the arrangements for the reception of data from the Metop spacecraft. The implications of the recent decision to make Metop data available via EUMETCast, rather than via NRT terminals, was discussed at some length and, at the request of participants, a technical description of the EUMETCast system was included in the package of supporting information.

It was also noted that the consolidation of all EUMETSAT real-time data onto one direct broadcast system was a good example of the “one-stop-shop” system for the reception of data (and is fully in line with the IGDDS concept advocated by WMO).

10. Summary

Dr Hinsman, in summing up, expressed the view that this meeting would be looked back on as “seminal” in the creation of a global approach to the collection and distribution of ATOVS data. Some work still remained to be done, but the framework for both regional and inter-regional cooperation and coordination was now established, and this should lead to the implementation of a global RARS network that satisfies the requirements for both regional data, and inter-regional data exchange.

Dr David Griersmith (ABoM) described the RARS approach as a revolution in the history of satellites in which there was a strong emphasis on one of the critical issues with satellite technology, namely increasing availability and use of the data. The RARS approach was entirely consistent with the new WMO model for satellite data dissemination in which there was a balance between a limited number of coordinated ground stations coupled with wide availability of data and products. He suggested therefore that the initial success of EARS as a pioneering system needed to be extended globally and that the momentum should be seized.

11. Closure

In closing the meeting Dr Hinsman thanked EUMETSAT for hosting the meeting and the preparation work, and thanked all the participants for their contributions which made the meeting such a success.

ANNEX II

AGENDA

Regional ATOVS Retransmission System (RARS) Workshop

09:00 16 December 2004 - 17:00 17 December 2004

EUMETSAT Headquarters

Darmstadt

1. Welcome

2. Introduction

3. Description and experience gained from existing RARS(s)

   - EUMETSAT [EARS];
   - NOAA;
   - Australia/China .

4. Establishment of additional RARS(s)1:

   - regional requirements;
   - inter-regional requirements;
   - existing capabilities (that could be used to construct a RARS).

5. Global constraints/considerations relevant to the establishment of a RARS:

   - consistency with the WMO Integrated Global Data Dissemination System (IGDDS) concept;
   - coherence of the global architecture [e.g. collection coverage, dissemination coverage, data exchange, standardisation (processing package utilisation, product levels, data formats, quality assurance...)]

6. Working sessions(s) to define potential RARS architectures and associated implementation actions

7. Presentation and discussion of the results of the working sessions (proposed architecture(s) and associated implementation actions)

8. Documentation of the global architecture, and associated points of contact

9. Possible Impact of Future Operational Systems

10. Wrap-up

[1] A questionnaire was sent to all participants prior to the workshop to help identify the points that should be covered under this agenda item.

ANNEX II

List of Participants

Chairman:
Dr Donald E. Hinsman
Head, WMO Space Programme
World Meteorological Organization
7 bis avenue de la Paix
Case postale 2300
CH-1211 Geneva 2
Switzerland
Tel: (41 22) 730 82 85
Fax: (41 22) 730 81 81
Email: DHinsman@wmo.int

EUMETSAT
Am Kavalleriesand 31
D-64296 DARMSTADT
Germany

Ms Karen Ernst
Legal Officer
Legal Affairs Division
Tel: (49) 6151 807 814
Fax: (49) 6151 807 661
Email: ernst@eumetsat.de

Dr David Lee
Operational Engineer
EUMETSAT ATOVS Retransmission Service
Tel: (49) 6151 807 579
Fax:
Email: Leed@eumetsat.dew

Dr Mikael Rattenborg
Director of Operations
Tel:
Fax:
Email:

Dr Anders Meier Soerensen
EARS Project Manager
Tel: (49) 6151 807 353
Fax: (49) 6151 807 304
Email: soerensen@eumetsat.de

Dr Richard Walterscheid
NOAA Representative at EUMETSAT
Tel: (49) 6151 807 831
Fax:
Email: walterscheid@eumetsat.de

Ms Sally Wannop
User Support Manager
Tel: (49) 6151 807 440
Fax: (49) 6151 807 304
Email: wannop@eumetsat.de

ABOM
Dr David Griersmith
Superintendent Satellites
Bureau of Meteorollogy
GPO Box 1289K
MELBOURNE, Vic 3001
Australia
Tel: (61) 3 9669 4594
Fax: (61) 3 9669 4168
Email d.griersmith@bom.gov.au

CMS
Mr Jérôme Lafeuille
Head
Centre de Météorologie Spatiale
B.P. 50747
F.22307 LANNION Cédex
France
Tel:
Fax:
Email: jerome.lafeuille@meteo.fr

INPE
Mr Sérgio de Paula Pereira
Head of Engineering and Support Team
Environmental Satellites Division
Institut Nacional de Pequisas Espaciais
Km 040 Rodovia Presidente Dutra
Caixa Postal Nr 001
CACHOEIRA PAULISTA (SP) 12630-000
Brazil
Tel: (55) 12 3186 9275
Fax: (55) 12 3186 9395
Email: spereira@cptec.inpe.br

JMA
Mr Yoshiaki Takeuchi
Chief
Numerical Analysis and Modelling Section
Numerical Prediction Division
Japan Meteorological Agency
1-3-4 Ote-Machi, Chiyoda-ku
TOKYO 100-8122
Japan
Tel: (81) 33212 8341 (ext 3310)
Fax: (81) 33211 8407
Email: ytakeuchi@met.kishou.go.jp

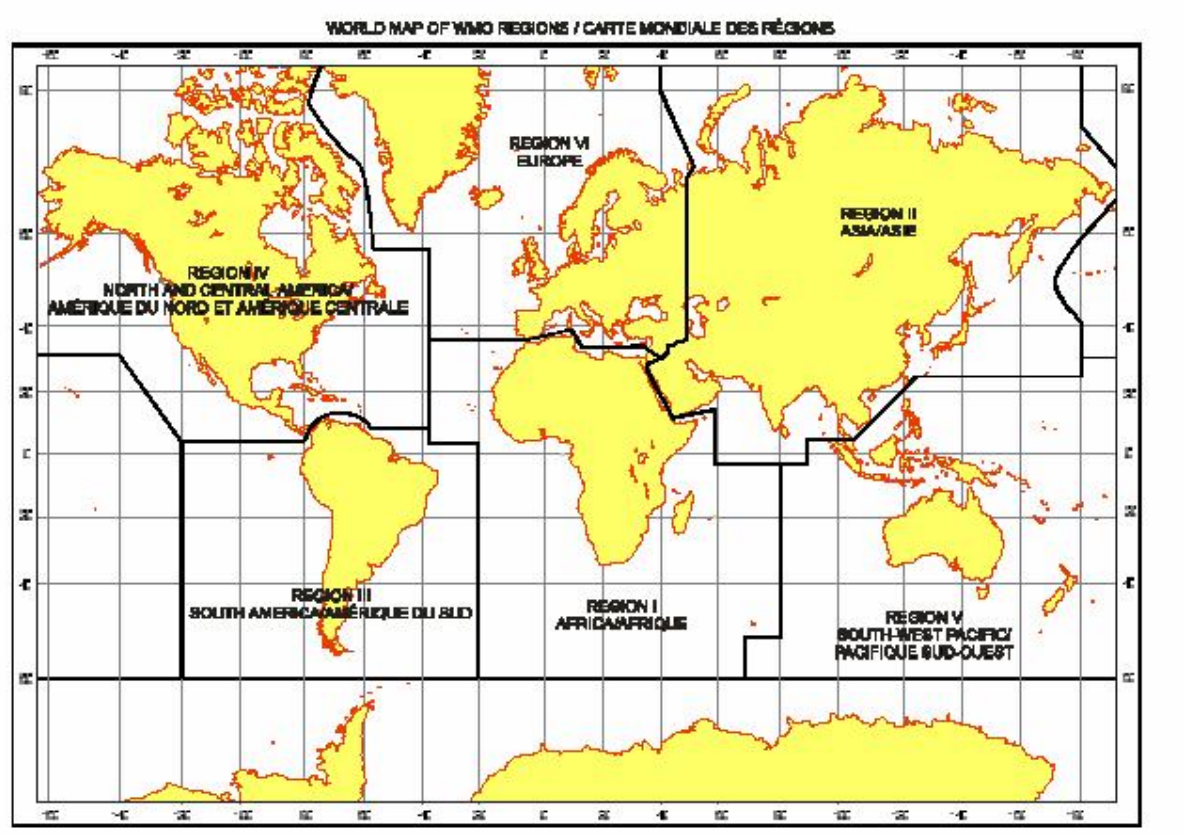
NOAA/NPOESS
Mr John Overton
NPOESS IDPS FTS Deputy
NOAA
8455 Colesville Road
Silver Spring, MD 20910
USA
Tel: (1) 301 713 4747
Fax: (1) 301 427 2164
Email: John.Overton@noaa.gov

Mr Peter Wilczynski
NPP Programme Manager
NPOESS
NOAA
8455 Colesville Road
Silver Spring, MD 20910
USA
Tel: (1) 301 713 4786
Fax: (1) 301 427 2164
Email: Peter.Wilczynski@noaa.gov

ANNEX 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**
Argentina	ATOVS, AVHRR	South America, Antarctica, South Pacific and South Atlantic	All polar orbiting satellites	NOAA Level 1b, BUFR	30 minutes	FTP Server, GTS, Satellite DB?	2 (soon 3) HRPT stations: SMN Villa, Conae Falda., SMN-Conae	V-SAT national distribution
Australia	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…
Brazil	AVHRR, ATOVS and ASCAT	- Global - S-W Pacific (off South America) - N-W and Central South America - Atlantic Ocean (N-E of South America)	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	2 HRPT Stations: [Cuiba and Cachoeira Paulista]	FTP server
Canada	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	3 HRPT Stations [Edmonton, Gander and Bedford]	EARS infrastructure
China	ATOVS, AVHRR, ASCAT	Global (regional requirements are already fulfilled)	NOAA-15, 16 and 17	AAPP Level 1b, BUFR	Around 30 minutes	GTS and DVB satellite direct broadcast	3 HRPT Stations: [Beijing, Guangzhou and Wurumuqi]	DVB direct broadcast via China-star 1

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**
France [La Reunion]	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	- 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)
France [Europe]	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	- 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)
Japan	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	1 HRPT Station: Kiyose, Tokyo	GTS and Internet
EUMETSAT	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	4 HRPT Stations: Tromsoe, Kangerlussuaq, Maspalomas and Athens	GTS and DVB satellite broadcast


WORLD MAP OF WMO REGIONS / CARTE MONDIALE DES RÉGIONS
REGION VI
EUROPE
REGION II
ASIA/ASIE
REGION IV
NORTH AND CENTRAL AMERICA
AMÉRIQUE DU NORD ET AMÉRIQUE CENTRALE
REGION III
SOUTH AMERICA/AMÉRIQUE DU SUD
REGION I
AFRICA/AFRIQUE
REGION V
SOUTH-WEST PACIFIC/
PACIFIQUE SUD-OUEST