

WORLD METEOROLOGICAL ORGANIZATION

**REGIONAL ATOVS RETRANSMISSION SERVICE
IMPLEMENTATION GROUP
(RARS-IG)**

**SIXTH MEETING
EXETER, UNITED KINGDOM
25-26 OCTOBER 2012**

FINAL REPORT



Participants in the RARS-IG-6 meeting



From left to right: Sergio Pereira (INPE), Jaedong Jang (KMA), Gloria Pujol (SMN Argentina), Nigel Atkinson (Met Office/EUMETSAT NWP SAF), Gilles Verner (Env. Canada/MSC), Anthony Rea (BOM), Christelle Ponsard (EUMETSAT), Jérôme Lafeuille (WMO), Yoshiaki Sato (JMA).

Other participants not shown on this picture: Frederick Branski (NOAA, President of CBS), Simon Elliott (EUMETSAT), Jian Liu (CMA), Mike Manore (Env. Canada).

REPORT OF THE RARS-IG-6 MEETING

1. Introduction

The sixth meeting of the RARS Implementation Group was held at the Met Office headquarters in Exeter, United Kingdom, following the closure of the joint meeting of APSDEU-12 and NAEDEX-24.

This main scope of the meeting was to prepare the inclusion of new sounder data acquired from METOP/IASI, SNPP/CrIS and ATMS, and FY-3 MWTS and MWHS, into RARS operations. The meeting could build in particular on the outcome of the RARS Technical Subgroup of the 18th International TOVS Study Conference (ITSC-18) held in Toulouse in March 2012. It was underlined that the inclusion of METOP, NPP and FY-3 data was very timely given the launch of METOP-B in September 2012, the progress in the commissioning of Suomi-NPP, and the recent APSDEU-NAEDEX discussions that confirmed the interest of all major NWP centres for low-latency access to METOP, SNPP and FY-3 sounding data.

The agenda of the meeting is Annex 1.

The actions agreed in the course of the meeting are listed in Section 6.1.

2. Status of the RARS/ATOVS Network

2.1 *Reports from the regional networks*

The status of the Asia-Pacific, South America and EARS RARS networks was presented, with emphasis on the implementation of new capabilities for METOP and SNPP data. The implementation of METOP acquisition capabilities is well advanced:

- All stations of the EARS network are either operational or ready to move to operations for METOP/ATOVS data and, if relevant, i.e. where the connectivity is sufficient, for METOP/IASI data.
- In Asia, Jincheon (KMA) is ready for METOP, SNPP and FY-3; Kiyose (JMA) is ready for METOP and SNPP, and Hong-Kong will follow soon after. Beijing (CMA) should be ready soon for SNPP
- In Oceania, the implementation is in progress with Perth (Australia) being ready for METOP; SNPP and FY-3.
- In South America, upgrades are planned on most of the stations, and Cachoeira Paulista (Brasil) is expected to be ready soon for METOP.

The readiness status of RARS capabilities for METOP, NPP and FY-3 is summarized in Annex 2. (See Actions 6.1 and 6.2.)

2.2 RARS central monitoring and software issues

Operations of the existing stations are nominal, with the exception of NOAA-19 reception in Córdoba and Santiago, due to an older version of AAPP, which should thus be upgraded. (See Action 6.3.)

2.3 Timeliness issues

NOAA and Environment Canada have looked at timeliness issues of Miami, Ewa Beach, Edmonton and Gander, with EUMETSAT and some progress has been made.

2.4 Procedure to report on, and correct, anomalies

In a recent case (12 October 2012) an anomalous bias was detected by a user (Meteo France) on two stations (Hong-Kong and Jincheon) and the situation was corrected very quickly, which illustrated the excellent coordination and responsiveness by all people involved : user centre who provided precise feedback, WMO Secretariat who forwarded the alert to the relevant persons in charge, EUMETSAT NWP-SAF who found the root cause and defined a corrective measure, RARS operators who implemented the corrective measure, EUMETSAT NWP-SAF and users who confirmed that the anomaly was corrected.

In order to be able to correct possible future anomalies with the same efficiency, the procedure for handling anomalies, including the clear definition of the respective roles, should be included in the RARS Operators Standards, and the relevant points of contacts be indicated on the web site. There should be full visibility on the network topology and the information chain up to the individual station operators. (See Action 6.4)

3. Further development of RARS/ATOVS

3.1 METOP receiving sites and inclusion of METOP/ATOVS data

The implementation of METOP acquisition capabilities is well advanced. The readiness of RARS capabilities for METOP is summarized in Annex 2. The generation of RARS products from METOP/ATOVS can be done in a similar way to the RARS products from NOAA/ATOVS. Several stations are already processing METOP/ATOVS data and providing the corresponding RARS products.

For station scheduling it is recommended to use the Two-Line Elements (TLE) from EUMETSAT: <http://oiswww.eumetsat.org/metopTLEs/html/index.htm>. The long term TLEs (Long TLE) should be used. (See Action 6.5)

3.2 Possible addition of new sites

In a private communication between Nico Kroese and Jérôme Lafeuille, the South-African Weather Service (SAWS) has expressed willingness to contribute to the RARS with a METOP receiving station recently implemented in Cape Town (35.5 °S, 18.2 °E) by CLS-Argos.

This case, similar to the case of Libreville, Gabon (0.36 °N, 9.68 °E), is a matter of cooperation with CLS-Argos which requires further investigation because the equipment is seen as a “black box” and the extraction of ATOVS or IASI data is not straightforward. The previous action RARS-IG-4.07 should be replaced by a new one. (See Action 6.6)

4. Implementation of RARS for METOP/IASI, S-NPP and FY-3 data

4.1 EARS/IASI and EARS/S-NPP concept

A detailed presentation was given by EUMETSAT on the operational concept for EARS/IASI and EARS/CrIS-ATMS. The RARS-IG agreed to adopt the same concept for IASI, CrIS and ATMS data in all RARS regional networks.

For IASI products, it is clarified that the associated cloud information is a simplified cluster analysis derived from the AVHRR. For NPP/CrIS, deriving similar cloud information from VIIRS would be rather complicated and have impact on timeliness, because it can't be done on a pixel basis. Therefore it is not planned to be implemented.

For IASI and CrIS products at least, the processing should be done at the receiving site to reduce the data volume to a manageable size.

4.2 METOP, SNPP and FY-3 receiving stations

There is a strong interest in direct readout FY-3 MWHS-1 data as a precursor for the advanced MWHS-2 instrument that will fly on FY-3C and beyond.

The readiness of RARS capabilities for METOP and S-NPP is summarized in Annex 2. We should keep track of which software versions are used on which stations.

(See Actions 6.7 and 6.8)

4.3 Telecommunication issues for data concentration

Based on the experience of EUMETSAT in EARS prototype services, the typical product size per Direct Readout station and per pass is estimated as follows (L1C BUFR compressed):

- METOP/IASI : 12-13 MB (including 366 channels and the PC scores).
- NPP/ATMS: 1.5 MB
- NPP/CrIS: 10 MB (without VIIRS cloud information).

The telecom scheme from data acquisition to the injection of L1C RARS products into the GTS has to be defined on a case by case basis:

- RARS stations with RMDCN access should directly inject into the RMDCN (e.g. Jincheon / Seoul)
- RARS station with GTS access should directly inject into the GTS (e.g. Kiyose / Tokyo)
- RARS station with no GTS/RMDCN access should send their products either to a GTS or RMDCN hub via FTP (e.g. Maupuia to Melbourne)
- As an alternative, RARS stations which are part of a coordinated regional/subregional network should send their products to the regional/subregional node that will send the whole RARS product package to a GTS/RMDCN hub (e.g. EARS stations concentrated by EUMETSAT via VPN, before being sent to Offenbach hub; Natal, Cuiaba via Cachoeira Paulista, before being sent to Brasilia hub).

In the case of IASI and CrIS products, because of the large data volumes, an optimized selection of stations is recommended in case of overlapping acquisition areas (e.g. Santiago to be used only as back-up to Córdoba). (See Action 6.9)

4.4 Telecommunication issues for data distribution

The approach for accessing RARS products is to be defined by each user centre, depending on its connectivity. It will be the matter of a trade-off between the benefit provided by additional data and the resulting load on the telecommunications. While the primary distribution means will be the GTS (or RMDCN), the use of a satellite broadcast service such as EUMETCast or CMACast would be an advantage for users with limited GTS connectivity. A schematic illustration of the telecommunication scheme is provided in Figure 1.

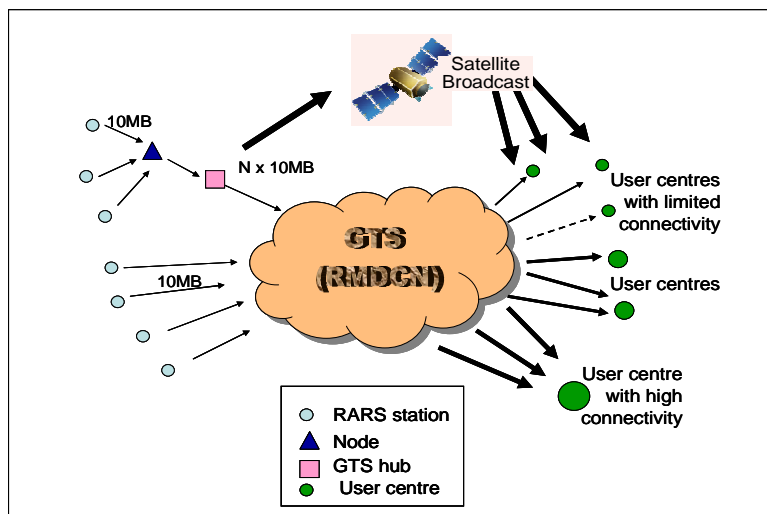


Figure 1: Schematic illustration of the telecommunication concept

In order to evaluate the data flows and their impact on the GTS/RMDCN, it is useful to know not only the data volumes generated by RARS, but also their distribution with time. The RARS-IG discussed a methodology for such an estimation, based on the product file size and the overpass times in UTC, taking into account the Equatorial Crossing Time of the relevant satellites (in Local Solar Time) and the longitude and latitude of each acquisition station. Preliminary estimations are provided in Figure 2 and 3, corresponding to the implementation of RARS in 2013 and 2014/2015 respectively under current planning assumptions. (See Action 6.10).

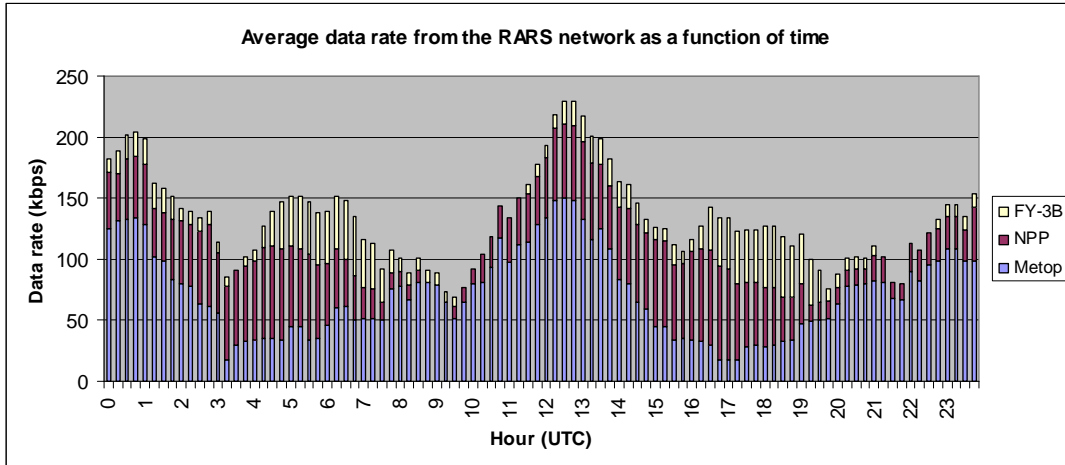


Figure 2: Fifteen-minute average data rate produced by the RARS network as a function of UTC time, based on the expected implementation by 2013.

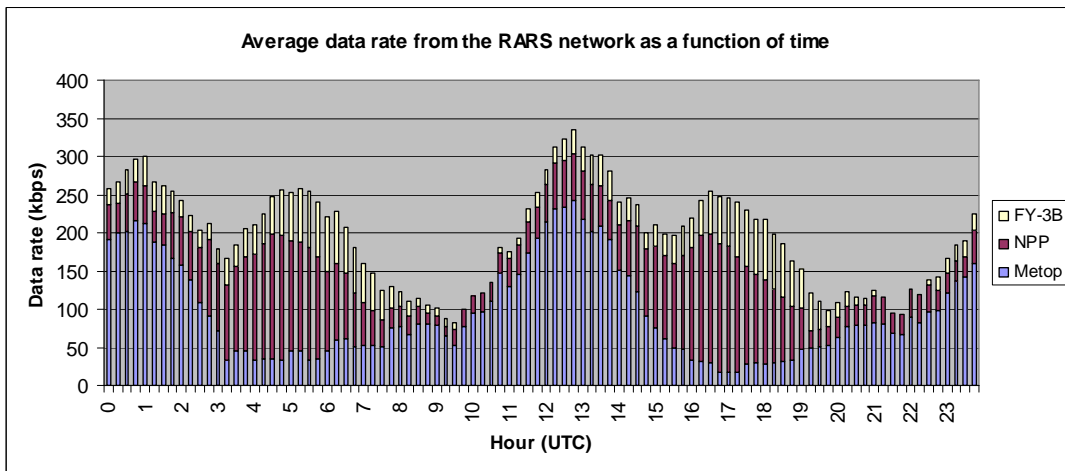


Figure 3: Fifteen-minute average data rate produced by the RARS network as a function of UTC time, based on the expected implementation by 2014/2015.

Figures 2 and 3 show a peak around 13:00 UTC and 01:00 UTC because of the high number of METOP acquisition stations located in Asia and Australia, around 110-140°E longitude, i.e. where the local time is 8-9 hours ahead of the UTC. It also shows that, under the assumptions taken in the calculations, the

data rate (averaged over 15-minute slots) is below 200 kbps in 2013 and below 300 kbps in 2014/2015 when taking into account all available RARS stations for the three satellites (METOP, SNPP, FY-3B).

These elements should be assessed by NAEDEX-APSDEU members and other potential users with a view **to refine their requirements** and **to consider telecom upgrades if relevant**. The requirements should be clarified e.g. as to whether all regions need to be covered (For example: are Antarctic regions equally important to mid-latitudes for short cut-off analysis? Shall there be a selection of stations to minimize overlaps?). In the case of IASI, an optimization could be made in sending channels only (without PC scores) if the requirement for PC scores is not firm. (See Action 6.11)

4.5 Code figures for new instruments (IASI, ATMS, CrIS, MWTS, MWHS)

The code figures previously defined for RARS ATOVS products are summarized in the "[RARS Coding Summary](#)" available on the RARS web site. As indicated in Annex 3, the following fields need to be defined for the new instruments including IASI, CrIS, ATMS as well as FY-3/MWTS and MWHS:

Field	Use	Tentative values for IASI, CrIS, ATMS (To Be Confirmed)
BUFR Section 1 Octet 12	Data sub-category	IASI=7; CrIS=8 or 30; ATMS=9 or 40
"A1" in the GTS heading	Data type designator	IASI=I; CrIS=C; ATMS=S
product identifier (filename)	Data designator	IASI, CRIS, ATMS

The open questions should be solved and the final code figures should be endorsed by the Expert Team on Data Representation and Codes for inclusion in the proper regulatory documentation (Manual on Codes and/or Manual on the GTS) and the RARS Coding Summary be updated accordingly. (See Action 6.12)

4.6 Implementation plan for METOP/IASI and SNPP data in RARS

The meeting reviewed and confirmed the course of actions discussed at ITSC-18/RARS Technical Subgroup, noting that a lot of progress had already made along this plan, as indicated below (*in italics after each action*):

- (i) Implement or upgrade the receiving stations for Metop and for NPP (*This implementation is now well engaged, see Annex 2*);
- (ii) Implement adequate servers at each acquisition station (*See details in Christelle Ponsard's presentation on EARS/IASI and EARS/SNPP*);
- (iii) Install the CSPP and AAPP processing software (*CSPP developed by CIMSS is available from <http://cimss.ssec.wisc.edu/cspp/>. AAPP is available from the NWP-SAF*);

- (iv) Organize the telecommunication aspects, which should be addressed at the regional level taking into account the respective locations of the stations and of the GTS hubs, and the bandwidth constraints (*See 4.3 and 4.4 above*).
- (v) Initiate as soon as possible the retransmission of Metop/ATOVS products, which should not raise any telecom difficulties (*This is already done by several stations*);
- (vi) Define filenames and/or bulletin headers for the new products, and update the RARS documentation accordingly (*See 4.5 and Annex 3*);
- (vii) Proceed with the retransmission of Metop/IASI and Suomi-NPP products once the telecommunication scheme is in place for these higher data volumes, and inform the NWP user community.
- (viii) Seek feedback from NWP community as concerns the adequacy of product contents and consider adjustments if relevant.

5. Other business

5.1 User Interaction

Updates on RARS have been regularly given by EUMETSAT and/or WMO at ITSC conferences in presentations or posters, and a RARS Technical Subgroup was organized within ITSC-18. Further presence at ITSC is recommended to provide visibility and seek feedback from the NWP and sounding community.

Updates on RARS have also be given at satellite users' conferences (NOAA, EUMETSAT) and this is further encouraged.

RARS user requirements and related data exchange issues are now formally addressed within APSDEU-NAEDEX, which is fully appropriate. Collocation of a RARS-IG meeting with APSDEU-NAEDEX is useful and should be adopted as a principle, as far as practical.

5.2 RARS Websites

The progress made at this meeting should be reflected in an update of the WMO RARS website. (See Action 6.13)

5.3 Technical advice

EUMETSAT (Christelle Ponsard) and the NWP-SAF (Nigel Atkinson) can be contacted for advice if necessary.

6. Conclusion

6.1 Summary of actions from RARS-IG-6

- RARS-IG-6.1: WMO (Jérôme Lafeuille) and BOM (Anthony Rea) to explore with Meteo-France the connectivity of Papeete for possible collection of at least ATOVS data from NOAA and METOP, noting that Meteo-France is planning to implement a new acquisition station on this site in 2013.
- RARS-IG-6.2: WMO (Jérôme) to remove Seoul (replaced by Jincheon) and Kelburn (replaced by Maupuia) from the list of RARS stations, as well as the sites for which no station is planned.
- RARS-IG-6.3: SMN (Gloria Pujol) to ensure that the AAPP version of Cordoba and Santiago is upgraded to v.7
- RARS-IG-6.4: WMO (Jérôme) to draft text in RARS Operators Standards on order to clarify the information flow and action chain required to react when an anomaly is detected in RARS operations.
- RARS-IG-6.5: EUM (Christelle) will inform all RARS-IG members of the availability of Two-Line Elements for METOP on the EUMETSAT website, for onward information of all stations operators. (**Action completed:** the URL for Metop TLE is: <http://oiswww.eumetsat.org/metopTLEs/html/index.htm>. It is recommended to use the long term TLEs (Long TLE) for station scheduling.)
- RARS-IG-6.6: WMO (Jérôme) and EUMETSAT (Christelle) to pursue dialogue with CLS-Argos with a view to include stations from the CLS-Argos network, such as Cape Town and/or Libreville.
- RARS-IG-6.7: CMA (Jian Liu) to investigate the possibility to provide RARS products from FY-3 MW sounder (in particular MWHS-1) acquired in Guangzhou and Urumqi
- RARS-IG-6.8: NWP-SAF (Nigel) Establish a web-based inventory of receiving stations indicating which software versions are implemented (e.g. AAPP and CSPP versions)
- RARS-IG-6.9: MSC (Gilles Verner) to investigate with APSDEU-NAEDEX members whether the NWP requirement for RARS data applies to the whole globe, or which geographical areas (e.g. Antarctica) could be considered with lower priority (also taking into account the availability of an Antarctic acquisition station for METOP).
- RARS-IG-6.10: WMO (Jérôme) to prepare a graph of expected telecom load, as a function of time, for the whole RARS /IASI and RARS/CrIS network
- RARS-IG-6.11: EUM (Christelle) and NWP-SAF (Nigel Atkinson) to investigate the impact of the PC scores on the IASI product size.

- RARS-IG-6.12: WMO (Jérôme) and IPET-DRC Chair (Simon Elliott) to clarify any outstanding issue regarding RARS product coding, in particular the “A1” field for IASI, CrIS, ATMS (tentatively I, C, S) and octet 12 (tentatively :7, 8, 9 or 7, 30, 40) and update the RARS Coding Summary.
- RARS-IG-6.13: EUM (Christelle) and WMO (Jérôme) to coordinate to update the RARS network plans on the WMO website.

It was agreed that the status of actions of the previous meetings would be reviewed off-line. An updated status is provided in Annex 4, which shows that the 25 actions from previous meetings are closed with the exception of three:

- RARS-IG-4.13: The RARS operators and regional or sub-regional network coordinators to check that the RARS products are listed and described with proper metadata in the relevant WIS DCPC and GISC catalogues.
- RARS B.1: To define guidelines for monitoring availability and timeliness of RARS data on the GTS, for each RARS network, to be ultimately included in the RARS Operators Standards.
- RARS B.3: Met Office to investigate whether the central monitoring can be extended to the availability and timeliness of RARS data obtained through the GTS, in addition to the regional monitoring performed by the RARS nodes.

6.2 Next meetings

The date and place of the next meeting is still To Be Determined. Possible venues are either with the next NAEDEX-APSDEU (tentatively in Beijing early 2014) or with ITSC-19 (in 2014, possibly in Asia as well).

6.3 Closure of the meeting

The meeting was closed at 13:30 with thanks to the Met Office for hosting it, and to all participants for their contribution that had enabled substantial progress.

ANNEX 1:

AGENDA

1. Introduction

- 1.1 Opening of the Session
- 1.2 Adoption of the Agenda

2. Status of the RARS/ATOVS Network

- 2.1 Status of the Asia-Pacific RARS
- 2.2 Status of the South America RARS
- 2.3 Status of EARS (including IASI and S-NPP data services)
- 2.4 RARS central monitoring and software issues
- 2.5 Dissemination, timeliness, and coding issues
- 2.6 Procedure to report on, and correct, anomalies

3. Further development of RARS/ATOVS

- 3.1 METOP receiving sites and inclusion of METOP/ATOVS data
- 3.2 Possible addition of new sites (South-Africa, Pacific, cooperation with CLS)

4. Implementation of RARS for METOP/IASI, S-NPP and FY-3 data

- 4.1 EARS/IASI and EARS/S-NPP concept
- 4.2 METOP, S-NPP and FY-3 receiving stations
- 4.3 Telecommunication issues for the Asia-Pacific
- 4.4 Telecommunication issues for South America
- 4.5 Implementation plan for METOP/IASI data in RARS
- 4.6 Implementation plan for S-NPP data in RARS

5. Other business

- 5.1 User Interaction
- 5.2 RARS Websites

6. Conclusion

- 6.1 Summary of actions
- 6.2 Next meetings
- 6.3 Closure of the meeting

ANNEX 2:

Status of RARS station readiness for METOP, NPP and FY-3 (as of 26 October 2012)

Station	METOP/ ATOVS	METOP/ IASI	NPP	FY-3	Comment
Kiyose	Operational	Ready	Ready		
Beijing			Being upgraded	Operational	
Guangzhou				Operational	
Urumqi				Operational	
Jincheon	Operational	Ready	Ready	Ready	
Hong Kong	Operational	Ready	Planned early 2013		
Melbourne CribPt	Being upgraded	Planned	Planned upgrade		X-Band AIRS
Darwin	Being upgraded	Planned	Planned upgrade		X-Band AIRS
Perth	Ready	Ready	Ready	Ready	
Townsville	Being upgraded	Planned	Planned upgrade		Technical pb
Papeete	Upgrade planned Q1 2013	TBD			Connectivity TBC
Singapore					TBD
Maupuia	Planned upgrade	Planned	Operational		
Maspalomas	Operational	Operational	Ready	TBC	Antenna FY3 ready
Kangerlussuaq	Operational	Ready	Upgrade in 2013	Reception in 2013	
Edmonton	Ready	Ready	Planned		Antenna NPP ready
Gander	Ready	Ready	Planned		Antenna NPP ready
Resolute	Ready	Ready			
Monterey	Operational				
Wallops Island	Operational	Plan TBC	TBC		
Gilmore Creek	Operational		TBC		
Athens	Operational	Operational	Ready	TBC	Antenna FY3 ready
Ewa Beach	Operational				
Miami	Operational	Plan TBC	TBC		
Lannion	Operational	Operational	Ready	Antenna ready	
Svalbard	Operational	Operational	Ready	Antenna ready	

St Denis (Reunion)	Operational		TBD		
Moscow	Operational	Planned 2013	Ready		
Muscat	Operational				
Khabarovsk	Ready				
Novosibirsk	Ready				
Cachoeira Paulista	Operational	Ready Soon	Planned	Planned	(X-band/ L-band)
Cuiaba	Being upgraded	Planned			Data via Cachoeira Paulista
Brasilia	Planned 2013	Planned	Planned		
Manaus	Planned upgrade	Planned upgrade	Planned upgrade		
Natal/INPE	Planned 2013	Planned 2013			Data via Cachoeira Paulista
Córdoba	Planned 2013/02	Planned TBC	Planned 2013/04		
Marambio	Planned upgrade				
Santiago de Chile	Possible upgrade		Planned 2014		Back-up of Cordoba (to optimize telecom)

ANNEX 3:

Coding parameters for IASI, CrIS, ATMS, MWTS and MWHS data

BUFR Section 1		GTS Bulletin heading		Filename	
Octets 5-6	Originating/Generating Centre	A ₁	Data type designator	productidentifier_oflag_originator_yyy yMmddhhmmss[_freelimit]_type [compression] with pflag= W oflag = C freelimit=[AAP filename]_buf type=bin	productidentifier or
Octet 7-8	Originating/Generating Sub-Centre	A ₂	Geographic designator		
Octet 11	Data category	CCCC	Location indicator		
Octet 12	Datasub-category				
Centre responsible for L1c processing		ATT.II-5/25 Table C6		Manual on the GTS WMO N386 Vol. I	
Common Code Table C1-C11		AMSUA=A, AMSUB=B, HIRS=H, MHS=M IASI=?, CrIS=?, ATMS=?, MWTS=?, MWHS=?			
HRPT numeric ID		ATT.II-5/22 Table C3		Manual on the GTS WMO N386 Vol. I	
Common Code Table C-12					
003= vertical sounding by satellite		Centre that compiles bulletin		Catalogue of Met.Bulletins	
BUFR Table A					
AMSUA=3, AMSUB=4 HIRS=5, MHS=6, IASI=?, CrIS=?, ATMS=?, MWTS=?, MWHS=?		Country code-Organization-Production centre		location indicator,	
Common Code Table C-13		A.II-15/32		data designator,	
		A.II-5		free description	
		A.II-15/33		=CCCC country code when oflag=C	
		(RARS+ Satellite name +station ID)			
		(consistent with CCCC in GTS Bulletin when relevant)			

ANNEX 4: Status of outstanding actions from previous meetings**Actions from RARS-IG-4**

Actions	Status/Comments
<p>Action RARS-IG-4.01: RARS-IG values the contribution of stations in Miami, St Denis and Ewa Beach that provide significant addition to the global RARS coverage. It encourages the involved parties to seek technical ways to further improve the timeliness towards the goal of 30 minutes. EUMETSAT to report at the next meeting (Due date: RARS-IG-5)</p>	<p>Further investigations were made by EUMETSAT and NOAA or Meteo-France respectively to optimize the timeliness.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.02: WMO SP to contact the Fiji Met Service in order to investigate issues and possible way forward to integrate Fiji in the Asia-Pacific RARS. (Due date: May 2010)</p>	<p>Update by the AP-RARS coordinator: the inclusion of Fiji is unlikely, action is cancelled.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.03: WMO SP and EUMETSAT to seek feedback from the NWP community at ITSC-17 to have better knowledge of, e.g. who the users are, and whether data is still valuable in case the cloud information is not available. (Due date: April 2010)</p>	<p>Completed. Posters presented and enquiry was distributed, but little response.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.04: WMO SP to contact Venezuela about possible inclusion of the CDPI Caracas station (Responsible: Freddy Flores) in South America-RARS. (Due date: May 2010)</p>	<p>No longer seen as a priority.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.05: WMO SP to update the "Status and plans of RARS HRPT stations", resulting coverage statistics, and maps (with assistance of Anders Soerensen). (Due date: April 2010)</p>	<p>Completed. Last update October 2011 New update will be made per Action RARS-IG-6.13.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.06: Brazil (INPE) and Argentina (SMN and CONAE) to investigate possible cooperation with Chile (DMC) towards the implementation of an HRPT station in Isla de Pascua, Chile and its inclusion in the South America RARS to reduce the gap over the Pacific. Brazil and Argentina to report at the next meeting. (Due date: RARS-IG-5)</p>	<p>Report provided by Argentina at RARS-IG-6.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.07: EUMETSAT to further investigate possibility of cooperation with CLS-Argos towards the implementation of an HRPT station in Libreville, Gabon and its inclusion in EARS. (Due date: June 2010)</p>	<p>Dialogue with CLS-Argos is on-going. Should also include the case of Cape Town station, with the support of SAWS. Replaced by new action RARS-IG-6.6</p> <p>CLOSED</p>
<p>Action RARS-IG-4.08: Richard Francis to explore opportunities for cooperation between UK Met Office and SAWS that could facilitate inclusion of a South African HRPT station (e.g. Pretoria) in the RARS. (Due date: April 2010)</p>	<p>No opportunity identified with SAWS on Pretoria, but on Cape Town (See above). In addition, CSIR was contacted by WMO but no response was received.</p> <p>CLOSED</p>

<p>Action RARS-IG-4.09: Operators of RARS stations which are not currently equipped for acquisition of Metop data (for instance Marambio, Santiago, Beijing, Urumqi, Guangzhou, ...) are encouraged to take steps to be ready for Metop-B, to be launched early 2012. (Due date: RARS-IG-5)</p>	<p>Actions have been taken by most operators, as reported at RARS-IG-6. No plan by CMA to acquire METOP for the time being.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.10: EUMETSAT to consider a test activation campaign of Metop-A AHRPT over an extended area including the Asia-Pacific, allowing current Metop receiving capabilities to be tested in advance of Metop-B. EUMETSAT to report at the next meeting. (Due date: RARS-IG-5)</p>	<p>Completed: Metop-A HRPT is routinely activated over an extended area. Metop-B has been launched.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.11: EUMETSAT, in cooperation with NWP SAF, to demonstrate the possibility to deliver an AAPP package to "virtual machines". (Due date: June 2010)</p>	<p>The concept of virtual machine was finally not selected for EARS due to additional complexity of maintenance for servers located at remote sites.</p> <p>CLOSED</p>
<p>Action RARS-IG-4.12: EUMETSAT, in cooperation with EARS-IASI partners, to demonstrate the removing of overlap among EARS-IASI data from adjacent EARS stations, as a possible model for the extension of RARS to advanced sounders. (Due date: February 2011)</p>	<p>EARS-IASI service design is based on a full pass processing at each participating station and a direct transmission from the EARS station to the EUMETCast uplink. The current plan is thus not to remove the overlap among stations (as is done for EARS-ATOVS).</p> <p>CLOSED</p>
<p>Action RARS-IG-4.13: The RARS operators and regional or sub-regional network coordinators to check that the RARS products are listed and described with proper metadata in the relevant WIS DCPC and GISC catalogues. (Due date: RARS-IG-5)</p>	<p>RARS products should be registered with a DCPC or GISC</p> <p>OPEN</p>

Actions from RARS-IG-5 (Boulder)

<p>Action B.1: To define guidelines for monitoring availability and timeliness of RARS data on the GTS, for each RARS network, to be ultimately included in the RARS Operators Standards.</p>	<p>On-going, by A. Rea</p> <p>OPEN</p>
<p>Action B.2: To ensure that roles are assigned in each RARS network to perform regular monitoring of availability and timeliness of RARS data on the GTS, as foreseen in the RARS Operators Standards, and to ensure that anomalies are reported to the relevant RTH or RARS station without delay to enable corrective actions.</p>	<p>Discussed at RARS-IG-6. Replaced by RARS-IG-6.4.</p> <p>CLOSED</p>
<p>Action B.3: Met Office to investigate whether the central monitoring can be extended to the availability and timeliness of RARS data obtained through the GTS, in addition to the regional monitoring performed by the RARS nodes.</p>	<p>OPEN</p>
<p>Action B.4: The RARS project to present RARS at ITSC-18 (Toulouse, 21-27 March 2012),</p>	<p>Completed. Included in ITSC-18 as a Technical Sub-Group</p>

introducing in particular the plans for new sounders. Contact the potential RARS users in advance of the conference to raise attention.	CLOSED
Action B.5: EUMETSAT to report on the outcome of actions RARS-IG 4.11 and 4.12.	Report provided at RARS-IG-5. CLOSED.
Action B.6: NOAA and relevant partners to define the selection of CrIS channels from the NPP Direct Broadcast to be processed and redistributed by the X-RARS project.	Selection of 399 channels is described in NOAA Technical Report N°133 (A.Gambacorta, C.Barnet, Aug 2011) NOAA/NESDIS CrIS channel selection CLOSED
Action B.7: To perform a survey on the connectivity of the preliminary list of stations. (Lannion, Moscow , Khabarovsk , Novosibirsk , Oman, Gander (TBC), Edmonton, Cachoeira Paulista, Cuiabá, Córdoba, Santiago, Melbourne, Darwin, Perth, Townsville, Casey, Kiyose, Jincheon, Beijing, Guangzhou, Urumqi, Maupuia, Singapore)	No longer in the action plan as reviewed by the RARS-IG-6. CLOSED
Action B.8: To set up a communication trial among the relevant stations. (Lannion, Moscow , Khabarovsk , Novosibirsk , Oman, Gander (TBC), Edmonton, Cachoeira Paulista, Cuiabá, Córdoba, Santiago, Melbourne, Darwin, Perth, Townsville, Casey, Kiyose, Jincheon, Beijing, Guangzhou, Urumqi, Maupuia, Singapore)	No longer planned. In the approach discussed by RARS-IG-6, the communication load will be tested by each user station individually, depending on its station selection. CLOSED
Action B.9: The above organizations (KMA, MetOffice, EC, BOM), with WMO, to coordinate with CMA to get the necessary technical documentation for FY-3 reception and pre-processing.	See CMA-Guide for installation of FY3L0PP/FY3L1PP http://www.wmo.int/pages/prog/sat/documents/SAT-GEN_TEC-CMA-Guide-FY3L0PP-FY4L1PP.pdf CLOSED
Action B.10: NWP SAF, CMA, and all partners to develop a plan for development of the appropriate software to be applied by the RARS for the generation of FY-3 BUFR data	The NWP SAF has entered its CDOP-2 phase, and enhancement of the support for FY-3 is included in the plans (e.g. IRAS and eventually MIRAS). AAPP v7 has the ability to ingest the FY-3 Sensor Data Records (SDRs, in hdf5 format) for MWTS and MWHS. A BUFR encoder for these instruments has been added to AAPP version released 10th Oct 2012. It is provisionally based on the BUFR sequence developed at ECMWF. CLOSED
Action B.11: WMO (Jerome Lafeuille and Fred Branski) to organize a progress meeting (teleconference) to follow-up these issues early July 2011.	Now superseded by the RARS Technical SubGroup meeting at ITSC_18. CLOSED
Action B.12: WMO (Jerome) to convene a RARS IG meeting by fall 2011 (e.g. October).	Completed in March 2012 as an ITSC-18 Technical Sub-Group CLOSED