W O R L D M E T E O R O L O G I C A L O R G A N I Z A T I O N

WMO RARS IMPLEMENTATION GROUP AND IGDDS IMPLEMENTATION GROUP

JOINT 3rd MEETING

TOKYO, JAPAN

5 - 6 February 2009

FINAL REPORT

EXECUTIVE SUMMARY

The third sessions of the Integrated Global Data Dissemination Service (IGDDS) Implementation Group and of the Regional ATOVS Retransmission Service (RARS) Implementation Group were held as a joint meeting on 5 and 6 February 2009 in Tokyo, Japan upon invitation of the Japan Meteorological Agency (JMA).

Significant progress was recorded in the implementation of the RARS network, as summarized in the table below which indicates the number of operational stations providing data over the GTS, and the resulting coverage as a percentage of the globe's surface. It is planned that by the end of April 2009 all RARS data transmitted in GTS bulletins will follow the agreed coding convention, and that file transmission will be implemented with agreed file naming convention in the course of 2009.

Regional component	January 2009	Planned end-2009	Planned end-2010	Potential
EARS	10 stations **23%**	15 stations **35%**	17 stations **40%**	46%
Asia-Pacific	14 stations **28%**	16 stations **30%**	18 stations **35%**	36%
South-America	5 stations **10%**	11 stations **13%**	15 stations **16 %**	17%
All	29 stations **61%**	42 stations **76%**	50 stations **82%**	91%

Current status and planned evolution of the RARS network coverage

The meeting reviewed a Project Plan for the Extension of the RARS Network to Include Advanced Sounders. This new phase of the RARS project would involve a set of X-band receiving stations and a communications infrastructure suitable for the collection and dissemination of the required subset of hyperspectral sounding data.

The meeting reviewed the progress of IGDDS satellite dissemination components including EUMETCast, FengYunCast, MITRA. It was also informed on GEONetCast and its American component, GEONETCast Americas. The DVB-S Operator Standard Document was endorsed.

The meeting welcomed the progress made by EUMETSAT on the Product Navigator, which is now used also by CMA and NOAA as a user interface to the catalogue of FengYunCast and GEONETCast-Americas respectively. It reaffirmed an action to complement this interface in order to generate metadata in accordance with WIS standards. Information was also provided on the web interface of JMA describing MTSAT data available by FTP over the Internet

The meeting was also informed that an inventory of satellite data requirements had been initiated in RA III and encouraged such an action that is expected to provide a useful input for consideration by data providers.

The IGDDS Implementation Plan was reviewed in breakout sessions, one group focusing on architecture and dissemination issues, the other on data requirements and data management. The outcome of this breakout session was discussed in plenary and will provide the basis for updating the Implementation Plan.

MEETING REPORT

1. Introduction

Mr Yoshiro Kozawa, Director-General of the Observations Department of the Japan Meteorological Agency (JMA), warmly welcomed the participants to the joint meeting and recalled the strong commitment of JMA to the RARS project, which is recognized as a very successful cooperative initiative that provides benefits to both regional and global NWP. The advances and achievements of the RARS and IGDDS projects in improving access to satellite data were emphasized. The need for close cooperation between the two groups was also stressed.

Mr Jerome Lafeuille, Chief of the Space-based Observing System Division of the WMO Space Programme, thanked JMA for hosting the meeting and welcomed the participants on behalf of WMO. He recalled that this meeting had been planned early in the year in order to be able to report on the IGDDS and RARS achievements at the fourteenth session of the Commission for Basic Systems (CBS-XIV) to be held in Croatia from 25 March to 2 April 2009. He emphasized that the RARS was now reaching an operational status, with data being made routinely available on the GTS in the agreed format, and felt that such achievements should be brought to the attention of the CBS and the worldwide user community. Mr Lafeuille pointed out that this third meeting of the RARS and IGDDS Implementation Groups had been convened in conjunction with the ninth meeting of the Asia Pacific Satellite Data Exchange and Utilization group (APSDEU-9), and was pleased to note that this had made possible the participation of executive managers of the telecommunication services from CMA, JMA, KMA and NOAA, whose participation showed the importance of the work of the RARS and IGDDS Implementation Groups.

At the suggestion of WMO, Mr Fred Branski was designated as Chairman for this meeting, with Jerome Lafeuille as Co-chair. The Chairman opened the meeting with some remarks about the links between RARS and IGDDS and their synergies. It was noted that a lot of work has been done, but more still needs to be done. The opportunity provided by the breakout session for the IGDDS was highlighted, and it was suggested that as the meeting proceeded, notes should be taken of the residual implementation gaps and challenges, which could provide a focus for the breakout session.

The provisional agenda was reviewed and adopted as the basis for the meeting - see Annex I.

2. Status of the Global RARS Network

2.1 Status of EARS

Kenneth Holmlund (EUMETSAT) reported on the status of the EUMETSAT Advanced Retransmission Service (EARS) which currently consists of four main elements:

- An operational ATOVS service;
- An operational AVHRR service;
- A pilot ASCAT service;
- A pilot IASI service.

Following the failure of an AHRPT transmitter, EUMETSAT has decided to implement a "partial" AHRPT service in those areas where the risk of damage from heavy ion radiation is reduced. For southbound passes, AHRPT side B is activated for all orbits over the North Atlantic and European area starting at around 60°N. The trial service started in September 2008.

To complement the “partial” AHRPT service, a Fast Dump Extract service is being implemented. This service comprises the most recent part of the X-band global dump received at Svalbard from the northbound passes and is processed by the EARS system for ASCAT and ATOVS, and in the future for AVHRR. It was noted that hardware modifications will be introduced for future Metop satellites (B and C) to avoid this problem of susceptibility to heavy ion radiation.

It was noted that the timeliness of EARS products is between 20 and 45 minutes.

The planned evolution of the EARS network was presented, as summarized below

- Moscow is planned to be operational as from spring 2009 (EUMETSAT is planning to visit Moscow in February 2009);
- Khabarovsk and Novosibirsk are planned to be operational during 2010;
- St Denis (La Reunion) and Muscat (Oman) are currently not in the EARS network. They are planned to be operational during this year (2009);
- The Hawaii and Miami stations are planned to be operational the week ending 13 February 2009 but there are issues with the timeliness of the data. The Hawaii station belongs to the US National Weather Service and the data is processed as soon as it is received at the EUMETSAT server in Washington. After some investigations by NOAA, it seems that the delay is occurring mostly in Hawaii (the transfer to SOCC and then on to the EUMETSAT server takes only a few minutes). NOAA is looking into it and EUMETSAT hopes to get better timeliness at some point.

An estimate was given of the resulting geographical coverage in proportion of the globe's surface (figures updated after the meeting):

- **Current** : 24% (Gilmore Creek, Edmonton, Monterey, Kangerlussuaq, Gander, Wallops, Svalbard, Lannion, Athens and Maspalomas);
- **Planned in 2009:** 36% (addition of Hawaii, Miami, Moscow, Muscat and La Reunion);
- **Potential:** 45% (addition of Resolute Bay, Libreville, Novosibirsk and Khabarovsk).

Some future evolutions of EARS were also highlighted including:

- Preparation of an EARS-IASI service specification (the user community is being consulted on the selection of the 300-400 channels to be included in the EARS-IASI products);
- Preparations for NOAA-19 reception and processing;
- Trial Fengyun-3 reception and product processing planned at Svalbard.

2.2 Status of the Asia-Pacific RARS

Overall status of the Asia-Pacific RARS

Anthony Rea (BoM) presented the status of the Asia-Pacific RARS on behalf of all the contributing countries. The presentation covered the current status, new stations, file format and harmonization issues, availability of data on the GTS and future plans.

Within the A-P RARS network there are 14 operational HRPT stations from Australia, China, Japan, Korea, New Zealand and Singapore; with Melbourne and Tokyo being the processing/distribution centres that inject the ATOVS data onto the GTS. All the data from these stations is being provided over the GTS, except for Casey. The data from Casey will be made available over the GTS during March 2009.

The data is now being used operationally at a number of NWP centres. JMA is providing timeliness monitoring information for all AP-RARS stations and the NWP-SAF is providing quality monitoring. The excellent support provided by these two centres is much appreciated by the RARS participants, with special gratitude for the AAPP support provided by the NWP-SAF.

The key developments since RARS-IG-2 were noted as:

- Davis, Antarctica data added on 9 September 2008;
- AP-RARS website created;
- New KMA antenna site at Jincheon;

- New BoM dual band (L/X) antenna installed at Casey, Antarctica.

The implementation of harmonized filenames within A-P RARS is planned for April. To facilitate this, a document was circulated to A-P RARS participants in December 2008. Most stations are using the most recent AAPP version and formal tracking of version utilization will be introduced via the AP-RARS website.

Concerning timeliness, 80% of the data is available within 30 minutes. The reasons for not meeting the timeliness requirements in 20% of the cases include:

- Transmission delays (Townsville);
- Delays associated with the stitching of data from three stations (CMA stations);
- Delays due to queuing after processing (Singapore) – this is under investigation.

Use of RARS data by JMA

JMA presented the impact of AP-RARS and EARS data on NWP:

- A-P-RARS data:
  - JMA now assimilates data from the 14 AP-RARS stations, the most recently added being Hong Kong and Townsville (end of March2008);
  - AP-RARS ATOVS data improve Early Analysis (EA) - reduces the difference from data-richer areas, and provides more accurate Cycle Analysis (CA);
  - No significant impact on forecast.
- EARS ATOVS data has a more positive impact on EA and forecasts with more available data used.

RARS data exchange and use by KMA

KMA then presented the current status of RARS data exchange and use by KMA:

- ATOVS BUFR data is exchanged between KMA and JMA:
  - ATOVS AAPP L1C (HIRS, AMSU-A, AMSU-B, MHS);
  - Telecommunications: GTS between Seoul and Tokyo at a speed of 16 kbps;
  - Data from Seoul to Tokyo: 1 HRPT station (Seoul);
  - Data from Tokyo to Seoul: 4 HRPT stations (1 Japan, 3 China).
- ATOVS data are currently used in the NWP model as well as for Weather Analysis;
- SATEM (satellite temperature and humidity sounding) data, received via the GTS, are also used operationally for the NWP Global Spectral Model;
- Exchanged ATOVS data will be used in the regional NWP model to improve weather forecasts;
- The HRPT station of KMSC (Jincheon) was installed and prepared for providing ATOVS data in December 2008.

JMA monitoring

Hidehiko Murata (JMA) then gave a presentation on the AP-RARS monitoring activities that are carried out within JMA, addressing:

- RARS stations that are processed at JMA/MSC;
- The A-P RARS Data Monitoring Web (developed and operated by JMA since November 2007) covering the comparison with global ATOVS data (navigation, calibration, timeliness and brightness temperature);
- The acquisition schedule for the Kiyose station;
- Landmark navigation correction using the ANA software.

Discussion

The Implementation Group gratefully acknowledged the excellent monitoring support provided by JMA for timeliness monitoring, and the NWP-SAF for quality monitoring. It was confirmed that the timeliness of the data from Seoul is fine and that the Seoul/Jincheon transition is planned for March 2009. It was also clarified that the reference point for timeliness should be the oldest data within a bulletin/file (i.e. as per the RARS Operator Standards).

The Chair noted that the capabilities of the GTS are under discussion in the Asia-Pacific region to improve data speeds, and to introduce any-to-any connectivity which could be expected to bring timeliness benefits for the RARS network.

2.3 Status of the South American RARS

Brazilian Component

Sérgio Pereira (INPE) presented a detailed status of the Brazilian component of the South American RARS and reported on actions and events since the last meeting. He addressed the potential extension of the South American RARS to Central America, as well as plans for RARS extension to advanced sounders.

The status of Brazilian receiving stations is summarized in the following table:

Station	Id	Implementation	Operational for RARS (Data on GTS)	Comments
Cachoeira Paulista (INPE)	cpt	Done	Operational	Timeliness: 18 mn Data in agreed standard format
Cuiaba (INPE)	cba	Done	Operational	Timeliness: 25 mn Data in agreed standard format
Brasilia (INMET)	inm	Done	Operational	Timeliness: 20 mn Data in agreed standard format
Natal (Navy Hydrol. Centre)	chm	Early 2009		Expected timeliness:28 mn
Fortaleza (FUNCEME)	fcm	Mid 2009		
Euzébio (INPE) or Natal (INPE)	euz nat	End-2009		The final location of INPE's "North-east" ground station is yet to be selected (Euzébio or Natal). Approximate location of Euzébio : 3.88 South, 38.45 West
Manaus (SIVAM)	svm	Early 2010		
Boa Vista (INPE)	bvs	End-2010		

It was further reported that:

- AAPP processing: By the end of March 2009, it is planned to upgrade all processing to AAPP version 6.8;
- GTS availability: Brazilian RARS data are available at Washington GTS node;
- Extension to Central America: Initial contacts have been made with Venezuela regarding a potential station in Caracas; assistance from the WMO Space Programme Office is requested;
- RARS Extension to Advanced Sounders: INPE is proposing to conduct a pilot project involving the insertion of AIRS data onto the RARS network.

Discussion

Anthony Rea (BoM) congratulated Brazil on the success of the South American RARS and noted that the proposed pilot project for advanced sounders looks very similar to Australia's plans for AIRS (This project will provide a subset of 300 channels in real-time for operational NWP, in a BUFR format identical to that of the product received from NESDIS).

The discussions on the Brazilian component of the South American RARS were concluded at this point – it being noted that the pilot project discussions will be addressed further under agenda item 6, and support for contacting Venezuela will be discussed in the framework of the RARS geographical extension under agenda item 3.

Argentinean component

Gloria Pujol summarized the status of the Argentinean component of the South American RARS:

- Cordoba and Marambio ground stations are providing data operationally since May and June 2008 respectively;
- AAPP processing is planned to be upgraded to version 6.8 in February 2009;
- RARS data bulletins are sent over the GTS in agreed format;
- RARS files (L1C AAPP) are sent via FTP to the NWP SAF ; the new filenaming convention will be implemented in June 2009;
- Data from both Cordoba and Marambio meets the 30 minutes requirement since November 2008; further improvement is expected with the use of a satellite link with Marambio;
- Monitoring of Argentina-RARS data is performed by the NWP SAF;
- Future implementations: a new station to be installed in Ushuaia (Tierra del Fuego) in 2009/2010, the Cotopaxi (Ecuador) station is to be operational by December 2009; Chile has plans for stations in Santiago, Punta Arenas and President Frei Base, but no plans to install stations at Isla de Pascua or Isla Juan Fernandez that would extend the coverage over the Pacific;
- The presentation pointed out potential overlaps among existing or planned stations.

Discussion

The Implementation Group welcomed the progress of the South American RARS. It was highlighted that the three operational stations in Brazil and two in Argentina were all providing data over the GTS in accordance with the agreed coding convention and within the required timeliness.

Concerning potential overlaps between some Chilean and Argentinean stations, the meeting felt that it is important to have redundancy in the network to ensure resilience in the event of failures. This means that overlapping stations can play a valuable role in the network.

Jerome Lafeuille noted that we should make a distinction between redundant RARS data and redundant stations. The former needs to be carefully managed to avoid data duplication on the RARS network (particularly in regions where communication capacity is limited). The former provides resilience and gives more assurance as to the service levels that would be provided.

Kenneth Holmlund pointed out that ground stations with overlapping coverage have the advantage that it is possible to have the coordinated tracking of a number of different satellites, which would not be possible without redundancy. It was noted that this aspect was particularly relevant at high latitudes that have frequent satellite overpasses.

The Chair also emphasized the advantages of back-up arrangements (in addition to the scheduling benefits).

2.4 RARS Operations Monitoring and Software Issues

Mr Nigel Atkinson, UK Met Office, gave a presentation (remotely) on monitoring issues, covering:

- Current compliance with coding standards:
  - There is generally a good adoption of RARS coding standards across the RARS network;
  - There are some missing bulletin headers, but this could be because the monitoring is being done via a combination of FTP over the Internet and EUMETCast (rather than the GTS);
  - RARS-IG-2 recommended the use of BUFR Edition 4 (environment variable BUFR_EDITION is used by AAPP);
  - AAPP BUFR encoder was updated July 2008 to give recommended data category and sub-category;
  - For stations still using BUFR Edition 3, the sub-category is locally defined, but EUMETSAT convention is (0,3,4,11 for HIRS/AMA/AMB/MHS);
  - JMA still using a version of the Met Office BUFR encoding software – it is recommended to switch to the AAPP version;
  - Some stations have defined sub-centre IDs in the documentation but have not yet implemented them (environment variable SUB_CENTRE is used by AAPP);
  - Hong Kong appears to be using an old version of the AAPP BUFR encoder (pre-July 2008);
  - Bulletin headers for JMA stations are not present in the files received in UK by FTP from BoM, but may be present in files injected onto GTS at Tokyo – issue to be further investigated.

- Data processing issues:
  - There is a problem with NOAA-16/17 navigation for Singapore. The AAPP software was updated but the AAPP data file (satid.txt) was not;
  - There is a danger of running AAPP on a platform that is not supported by the NWP SAF, i.e. Windows;
  - AMSU-B calibration file at Beijing (missing channels for NOAA-16);
  - Data flow is rather unreliable for Kelburn and Marambio;
  - Date-stamp problems in September 2008 were solved by AAPP patch – mostly implemented within a few days.
- Satellite issues:
  - NOAA-N prime (NOAA-19) will be launched shortly and AAPP update 6.8 has been issued in readiness;
  - Tracking priorities will need to be looked at (NOAA-18 and 19 are in similar orbits);
  - NOAA-16 AMSU-A is showing rapid noise degradation in channels 5, 6, 8, 9, 10, 12, 13, and 15 – since 24 January – it may not be useful for much longer and is no longer assimilated at the UK Met Office;
  - NOAA-15 AMSU-A/AMSU-B are still assimilated at the Met Office;
  - MetOp-A HRPT is only available over Europe (i.e. EARS).

- RARS Timeliness:
  - The timeliness of RARS data is reported to RARS operators via a daily email;
  - Fifty percent (50%) of passes are within 30 minutes for most stations (exceptions Beijing, Townsville, and Hawaii);
  - Singapore and Hong Kong are marginal (with respect to the 30 minute timeliness requirement);
  - RARS timeliness compares well with global data available via NESDIS (50% available within 2.4 hours for all NOAA satellites - measured from mid-orbit to reception at the UK Met Office in January 2009).

- AAPP developments in 2009:

- IASI will be processed from level 0 to level 1c at selected European stations (HRPT) and at Svalbard (X band) – not available in other regions because the Metop A-HRPT is only active over Europe (EARS stations) – the service is based on a selection of 366 channels plus 280 PC scores;
- To support this service a new BUFR format has been developed (includes encoder/decoder in AAPP);
- When Metop-B is launched (after 2011) and there is full global AHRPT coverage, this service could be considered for other regions.

Discussion

JMA clarified that it will use the AAPP software for BUFR encoding within two months.

There was also a discussion about the use of IASI global data, and whether it was being received via the GTS. Based on responses from the Implementation Group, it would appear that most of it is relayed via bilateral links.

The members of the RARS Implementation Group then again expressed their deep appreciation to the UKMO/NWP SAF for their indispensable contribution to the running of the RARS network.

2.5 Cross-cutting aspects

Based on the information supplied by the RARS operators during the course of the meeting, an updated table showing the current HRPT station status and future planning is provided in Annex II.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action RARS-IG-2.1: WMO SP to update table to include new information about current and planned HRPT stations (Athens, Cotopaxi (Ecuador), correction of Tahiti location, clarify that Jincheon will take over from Seoul at the end of 2008, changes to the availability of Fortaleza, Manaus and Boa Vista). Due date: end-June 2008.

Status: **Closed** - this action was implemented via the updated HRPT station table, attached as Annex III to the RARS-IG-2 Report.

Action RARS-IG-2.5: All RARS operators to identify if their stations can/will meet the RARS timeliness requirement of 30 minutes (and if not, the timeliness figure that can/will be achieved). Due date: end-August 2008.

Status: **Closed** – all RARS operators have provided the requested timeliness information.

Action RARS-IG-2.6: Mr Nigel Atkinson (UKMO/NWP SAF) will investigate whether timeliness information could be recorded/reported by the NWP SAF. Due date: end-August 2008.

Status: **Closed** - timeliness information was added to the daily summary emails that are sent to the RARS operators by the NWP SAF, from 27th June. The median, maximum and minimum delays, and total number of passes from each station were added to the summary.

Action RARS-IG-2.7: BoM to contact the ITWG Co-chairs to further investigate the matter with the ITWG Subgroup Chairs and to provide a synthesis paper on the feedback received from NWP operators for the next meeting of the RARS Implementation Group. Due date: RARS-IG-3.

Status: **Closed** – it was decided not to pursue this action further.

Action RARS-IG-2.8: BoM to establish a NWP operator email list so that the NWP user community can be informed of RARS developments. Due date: RARS-IG-3.

Status: **Closed** - after correspondence with ITWG Co-chairs, BoM suggest using ITWG-NWP mailing list. It was suggested that all RARS operators could be added to this list. BoM will provide details of the email list server to all RARS operators.

Action RARS-IG-2.9: WMO SP to update the RARS Operator Standards to reduce the grace period for updating the AAPP software from three months to one month. Due date: end-August 2008.

Status: **Closed** – RARS Operator Standards have been updated and made available.

Action RARS-IG-2.10: WMO SP to update the RARS Operator Standards to allow local processing to AAPP level 1c. Due date: end-August 2008.

Status: **Closed** – RARS Operator Standards have been updated and made available.

3. RARS Geographical Extension

Jerome Lafeuille provided an evaluation of the current and planned geographical coverage of the RARS network, as summarized in Table 1 below (Figures updated after the meeting).

Regional component	January 2009	Planned 2009	Planned 2010	Potential
EARS	10 stations **23%**	15 stations **35%**	17 stations **40%**	46%
Asia-Pacific	14 stations **28%**	16 stations **30%**	18 stations **35%**	36%
South-America	5 stations **10%**	11 stations **13%**	15 stations **16 %**	17%
All	29 stations **61%**	42 stations **76%**	50 stations **82%**	91%

TABLE 1: RARS geographical coverage, expressed in percentage of the globe's surface

According to these plans, the RARS would cover more than 80% of the globe's surface by 2010. Jerome Lafeuille further presented an estimation of the contribution that each new station would bring to increasing the coverage. This contribution ranges from 4% to 0, depending on the degree of overlap with neighbouring and existing stations. Whilst noting that some overlap was useful to secure continuity, he further recommended focusing future implementation efforts on those stations that will provide the best coverage increment.

The priorities for new installations were then reviewed, and the following was recommended:

- For EARS: Hawaii, Miami, Moscow, Muscat, Reunion in 2009, then Khabarovsk and Novosibirsk;
- For Asia-Pacific: Casey, Fiji, in 2009, then Tahiti, Guam and Marshall Island in 2010;
- For South America: Natal, Cotopaxi, Santiago, Punta Arenas in 2009, Juan Fernandez, Manaus in 2010.

Discussion

Sérgio Pereira started the discussion by noting that the planning for Fortaleza has moved from 2010 to 2009. Also, after some investigation into potential overlaps, it was clarified that the geographical locations of Manaus and Boa Vista were distinct (3 deg latitude South and North respectively).

Tahiti and Guam were identified as being of the highest priority for the Asia-Pacific RARS implementation and Noumea was noted as being of lower priority.

Jerome Lafeuille informed the Implementation Group that WMO has written to the Permanent Representative of Chile about the potential installation of a station in Juan Fernandez island, which seemed however unlikely in the near future.

Concerning Guam and the Marshall Islands, connectivity was identified as being an important issue. It was agreed that the WMO SP will send a letter to the US requesting support on this issue (keeping the Asia-Pacific RARS Coordinator informed).

RARS-IG-3.1: WMO SP, in coordination with Fred Branski, to contact the US about the possible inclusion of HRPT stations in Guam and the Marshall Islands within the RARS network (keeping the Asia-Pacific RARS Coordinator informed). Due date: end April 2009.

Jerome Lafeuille also informed the Implementation Group that a letter has been written to EUMETSAT concerning Libreville, and to South Africa concerning Pretoria and Gough Island, and, as yet, no reply has been received.

In summarizing the discussions the Chair noted that there was still significant potential for expanding the RARS network and encouraged the Implementation Group members to proceed with their plans for including additional stations (taking due account of the priorities).

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action RARS-IG-2.2: WMO SP to write to EUMETSAT to encourage the inclusion of stations in Central (e.g. Gabon) and South Africa. Due date: end-June 2008.

Status: **Closed** – letter sent to EUMETSAT on 15 December.2008 As yet no response has been received.

Action RARS-IG-2.3: WMO SP to write to SAWS to encourage the involvement of Pretoria and Gough Island in the RARS network. Due date: end-June 2008.

Status: **Closed** – letter sent to SAWS on 15 December 2008. As yet no response has been received.

Note: In addition a letter was sent to Chile concerning Juan Fernandez Island.

Action RARS-IG-2.4: BoM to provide a list of US HRPT stations that could potentially contribute to the RARS network. Due date: end-June 2008.

Status: BoM - the list of US stations potentially useful to AP-RARS is:
- Guam or Marshall Islands (some correspondence but limited progress);
- Hawaii (now incorporated into EARS);
- McMurdo (no correspondence thus far).

BoM consider it may make more sense to lump the US stations together under EARS if the mechanisms are already in place

Following discussions, it was agreed that the action should be closed and a **new action** raised (see Action RARS-IG-3.1).

4. RARS Data Dissemination Issues

4.1 Update on RARS Data Representation and Coding

Jerome Lafeuille introduced Document 4.1 summarizing the status of definition of codes, GTS bulletin headings and filenames for the dissemination of RARS data. The proposals by the second RARS Implementation Group meeting were reviewed by the Joint Meeting of the Expert Team on Data Representation and Codes (ET-DRC) and Coordination Team on Migration to Table Driven Code Forms (CT-MTDCF) on 1-5 September 2008 and by the Expert Team on GTS-WIS Operational Implementation (ET-OI) on 23-26 September 2008, and subsequent interaction with the Chairpersons of these groups.

As concerns the BUFR encoding of RARS data:

- Centre and sub-centre identifiers: These are defined in Common Code Tables C-11 and C-12, which have been updated in order to include the existing and planned RARS centres and stations. The identifiers of Khabarovsk and Novosibirsk, that were proposed at a later stage are still to be confirmed by the CBS President;

- In data category 003 (“Vertical sounding by satellite”), the data sub-category is defined by Common Code Table C-13, which has been updated in order to include identifiers for the various instruments of the ATOVS suite.

- Note that the Common Code Tables are available online:

  http://www.wmo.int/pages/prog/www/WMOCodes/OperationalCodes.html

As concerns the headings for transmitting BUFR-encoded RARS data as GTS bulletins:

- The data type designator is defined by Table C-6 of the Manual on the GTS. An update of this table is being submitted to CBS-XIV in order to include identifiers for the various instruments of the ATOVS suite.

As concerns the filenames for transmitting BUFR-encoded RARS data as files:

- The ET-OI and CGMS-36 were informed of the implementation of the GTS file naming convention for RARS data that was agreed upon by RARS-IG-2.

- The CBS will be asked to endorse the use of xx as country code for international organizations such as EUMETSAT.

All RARS coordinators were invited to check the indications regarding the stations under their responsibility and to complete the table, if relevant, for future stations.

Sergio Pereira noted that the "production centre" to be indicated in the product identifier of the filename should be "inpe" for all Brazilian stations and Jae-Dong Jang indicated that the station identifier for Jincheon was: "Jin".

It was also noted that Boa Vista is not considered in the table, which shall be updated accordingly.

Following a review of the open points, the following new actions were raised:

RARS-IG-3.2: The Asia-Pacific RARS Coordinator to provide the missing details for Kelburn and Fiji. Due date: end-February 2009.

RARS-IG-3.3: EUMETSAT, in coordination with Environment Canada, to clarify whether a second Edmonton station will be identified once the two currently collocated Edmonton stations are separated (planned to take place during 2009). Due date: end-February 2009.

4.2 Status of RARS Data Dissemination via GTS and Other Means

Based on information provided before the meeting, the overall status was summarized as:

- Nearly all data is available on the GTS (apart from Casey which will be on the GTS in March 2009);

- EARS and the Brazilian RARS component comply with the relevant RARS coding and representation conventions; the Argentinean RARS component is compliant for bulletins and will be compliant for filenames by June 2009; the Asia-Pacific RARS plans to comply in the coming months.

The Asia-Pacific RARS coordinator then provided more details on the current status and plans for dissemination via the GTS and the compliance status with the RARS Coding and Data Representation Conventions. With the current planning, all data (including that from Casey) should be on the GTS by the end of March 2009 and there will be compliance with the RARS Coding and Data Representation Conventions by the end of April 2009.

RARS-IG-3.4 All Asia-Pacific RARS contributors to comply with the RARS coding and data representation conventions and harmonize AAPP software versions. Due date: end-April 2009 for the bulletins and AAPP software versions, June 2009 for the filenames.

The Chair clarified that bulletins were currently the main traffic on the GTS but that in the long-term a move to a file capability will be required.

It was also noted that headers can be constructed from the information in the table, and data providers are encouraged to make header information available for users.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action RARS-IG-1.3 part b): For files that only contain RARS data, to start implementing the WMO Core Profile of the ISO Metadata standard (version 1.0 adopted by CBSExt.(06)), and to contribute to the further development of these standards, in particular through the InterProgramme Expert Team on Metadata Implementation.

Status: **EUMETSAT**: The proposed approach was to use the EUM product navigator as the source of metadata for EARS (and other EUM data). The new Product Navigator http://www.eumetsat.int/Home/Main/Access_to_Data/ProductNavigator/index.htm introduced in 2008 describes all EUMETSAT data resources (including products from the Satellite Application Facilities, SAFs, and some third-party data) – all compatible with ISO 19115/19139 standards and conforming to the EU INSPIRE directive.

BoM: We have the capability to implement these changes and the new filenaming conventions are running on our parallel testbed. It is planned to send an email to AP-RARS participants today requesting that we agree on the changes at RARS-IG-3 and implement them across AP-RARS by the end of March 2009.

Argentina: To be developed for June 2009.

=> Following a discussion it was concluded that this action had been partially completed, but should remain **open** as additional work needs to be done to sort out the metadata issue.

Action RARS-IG-1.5: All RARS Coordinators to implement the filenaming convention with product identifiers using data designator category 003 and sub-categories to be defined in Common Table C13 of the Manual on Codes.

RARS operators will aim to implement the filenaming convention by the end of August 2008, with a hard deadline of the end of 2008 (agreed at RARS-IG-2).

Status

EUMETSAT: EUMETSAT is currently working on making the necessary changes to send BUFR files according to the RARS naming convention to our RTH, DWD. In addition we are informed that DWD is not ready to handle the new GTS filenames. DWD hopes to be ready around March 2009.

BoM: See response to RARS-IG-1.3.

Argentina: Adopted as from December 2008.

Brazil: Action item closed for the Brazilian component of South American RARS (GTS focal point informed). Since middle of October, 2008 RARS files placed on GTS by Brazil are named in accordance with the file naming convention agreed at RARS-IG-2.

=> After a discussion, it was decided to leave this action **open** and RARS operators were encouraged to move forward to filenames (in addition to bulletins) with a new deadline of July 2009.

Action RARS-IG-1.6: In order to identify HRPT stations in a coherent manner, all RARS Coordinators to make coordinated proposals for unambiguous sub-centre identifying numbers

that would be proposed for inclusion in a future update of the common Table C12 of the Manual on Codes, in coordination with the CBS Expert Team on Data Representation and Codes. Due date: end of September 2007.

Ongoing at RARS-IG-2. The Asia-Pacific region needs to generate a revised proposal and all RARS operators (apart from EUMETSAT) need to coordinate their proposals with their respective focal points. New due date: end-June 2008.

Status

EUMETSAT: Details provided for all stations except Khabarovsk and Novosibirsk. Proposal is "Kab" and "Nov" with numerical ID 200 and 210. However there is very little planning at this stage for the introduction of these stations.

BoM: Completed.

Argentina: Sub-centres defined without ambiguity for current stations, new stations to be defined (Ushuaia).

Brazil: Action item closed for the current stations Brazilian component of the South American RARS. Identifiers shall however be defined for new stations as the planning will be confirmed (Boa Vista, Eusebio, Natal/INPE, Caracas)

=> It was agreed that the action had been completed and could be **closed**. However operators shall propose identifiers for new stations as the planning progresses.

Action RARS-IG-2.12: WMO SP to capture the agreements concerning RARS code and format issues in the next version of the RARS Operator Standards. Due date: end-July 2008.

Status: **Closed** – RARS Operator Standards have been updated and made available.

Action RARS-IG-2.13: All RARS operators to inform their GTS focal points about the availability of RARS bulletins. Due date: end-September 2008.

Status

EUMETSAT: GTS focal point (DWD) has been informed about the availability of EARS bulletins. See also RARS-IG-1.5

BoM: Completed

Argentina: GTS focal point has been notified about the availability of RARS bulletins, which have been inserted on the GTS since 24 November 2008.

Brazil: According to Jose Mauro (INMET) and James Gilleland (NOAA), RARS files are properly reaching the GTS Node at NWS in Washington (December 2008).

=> It was concluded that the action had been completed and could be **closed**.

Action RARS-IG-2.14: WMO SP to include the Table D Sequence Descriptor in BUFR for Instruments on the WMO RARS website. Due date: end-October 2008.

Status: **Closed** – information has been made available on the WMO RARS website.

Action RARS-IG-2.15: WMO SP to submit proposals to the CBS Expert Team on GTS/WIS Operations and implementation for the allocation of A1A2ii for the cases where T1T2 is set to "IN" and, in parallel, inform the CGMS Task Force on Codes. Due date: end-September 2008.

Status: **Closed** – these proposals have been submitted to the CBS Expert Teams convened in September 2008 and agreed or submitted to CBS (meeting in March 2009) where relevant.

Also a report presented at CGMS-36 in WMO-WP-08 and WMO-WP-09.

The latest information on RARS coding is on the RARS WMO website. ftp://ftp.wmo.int/Documents/PublicWeb/sat/Projects/RARS_Coding-summary.xls

Action RARS-IG-2.16: WMO SP to inform the CBS Expert Team on GTS/WIS Operations about the agreements reached on RARS filenaming. Due date: end-September 2008.

Status: **Closed** – see response to RARS-IG-2.15

5. RARS User Information

5.1 WMO RARS Website

Robert Husband informed the Implementation Group that updates to the WMO RARS website had been prepared in two areas:

- Geographical coverage plots (based on the information made available before RARS-IG-3);
- A section on "How to Access RARS Data".

The Implementation Group took note of the proposed changes to the website and particularly welcomed the new section entitled "How to Access RARS Data".

5.2 Individual RARS Websites

BoM informed the Implementation Group that their website had not been updated recently, but further work was expected to start soon.

JMA then described the comprehensive monitoring features of their RARS site, including:

- Timeliness information;
- A comparison with global data;
- Scheduling information;
- Availability statistics.

5.3 Other Information Actions towards the User Community

Jerome Lafeuille then summarized the information actions towards the NWP user community and the presentations that had been made to the RARS NWP user community. It was noted that, at the ITOVS Conference, the RARS initiative had aroused great interest.

Anthony Rea informed the Implementation Group that the 9th International Conference on Southern Hemisphere Meteorology and Oceanography (9th ICSHMO) would take place in Melbourne in February 2009; and a presentation would be made on RARS by the BoM.

It was agreed that the CBS Newsletter at the end of April 2009 could be a good vehicle for communicating the achievements and current status of the RARS Network.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action RARS-IG-2.11: BoM to review their proposed website for compliance with the RARS Operator Standards, EARS and WMO websites, and to propose an update for propagation to other RARS operators. Due date: end-July 2008.

Status: **BoM**: website does not comply at the moment (a lot of links are not yet active).

=> After discussion it was concluded that this action should remain **open.** BoM will review and distribute their website to other RARS operators in four weeks. It was confirmed that this website should be at the regional level (and would be linked to the WMO RARS website).

Action RARS-IG-2.17: WMO SP to include a section on "How to access RARS data" in a prominent position within the WMO RARS website. Due date: end-October 2008.

Status: **Closed** – Text agreed, website implementation is covered by a new action (RARS-IG-3.5).

Following a review of the status, the following new action was raised:

RARS-IG-3.5 WMO SP to update the WMO RARS website to reflect the outcomes of RARS-IG-3 (i.e. coverage maps and section on "how to access RARS data"). Due date: end-April 2009.

6. RARS Extension to Advanced Sounding Missions

Robert Husband then presented RARS-IGDDS-IG-3/Doc.6 on the proposed RARS Extension to Advanced Sounder Missions.

It was recalled that the future NPP and NPOESS missions will include an advanced infrared sounder (CrIS) associated with a microwave sounder (ATMS). In order to take advantage of this advanced capability as early as possible, as recommended by the 16th International TOVS Scientific Conference (ITSC-16), consideration should be given to the possible extension of the RARS concept to the acquisition and redistribution of such data.

While the current RARS concept provides a useful reference for this activity, its application to NPP and NPOESS data raises specific issues. In the case of NPP/NPOESS sounding instruments, the nature of the data, their volume, and their direct broadcast characteristics are significantly different from

the case of ATOVS data acquired by HRPT, and investigations shall thus be made in order to determine the most appropriate technical options.

A first draft of a project plan for the extension of the RARS concept to NPP/NPOESS advanced sounding missions is included in the Appendix of RARS-IGDDS-IG-3/Doc.6 and the main activities proposed in the plan were briefly summarized, i.e.:

- Refine User Requirements;
- Upgrade/Establish Reception Stations;
- Upgrade Communications Infrastructure (as necessary);
- Optimize the Data Processing and Collection Architecture;
- Ensure Availability of Instrument Data Processing Packages;
- Update RARS Operator Standards;
- Ensure User Awareness of Advanced Sounder Service;
- Project Governance.

Also, some relevant elements from Nigel Atkinson's earlier presentation were recalled, namely:

- Pre-processing Issues for NPP:
  - It is proposed that the IPOPP package (NASA/Wisconsin) will be used to process from level 0 to Sensor Data Records (level 1b);
- Currently there is some uncertainty as to the sort of ATMS and CrIS data that should be disseminated within the framework of a RARS extension to embrace advanced sounders. The approach could be similar to that taken for EARS IASI in terms of channel selection and PC scores.

Discussion

Following the presentation, the Chair noted that the pilot projects being considered in the Asia-Pacific and South American regions were fully consistent with this proposed project and could usefully contribute to it.

Anthony Rea noted that the section addressing user requirements (section 3.1) may need to also consider the communication infrastructure as this may be a driver and could constrain the user requirements. Jerome Lafeuille understood this concern but felt that it would be useful to identify user requirements independently from implementation constraints, at least as a starting point. Requirements would then be refined through iteration among users and providers.

Concerning the receiving station specification, it was clarified that any X-band antenna should be able to receive the data (if it can receive Terra and Aqua then it should be OK).

To aid any discussion on the possible selection of channels, EUMETSAT agreed to provide a list of the IASI channels that have been selected for the EARS IASI service.

RARS-IG-3.6 EUMETSAT to provide a list of the IASI channels selected for the IASI Pilot Service to all participants of RARS-IGDDS-IG-3. Due date: end-March 2009.

In response to a query regarding the potential start date, Jerome Lafeuille felt that the project could start as soon as there is consensus on the project plan.

The Chair suggested that Implementation Group members should be given a couple of months to provide any final input to the plan, and that 1 May 2009 could be a reasonable kick-off date for the project. In this respect it was noted that the relevant pilot activities in INPE and BoM could be reflected as a contribution to the project.

In response to a question from the Chair, it was confirmed by the Implementation Group members that it should be possible to provide the relevant feedback on the plan in time for a kick-off on 1 May 2009.

RARS-IG-3.7 INPE and BoM to provide input to the WMO SP on their advanced sounder pilot activities that could potentially contribute to the "Project Plan for the Extension of the RARS Network to Include Advanced Sounders". Due date: end-March 2009.

RARS-IG-3.8 All RARS contributors to provide comments to the WMO SP on the "Project Plan for the Extension of the RARS Network to Include Advanced Sounders". Due date: end-March 2009.

RARS-IG-3.9 WMO SP to update the "Project Plan for the Extension of the RARS Network to Include Advanced Sounders" and circulate to the RARS-IG. Due date: end-April 2009.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action RARS-IG-2.18: RARS operators to indicate (a) which of their stations have an X-band reception capability (and which are planned to be upgraded by the time of the launch of NPP) and (b) whether they would be willing to consider an extension of the RARS concept to NPP/NPOESS data. Due date: end-September 2008.

Status

EUMETSAT: An X-band capability is planned for Lannion, Maspalomas, Svalbard and Moscow.

BoM: Stations with X-band Capability;
- Perth - RARS extension to X-band possible;
- Crib Point (Melbourne) - RARS extension to X-band possible;
- Townsville - RARS extension to X-band possible but band-width dependent;
- Darwin - X-band capability by mid-2009 - RARS extension to X-band possible but band-width dependent;
- Casey - X-band capability by early-2009 - RARS extension to X-band possible but band-width dependent.

Argentina: ETC has X-band reception capability and will be ready for NPP. EBM has not X-band reception capability. An X-Band GS will be installed in the south of Argentina for 2009/2010.

Brazil: a) So far, INPE's Cuiaba ground station has X-band reception capability, and is planning to upgrade it for NPP/NPOES forthcoming satellites. Also an entirely new receiving station for NPP is planned to be installed in Cachoeira Paulista in 2010.

b) INPE is fully in favor of extending the RARS concept to this new generation of environmental satellites.

KMA expressed an interest in participating (KMA have an X-band station at Jincheon) and agreed to be put on the list of potential participants (subject to confirmation).

=> It was agreed that this action was **closed**.

Action RARS-IG-2.19: WMO to investigate with IPO potential technical support and cooperation that could be provided to the RARS community in the period leading up to the full implementation of the SafetyNet. Due date: end-September 2008.

Status: The WMO SP contacted the IPO in December 2008. IPO was very interested in the project. One option that could be considered is the use of Simulcast functionality. The IPO would be ready to perform a feasibility analysis if this option was felt to merit further investigation.

It was agreed that this action was **closed**.

7. Summary of RARS-related Actions

A list of all RARS actions raised at this meeting of the Implementation Group is included in Annex III.

8. Status and Plans of IGDDS and Geonetcast DVB-S Services

8.1 EUMETCast

Kenneth Holmlund then gave a presentation covering three main topics:

- EUMETCast;
- GEONETCast;
- The EUMETSAT Earth Observation Portal and Clearinghouse.

EUMETCast

An overview of the current status of EUMETCast was provided (System Components; Service Management; Services; Main Features; Scalability; Procedure to introduce new data and the criteria for when EUMETCast is useful).

GEONETCast

An overview of the current status of GEONETCast was then provided which addressed Partners; Coverage; Achievements during 2008; Plans for 2009; Interoperability; User Engagement; Related GEO Tasks; Training Channel and the Hazard Alert Channel.

The main achievements during 2008 were noted as:

- Start of the GEONETCast Americas Operational Service;
- Expansion of User and Provider base (Africa, RANET, SEVIR and CBERS);
- Data and Metadata compliance;
- Data Centre links and regional re-broadcasts (EUMETCast and FengYunCast).

For 2009 the focus will be on further developing the following areas:

- regional data centre interoperability;
- increasing and diversifying the user base;
- GEO Tasks;
- Training Channel;
- Hazard and Alert Channel;
- Product Navigator.

EUMETSAT Earth Observation Portal and Clearinghouse

The purpose of the EUMETSAT EO Portal and Clearinghouse is to provide EUMETSAT users with a single point of online access to all EUMETSAT data and dissemination services. This will allow users to discover, search, order and subscribe to operational services (including data from partner agencies). Interoperability is a key feature of this system and compliance with the relevant international standards has been one of its design constraints (INSPIRE, WIS, OGC …). EUMETSAT also clarified that the EUMETSAT Earth Observation Portal is based on an evolution of the Product Navigator.

The next steps in the implementation of this project are:

- User Registration and Subscription (April 2009);
- Data Search (August 2009);
- Data Ordering (December 2009).

It was noted that data discovery is already available.

8.2 FengYunCast

Dr Liu Jian then summarized the latest status of FengYunCast and recent developments.

- FengYungCast is operated through the Asiasat-4 satellite, located at 122 °E;
- The dissemination schedule contains FY-2C and FY-2D S-VISSR data and derived products (wind vectors, clouds, precipitation estimates, radiation);
- An operational data exchange has now been implemented between CMA and EUMETSAT; CMA is providing EUMETSAT with FY-2 data and products, reciprocally this data exchange enables CMA to rebroadcast to FengYungCast users a wide range of data including Meteosat data (0° and 67°E), derived products, and data from other satellites (Jason-1, GOES).

8.3 Mitra

Mr Dzhalil Akhtyamov (ROSHYDROMET) presented the MITRA system, addressing the:

- Main features of the MITRA system;
- Footprint (four satellites providing coverage of Europe and Asia);
- Terminal equipment;
- Data receiving software;
- Data flows within the MITRA system (including products);
- Disseminated satellite image data (NOAA satellites);
- Products from the Scientific Research Centre “Planeta”;
- Standard data processing and presentation software;
- System robustness;
- Use of TCP/IP for guaranteed content delivery.

8.4 Geonetcast Americas

The Chair then presented the status of GEONETCast Americas, describing the:

- Coverage (most of North, Central and South Americas, with an extension over the Pacific still under consideration);
- Service features (initial 2 Mbps bandwidth with options to upgrade to 10Mbps, DVB-S and 99.9% availability);
- Architecture;
- Receiver station characteristics;
- data products (channels, format and discovery);

- Samples of initial products (from INPE, SEVIR, US Environmental Protection Agency, US Department of Energy and NOAA);
- GEONETCast Americas Coordination Group.

Discussion

The discussions under this agenda item were postponed until after the presentations associated with agenda item 9.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action IGDDS-IG-2.1:BoM to provide a report on their user experiences with FengYunCast and, if necessary, to request the datapack provided at the international training from CMA

Status: BoM reported that they have had their FengYunCast system in place since 2007 - the FengyunCast system was installed at the Bureau of Meteorology's Crib Point Satellite Facility in September 2007. The system has been running reliably since that time, providing data from the FY-2C and FY-2D satellites. In July 2008 an additional software upgrade was provided by the manufacturer which allowed the direct output of raw data and injection into the Bureau's processing systems. As the Bureau already receives FY-2C and FY-2D data via direct broadcast, the FengyunCast system functions as a backup to operational systems.

It was agreed that this action was **closed**.

Action IGDDS-IG-2.2: CMA to provide WMO Space Programme Office with the information package provided at the international training in October 2007. Due date: end July 2008.

Status: **Closed** - CMA sent the FengYunCast user guide to WMO and BoM on 27 June 2008 (The PDF version of the user manuals was posted on the WMO website as reference documents for this meeting).

9. Status of Other IGDDS Dissemination Capabilities

9.1 Direct Broadcast

There were no discussions or presentations under this agenda item.

9.2 Internet

Koji Kawashima (JMA) presented the status of MTSAT image delivery via the Internet. The presentation addressed the following main topics:

- MTSAT Direct Dissemination Service (HRIT/LRIT);
- MTSAT Landline Service (FTP over the Internet and the JMA website);
- JMA's future plans for MTSAT including the next steps for the dissemination system (for MTSAT-2 JMA plans to disseminate imagery via the Internet instead of through direct broadcast).

Discussion (agenda points 8 and 9)

In response to a query from KMA it was stated that the cost of a MITRA reception station was around USD 7,000 (including the software). It was also clarified that there is no cost for receiving the service.

In response to a query regarding the impact on the user of migrating to DVB-S2, EUMETSAT took an action to provide further information on the issue.

IGDDS-IG-3.1: EUMETSAT to inform the IGDDS-IG members of the impacts on the user of migrating to DVB-S2. Due date: April 2009.

Noting that the same Product Navigator was now used worldwide (EUMETSAT, NOAA and CMA) as a user interface, Jerome Lafeuille asked JMA about the relevance of also using the Product Navigator to present MTSAT products disseminated via the Internet, with a view to minimize specific developments and maximize harmonization. JMA informed the Implementation Group on its current web interface.

Gilles Verner (Environment Canada) asked about the procedure for adding products to GEONETCast, and the Chair replied that a request should be made to the GEONETCast coordinator. A general discussion then ensued as to how the user community needs are served.

Jerome Lafeuille recalled the information given by NOAA that the main target of the GEONETCast Americas service was not the meteorological community, but rather the GEO environmental community at large in all its Societal Benefit Areas (SBA). He observed that GEONETCast Americas currently did not deliver meteorological satellite imagery as required by operational meteorologists; and he wondered whether NOAA could consider addressing such a requirement for the future evolution of the system. The Chair stated that the SBA “Weather” was not excluded and that, in principle this was possible although not the main scope of the system.

10. IGDDS Standards for DVB-S Dissemination Services

Robert Husband briefly recalled the minor updates to the IGDDS Standards that had been implemented following the action placed at the last Implementation Group meeting (see review of related actions).

In addition, a new action was raised concerning the need to clarify that the Standards were also applicable to future evolutions of DVB-S.

IGDDS-IG-3.2: WMO SP to release the DVB-S Operator Standards with a clarification that they also apply to future evolutions of DVB-S. Due date: April 2009.

Review of Related Actions

The status of the relevant outstanding actions was then reviewed.

Action IGDDS-IG-2.5: WMO SP to update the IGDDS Standards Document (Title and Introduction) to make it clear that it applies to DVB-S systems. Due date: IGDDS-IG-3.

Status: **Closed** – the updated document is available.

11. Data Discovery, Access and Retrieval

11.1 Metadata and Product Navigator

Under this agenda item the discussions focused on the status of the relevant action.

Action IGDDS-IG-2.3: EUMETSTAT to provide the results of harvesting metadata from the Product Navigator (involving setting up an interface to allow the remote query of the

product navigator and the standardization of the catalogue information formats within the Product Navigator). Due date: IGDDS-IG-3.

Status: **Open** – EUMETSAT activities ongoing.

The Implementation Group recalled the significance of this action. While noting the high value of the Product Navigator, the Implementation Group recalled the need to add a capability to automatically "harvest" metadata from the Product Navigator, in order to allow the interoperability of data catalogues, which is a fundamental principle of the WIS and of GEOSS. The implementation shall be compatible with WIS metadata standards.

12. Regional Requirements for Data Access

Jerome Lafeuille recalled that identifying data access requirements was a priority task in the IGDDS Implementation Plan, as well as for the implementation of the WIS. Once requirements are defined, a dialogue can be conducted with data providers to investigate ways and means to provide the required data and products. These requirements were depending on the applications and on the type of user infrastructure available in each specific region, thus they had to be tuned to each region. For the definition of such requirements, it had been suggested in earlier discussions to involve Regional Rapporteurs on the Space Programme, Centres of Excellence, and regional groups such as NAEDEX and APSDEU. An action has been initiated for South and Central America by Dr Luiz Toledo Machado, Rapporteur on the Space Programme for RA III; and he invited Sérgio de Paula Pereira to inform the group on the status of this action.

Sérgio Pereira then presented the status of this action, addressing:

i) Proposed Requirement Structure (generic headings: Data, Data Characteristics, Format, Expected Format (future), Frequency, Timeliness, Size/Data Rate, Application and Priority);
ii) A Populated Example (based on GOES data) following the proposed requirement structure;
iii) Training – RA III and RA IV have a regional focus group and four Centres of Excellence to support implementation.

Jerome Lafeuille then asked the group if the requirement format, as presented, would be a good basis for a dialogue with IGDDS operators.

The Implementation Group welcomed this approach and considered that, in the case of South and Central America, such an expression of requirements was a valuable basis to explore, for instance, the possibility to accommodate additional data in the GEONETCast Americas and/or EUMETCast Americas services.

The Chair also noted that the WIS standards should be followed when defining data priority.

During the discussions a hope was expressed that it would be possible to complete the formulation of the requirements for RA III by the end of April 2009. The WMO SP agreed to help facilitate the subsequent dialogue with the data providers.

IGDDS-IG-3.3: WMO SP to facilitate a dialogue with data providers in response to the stated data requirements. Due date: IGDDS-IG-4.

Review of Related Actions

The status of the relevant outstanding actions was reviewed.

Action IGDDS-IG-1.3: ROSHYDROMET to report back to IGDDS-IG-2 on the progress in establishing subregional requirements

Status at IGDDS-IG-2: **Open** – at the 19th session of the CIS Intergovernmental Council on Meteorology (October 2007) ROSHYDROMET presented information concerning the establishment of the WMO IGDDS and ROSHYDROMET's participation in it. It was decided to request the Council Working Group on Telecommunications to prepare a regional IGDDS project including the regional requirements and a list of potential products for dissemination. The project will be prepared by this Working Group and presented at the next session of the Council in November 2008. New due date: RARS-IG-3.

Status at IGDDS-IG-3: **Open** - at the 20th session of the CIS Intergovernmental Council on Meteorology (8-9 October 2008) it has been decided to start preparation of the regional IGDDS project. All potential participants of the regional project will receive a question list with configured requirements of products for dissemination. The Main Radio Meteorological Centre (MRMC) of ROSHYDROMET jointly with other participants from the Intergovernmental Council on Meteorology have to prepare an offer for the organization of a regional IGDDS project, including regional requirements – to be presented at the next session of the Council in November 2009.

Action IGDDS-IG-1.4: IGDDS Implementation Group members participating in APSDEU and the North America and Europe Data Exchange meetings to report back to IGDDS-IG-2 on items of relevance to the establishment of regional requirements.

Status: Neither group focussed in detail on this issue.

There was a general discussion as to the way forward, including whether adding a preferred dissemination mechanism to the NAEDEX and APSDEU data requirements was appropriate (it was concluded that this was not appropriate). In order to make progress in this area, the Chair (who participates in both NAEDEX and APSDEU) volunteered to send NAEDEX and APSDEU requirements (after confirmation from the NAEDEX and APSDEU participants) in two months

Action IGDDS-IG-1.10: JMA, BoM and KMA to express their requirements for proposed additions to the FengYunCast dissemination schedule, to enhance the regional operational value, by end of September 2007, in order to allow a presentation and discussion at APSDEU-8, with a view to obtaining a consolidated regional proposal from APSDEU-8 (to be formally communicated to CMA following APSDEU-8).

Status at IGDDS-IG-2: Ongoing - the next APSDEU will take place in February 2009. New due dates were agreed as follows:

- End-July 2008 for the first part of the action (express requirements);
- Obtain response from APSDEU by February 2008.

Status: **Open** - JMA has no requirement for the FengYunCast dissemination schedule at present. KMA has made some suggestions for additions to the FengYunCast schedule that are in line with those of BoM, i.e.:

- Elements of the global Metop datastream;
- MSG data;
- Global FY-3a data;

- COMMS data after 2010.

BoM agreed to consolidate the list with KMA and CMA and to provide a table by March 2009.

Action IGDDS-IG-1.11: CMA to investigate the feasibility of adding the requested products to the FengYunCast dissemination schedule and to provide a timetable for their introduction by the end of 2007.

Status: **Open** – action is due three months after the completion of the related action **IGDDS-IG-1.10**.

Action IGDDS-IG-2.4: WMO SP to contact Regional Rapporteurs for the WMO Space Programme and ask them to provide generic requirements for their regions (using the requirements document presented at IGDDS-IG-1 as a starting point) and requesting a response by the end of the year. Due date: end-June 2008.

Status: The Rapporteur for RA III was contacted and requested to provide some intermediate feedback in time for IGDDS-IG-3. The Rapporteur was also encouraged to include Central America in the dialogue (in the absence of a Rapporteur for RA IV). An interim response was received on 19/01/09 and a further update was received at this meeting (see summary of INPE presentation under this agenda item).

The priority was placed on RA III because of the need to have a clear requirement basis for the future evolution of GEONETCast-Americas, EUMETCAST-Americas, and other dissemination means available in the region (e.g. LRIT, and GRB in the future).

The Rapporteur for RA II (Tatsuya Kimura) was contacted on 8 January 2009. He has undertaken a pilot project which focuses mainly on improving the information on data access, but would address data requirements and user training as a second priority. The requirements in RA II will take into account an action relating to APSDEU, from IGDDS-IG-1 (see **Action IGDDS-IG-1.4).**

In RA IV, RA V and RAVI, there are no Rapporteurs (D. Griersmith has recently retired).

Concerning RA I, no active communication was established with the Rapporteur.

The Group commented that this process was important, that the requirements should be expressed in concrete manner, and that the whole process should be kept under review by the IGDDS Implementation Group. It was decided to leave the action **open** and a report will be provided to IGDDS-IG-4.

13. Information on Relevant Ongoing Actions

13.1 Task Force on Codes

The CGMS Task Force on Satellite Data Codes was established in order to advise CGMS and WMO on issues related to satellite data representation, identification and handling within the WMO Information System. The first meeting of the TFSDC was held at the WMO Headquarters in Geneva, 26-27 February 2008. In addition to reviewing its function and Terms of Reference, the Task Force considered a number of technical issues relating to the encoding and exchange of satellite data. In particular the Task Force recommended the development of a typology of satellite data and products to be used to update Common Table C-13 of the Manual on Codes for data categories and sub-categories and the corresponding Table C-6 of Attachment II-5 of the Manual on the GTS. The Expert Team on

Data Representation and Codes was informed of these proposals and approved the update of Common Table C-13 as listed in Appendix B, with a view for its validation.

A report was provided to CGMS-36, and CGMS recommended to its Members to ensure broad and permanent participation in the Task Force. To date, the following members were designated (subject to confirmation):

- CMA: An Lai SUN (NSMC)
- EUMETSAT: Simon Elliott
- JMA: Motoo Hayashi, System Engineering Division, MSC
- NOAA: Thomas Smith (NOAA/NESDIS)
- ROSHYDROMET: parkhom@planet.iitp.ru (Name ?)
- Chairman of ET/DRC: Milan Dragosavac (ECMWF)

13.2 DCPC Designation Process

In response to a letter of invitation, proposals for the designation of GISCs and DCPCs have now been received by WMO (81 DCPCs and 13 GISCs). These proposals are at quite a high level and in some cases it is somewhat difficult to see if IGDDS-type functionality is included within the submission. So it is recommended that IGDDS operators check with their services that the submission includes their respective IGDDS components.

IGDDS-IG-3.4: IGDDS operators to verify that their IGDDS components (including DVB-S services and other dissemination means) have been included within the scope of the DCPC designation process. Due date: April 2009.

A working group has now reviewed the proposals, and the assessments are currently being compiled and entered into a database. These assessments will be checked again by the working group and summary assessment reports will be created for each DCPC and GISC.

A copy of the working group's assessment report for each candidate centre will then be made available to contributors for review and for the opportunity to address some of the technical issues raised by the working group.

14. IGDDS Implementation Plan Review and Update

Robert Husband introduced the updated IGDDS Implementation Plan (RARS-IGDDS-IG-3/Doc. 14). It was noted that the plan has been modified in accordance with the outcome of the IGDDS-IG-2, with the main changes being:

- Expansion of the IGDDS Definition and Goal (section 3.1);
- Updated description of the IGDDS Assets (section 6);
- Further actions added and existing actions clarified (sections 7.1 and 7.2);
- Implementation schedule adjusted (section 12);
- Task categorization and implementation responsibilities modified (section 13).

Jerome Lafeuille commented that this Implementation Plan was pursuing two objectives: (i) to provide some strategic guidelines for improving access to satellite data and products within the WIS for developed and developing countries, and (ii) to provide a roadmap for implementation actions. The document was a kind of compromise between these two aspects. Strategic guidelines are expressed in sections 3 and 4 of the document; they refer to global data exchange, integrated dissemination means, user interaction, promotion of cost-efficient and scalable systems such as DVB-S, quality of service, interoperability standards. The implementation actions are described in section 7. The document has been approved by CGMS as a valuable basis, and subsequently refined and approved by the IGDDS-IG, however, there was no evidence that it has the appropriate level of detail to serve as a reference for action. Furthermore, while the strategy has to be defined for the long-term, the implementation actions

should provide an adequate response to the developments occurring in the short-term, for instance taking into account the advent of the next generation of satellites, the emerging capabilities of the WIS. Jerome Lafeuille thus wished to seek the views of the group on whether the proposed actions should be refined to ensure that they are targeted enough to be achievable, and lead to the expected deliverables.

To solicit ideas for the further improvement of the Plan, it was decided to form two breakout groups: with one group addressing Architecture and Dissemination; and the other group addressing Data Requirements and Data Management.

Architecture and Dissemination

The breakout group on Architecture and Dissemination made the following recommendations for the update of the plan:

- Provide more background on WIS (to facilitate the understanding of the architecture);
- Provide more background on the relationship between WIS and the IGDDS projects (and the relative implementation phasing);
- Clarify that it is anticipated that there will be at least one IGDDS-DCPC for each of the four regions (for data collection and data provision to the GISC) – wording may need to be updated;
- Clarify actions A3.1 and A3.4 (defining what exists today, its anticipated evolution and the applicable standards and mechanisms for data access – there is a need to know the current status of the applicable standards);
- Make sure that all dissemination mechanisms are addressed - not just DVB-S;
- Expand Action A3.4 to add further elements:
  - Reliability,
  - Compatibility with WIS,
  - Wide acceptance,
  - Easy inter-regional data exchange,
  - Easy swap from one ADM service to another in the footprint overlap areas;
- Assign priorities to actions;
- Add further precision to the meaning of actions A3.6, A3.7 and A3.8. They could be viewed as a means by which to get data. It may be better to consider them as sub-items of another major action (to establish appropriate data delivery mechanisms);
- Need for a standard service definition (which should come from WIS).

Data Requirements and Data Management

The breakout group on Data Requirements and Data Management made the following recommendations for the update of the plan:

- In section 6.2 it should read “EUMETSAT also offers an “IGDDS-type…”;
- Put the last bullet of A.1.1 into A.1.2 as there is a need to have enough warning for DCPCs to enable appropriate planning;
- Reword Action A.4.2 on the development of the metadata standard – one task should be to establish the minimum set of metadata that should be available (to describe the disseminated data);
- Reword Action A.4.4 to make sure that there is a coordinated message sent to users (i.e. one voice);
- Action A4.3 could be reworded to make reference to a Training Channel;
- The duplication between A4.1 and A4.4 needs to be removed.

The Chair thanked the two breakout groups for their stimulating and useful recommendations. It was agreed that these recommendations will be reviewed by the WMO SP and the IGDDS Implementation Plan updated in time for the next meeting of the Implementation Group.

IGDDS-IG-3.5: WMO SP to update the IGDDS Implementation Plan in line with conclusions of IGDDS-IG-3. Due date IGDDS-IG-4.

15. Summary of IGDDS-related Actions

A list of IGDDS actions raised at this meeting of the Implementation Group is included in Annex IV.

16. Any Other Business

The important contribution that Chile could potentially make to the South American RARS was discussed, and the WMO SP was invited to investigate options for obtaining data from Chile (in conjunction with interested parties).

RARS-IG-3.10 WMO SP to investigate options for obtaining RARS data from Chile (in conjunction with the interested parties). Due date RARS-IG-4.

Concerning the Asia-Pacific RARS Coordinator, Anthony Rea informed the Group that, following the retirement of David Griersmith, he is currently acting in this role; and agreement needs to be reached about his continuation, or otherwise, until the next Implementation Group meeting. It was unanimously agreed that Anthony should continue in this role at least until the next meeting of the Implementation Group. At that meeting the Terms of Reference for the role of the Asia-Pacific RARS coordinator (possibly making use of the documentation created at the start of the RARS project) would be presented for endorsement by the Implementation Group.

The Terms of Reference would propose a term of office together with appropriate mechanisms for the appointment of a new coordinator.

RARS-IG-3.11 BoM to propose Terms of Reference for the role of Asia-Pacific RARS Coordinator. Due date: RARS-IG-4.

17. Conclusion

In conclusion the Chair thanked the participants, WMO and JMA for a very productive and constructive meeting. In particular, the excellent meeting support provided by JMA, which involved an enormous amount of work, was much appreciated by all participants and greatly facilitated the conduct of the meeting.

Jerome Lafeuille added the thanks of the WMO SP to those of the Chair, and noted with appreciation the expansion of the RARS network and its future evolution to embrace advanced sounders. Also, he was pleased that co-locating the meeting with APSDEU-9 had allowed the participation of new experts in the meeting, which was greatly welcomed, as it brought different perspectives and experience, and helped build linkages between different communities. Finally, he thanked Fred Branski for his expert chairing of the meeting.

It was noted that the next meeting was likely to be held in Geneva in March 2010.

PROVISIONAL AGENDA

1. Introduction

2. Status of the Global RARS Network
2.1 Status of EARS
2.2 Status of the Asia-Pacific RARS
2.3 Status of the South American RARS
2.4 RARS Operations Monitoring and Software Issues

3. RARS Geographical Extension

4. RARS Data Dissemination Issues
4.1 Update on RARS Data Representation and Coding
4.2 Status of RARS Data Dissemination via GTS and Other Means

5. RARS User Information
5.1 WMO RARS Website
5.2 Individual RARS Websites
5.3 Other Information Actions towards the User Community

6. RARS Extension to Advanced Sounding Missions

7. Summary of RARS-related Actions

8. Status and Plans of IGDDS and Geonetcast DVB-S Services
8.1 EUMETCast
8.2 FengYunCast
8.3 Mitra
8.4 Geonetcast Americas

9. Status of Other IGDDS Dissemination Capabilities
9.1 Direct Broadcast
9.2 Internet

10. IGDDS Standards for DVB-S Dissemination Services

11. Data Discovery, Access and Retrieval
11.1 Metadata and Product Navigator

12. Regional Requirements for Data Access

13. Information on Relevant Ongoing Actions
13.1 Task Force on Codes
13.2 DCPC Designation Process

14. IGDDS Implementation Plan Review and Update
15. Summary of IGDDS-related Actions
16. Any Other Business
17. Conclusion

RARS HRPT STATION STATUS AND ANTICIPATED EVOLUTION (February 2009)

(In this table, stations are ranked by regional RARS centre, then by processing centre, then by sub-centre identifier)

Area	Regional RARS Centre	HRPT Station Name	Latitude	Longitude	Operator	Identifier	Processing centre ID	Sub-centre ID	Ops status or planned implementa-tion	Comments
Asia-Pacific	Tokyo (JMA)	Syowa	69° S	39.58° E	JMA	syo	34	207	Ops	
		Kiyose	35.77° N	139.53° E	JMA	kiy	34	240	Ops	
		Beijing	39.93° N	118.28° E	CMA	pek	39	225	Ops	
		Guangzhou	23.13° N	113.3° E	CMA	pek	39	226	Ops	Data merged with Beijing
		Urumuqi	43.78° N	87.6° E	CMA	pek	39	228	Ops	
		Seoul	37.48° N	126.92° E	KMA	seo	40	243	Ops	Replaced by Jincheon in March 09
		Jincheon	36.99° N	127.43 °E	KMA	jin	40	245	March 09	
		Hong Kong	22.3° N	114° E	HKO	hkg	110	229	Ops	
		For all Asia-Pacific RARS stations: the agreed coding convention is planned to be applied as of end of April 2009								

Area	Regional RARS Centre	HRPT Station Name	Latitude	Longitude	Operator	Identifier	Processing centre ID	Sub-centre ID	Ops status or planned implementation	Comments
Asia-Pacific	Melbourne (BOM)	Casey	66.26° S	110.53° E	BOM	csy	2	201	May 09	Comm. upgrade
		Davis	68.58° S	77.97° E	BOM	dvs	2	203	OPS	
		Melbourne Crib	37.88° S	144.96° E	BOM	mel	2	211	OPS	
		Darwin	12.46° S	130.84° E	BOM	dar	2	214	OPS	
		Perth	31.95° S	115.89° E	BOM	pth	2	217	OPS	
		Townsville	19.28 S	147.05 E	AIMS	tvl	2	219	OPS	Transmission delays
		Fiji	17.7° S	177.6° E	FMS	fij	2	232	May 09	
		Noumea	22.27° S	166.45° E	Meteo-	nou	2	235	No plan	
		Tahiti/Papeete	17.56° S	149.61° W	Meteo-	pap	2	237	2010	TBC
		Vladivostock	43.0° N	131.54° E	RossHydro	vla	2	250	No plan	
		Guam	13.47° N	144.78° E	USAF	gua	2	251	2010	TBC with USA
		Honolulu	21° N	157.5° W		hon	2	252	No plan	(Included in EARS)
		Kelburn, NZ	41.3° S	174.5° E	MetService	kel	69	247	OPS	To be replaced by Kilburnie in 2009
		Kilburnie, NZ			NIWA		TBD	TBD	May 09	
		Singapore	1.3° N	103.83° E	NEA	sgp	72	249	OPS	
		Kwajalein Atoll	8.7°N	167.7°E	USAF	kwa	TBD	TBD	Not planned	
		For all Asia-Pacific RARS stations: the agreed coding convention is planned to be applied as of end of April 2009								

Area	Regional RARS Centre	HRPT Station Name	Latitude	Longitude	Operator	Identifier	Processing centre ID	Sub-centre ID	Ops status or planned implementation	Comments
Europe and North-America (EARS)	Darmstadt (EUMETSAT)	Maspalomas	27.78°N	15.63°W	INTA	mas	254	20	OPS	
		Kangerlussuaq	66.98° N	50.67° W	DMI	kan	254	30	OPS	
		Edmonton	53.33° N	113.5° W	EC	edm	254	40	OPS	
		Gander	48.94° N	54.57° W	EC	gan	254	60	OPS	
		Monterey	36.35° N	121.55° W	NOAA	mon	254	70	OPS	
		Wallops Island	37.8°N	75.3° W	NOAA	wal	254	80	OPS	
		Gilmore Creek	64.97°N	147.40° W	NOAA	gil	254	90	OPS	
		Athens	38.0° N	23.44° E	HNMS	ath	254	100	OPS	
		Ewa Beach (Hawaii)	21.33 N	158.06 W		ewa	254	120	Febr.09	Transmission delays
		Miami	25.73 N	80.15 W		mia	254	130	Febr.09	
		Lannion	48.7°N	3.5° W	Meteo-France	lan	254	140	OPS	
		Svalbard	78.13° N	15.23° E	KSAT	sva	254	150	OPS	
		St Denis (Reunion)	20.88 ° S	55.50 ° E	Meteo-France	std	254	170	2009	
		Moscow	55.75° N	37.62° E		mos	254	180	2009	
		Muscat (Oman)	23.61° N	58.54° E		mus	254	190	2009	
		Khabarovsk	48.47° N	135.35° E		kha	254	200	2010	
		Novosibirsk	54.8° N	83.13° E		nov	254	210	2010	
		Resolute Bay	74.71° N	94.97°W			254		Not yet planned	
		Libreville	0.27° N	9.25° E			254		Not yet planned	

Area	Regional RARS Centre	HRPT Station Name	Latitude	Longitude	Operator	Identifier	Processing centre ID	Sub-centre ID	Ops status or planned implementation	Comments
South America	Cachoeira Paulista (INPE)	Cachoeira Paulista	22.33° S	45° W	INPE	cpt	46	10	OPS	
		Cuiaba	15.55° S	56.7° W	INPE	cba	46	11	OPS	
		Brasilia	15.78° S	47.92° W	INMET	inm	46	12	OPS	
		Fortaleza	3.73° S	38.56° W	FUNCEME	fcm	46	13	Mid 2009	
		Natal/Navy	5.785° S	35.22° 'W	CHM	chm	46	14	Mid 2009	
		Manaus	03.02° S	60.05° W	SIVAM	svm	46	15	Early 2010	
		Natal/INPE	5.836° S	35.21° 'W	INPE	nat	46	16	End 2009	
		Euzebio	03.88 S	38.45° W	INPE	euz	46		Not planned	
		Boa Vista	02.75° N	60.75° W	INPE	bvs	46	17	End 2010	
		Caracas	10.5°N	66.94° W			46		Not yet planned	
South America	Cordoba (CONAE)	Córdoba	31.52° S	64.45° W	CONAE	etc	147	10	OPS	
		Ushuaia	58.80 S	68.33 W	CONAE	etu	147	15	2009/2010	
		Marambio	64.23° S	58.63° W	CONAE	ebm	147	20	OPS	
		Santiago de	33.26° S	70.41° W	DGAC	ets	147	30	2009	
		Punta Arenas	53.02° S	70.51° W	DGAC	epa	147	40	2009	
		Base Presid.	62.2° S	58.93° W	DGAC	epf	147	50	2009	
		Cotopaxi	0.82° S	78.63° W	CLIRSEN	cpe	147	60	Dec 2009	
		JuanFernandez	33.37 S	79.5 W					Not planned	

LIST OF RARS-IG-3 ACTIONS

RARS-IG-3.1: WMO SP, in coordination with Fred Branski, to contact the US about the possible inclusion of HRPT stations in Guam and the Marshall Islands within the RARS network (keeping the Asia-Pacific RARS Coordinator informed). Due date: end April 2009.

RARS-IG-3.2: The Asia-Pacific RARS Coordinator to provide the missing details for Kelburn and Fiji. Due date: end-February 2009.

RARS-IG-3.3: EUMETSAT, in coordination with Environment Canada, to clarify whether a second Edmonton station will be identified once the two currently collocated Edmonton stations are separated (planned to take place during 2009). Due date: end-February 2009.

RARS-IG-3.4 All Asia-Pacific RARS contributors to comply with the RARS coding and data representation conventions and harmonize AAPP software versions. Due date: end-April 2009 for the bulletins and AAPP software versions, June 2009 for the filenames.

RARS-IG-3.5 WMO SP to update the WMO RARS website to reflect the outcomes of RARS-IG-3 (i.e. coverage maps and section on “how to access RARS data”). Due date: end-April 2009.

RARS-IG-3.6 EUMETSAT to provide a list of the IASI channels selected for the IASI Pilot Service to all participants of RARS-IGDDS-IG-3. Due date: end-March 2009.

RARS-IG-3.7 INPE and BoM to provide input to the WMO SP on their advanced sounder pilot activities that could potentially contribute to the “Project Plan for the Extension of the RARS Network to Include Advanced Sounders”. Due date: end-March 2009.

RARS-IG-3.8 All RARS contributors to provide comments to the WMO SP on the “Project Plan for the Extension of the RARS Network to Include Advanced Sounders”. Due date: end-March 2009.

RARS-IG-3.9 WMO SP to update the “Project Plan for the Extension of the RARS Network to Include Advanced Sounders” and circulate to the RARS-IG. Due date: end-April 2009.

RARS-IG-3.10 WMO SP to investigate options for obtaining RARS data from Chile (in conjunction with interested parties). Due date RARS-IG-4.

RARS-IG-3.11 BoM to propose Terms of Reference for the role of Asia-Pacific RARS Coordinator. Due date: RARS-IG-4.

LIST OF IGDDS-IG-3 ACTIONS

IGDDS-IG-3.1: EUMETSAT to inform the IGDDS-IG members of the impacts on the user of migrating to DVB-S2. Due date: April 2009.

IGDDS-IG-3.2: WMO SP to release the DVB-S Operator Standards with a clarification that they also apply to future evolutions of DVB-S. Due date: April 2009.

IGDDS-IG-3.3: WMO SP to facilitate a dialogue with data providers in response to the stated data requirements. Due date: IGDDS-IG-4.

IGDDS-IG-3.4: IGDDS operators to verify that their IGDDS components (including DVB-S services and other dissemination means) have been included within the scope of the DCPC designation process. Due date: April 2009.

IGDDS-IG-3.5: WMO SP to update the IGDDS Implementation Plan in line with conclusions of IGDDS-IG-3. Due date IGDDS-IG-4.

LIST OF PARTICIPANTS

ARGENTINA

Ms Gloria C. Pujol
Remote Sensing Division
Servicio Meteorological Nacional (SMN)
25 de Mayo 68 - Cap. Fed
BUENOS AIRES
Argentina
Tel.: +54 (11) 4317 6000 ext. 18103
Fax: +54 (11) 5167 6711
Email: gpujol(at)smn.gov.ar

AUSTRALIA

Dr Anthony Rea
Acting Superintendent Satellite Activities
Space Based Observations Section
Australian Bureau of Meteorology
GPO Box 1289
MELBOURNE 3001
Australia
Tel.: +61 (3) 9669 4594?
Fax: +61 (3) 9669 4168?
Email: a.rea(at)bom.gov.au

BRAZIL

Mr Sergio de Paula Pereira
National Institute for Space Research (INPE)
Environmental Satellite Systems Division
DSA/CPTEC
Km 040 Rodovia Presidente Dutra
CACHOEIRA PAULISTA (SP) 12630-000
Brazil
Tel.: +55 (12) 3186 9275
Fax: +55 (12) 3186 9395
Email: spereira(at)cptec.inpe.br

CANADA

Mr Gilles Verner
Chief, Data Assimilation and Quality Control
Canadian Meteorological Centre
2121 Transcanada
DORVAL, H9P 1J3
Canada
Tel: +1 (514) 421 4624
Fax: +1 (514) 421 4657
Email: Gilles.Verner(at)ec.gc.ca

CHINA

Dr Liu Jian
National Satellite Meteorological Center
China Meteorological Administration
46, Zhongguancun Nandajie
BEIJING 100081
China
Tel.: +86 (10) 6840 6046
Fax: +86 (10) 6217 2724
Email: liujian(at)cma.gov.cn

Mr Zhou Lin
National Meteorological Information Centre
China Meteorological Administration
46, Zhongguancun Nandajie
BEIJING 100081
China
Tel.: +86 (10) 6840 7308
Fax: +86 (10) 6217 3225
Email: zhoulin(at)cma.gov.cn

EUMETSAT

Dr Kenneth Holmlund
EUMETSAT
Am Kavalleriesand, 31
D-64295 DARMSTADT
Germany
Tel.: +49 (6151) 807 599
Fax: +49 (6151) 807 304
Email: Kenneth.Holmlund(at)eumetsat.int

JAPAN

Mr Norio Kamekawa
Technical Officer
System Engineering Division
Data Processing Department
Meteorological Satellite Center
JMA
3-235 Nakakiyoto, Kiyose-shi,
TOKYO
Japan
Tel: +81 (42) 493 4981
Fax: +81 (42) 492 2433
Email: orion-kamekawa(at)met.kishou.go.jp

Mr Koji Kawashima
Satellite Program Division
Observations Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100 8122

Japan
Tel.: +81 (3) 3201 8677
Fax: +81 (3) 3217 1036
Email: kj.kawashima(at)met.kishou.go.jp

Mr Takuyuki Kawazu
Director
Satellite Program Division
Observations Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100 8122
Japan
Tel.: +81 (3) 3201 8677
Fax: +81 (3) 3217 1036
Email: kawazu(at)met.kishou.go.jp

Mr Toshiyuki Kurino
Director
System Engineering Division
Data Processing Department
Meteorological Satellite Center
JMA
3-235 Nakakiyoto, Kiyose-shi,
TOKYO 204 0012
Japan
Tel: +81 (42) 493 4970
Fax: +81 (42) 492 2433
Email: tkurino@met.kishou.go.jp

Mr Hidehiko Murata
Technical Officer
System Engineering Division
Data Processing Department
Meteorological Satellite Center
JMA
3-235 Nakakiyoto, Kiyose-shi,
TOKYO
Japan
Tel: +81 (42) 493 4981
Fax: +81 (42) 492 2433
Email: hidehiko.murata(at)met.kishou.go.jp

Mr Akihiro Shimizu
Technical Officer
Satellite Program Division
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100-8122 Japan
TEL : +81 3 3201 8677
FAX : +81 3 3217 1036
Email: aki-shimizu(at)met.kishou.go.jp

Mr Kenji Tsunoda
Information and Communication Division
Forecast Deparetment
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100 8122
Japan
Email: tsunoda(at)met.kishou.go.jp

Mr Naotaka Uekiyo
Scientific Officer
Satellite Program Division
Observations Department
Japan Meteorological Agency
1-3-4 Otemachi, Chiyoda-ku
TOKYO 100 8122
Japan
Tel.: +81 (3) 3201 8677
Fax: +81 (3) 3217 1036
Email: uekiyo(at)met.kishou.go.jp

REPUBLIC OF KOREA

Dr Jae-Dong Jang
Assistant Director
KMA/KMSC
25-168 San Gwanghaewon-myun (ri)
Jincheon-gun Chungcheongbook-do
SEOUL
Republic of Korea
Tel: +82 (43) 717 0233
Fax: +82 (43) 717 0209
Email: jaedongjang(at)kma.go.kr

Dr OkKi Lee
Head of IT Operation
Division of IT and Infrastructure
KMA
45 Gisnagcheong-gil Dongjak-gu
SEOUL
Republic of Korea
Tel: +82 (2) 2181 0416
Fax: +82 (2) 2181 0449
Email: yiokki(at)kma.go.kr

RUSSIAN FEDERATION

Mr Dzhalil Akhtyamov
Chief of Division
ROSHYDROMET
Moldagulovoy street, 30, 377
MOSCOW 11538
Russia
Tel: +7 (499) 795 22 88
Fax: +7 (499) 252 55 04, +7 (495) 605 33 32
Email: meteosrv(at)mail.ru, add(at)mecom.ru

UNITED KINGDOM

(for item 2.4, by phone)
Mr Nigel Atkinson
NWP SAF AAPP Manager
Met Office

FitzRoy Road
EX1 3PB EXETER
United Kingdom
Fax: +44 (1392) 885681
Email: Nigel.Atkinson(at)metoffice.gov.u

UNITED STATES

Mr Fred Branski
International Data Exchange and
Requirements Liaison
NOAA/NWS
1325 East-West Highway, Room 17456
SILVER SPRING, MD 20910
United States of America
Tel: +1 (301) 713 3538 ext 121
Fax: +1 (301) 713 9450
Email: fred.branski(at)noaa.gov

Mr Hanjun Ding
Physical Scientist
NOAA/NESDIS
5200 Auth Road
SUITLAND, MD 20746
United States of America
Tel: +1 (301) 763 8142 ext.124
Fax: +1 (301) 899 9196
Email: Hanjun.Ding(at)noaa.gov

Mr Brent Gordon
Chief
Systems Integration Branch,
NCEP Central Operations
NOAA
5200 Auth Road
CAMP SPRINGS, MD, 20745
United States of America
Tel: +1 (301) 763 8000 ext. 7193
Fax: +1 (301) 763 8381
Email: Brent.Gordon(at)noaa.gov

Mr John Paquette
Physical Scientist
NESDIS/OSDPD/SSD
5200 Auth Road, Room 607
WWBG-E/SP2
CAMP SPRINGS, MD 20746-4325
United States of America
Tel: +1 (301) 763 8131
Fax: +1 (301) 763 8131
Email: John.Paquette(at)noaa.gov

SECRETARIAT

Mr Robert Husband
Consultant for WMO
Ballaccoil, Lhagg Road, Dalby
Isle of Man IM5 3BU
British Isles
United Kingdom
Tel.: +44 (1624) 845410
Fax: +44 (1624) 845161
Email: husband(at)eumetsat.int

Mr Jérôme Lafeuille
Chief, Space-based Observing
System Division
WMO Space Programme Office
World Meteorological Organization
7 bis, Avenue de la Paix
Case Postale 2300
CH-1211 GENEVE 2
Switzerland
Tel: +41 (22) 730 82 28
Fax: +41 (22) 730 84 74
E-mail: JLafeuille(at)wmo.int