A global Network of Regional ATOVS Retransmission Services (RARS)

Marie Dumont (WMO Space Programme)
Anders Soerensen (EUMETSAT)
Jérôme Lafeuille (WMO Space Programme)
Outline

• Definition and historical background

• Description of the different RARS

• Expected outcome by the end of 2007
Purpose of RARS Network

• To improve availability and timeliness of time-critical polar-orbiting satellite data for the global domain in order to fulfill global and regional requirements

• To take advantage of Direct Broadcast (timeliness) without the limitations of single local acquisition area
Background

• The global RARS network is building on the EUMETSAT ATOVS Retransmission Services (EARS)
• CBS XIII, EC-57 and CGMS, requested the implementation of a global network of RARSs
• ITSC action IIFS-4 requests WMO to ‘promote the implementation of a globally coordinated system of RARS…’
• ITSC action IIFS-5 requests WMO to ‘coordinate the development of backbone reception stations and dissemination nodes, contacts and implementation standards, including quality, formats and processing software requirements…’
• 3 Global RARS workshops (2004,2005,2006) and a RARS Implementation Group being established
Definition

• **RARS: Regional ATOVS Retransmission Service**
  - An extension of the EARS concept implemented by EUMETSAT (2002)
  - To collect ATOVS and AVHRR data by direct broadcast from polar-orbiting satellites through several HRPT stations and make these data globally available in a timely manner
RARS requirements and data content

• **RARS data content:**
  – **AMSU-A**
  – **AMSU-B or MHS** for NOAA-N or MetOP  
  – **HIRS**
  – **AVHRR** on HIRS grid (20.3 km) for local cloud information

• **Global NWP requirements** for soundings call for a 30 min timeliness (breakthrough), BUFR format and consistency of data calibration.
RARS objectives

• **Timeliness**: near-global data are available within 30 minutes (instead of 2-3 hours) in NWP centers through GTS and/or Alternative Dissemination Means (ADMs)
  - potentially reduced to 10 minutes with data segmentation for some instrument data
• **Data quality and consistency**:  
  • Use of common pre-processing software (AAPP)  
  • Standardization of products formats, quality tagging and service management  
  • Data monitoring with support of EUMETSAT SAF on NWP

• **Cost effectiveness**  
  • few HRPT stations needed to ensure near-global coverage  
  • telecom costs for data concentration are decreasing  
  • GTS or ADMs allow low-cost access
Outline

• Definition and historical background

• Description of the different RARS

• Expected outcome by the end of 2007
EUMETSAT RARS (EARS)

- ATOVS retransmission from 10 HRPT stations
- Additional services:
  - Pilot AVHRR retransmission from 5 stations
    ‘1 minute’ segments disseminated within 10 min!
  - Pilot ASCAT collection from 7 stations
- Plans for IASI to be refined after Metop commissioning

3 stations ready

23/01/2007
Asia-Pacific RARS (1)

- **Coordinator:** D. Griersmith (Australia)
- RARS currently includes 10 HRPT stations from Japan, Korea, China (concentrated in Tokyo) Australia (concentrated in Melbourne)
- Tokyo and Melbourne inject ATOVS data into GTS
- Preliminary feedback of positive impact on NWP
- 5 HRPT stations to be added by December 2006
Asia-Pacific RARS (2)
South American RARS(1)

- In development and testing phase (software, communications)
- Planned to be fully operational by the end of 2007

<table>
<thead>
<tr>
<th>Processing and distribution centre</th>
<th>HRPT stations planned in 1st stage</th>
<th>Considered expansion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brazil (INPE) S. Pereira</td>
<td>Fortaleza</td>
<td>Peru</td>
</tr>
<tr>
<td></td>
<td>Natal</td>
<td>Chile (TBC)</td>
</tr>
<tr>
<td></td>
<td>Cachoeira Paulista</td>
<td>Central-America (TBD)</td>
</tr>
<tr>
<td></td>
<td>Brasilia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Manaus</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cuiaba</td>
<td></td>
</tr>
<tr>
<td>Argentina (CONAE) G. Pujol</td>
<td>Cordoba</td>
<td>Marambio (Antarctica)</td>
</tr>
</tbody>
</table>

23/01/2007
Towards global coverage

- EARS covers a large part of the Northern hemisphere
- Asia Pacific RARS is starting and South American RARS is a new priority

→ But there are still gaps over Africa and eastern Pacific …
Outline

• Definition and historical background

• Description of the different RARS

• Expected outcome by the end of 2007
Expected outcome and potential expansion

• **Short-term (end 2007)**
  - Near-global coverage
  - Improved timeliness
  - Improved data consistency
    - quality monitoring with support of SAF NWP
  - Enhanced user information through WMO RARS web site

• **Extending the RARS concept beyond ATOVS**
  - **Advanced sounders**: Similar requirement for IASI (after suitable data compression/channel selection)
  - ** Scatterometer data**: RARS can provide the wider coverage required for ASCAT data processing
  - **AVHRR imagery**: RARS can provide full resolution AVHRR data while global data from NOAA/POES only available in GAC (4 km) resolution
Acknowledgements

- **EARS**: EUMETSAT, NOAA, KSAT, DMI, HNMS, INTA, MSC/CMC, Météo-France
- **Asia-Pacific RARS**: JMA, ABoM, KMA, CMA
- **South-American RARS**: INPE/CPTEC, INMET, SMN, CONAE
Thank you …
Definitions

- **RARS: Regional ATOVS Retransmission Service**
  - An extension of the EARS concept implemented by EUMETSAT to collect ATOVS and AVHRR data by direct broadcast from polar-orbiting satellites through several HRPT stations and make these data globally available in a timely manner.

- **IGDDDS: Integrated Global Data Dissemination Service**
  - The WMO project ensuring that satellite data and products are made available worldwide in a timely and cost-efficient manner, within the WMO Information System.
RARS within IGDDS, IGDDS within the WIS

- LEO satellites: Global data (recorded/dumped)
- GEO satellites: in the region
- Polar orbiting satellites: Network of HRPT stations
- R&D satellites

DCPC: Data, metadata & user management

Central processing

Regional processing

Interoperability

GISC: (Data, metadata and user management)

Satellite products

Data exchange with other DCPCs

Routine Dissemination

ADM

Other media

Request/ reply (Internet)

Request/ reply (Internet)

National centres and other users
EARS ATOVS

Satellites: NOAA-K,-L,-M, NOAA-N,-N’ Metop

Instruments: HIRS, AMSU-A, AMSU-B, MHS

Data Rate: ~10 kb/s
EARS AVHRR

Satellites: NOAAKLM, NOAA NN’
Metop

Data Rate: 622 kb/s

NOAA-18 received by EARS

23/01/2007
EARS AVHRR Regional Pass

- Recombination of data from Maspalomas, Lannion and Svalbard
- Data disseminated via EUMETCast as 1-minute segments
- Achieved end-to-end timeliness of the segments in the order of 10 minutes
EARS ASCAT

Satellites: Metop

Data Rate: 60 kb/s
Asia-Pacific RARS (2)

<table>
<thead>
<tr>
<th>Processing or Dissemination Centre</th>
<th>HRPT stations providing ATOVS data</th>
</tr>
</thead>
<tbody>
<tr>
<td>September 2006</td>
<td>To be added December 2006</td>
</tr>
<tr>
<td>Tokyo</td>
<td>Tokyo-Kiyose Syowa (Antarctica)</td>
</tr>
<tr>
<td></td>
<td>Seoul</td>
</tr>
<tr>
<td></td>
<td>Beijing</td>
</tr>
<tr>
<td></td>
<td>Guangzhou</td>
</tr>
<tr>
<td></td>
<td>Urumiji</td>
</tr>
<tr>
<td>Melbourne</td>
<td>Melbourne (x 2)</td>
</tr>
<tr>
<td></td>
<td>Darwin</td>
</tr>
<tr>
<td></td>
<td>Perth</td>
</tr>
<tr>
<td></td>
<td>Singapore</td>
</tr>
<tr>
<td></td>
<td>Vladivostok</td>
</tr>
<tr>
<td></td>
<td>Honolulu</td>
</tr>
<tr>
<td></td>
<td>New Zealand</td>
</tr>
<tr>
<td></td>
<td>Hong Kong</td>
</tr>
</tbody>
</table>

23/01/2007
Next Steps

- CGMS 34, 2-7 November, Shanghai
- CBS, 9-16 November, Seoul
- 4th RARS-IGDDS Implementation workshop in June 2007 (location TBD)