Contributions of DBNet South America-Argentina Component for NWP community

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Abstract

DBNet is a network of Direct Readout stations sharing their data in near real time following a set of procedures and best practices to ensure interoperability, global availability and timeliness of DBNet products. The key requirements are the use of current AAPP, the delivery of L1c in BUFR, sending over the GTS (and possibly other means) within 30 minutes and identifiers are the Bulletin headings and WMO filename convention.

Córdoba Ground Station is operated by Argentina Space Agency (CONAE) and since May 2008 has become operational, as main node for DBNet South America-Argentina Component, processing and distributing ATOVS data and hyperspectral sounders: NOAA/ATOVS, METOP-B/ATOVS, METOP/IASI S-NPP/CrIS and S-NPP/ATMS.

Marambio station (Antarctica) and Santiago station (Chile) as part of that component, contribute with ATOVS data too. Isla de Pascua station (Easter Island) located in the Southwest Pacific, is operational since August 2015 through agreement between CLS-Argos and Chile, having the ability to extract the ATOVS data, but not the delivery of these, due to restrictions on communication link with the continent.

Direct Readout stations performance, as well as schemes of processing and dissemination of ATOVS data and hyperspectral sounder products for NWP community, are shown in the presentation.

CONCEPT :

- Numerical Weather Prediction (NWP) requires timely access to polar orbiting sounder data.
- Using the Direct Readout Data stream ensures timely data access. However, a single Direct Readout Station can only acquire polar-orbiting satellite data within a radius of ca. 2500 km, which is not sufficient for regional and global NWP uses.
- In gathering data received from a number of individual Direct Readout Stations implemented throughout the world, the acquisition area is virtually extended to quasi global coverage.
- In optimizing data concentration and processing from these individual stations, data can be available within 30 minutes from adquisition.
- Data are shared over the Global Telecommunications System of WMO (GTS) and other means, in standard BUFR format, for global access.
- Common processing standard : data are processed to Level 1C using APP.
- Global DBNet data monitoring helps ensuring data consistency and quality.

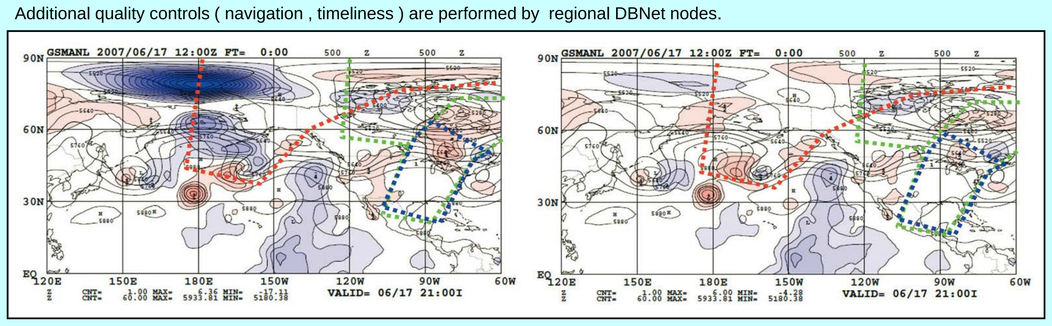
RARS System Concept (Sources : EUMETSAT , J. Lafeuille)

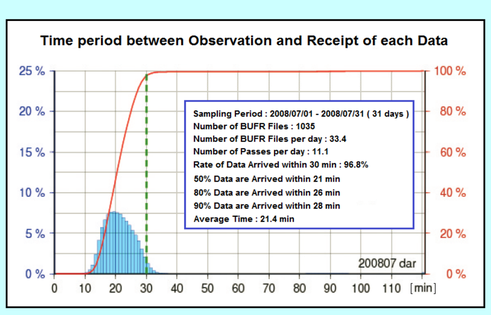
RARS BENEFITS (Data quality / Timeliness Monitoring)

The EUMETSAT Satellite Applications Facility on Numerical Weather Prediction (NWP-SAF) hosted by the UK Met Office performs routine DBNet data monitoring. Data collected by the DBNet are compared with equivalent data extracted from the global data set processed by NOAA. Consistency of these different data sets is vital to enable the DBNet data to be used alongside global data (i.e. NWP applications).

Timely availability of satellite sounding data through the DBNet project enables using this data in Numerical Weather Prediction models with short cut-off time for regional or short-range global weather forecast.

Additional quality controls (navigation , timeliness) are performed by regional DBNet nodes.





The diagrams above illustrate the quality of operational analysis in the Japanese NWP system, without (left / left) or with (left / right) the use of EARS data.

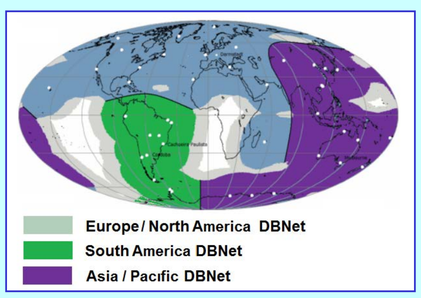
The 500hPa geopotential field resulting from the operational analysis with 2h20 cut-off time is compared with a reference cycle analyzed fields.

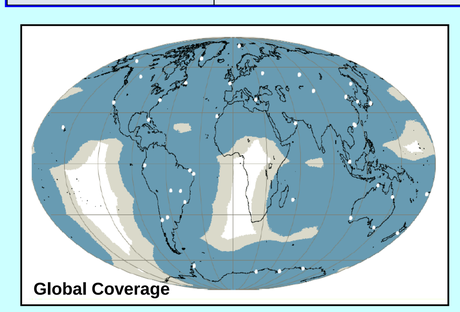
On the left / left diagram, without using EARS data, the difference reaches 17m over North Pacific (dark blue area). On the left / right diagram, when EARS data are used, the difference do not exceed 2m on that region. EARS significantly improves the operational analysis since it provides important sounding information by the cut-off time.

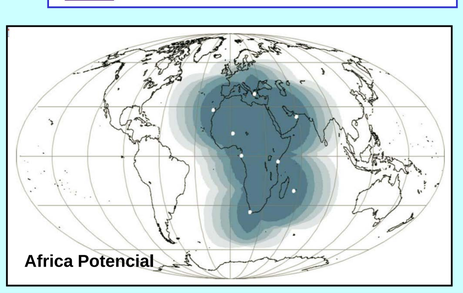
The right diagram, shows the timeliness between the Local Processing and Distribution Data Processing Center. For this node, the average timeliness is 21 minutes and the maximum is 30 minutes.

(Sources : JMA, J. Lafeuille)

Regional Network	Regional o Sub- regional Node
DBNet - EUMETSAT	EUMETSAT
DBNet - Asia / Pacific	JMA
	BoM
DBNet - Sud America	INPE
	SMN Argentina / CONAE
DBNet - NOAA	NOAA







Service	Applications	Products	Data Latency goal / thresh.	Availability	Coverage
IR/MW Sounding	Global and High Resolution NWP	Level 1 Brightness Temperature	20/30 Min.	95%	90%
IR / VIS Imaging	Nowcasting	Level 1 Radiance & Reflectivity	10/20 Min.	95%	30%
HiRes IR Sounding	Global and High Resolution NWP	Level 1 Radiances & PC Scores	20/30 Min.	95%	90%
Scatterometry	NWP, Nowcasting and Ocean Applications	backscatter cross-sections	20/30 Min.	95%	50% (oceanic areas)
MW Imagery	NWP, Nowcasting	Level 1 Brightness Temperature	20/30 Min.	95%	30%

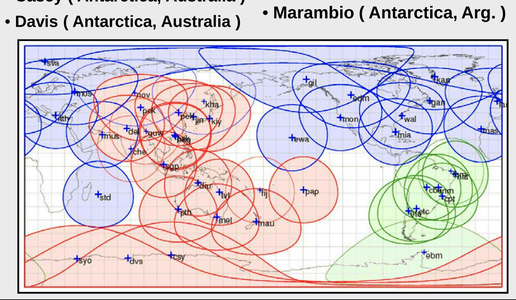
Categories	Services / Instruments
IR/MW Sounding	DBNet (AMSU-A, MHS, HIRS) ATMAS, VASS (MWTS, MWHS, IRAS)
Hyperespectral IR Sounding	CrIS, IASI, HIRAS
IR / VIS Imaging	VIIRS, AVHRR, MERSI
Scatterometry	ASCAT
MW Imagery	MWRI

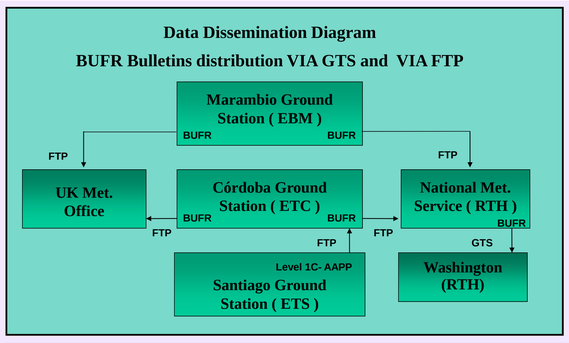
RARS STATIONS

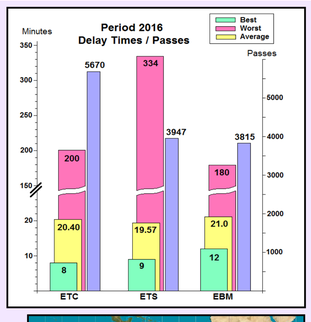
EARS
- Svalbard (Norway)
- Kangelussuaq (Denmark)
- Gilmore Creek, Alaska (USA)
- Moscow (Russian Federation)
- Novosibirsk (Russian Federation)
- Edmonton (Canada)
- Lannion (France)
- Khabarovsk (Russian Federation)
- Athens (Greece)
- Wallops Island (USA)
- Monterrey (USA)
- Maspalomas, Canary Is. (Spain)
- Miami (USA)
- Miscat (Oman)
- Ewa Beach, Hawai (USA)
- St. Denis, Reunion Is. (France)

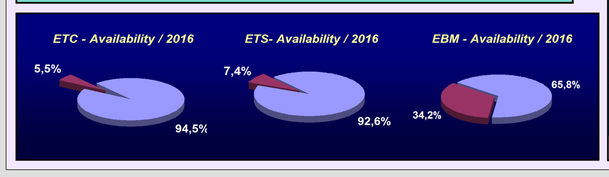
ASIA – PACIFIC
- Urumqi (China)
- Jincheon (Rep. Korea)
- Guangzhou (China)
- Hong Kong (China)
- Singapore (Singapore)
- Darwin (Australia)
- Fiji (Fiji)
- Townsville (Australia)
- Perth (Australia)
- Melbourne (Australia)
- Maupuia (New Zeland)
- Casey (Antarctica, Australia)
- Davis (Antarctica, Australia)
- Syowa (Antarctica, Japan)

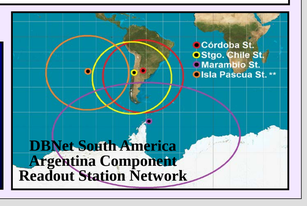
SOUTH AMERICA
- Fortaleza (Brazil)
- Natal (Brasil)
- Cuiaba (Brazil)
- Brasilia (Brazil)
- Cachoeira Paulista (Brazil)
- Cordoba (Argentina)
- Santiago (Chile)
- Marambio (Antarctica, Arg.)





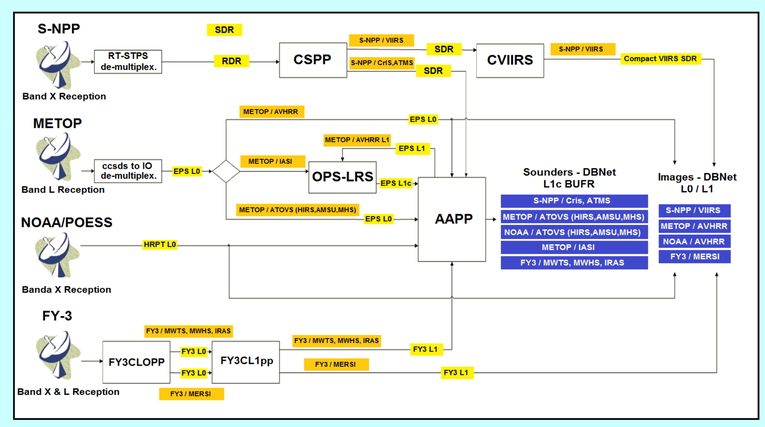






Córdoba Ground Station (ETC)

- Córdoba Ground Station is operated by Argentina Space Agency (CONAE), started in September 1996.
- May 2008 became operational, as main node for DBNet South America-Argentina Component.
- Reception capability in L & X Bands.
- Geographical location : Lat. : - 31° 31' Lon. : - 64° 27' Altitude: 730 m ASL.
- Processed Satellites : NOAA18, NOAA19, METOP-B, S-NPP.
- Software Running : AAPP V 7.15 Metopizer 3.50 (METOP) IPOPP 2.5 (S-NPP)
  RT-stps 5.6 (METOP-B and S-NPP) OPS-LRS_v7u2 (METOP-B IASI)
- Processed Satellite Sounders :
  NOAA/ATOVS METOP-B/ATOVS METOP/IASI
  S-NPP/CrIS S-NPP/ATMS
- Bufr Encoder : Bufrdc_000409
- Córdoba and Santiago L1C files



Santiago Ground Station (ETS)

- Operated by the Chile Meteorological Direction.
- January 2010 became operational for DBNet South America /Argentina Component
- Currently, the Station acquires data from GOES, NOAA-18, NOAA-19 TERRA / AQUA satellites
- Geographical location : Lat. : - 33° 15' Lon. : - 71° 24' Altitude: 520 m ASL.
- Processed Satellites : NOAA18 & NOAA19
- Software Running : AAPP V 7.13
- Processed Satellite Sounders : NOAA18 and 19 /ATOVS L1C
- Bufr Encoder : Bufrdc_000405, but it does not run properly, so NOAA/ATOVS L1C encoder runs in ETC.

Base Marambio Station (EBM)

- Marambio Base Station is located on the Seymour island (Marambio), operated by CONAE remotely.
- In June 2008 started operational for DBNet South America Argentina Component.
- Geographical location : Lat.: - 64° 14' Lon.: - 58° 38' Altitude: 200 m ASL
- Since June 2010 until May 2015 was out of order, at present it is fully operational.
- Processed Satellites : NOAA18 & NOAA19
- Software Running : AAPP V 7.13
- Processed Satellite Sounders : NOAA-18 and NOAA-19 /ATOVS L1C
- Bufr Encoder : Bufrdc_000405 . Bufr files are sent directly to UK Met Office and Argentina Met Service, the link used is via satellite (ARSAT-2)

Next Plans

ETC : AAPP update V8.1 (Dec. 2017)

EBM : Hard & Software update (Dec. 2017)

ETS : Update Hard & Software for NOAA, NPP, Metop-B , Aqua and Terra reception (Feb. 2018).

** IS. de Pascua (Eastern Island) : The station is operative for reception. During 2018 the link with the continent will be solved (bandwidth constraint) .

Is. Pascua Station – Eastern Island (Chile)

- A readout station was implemented by CLS-ARGOS in late August 2015 at Mataveri international airport on Isla de Pascua, located in the Southwest Pacific.
- Capability to receive:
  L- Band : NOAA, Metop X- Band : SNPP and FY-3
- Geographical location:
  Lat. : - 27° 9′ Lon. : - 109° 25′
- The global DBNet coverage has a gap on the Southwest Pacific, so Isla de Pascua is perfectly located to fill it.