CLS

COLLECTE LOCALISATION SATELLITES

Argos Operations

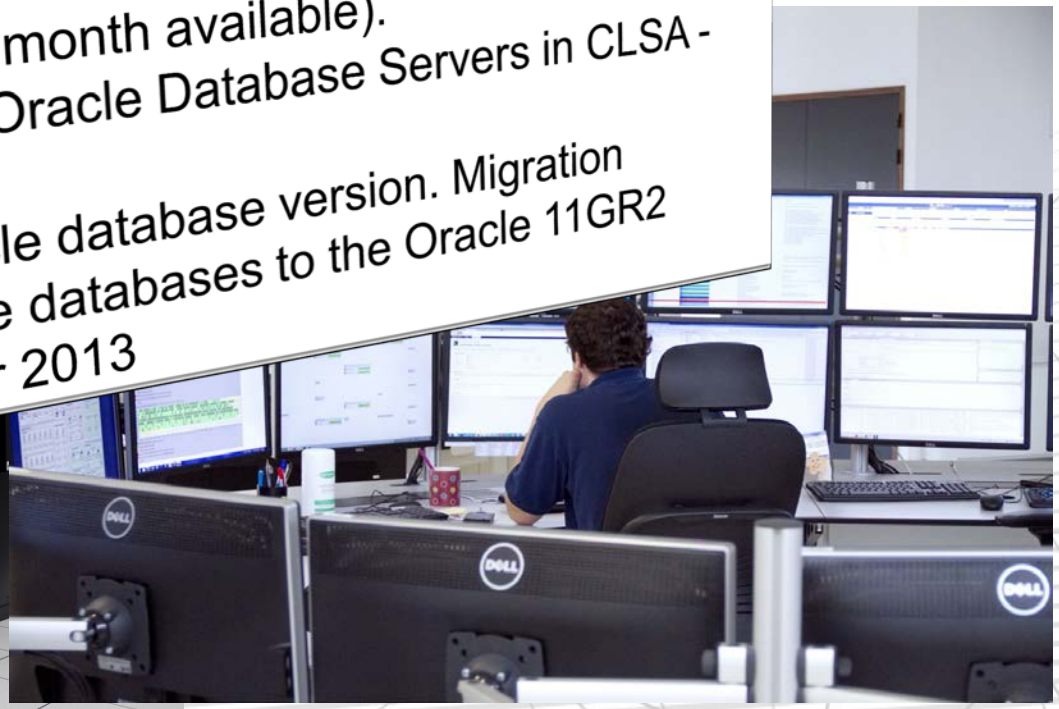
Agenda Item 10.3

DBCP-30,

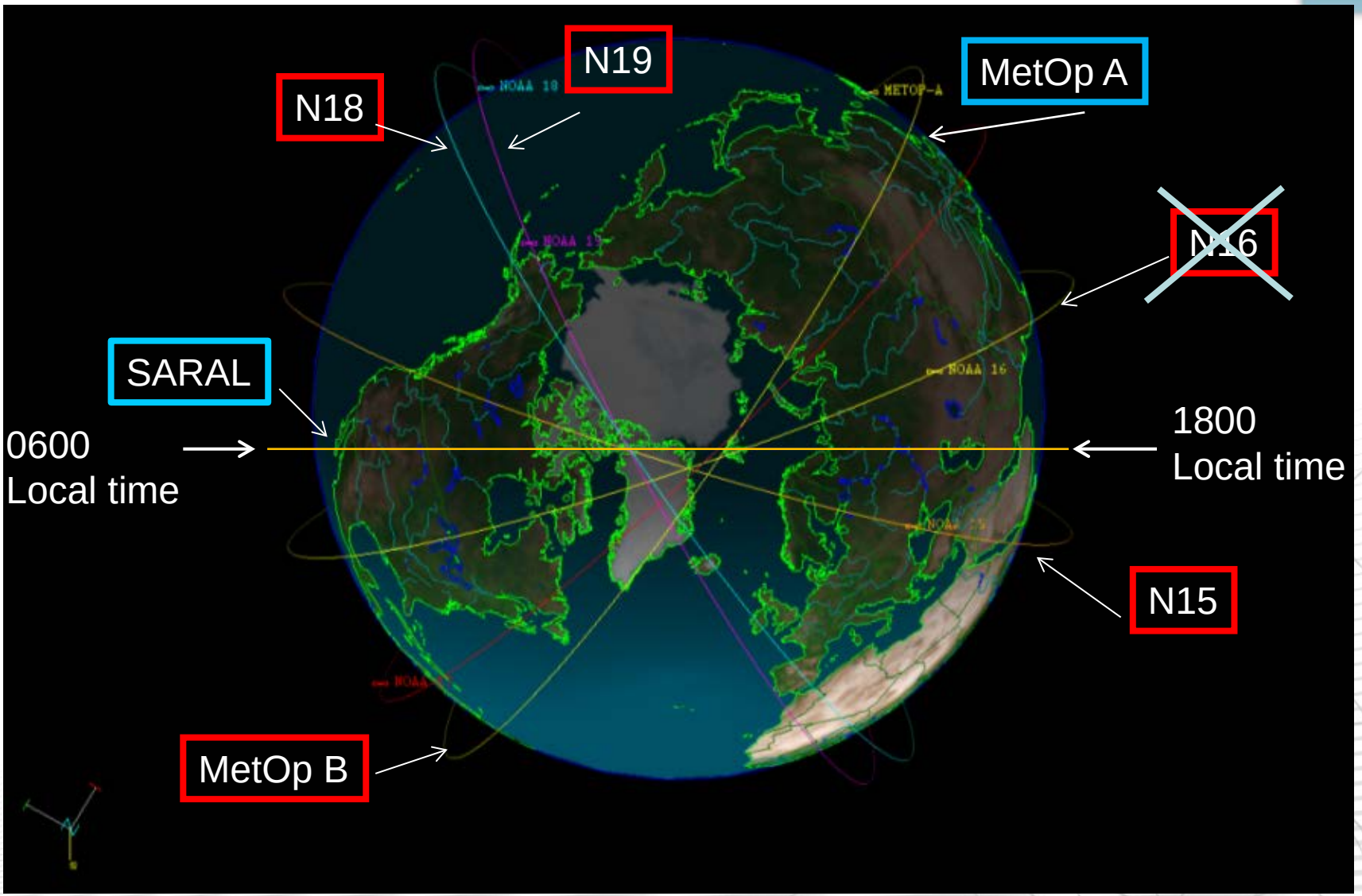
27-31 October 2014 Weihai, China

Highlights

- NOAA-17 Decommissioned April 10th 2013
- SARAL launched February 25th 2013 and Argos-3 Services opened May 1st 2013
- NOAA-16 Decommissioned June 10, 2014
- Online Archive data downloading feature through ArgosWeb (last 12 month available).
- Replacement of Oracle Database Servers in CLSA - May 25th 2013
- Upgrade of Oracle database version. Migration CLS/CLSA Archive databases to the Oracle 11GR2 version December 2013



ARGOS SPACE SEGMENT



Future Argos DCS Space Segment

Orbit	Mission/ Spacecraft	Instrument	Comments
Early Morning	SARAL	Argos-3	Launched in 2013
Early Morning	Post-SARAL	Argos-4	Expected Launch in ~2019
Mid-Morning	Metop-B Metop-C	Argos-3	Metop-B: Launched in 2012 Metop-C: Expected Launch in 2018
Mid-Morning	Metop-SG-B1 Metop-SG-B2	Argos-4	Expected Launch in ~2022 Expected Launch in ~2029
Afternoon	NOAA-19	Argos-3	Launched in 2009
Afternoon	Future Missions (2)	Argos-4	First Mission: Expected Launch in ~2019 Second Mission: Expected Launch in ~2025

Blue=NOAA; Green=EUMETSAT; Orange=ISRO

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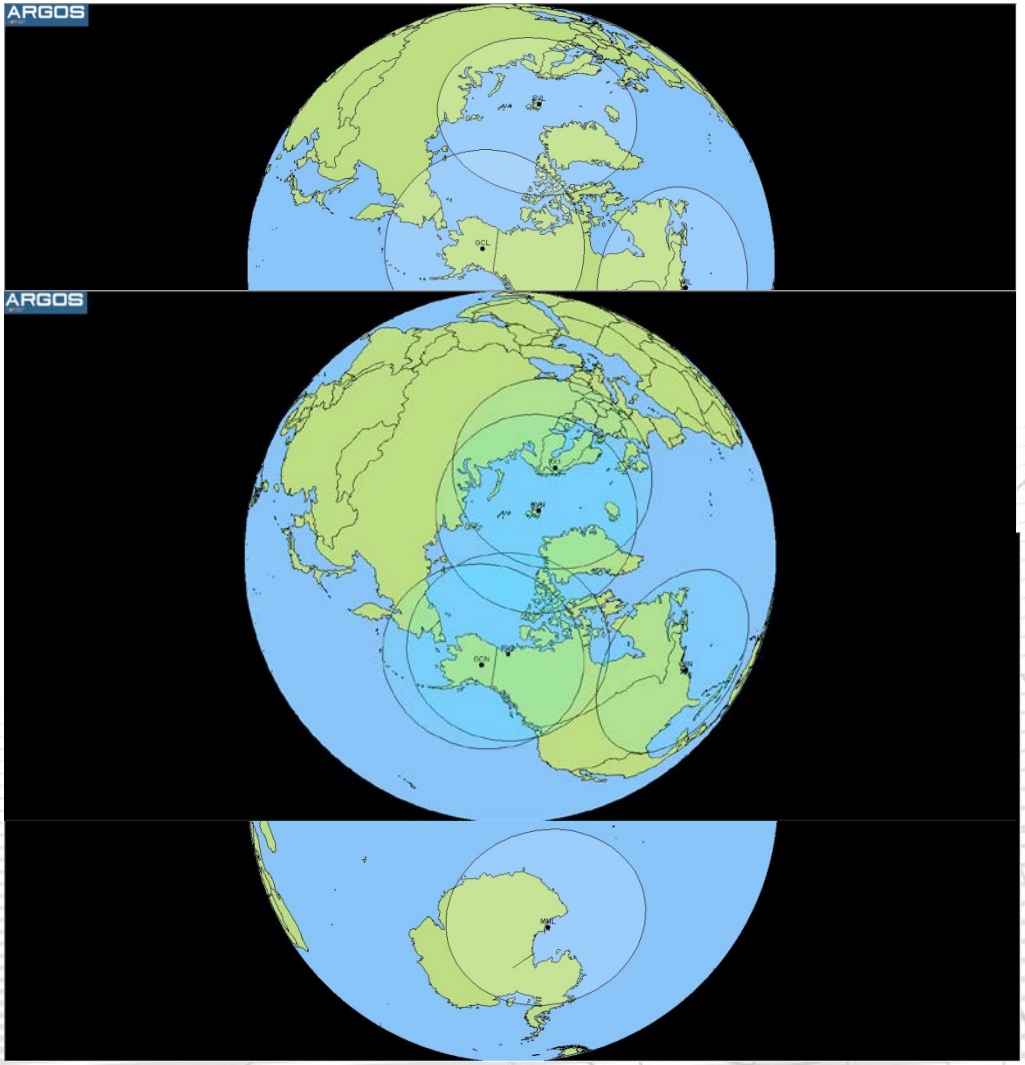
Argos DCS Program Manager
NOAA Satellite Operations Facility
Fall 2014

Ground Segment (GGS)

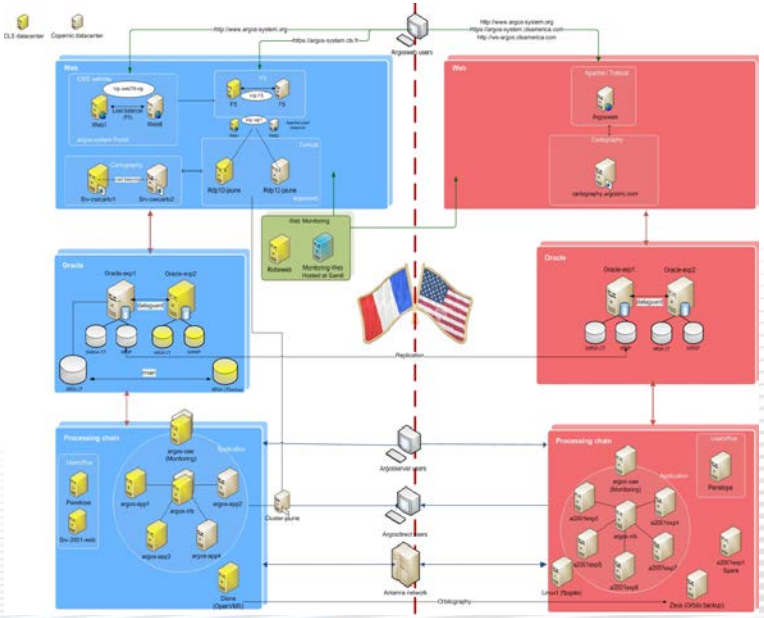
- Global Ground Stations (6)

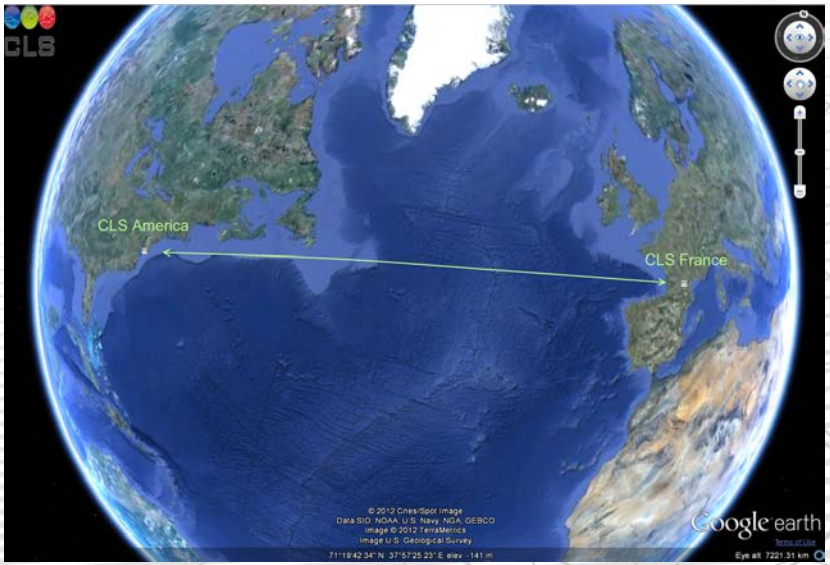
  - **Fairbanks & Wallops**
    - N15 to N19
  - ~~**Svalbard (NOAA antenna)**~~
    - ~~**N15 to N18 blind orbits**~~
  - **Svalbard (Eumetsat antenna)**
    - METOP-A & B
    - N19 blind Orbits (received through NOAA link)
  - **McMurdo:**
    - METOP-A until April 2013
    - METOP-B since April 2013
  - **Inuvik & Kiruna**
    - SARAL



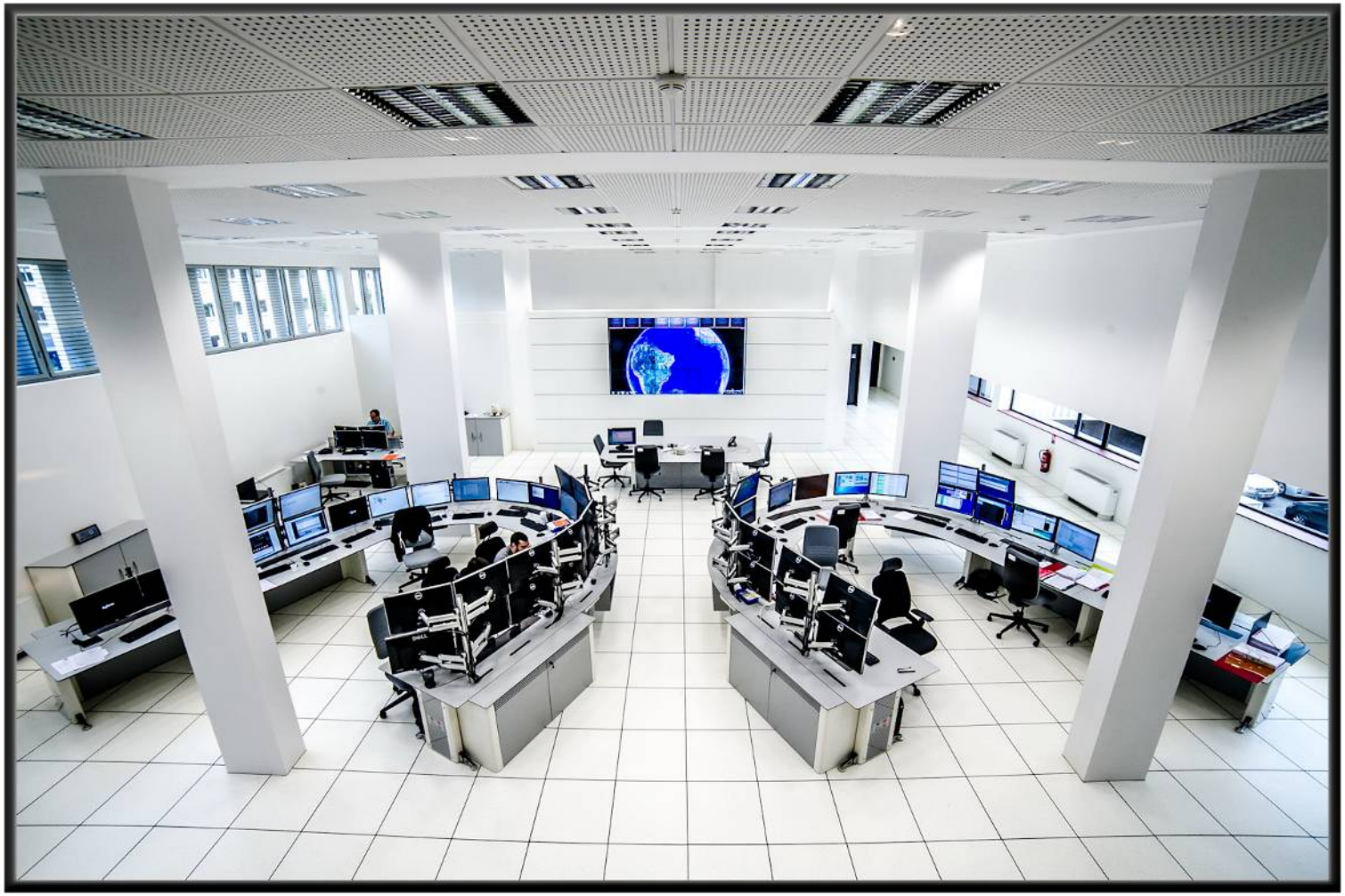
Ground Segments (GPC)

- 2 Global Processing Centers
  - Fully Redundant
  - 24/7 Staff
  - All Argos Computing Infrastructure has been Upgraded; New Oracle DB Servers; New Virtualized Application Servers; New Storage Arrays

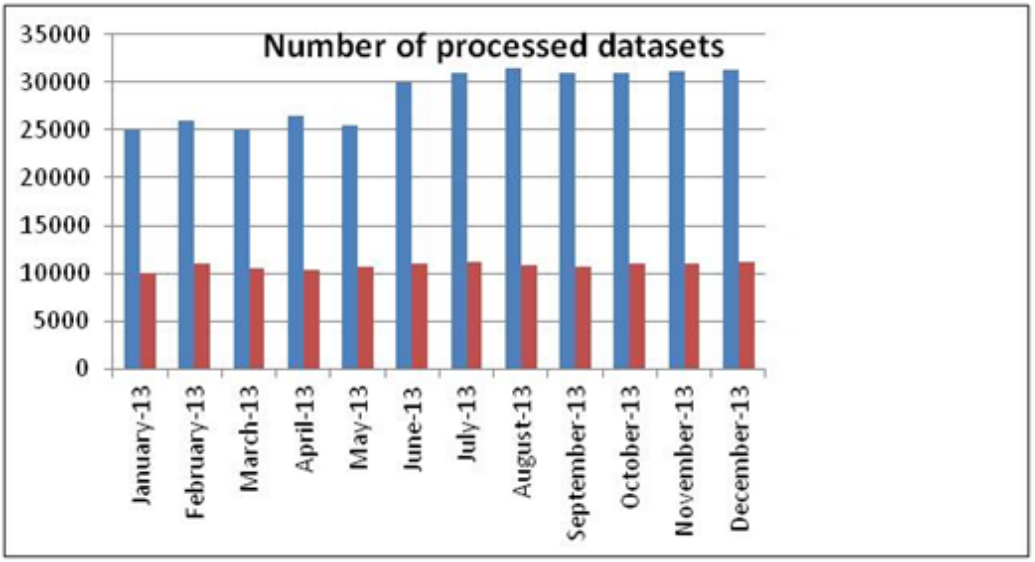




Argos Control Room



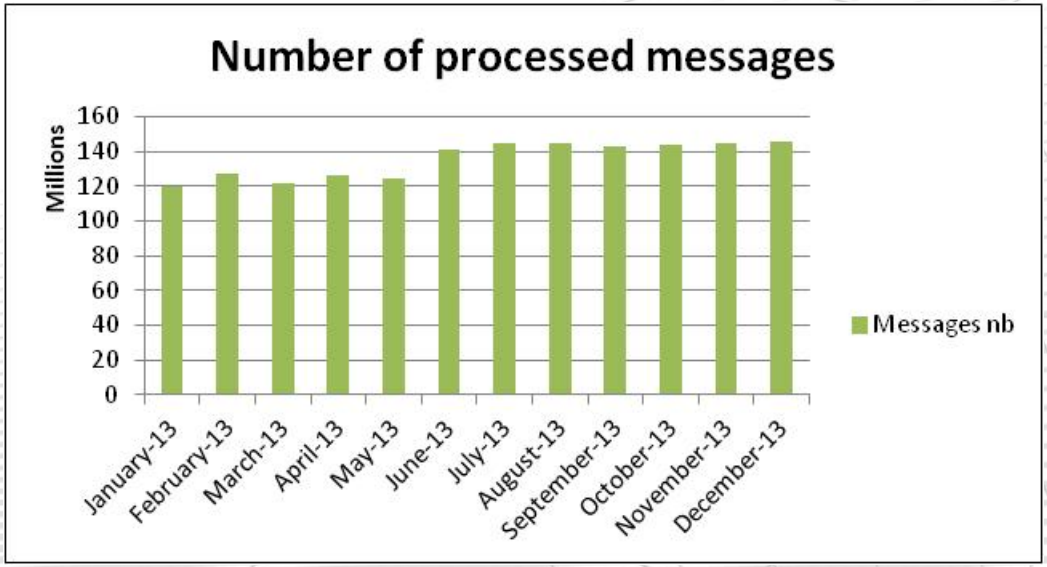
Operations Statistics



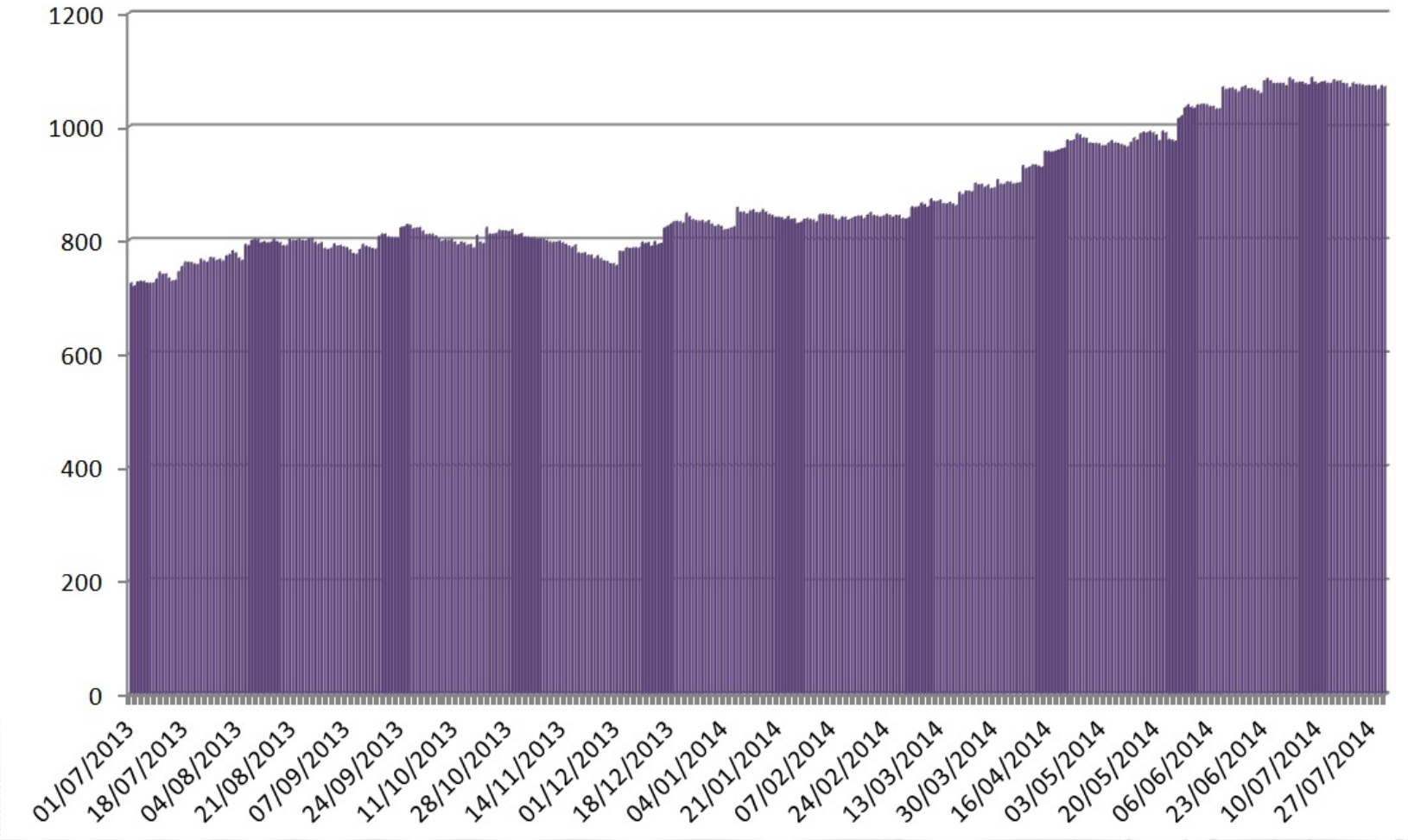
Per day	2007	2008	2009	2010	2011	2012	2013
Messages received	1 957 500	1 969 658	2 273 233	2 871 885	2 904 476	2 790 580	3 060 434
Distinct Messages received	972 000	1 164 717	1 272 459	1 470 953	1 451 938	1 443 247	1 513 630
Argos Locations	66 750	66 176	77 837	94 151	92 168	93 343	94 626
GPS Locations	163 150	187 829	185 496	205 259	212 587	224 857	243 366

~ 1 300 datasets per day

~ 4 600 000 messages per day

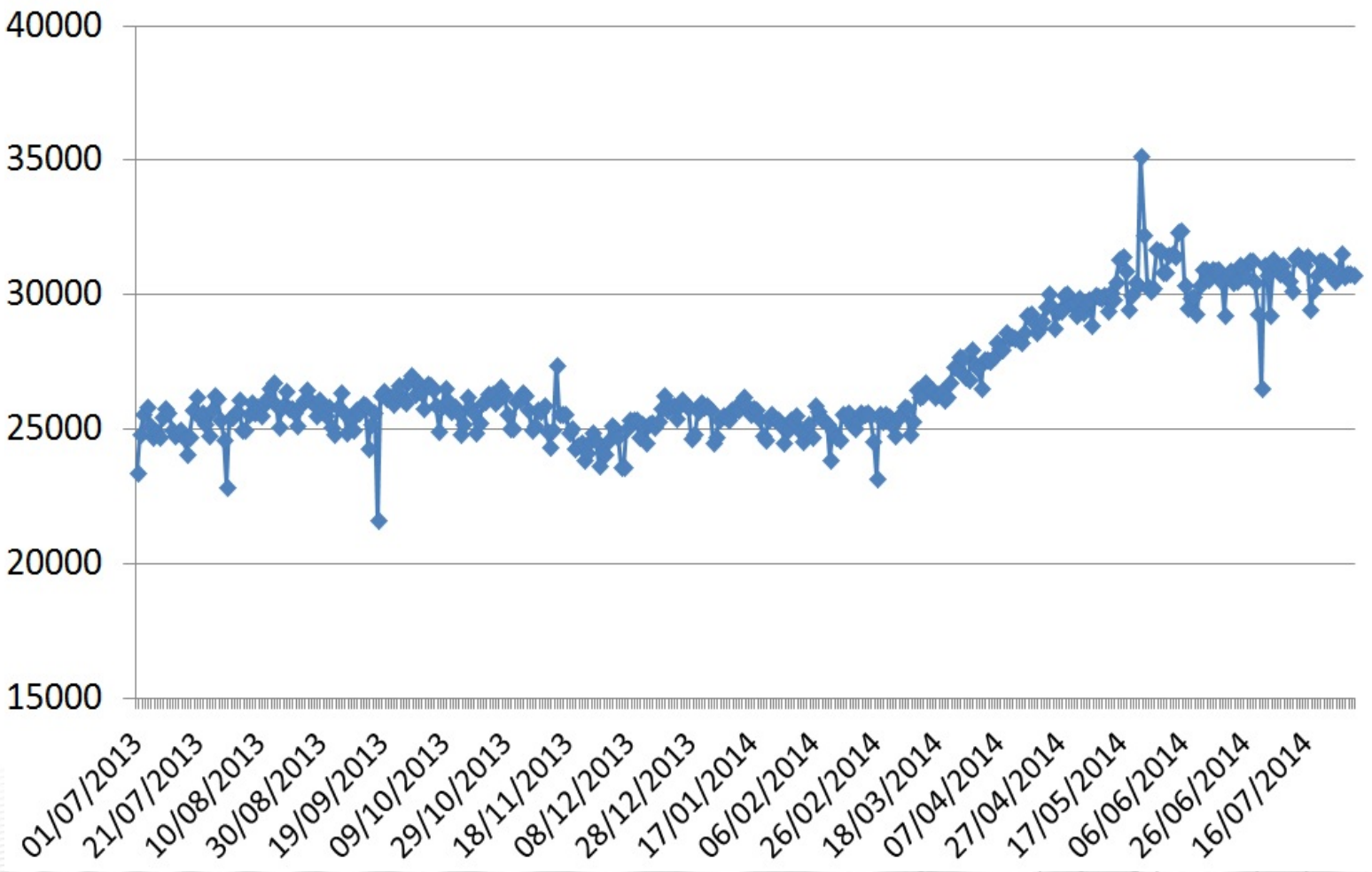


Number of drifters GTS processed per day

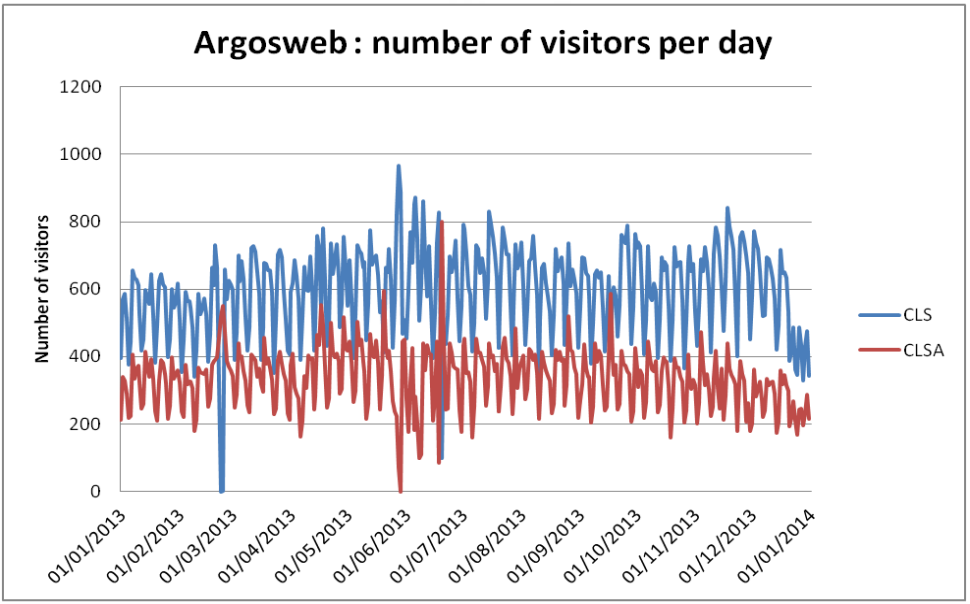


CLS
COLLECTE LOCALISATION SATELLITES

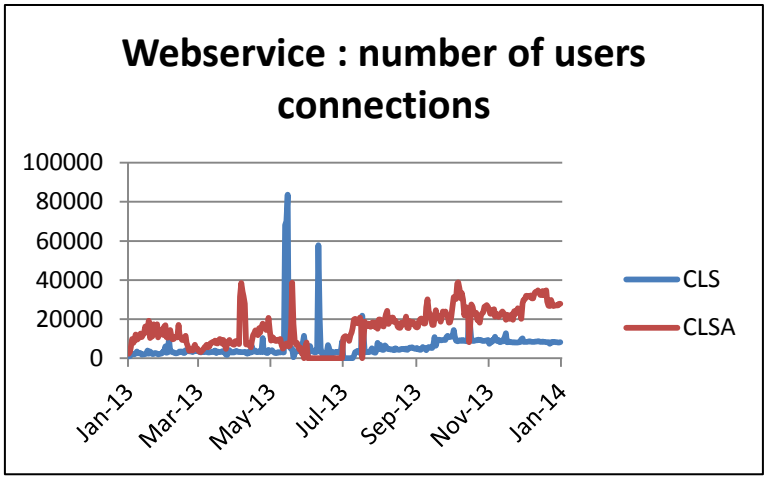
Number of BUFR bulletins sent on GTS per day



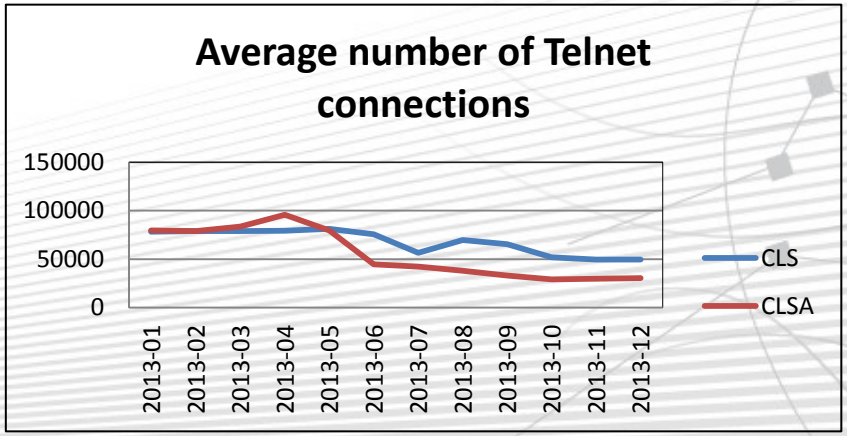
Operations Statistics



800 visitors per month at CLS France and 400 at CLS America



10 000 connections at CLS FRA
30 000 at CLS America



Telnet connections are decreasing in favor of Webservices usage

ARGOS
SYSTEM IMPROVEMENTS

Agenda Item 10.3

DBCP-30,

27-31 October 2014 Weihai, China

Ground segment

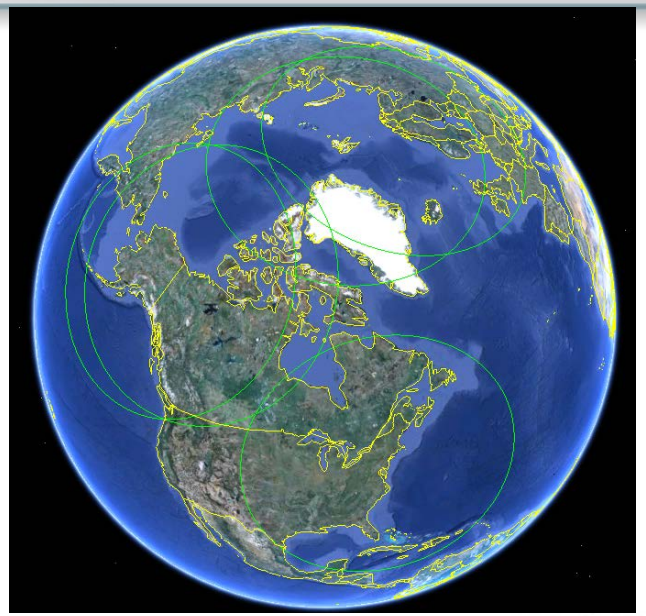
Global & Regional receiving stations network

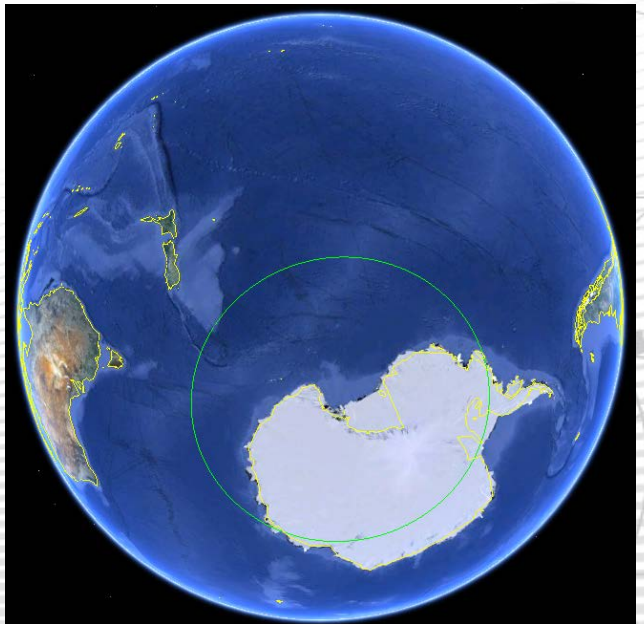
Global & Regional processing centres

Argos application software

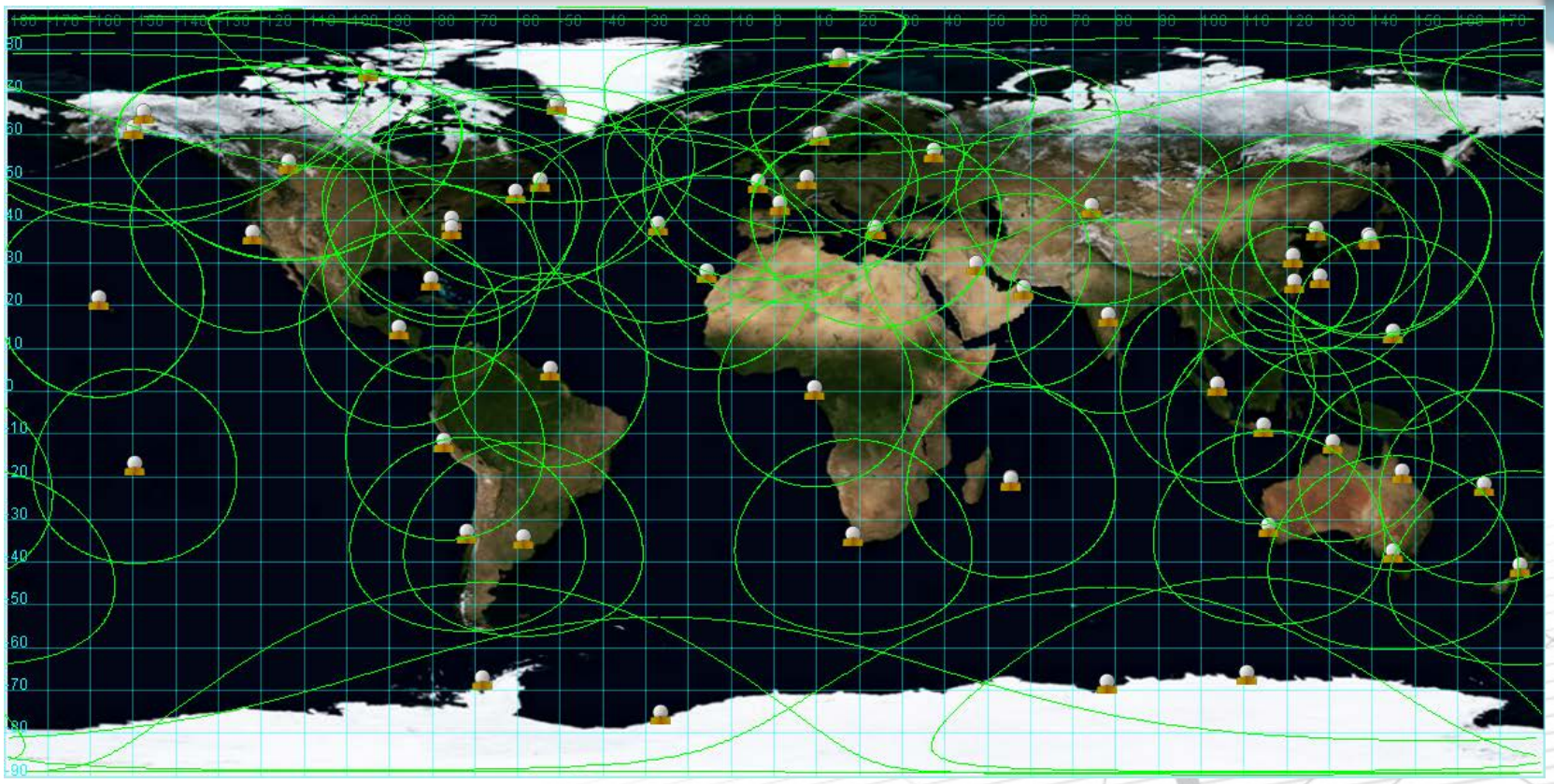
Global Receiving Stations

- Global Ground Stations (6)
  - **Fairbanks & Wallops**
    - N15, ~~N16~~, N18, N19
    - METOP-A & B backup
  - **Svalbard (Eumetsat antenna)**
    - METOP-A & B
    - N19 blind orbits
  - **Svalbard (NOAA antenna)**
    - NOAA-15, 16, 18 blind orbits (until end of November 2013)
  - **McMurdo:**
    - METOP-B
  - **Inuvik & Kiruna**
    - SARAL





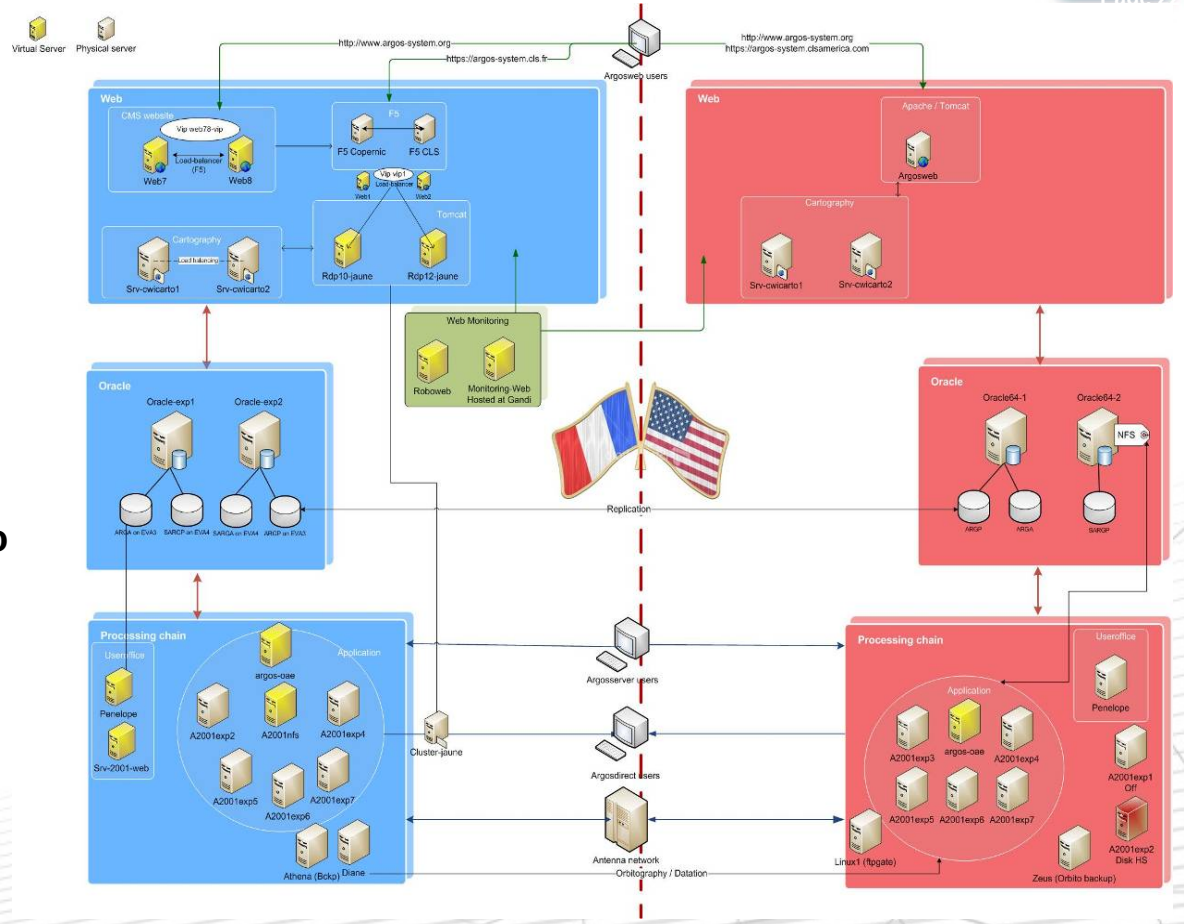
Realtime Receiving Stations



- 66 real-time ground stations
- In 2013, 2 new antennas (Bali, Tahiti)
- 22 out of 66 are receiving METOP-A and B
- 9 out of 66 are receiving Saral

Global Processing Centers

- **IT architecture still the same (mutual redundancy)**
- **No major modifications of the IT infrastructure**
- **More powerful Oracle database servers**
- **Servers Virtualization**
- **Spliting of the Argos database into two distinct database :**
  - **short term database which contains data < 18 months**
  - **a long term database for data beyond 18 months.**



Argos application software

2013

- **Integration of a new BUFR Template for drifting/moored buoys**
- **On-line data extraction from archive database (12 months)**
- **Opening of 20 days on-line R/T database data extraction**
- **Android Application : CLS view and Thorium App**
- **Migration Oracle 11G**
- **Migration of Argos operating system (CentOS)**

Future Software Developments

2014/2015

- New Argos Orbitography
- New earth elevation model
- Improvement of web services for Argos-3
- BCH message decoding
- New databank formats

System performances

Mean data disposal time

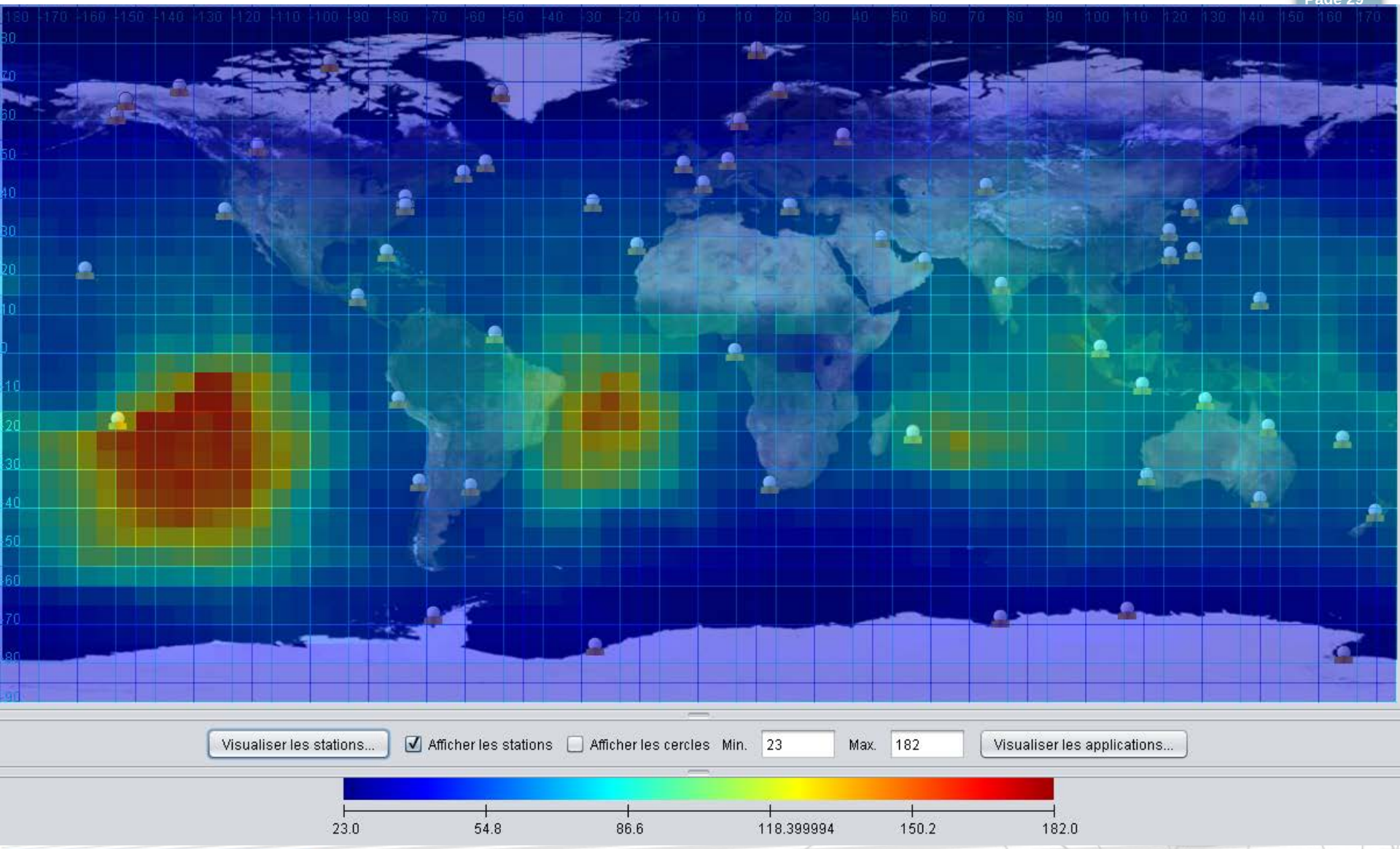
Minimal received power

System occupancy

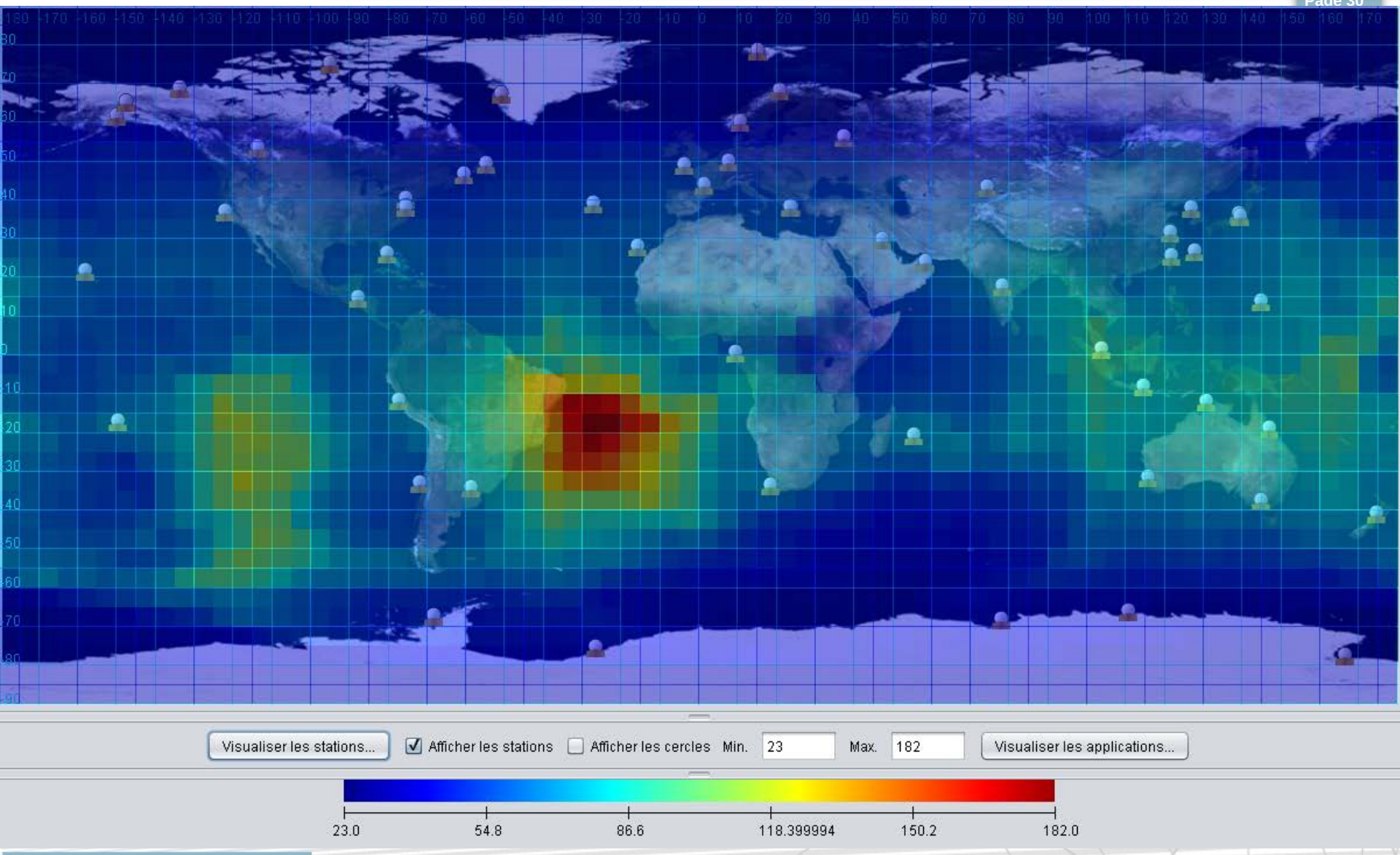
Network: 19 upgraded stations

Already upgraded To be upgraded Waiting for authorization

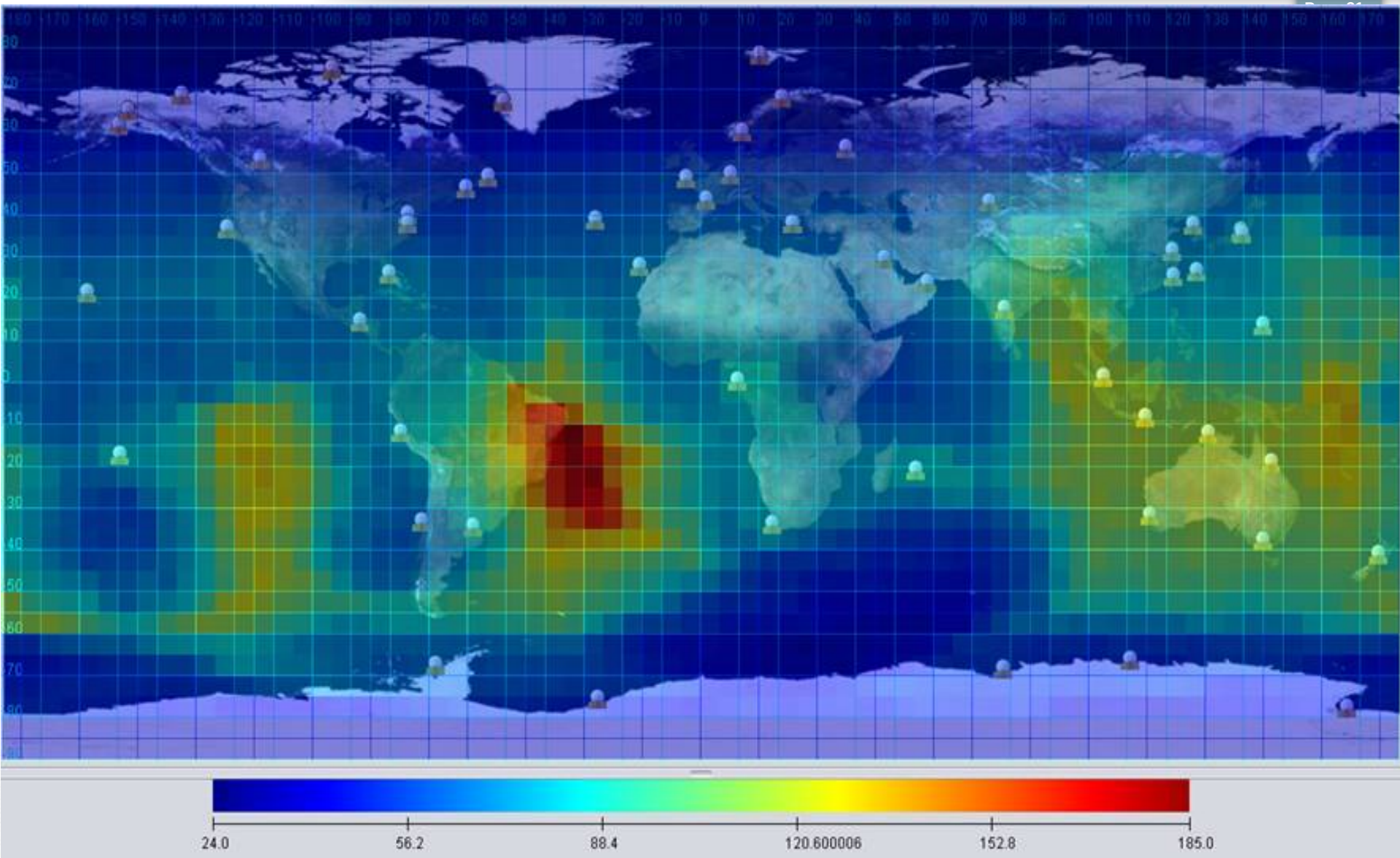
Disposal Time (May 2013)



Disposal Time (May 2014)



Disposal Time (July 2014)



Upgrade status

- **UPGRADE OF 3 CLS STATIONS:**

LIMA, HATOYAMA, LANNION, TOULOUSE	Completed

- **UPGRADE OF 8 NON-CLS EXISTING STATIONS:**

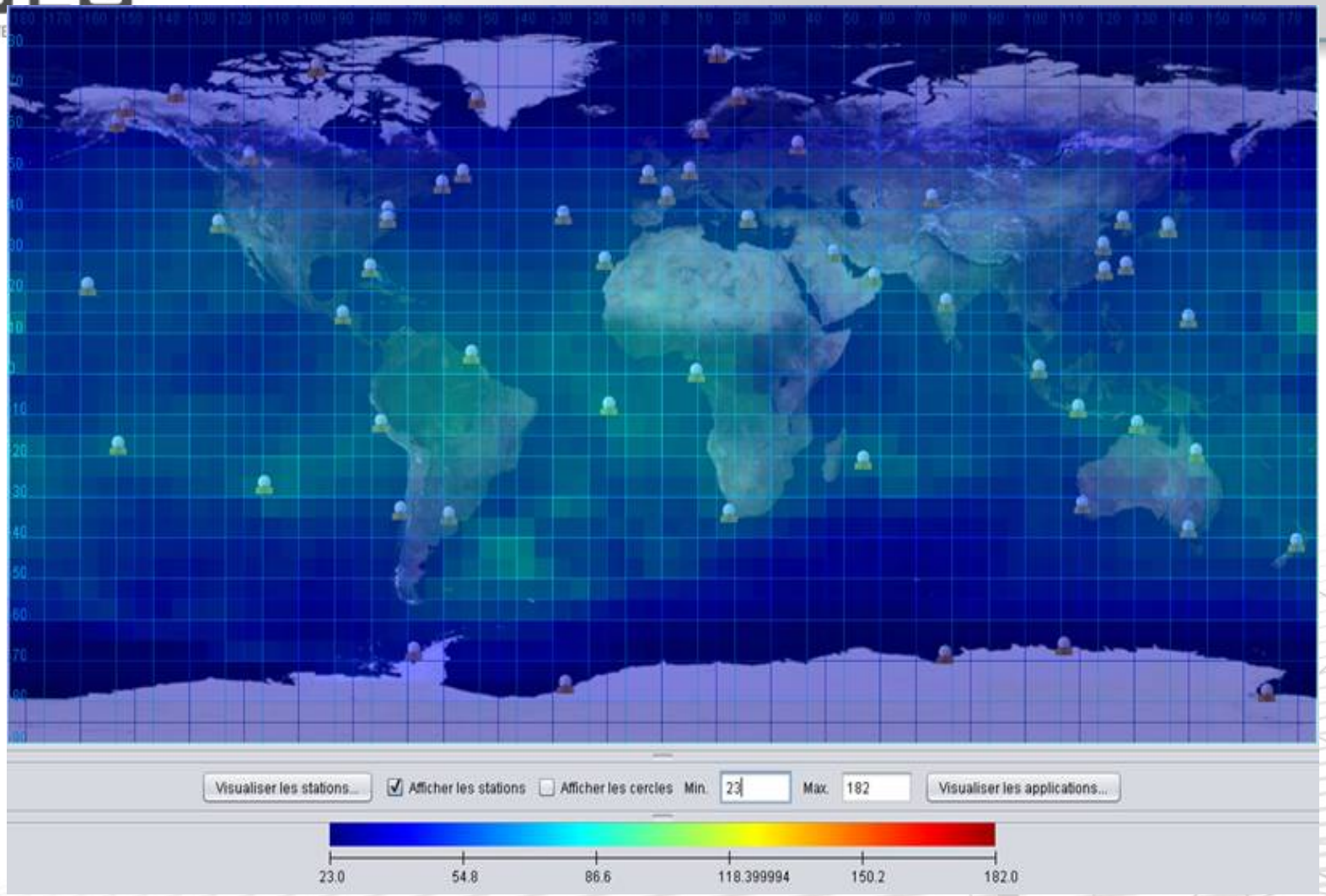
REUNION, MIAMI, BALI, PAPEETE	Completed
OMAN	Operational
MONTEREY, ATHENS, MAS MALOMAS	Waiting for authorization

- **PROCURE AND INSTALL 5 NEW STATIONS:**

CAPETOWN	Completed
LIBREVILLE	Completed
ASCENSION ISLAND, EASTER ISLAND, FRENCH GUYANA	Dec 2014 – June 2015

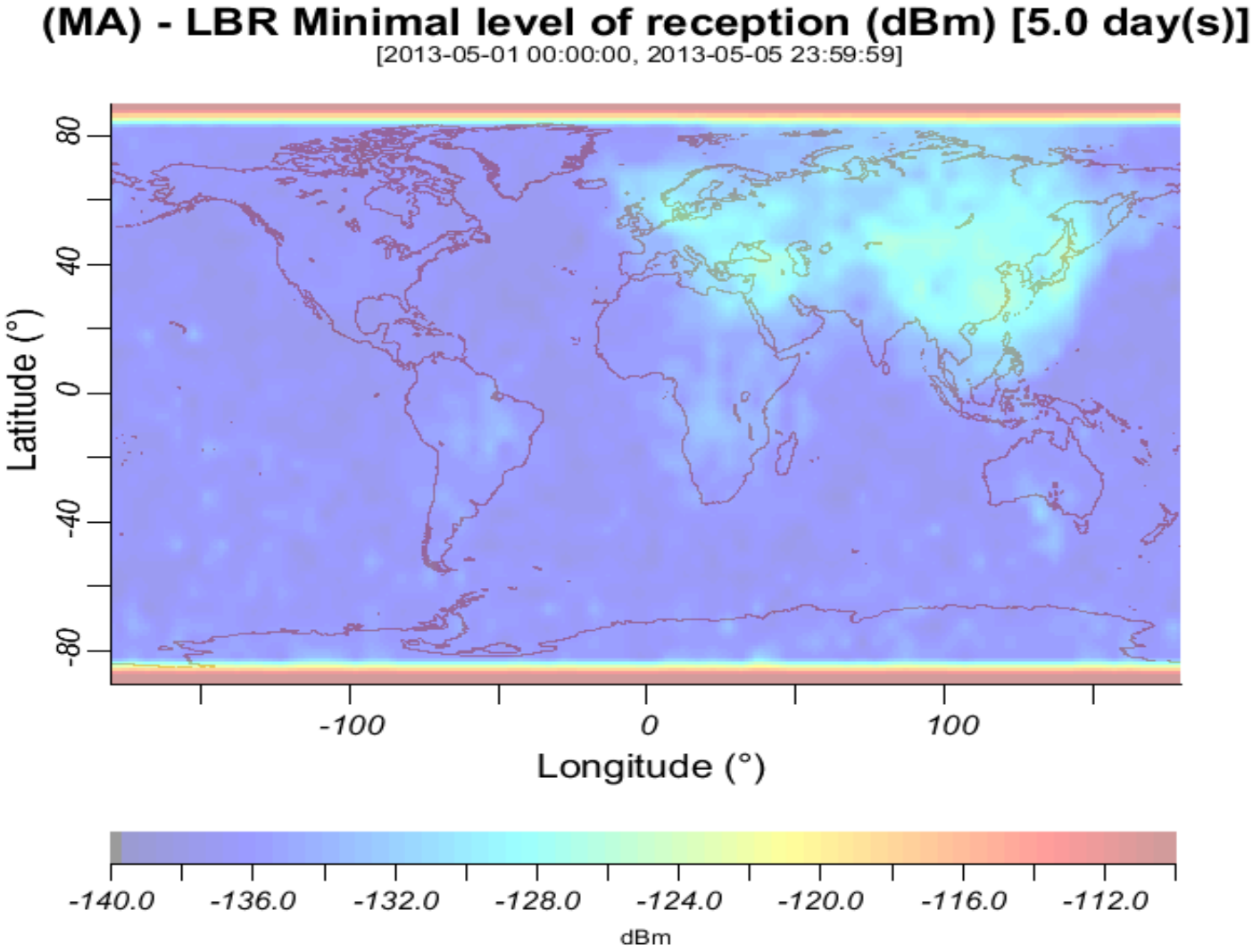
- **UPGRADE 3 EXISTING AUS/NZ STATIONS:**

CAPE FERGUSON,	Waiting for ESS Upgrade
CASEY, WELLINGTON	Waiting for authorization

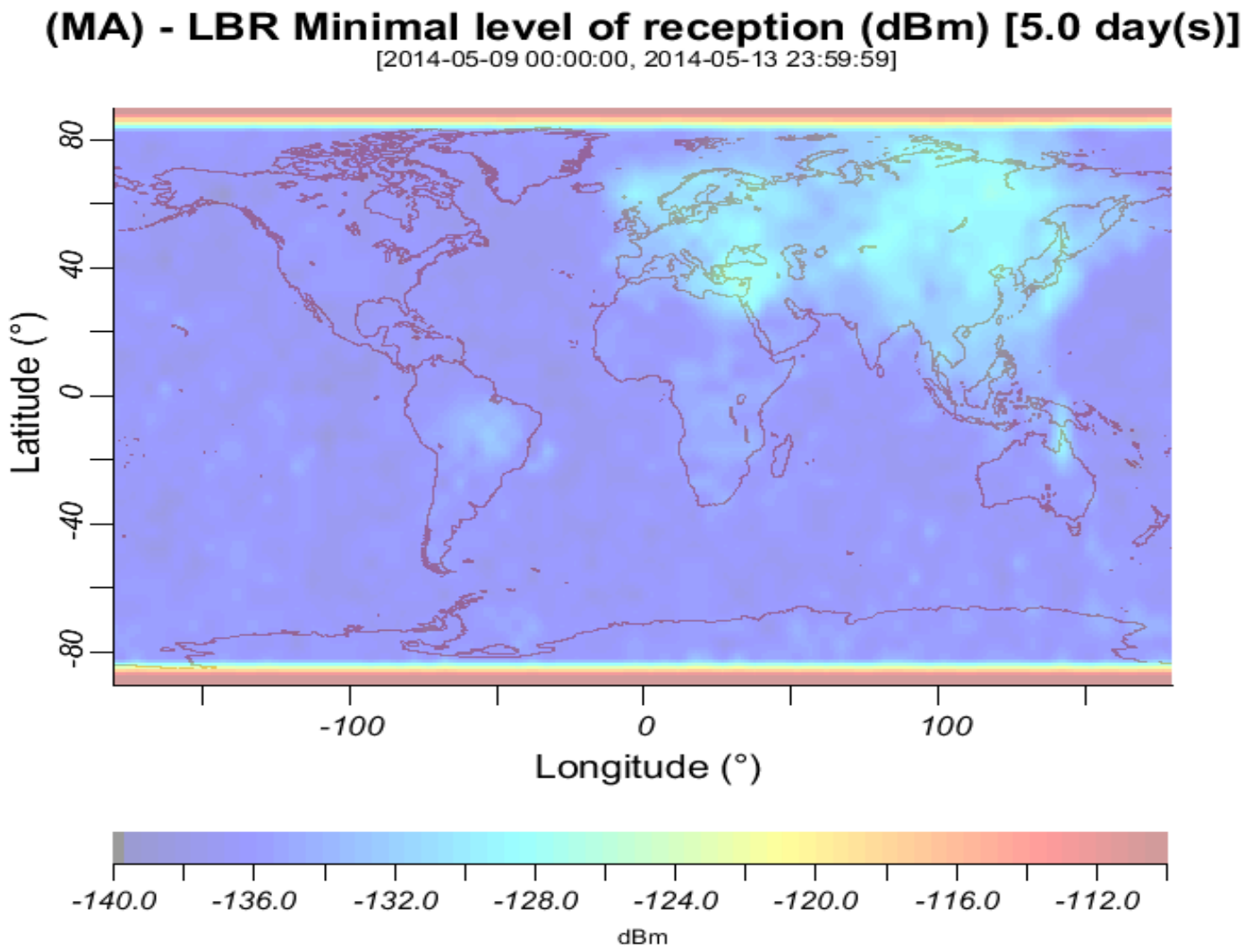


PROJECTED GLOBAL DISPOSAL TIMES AT END OF ANTENNA UPGRADE PROJECT (late-2015)

Background Noise (May 2013)

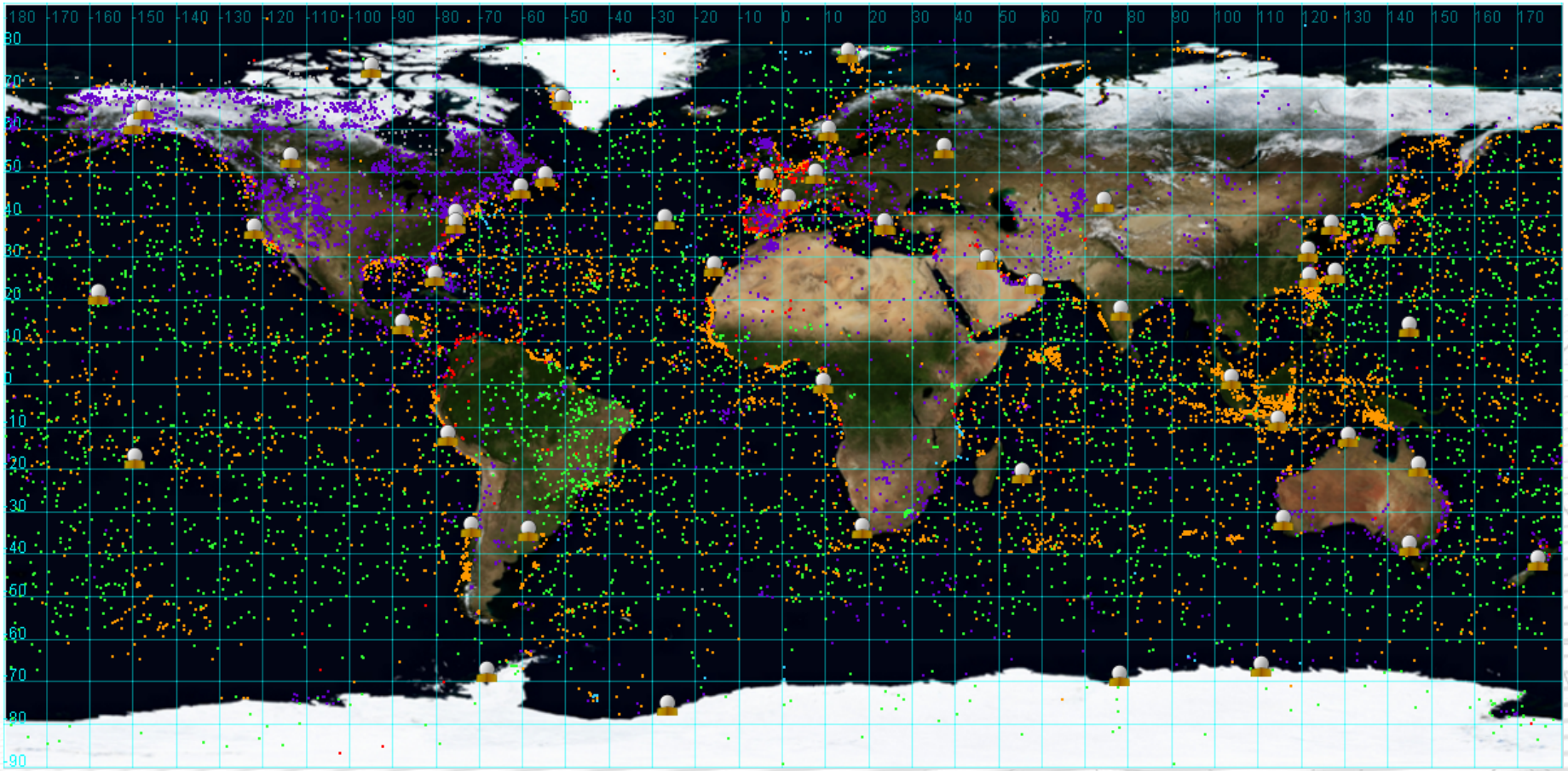


Background Noise (May 2014)



System Occupancy

22 000 Argos beacons are seen at least once a month



Underway Projects

Argos-4 ground segment upgrade

Argos chipset

CLS View

Argos Goniometer

ARGOS-4 Ground Segment Upgrade

- **Objective**
  - **Update of the existing Argos ground segment to prepare for the new generation of Argos-4 instruments as well as a general enhancement of the Argos ground segment .**

- **Status:**
  - **Project started January 1st, 2014, beginning with the part dedicated to the general enhancement of the ground segment**
  - **The project is funded by CNES and led by CLS**

- **Activities**
  - **Studies and Specifications**
  - **Developments**
  - **Qualifications**
  - **Operations**

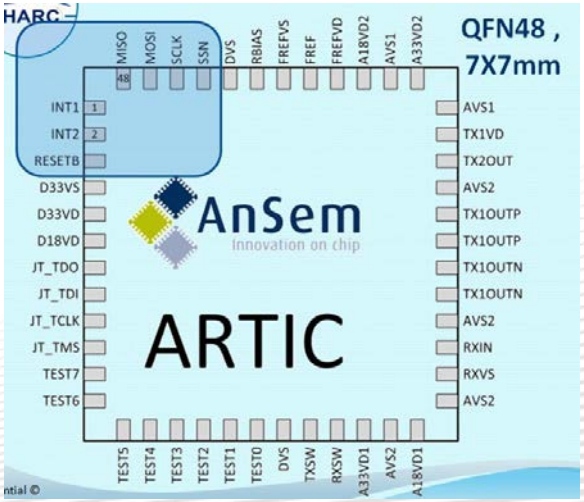
ARGOS-4 Ground Segment Upgrade

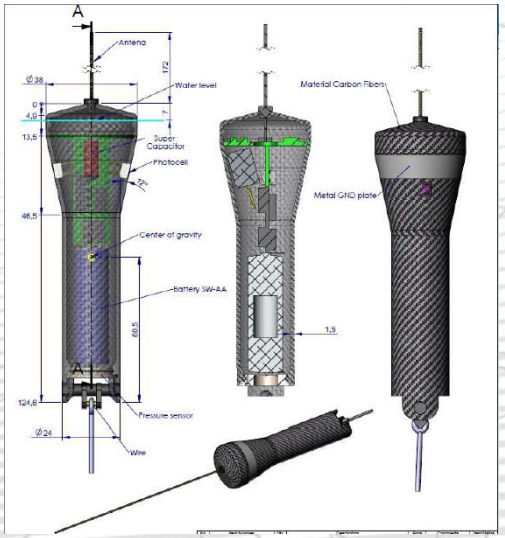
Main improvements / developments

- **New user services**
  - Argos web interface
  - Smartphone application
  - Data extraction on-demand
  - Data re-processing
  - Web services
- **Location**
  - Digital Elevation Model
  - Smoothing
  - Initialization
  - Automatic maneuvers
- **System**
  - Spectral analysis
  - Pseudo-messages processing
  - Bit error detection/correction
  - reporting
- **Processing**
  - GTS software
  - User guidance office
  - Archiving
  - Downlink Messaging Management center
  - Orbitography
- **Facilities**
  - Master beacons
  - Reference beacons
  - Ground stations
  - Processing centers

ARGOS Chipset

- **Status**
  - **Project started in October 2012**
  - **State of the Art – Specifications review in march 2012**
  - **Preliminary design review will be held in July 2013**
  - **First run of foundry in May 2014. Currently, tests are being conducted at ANSEM facility**
  - **The popup tag that will support the field application has been fully defined by StarOddi and will be manufactured at the beginning of this summer**





CLS View

- ✓ An Android application available to consult Argos tracks from a smartphone/pad.

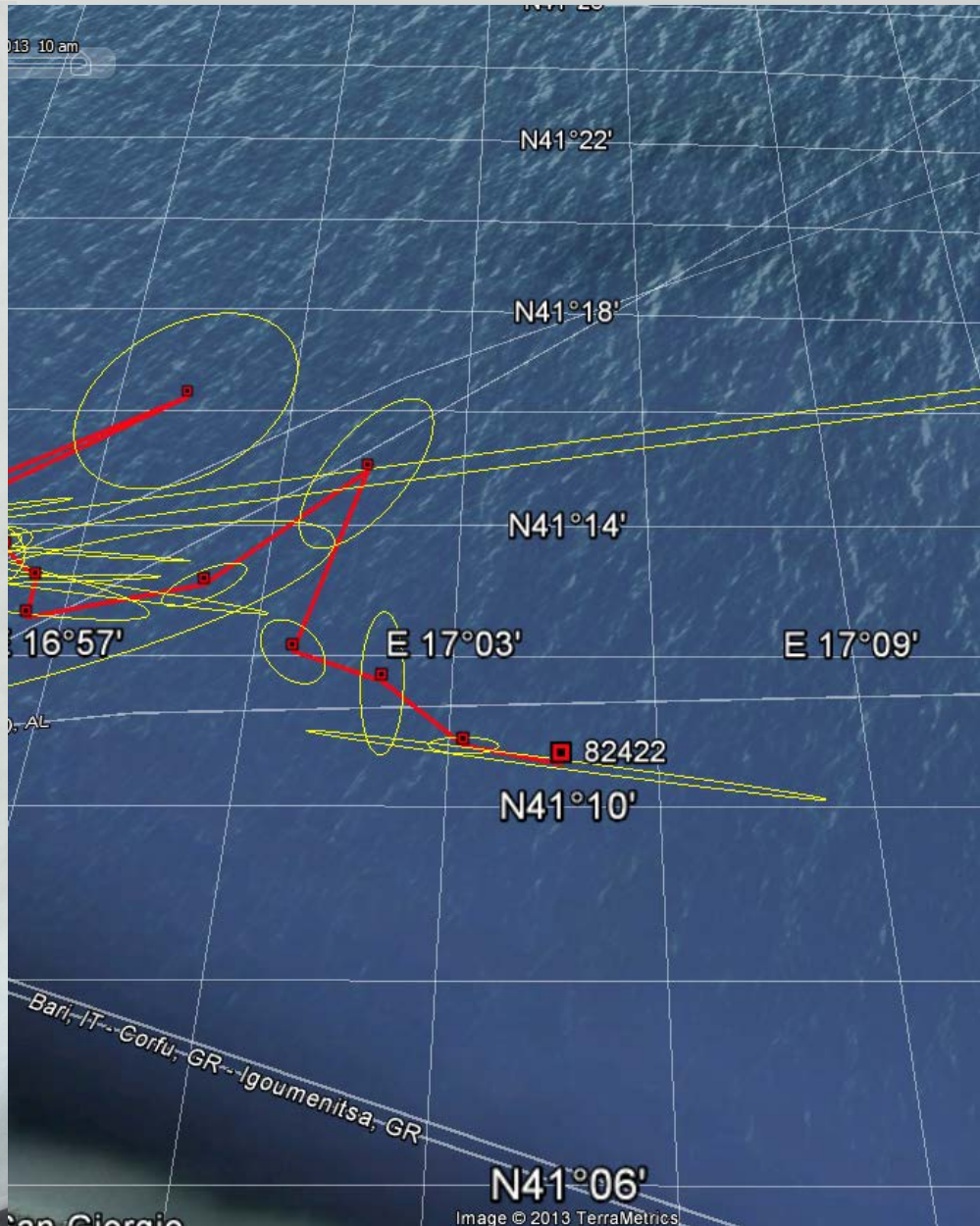
Distance measurements when in isoline mode take into account the curvature of the Earth's surface.

CLS View provides mobile tracking data with different map backgrounds (shown here Google Earth). View data from 100 mobiles maximum and up to 2500 positions.

Free installation

ANDROID APP ON Google play

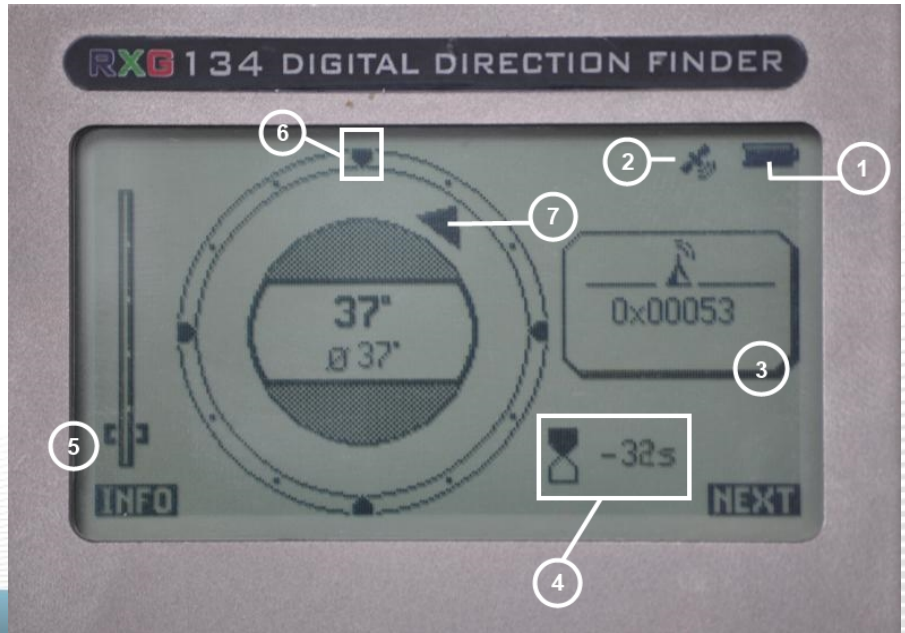
Argos tools for recovery



Argos Goniometer

- CLS has recently developed a new high sensitive direction finder that provides for field recovery:
  - ✓ the direction to find an Argos platform
  - ✓ an indication of the signal power of the Argos transmitter
  - ✓ GPS positions transmitted by the platform (if exist)

- The Argos signal can be received on the field from few meters to more than 100 km (depending of the altitude/power)



(1)	Battery level
(2)	GPS activated
(3)	Transmitter ID
(4)	Estimated time remaining until next reception
(5)	Received-signal strength indicator
(6)	Reference azimuth (red pointer on antenna)
(7)	Direction of bearing relative to the reference azimuth