DORIS NETWORK STATUS

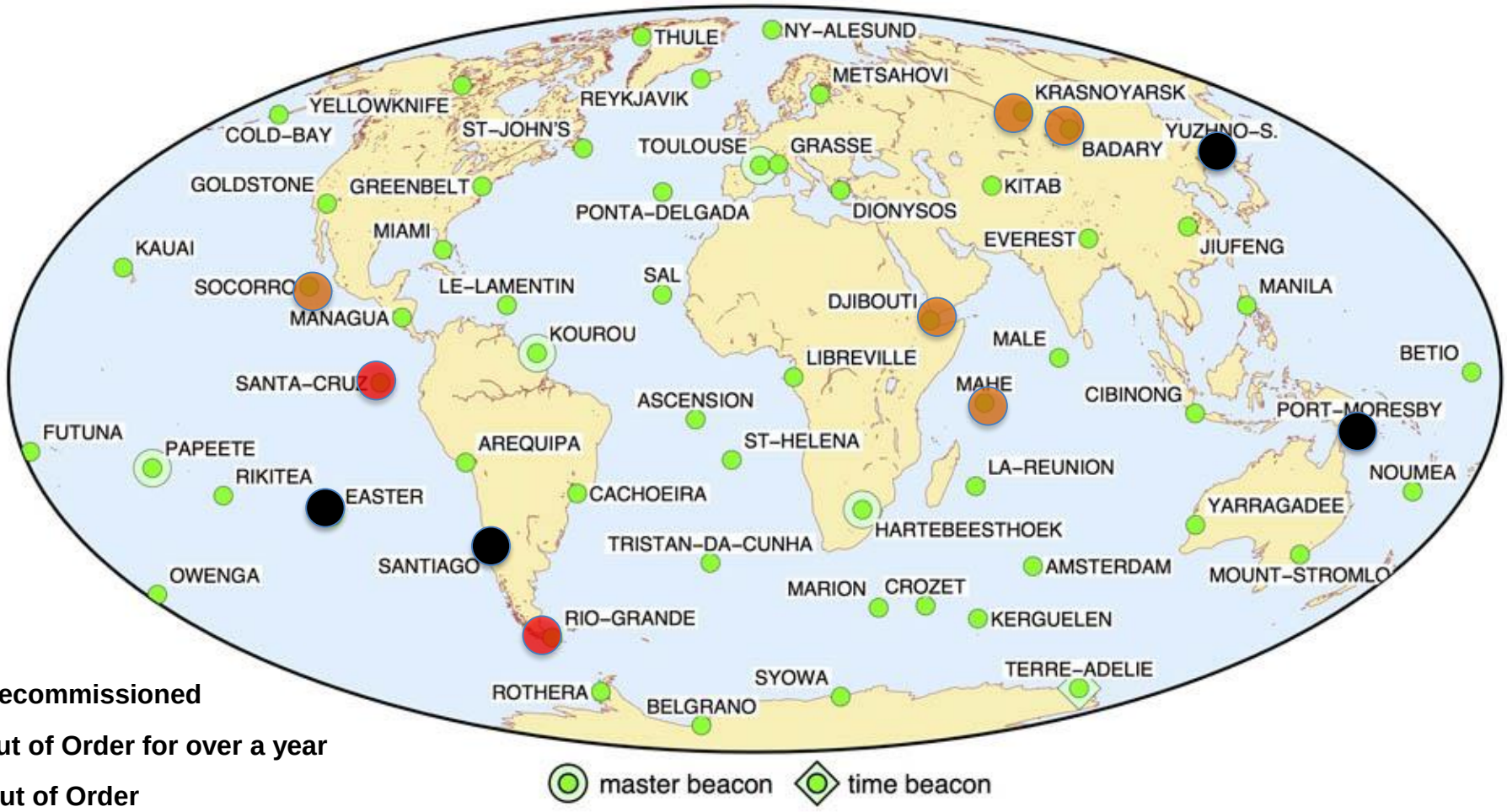
JUNE 2018

JEROME SAUNIER, IGN - FRANCE


Mangilao, Guam Island

OPERATIONNAL STATUS

60 permanent stations of which: 11 beacons are out of order (4 decommissioned)



- **Decommissioned**
- **Out of Order for over a year**
- **Out of Order**

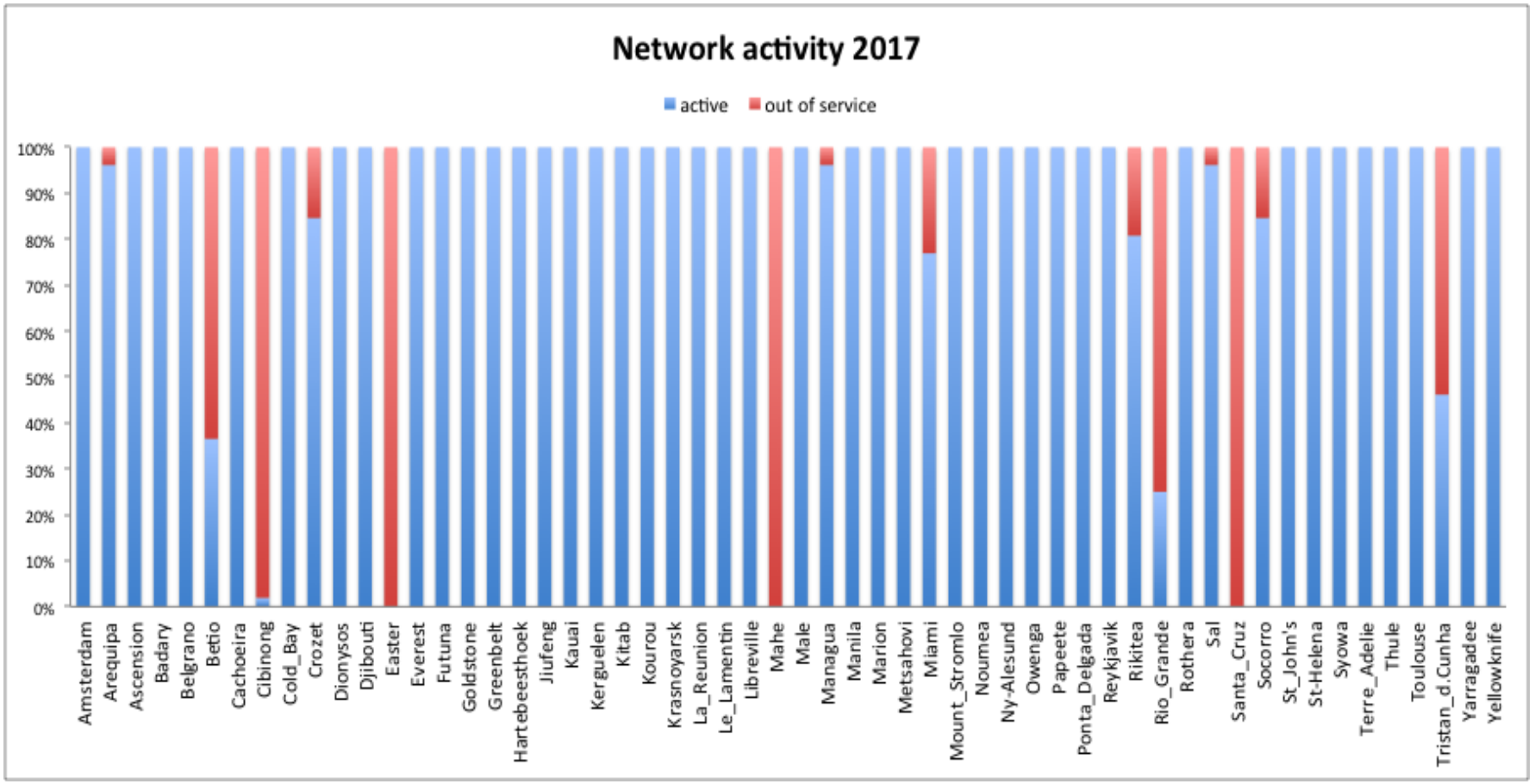
GMT 2018 Jun 06 12:28:04

Decommissioned (pending replacement):

Yuzhno-Sakhalinsk (11/2005), Santiago (05/2013), Port-Moresby (06/2013), Easter (08/2015)

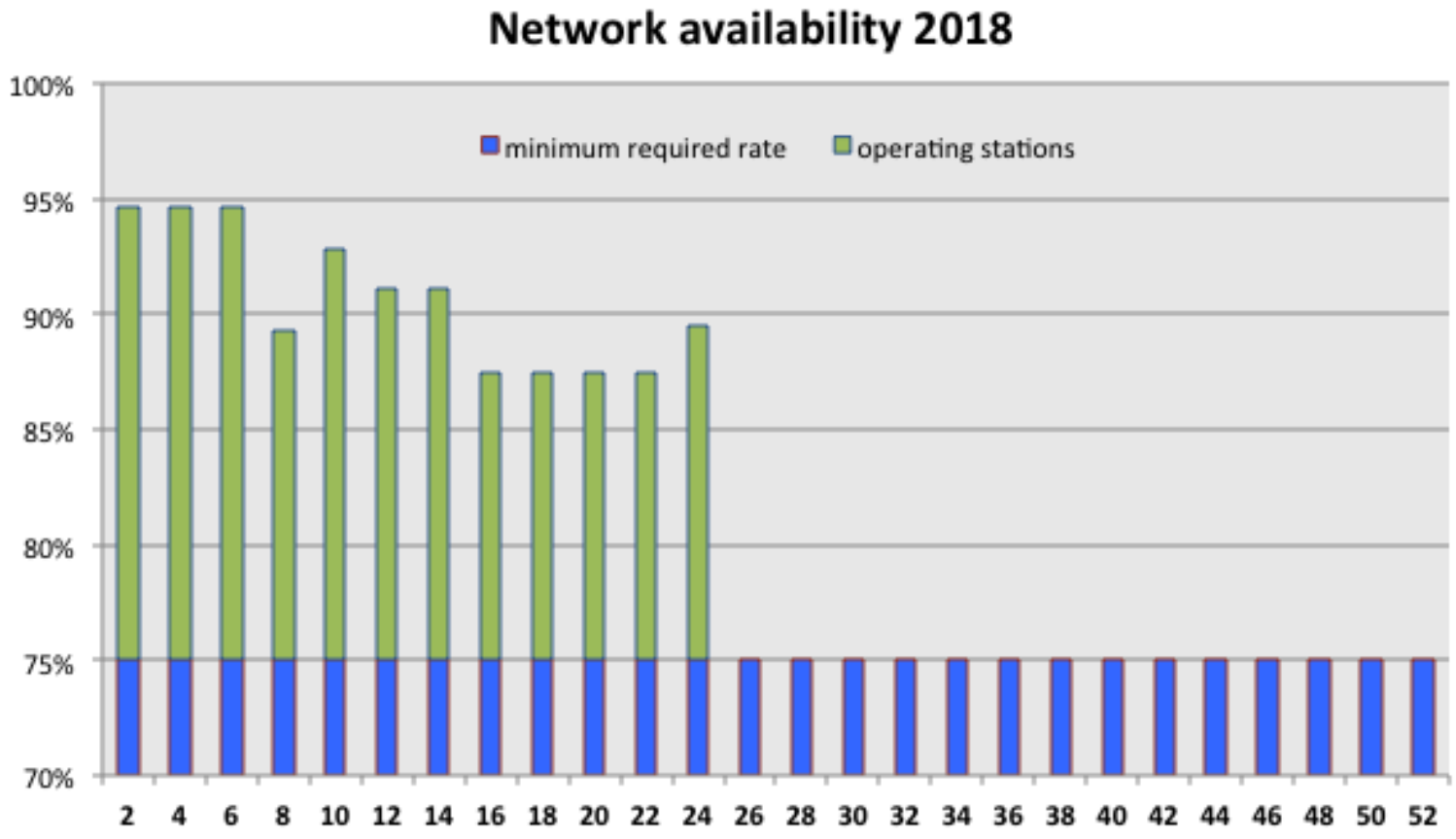
NETWORK AVAILABILITY

- 89% ANNUAL MEAN OF OPERATING STATIONS IN 2017
- RESULT OF THE COMBINED EFFORT OF CNES, IGN AND HOST AGENCIES



NETWORK AVAILABILITY

- 4 MAINTENANCE OPERATIONS SINCE THE BEGINNING OF 2018
- RUSSIAN BEACONS WERE DEACTIVATED ON FEBRUARY 16TH



NETWORK EVENTS

2018	Station		Event
Apr.	WEUC	*Wettzell*	*Beacon replacement*
	MLAC	**Mangilao**	**Station installation** and local tie survey
Feb.	ROXC	**Rothera**	**Station relocation** and local tie survey
	BADB	*Badary*	*Shutdown for indefinite period*
	KRBB	*Krasnoyarsk*	*Shutdown for indefinite period*

2017	Station		Event
Dec.	ARFB	*Arequipa*	*Beacon replacement*
	CIDB	*Cibinong*	*Beacon replacement*
Nov.	CRQB	*Crozet*	*Beacon replacement*
	SARC	Sal	Antenna verticality adjustment
Aug.	TRJB	*Tristan Da Cunha*	*Beacon replacement*

IDS STATIONS

- **WETTZELL (DEU): INTO OPERATION SINCE SEPTEMBER 2016**
  - Shifted frequency transmissions
  - Good performance: 13th in the network ranking
- **MANGILAO (GUAM ISLAND, USA): COMMISSIONED IN APRIL 2018**
  - Significant contribution to the coverage in Pacific area
  - Should be soon incorporated into the permanent network

NETWORK EVOLUTION

SCHEDULED IN 2018

- Santiago, CHL: **new site** in **San Juan**, ARG (co-location SLR+GNSS)
- **Ny-Ålesund**, NOR: station **re-location** 3 km away (**co-location GNSS+SLR+VLBI**)

AS SOON AS POSSIBLE

- **Santa-Cruz,** ECU: station **restarting**
- **Easter Island**, CHL: station **re-location** 5km away, at the airport (hosting migration)
- Port-Moresby, PNG: **new site** in **northern Australia** (possibly Katherine)

UNDER CONSIDERATION

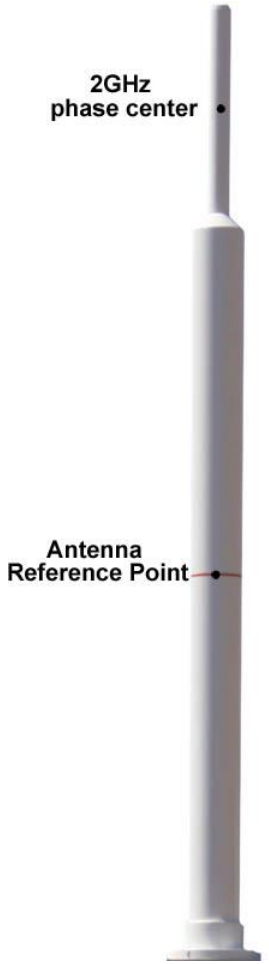
- Northern Asia: **new site** in **Changchun**, CHN **(co-location GNSS+SLR)**
- **Reykjavik**, ISL: station **re-location** to improve performance
- **Papenoo**, French Polynesia: **new core site** with the 4 techniques

4TH GENERATION DORIS GROUND BEACON

- Prototype currently in testing phase. Deployment is scheduled from mid 2019.

CURRENT NETWORK COMPONENTS

- **13 STATIONS EQUIPPED WITH STAREC C:**
  - ADHC, GONC, JIWC, KEVC, KIVC, MLAC, MNAC, OWFC, PDOC, ROXC, SARC, SOFC, WEUC
  - No systematic deployment but replacements are performed after any maintenance operation
  - 2 mm uncertainty in the horizontal plane; 2.5 mm for the vertical component
- **45 STATIONS EQUIPPED WITH STAREC B:**
  - Before September 2014
  - Standard uncertainty of the 2GHz phase center position in the vertical direction is 5 mm (vs. 1 mm)
- **NEXT BATCH OF STAREC ANTENNAE: POSITION OF THE 2GHZ PHASE CENTER WRT THE ARP HAS CHANGED**
  - The relative position is defined within ±1mm
  - New antenna characterization is required => Starec D
  - Deployment will start in 2019



DORIS / VLBI RF COMPATIBILITY

SPECIFICATIONS BASED ON SUCCESSIVE RF COMPATIBILITY TESTS:

- Greenbelt, MD USA (2014)
- Wettzell, Germany (2015-2016)
- Papenoo, French Polynesia (2017)

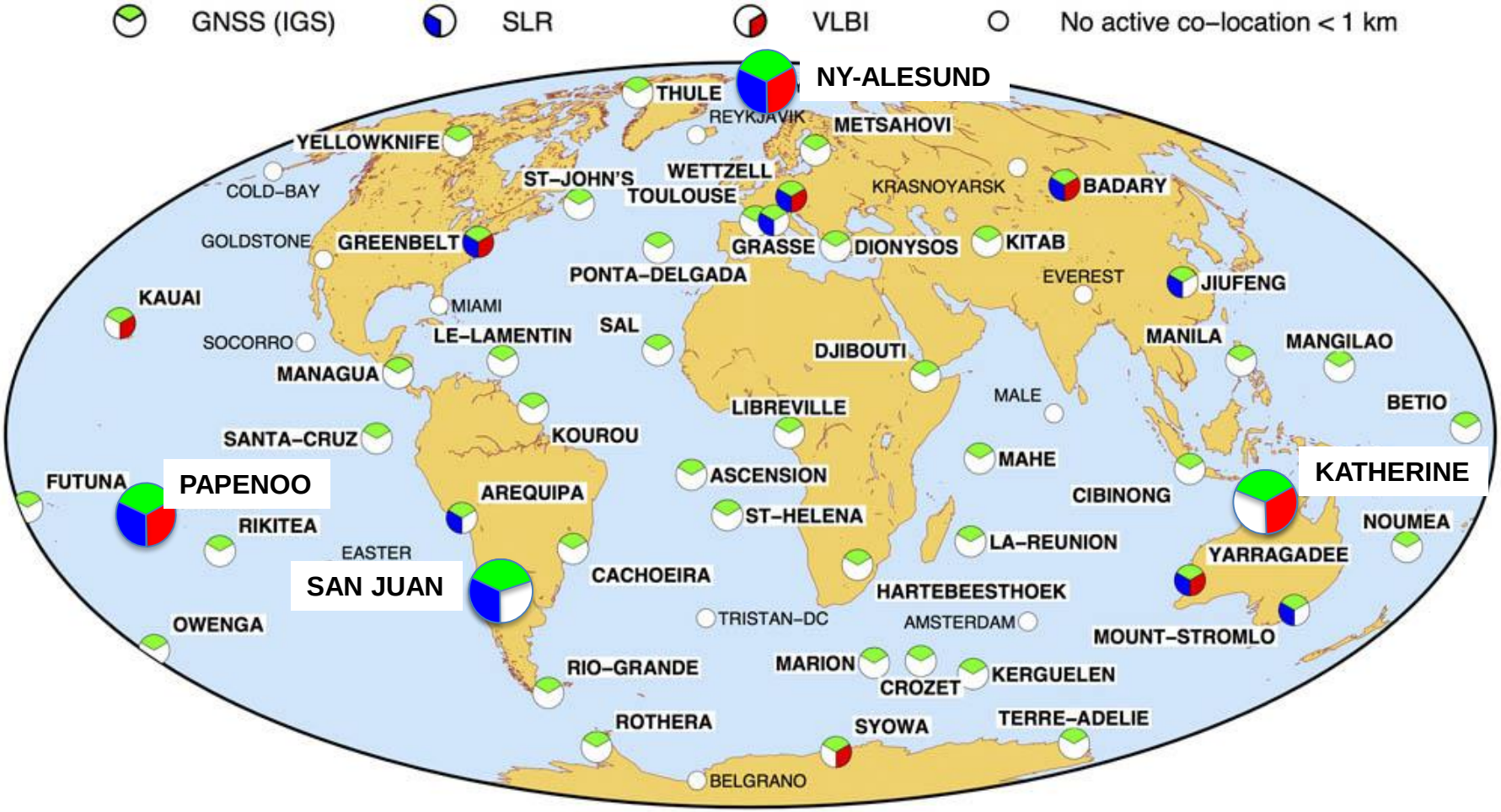
FINDINGS:

- The maximum level limit of the DORIS signal (2.036 GHz) allowed at the VLBI antenna input must be considered (commonly -60dBm)
- The minimum distance between DORIS and VLBI antennas shall be 300m
- Natural barrier, building, or RF shield providing total obstruction between the DORIS and VLBI antennas is highly recommended to contribute to the RF interference mitigation
- It is best to have height difference between the two antennas with DORIS above VLBI as DORIS signal is lower at low elevation.
- A specific study taking into account all the VLBI characteristics and the layout of the site is required and RF compatibility tests in real conditions are highly recommended.
- These requirements and precautions do not guarantee full compatibility of both systems. Other phenomena (reflection and diffraction of the DORIS signal, insufficient attenuation of the barrier) may modify the level of the signal received at the VLBI antenna input.

INCLUDED IN THE DORIS SYSTEM REQUIREMENTS DOCUMENT 2.1

CO-LOCATIONS

- DORIS STATIONS CO-LOCATED WITH OTHER IERS TECHNIQUES



=> 80% of stations co-located with GNSS; 9 with SLR; 6 with VLBI

LOCAL TIE SURVEYS

DORIS TIES VECTORS AT CO-LOCATED SITES

- NEW: estimated uncertainties were added; taking into account the site survey method; monument stability: distance between instruments; completion date
- File available on ftp://ftp.ids-doris.org/pub/ids/stations/DORIS_ext_ties.txt : tie vectors with instruments identification, co-location dates, site survey date and precision

SUCCESSIVE ANTENNA LOCATIONS ON THE SAME SITE

- All available (since 1992) tie vectors are compiled in a text file: ftp://doris.ign.fr/pub/doris/cb_mirror/stations/DORIS_int_ties.txt or CDDIS server
- This file has recently been enriched and updated

RECENT PUBLICATION (IERS TECHNICAL NOTE):

- “IGN best practice for surveying instrument reference points at ITRF co-location sites” Jean-Claude Poyard, with contributions by Xavier Collilieux, Jean-Michael Muller, Bruno Garayt and Jérôme Saunier 2017 (IERS Technical Note No. 39)
- Available on line:https://www.iers.org/IERS/EN/Publications/TechnicalNotes/TechnicalNotes.html