



# The future International DORIS Service



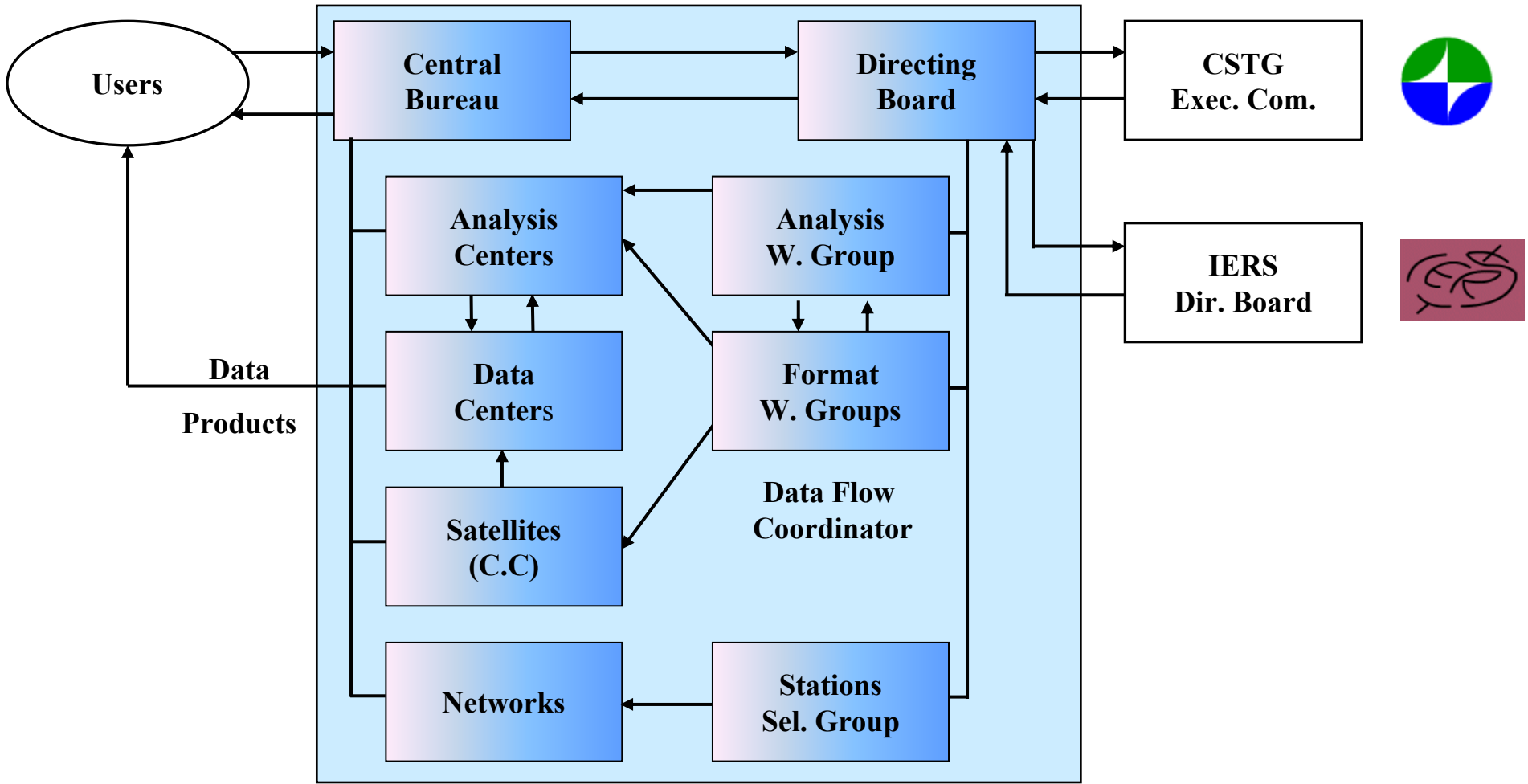
- G. Tavernier (CNES)
- M. Feissel-Vernier (Paris Observatory/IGN)
- F. Lemoine (GSFC)
- C. Noll (GSFC/CDDIS)
- J. Ries (UTEX/CSR)
- L. Soudarin (CLS)
- P. Willis (IGN/JPL)



# SUMMARY

- ➔ Organization: Steering Committee, Central Bureau
- ➔ Satellites
- ➔ Data: data flow coordination, data centers
- ➔ Analysis: analysis coordination, analysis campaign
- ➔ Stations: stations selection group, network evolutions
- ➔ Workshops: Toulouse, Biarritz, Marne la Vallée
- ➔ from the DORIS Pilot Experiment to the IDS candidature

# Organization



# Steering Committee

- ➔ Gilles Tavernier CNES  
Chairperson  
Gilles.Tavernier@cnes.fr
- ➔ Martine Feissel Paris Observatory and IGN  
Analysis coordinator  
feissel@ensg.ign.fr
- ➔ Carey Noll NASA GSFC  
Data Flow coordinator  
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- ➔ John Ries University of Texas CSR  
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- ➔ Laurent Soudarin CLS  
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- ➔ Pascal Willis IGN JPL  
DORIS representative to IERS  
Pascal.R.Willis@jpl.nasa.gov
- ➔ Frank Lemoine NASA GSFC  
Stations Selection Group Chairperson  
flemoine@ishtar.gsfc.nasa.gov



# Central Bureau

## ➔ CNES/IGN/CLS

- Gilles Tavernier, Jean-Pierre Granier
- Laurent Soudarin, Jean-Jacques Valette
- Pascal Willis, Hervé Fagard

➔ Website : <http://ids.cls.fr>



***INTERNATIONAL  
DORIS  
SERVICE***

About IDS   Organization   Events   Data centers   Reports   Contacts & Links  
All about DORIS

# Satellites

90 91 92 93 94 95 96 97 98 99 2000 01 02 03 04 05 06 07

SPOT2



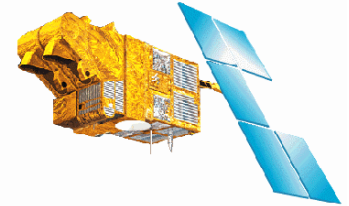
TOPEX-POSEIDON



SPOT3



SPOT4



## DORIS applications



Orbit determination



Gravity field



Earth rotation



Localization



On-board real time orbit



Time-tagging

1<sup>st</sup> generation receiver

2<sup>nd</sup> generation receiver

December 7, 2001

JASON1



March 1, 2002

ENVISAT1



May 4, 2002

SPOT5



CRYOSAT



JASON2



PLEIADES...



# Data flow coordination

## ➔ Carey Noll

NASA GSFC

USA

- new satellites: Jason, ENVISAT, SPOT 5
- first products: stations coordinates, EOP, geocenter, orbits

## ➔ Data Centers :

- NASA GSFC CDDIS - USA
  - ◆ <ftp://cddisa.gsfc.nasa.gov/pub/doris>

Carey Noll



- IGN
  - ◆ <ftp://lareg.ensg.ign.fr/pub/doris>

Edouard Gaulué



# DORIS Data delivery

- ➔ SPOT 2 (03/31/90 to 07/04/90, 02/01/92 to 03/22/92, since 10/16/92)
  - arc 440: 02/01/03 to 02/10/03 (04/03/03: T + 8 weeks)
- ➔ SPOT 3 (02/01/94 to 11/09/96)
- ➔ TOPEX (since 09/25/92)
  - cycle 386: 03/07/03 to 03/17/03 (03/31/03: T + 2 weeks)
- ➔ SPOT 4 (since 05/01/98)
  - arc 214: 02/08/03 to 02/15/03 (03/27/03: T + 6 weeks)
- ➔ JASON (since 01/15/02)
  - cycle 39: 01/28/03 to 02/06/03 (04/04/03: T + 8 weeks)
- ➔ SPOT 5 (since 06/11/02)
  - arc 29: 02/11/03 to 02/19/03 (04/03/03: T + 6 weeks)
- ➔ ENVISAT (since 06/18/02)
  - arc 30: 01/07/03 to 01/13/03 (03/18/03: T + 9 weeks)



# DORIS Iono/Raw Data delivery

- ➔ SPOT 2
  - 10/28/02 to 12/29/02 and 03/03/03 to 03/16/03 (04/01/03: T + 16 days)
- ➔ TOPEX
  - 01/01/02 to 02/09/03 and 03/03/03 to 03/16/03 (04/01/03: T + 16 days)
- ➔ SPOT 4
  - 01/01/02 to 02/15/03 and 03/03/03 to 03/16/03 (04/01/03: T + 16 days)
- ➔ JASON
  - 08/19/02 to 02/16/03 and 03/03/03 to 03/16/03 (04/01/03: T + 16 days)
- ➔ SPOT 5
  - 05/04/02 to 02/16/03 and 03/03/03 to 03/15/03 (04/01/03: T + 17 days)
- ➔ ENVISAT (soon)

# Analysis coordination

➔ Martine Feissel-Vernier      Paris Observatory and IGN      France

## ➔ Analysis campaign

- Sets of station coordinates
  - ◆ **time series**
  - ◆ **global solutions**
- Satellite orbits
- EOP time series
- Geocenter time series

➔ <http://lareg.ensg.ign.fr/IDS/>

# Analysis campaign

## ➔ CNES/SSALTO

- station coordinates (sinex time series): M, W

## ➔ IGN/JPL

- station coordinates (sinex time series): M, W
- station coordinates (sinex global)
- EOP
- Geocenter

## ➔ INASAN

- station coordinates (sinex time series): M, W

## ➔ LEGOS-GRGS/CLS

- station coordinates (sinex time series): M
- orbits (Jason)

## Other Analysis Centers

- ➔ CSR/UTEX
- ➔ IAA
- ➔ ESA/ESOC
- ➔ NASA/GSFC-Raytheon
- ➔ The Delft University of Technology
- ➔ Geoscience Australia
- ➔ The Royal Observatory of Belgium
- ➔ University of Berne
- ➔ Czech Technical University in Prague

# Stations Selection Group

➔ Frank Lemoine Chairperson	GSFC	USA
➔ Eric Calais	CNRS	France
➔ Chuck DeMets	University of Wisconsin	USA
➔ Hervé Fagard	IGN	France
➔ Ramesh Govind	AUSLIG	Australia
➔ Bruce Haines	JPL	USA
➔ Kristine Larson	University of Colorado	USA
➔ Simon Williams	Proudman Ocean. Lab.	UK

# Stations Selection Group

## ➔ Site criteria

- International Space Geodetic and Gravimetric Network (ISGN)
- DORIS site constraints

## ➔ Selection

- glacier: Sorsdal, Lambert (Geoscience Australia, Antarctica)
- geodesy: Wetzell/TIGO (Bundesamt für Kartographie und Geodäsie, Chile)
- altimeter calibration: GAVDOS (TU Crete)
- altimeter calibration: BURNIE (Geoscience Australia, Banks strait)

➔ <http://phys-geophys.colorado.edu/~kristine/doris.html>

# DORIS Network

## Evolution prospects: objectives

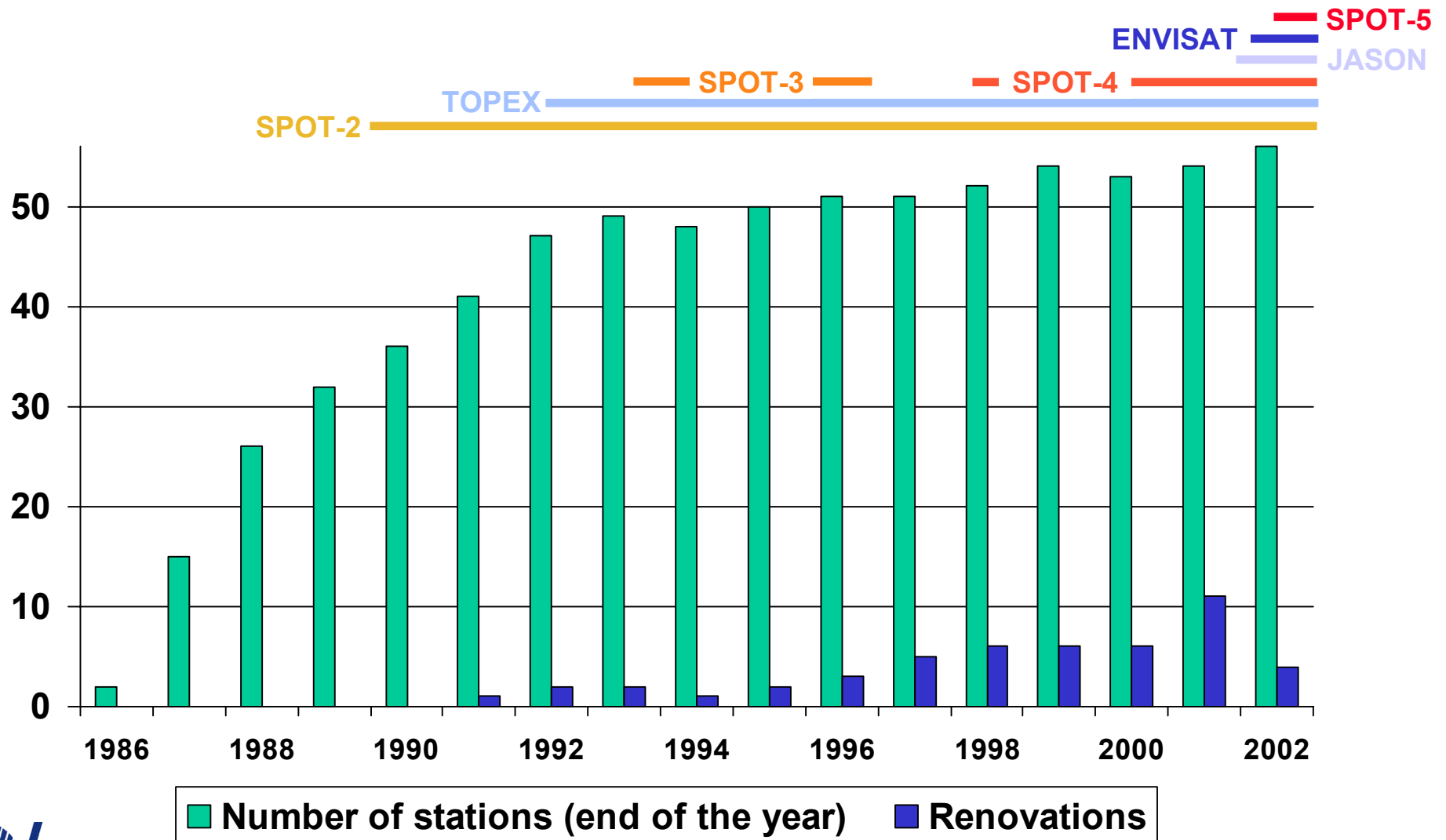
- ➔ The long term stability of the antennas  
(stations renovation action)
- ➔ The global coverage  
(a few more stations to fill in the remaining “holes”  
+ DORIS Pilot Experiment proposals)
- ➔ The equipment’s reliability  
(deployment of a new generation of beacons)

# DORIS Network





# Evolution of the network



# Network renovation progress



# Network: latest news

- ➔ Two new stations installed at the end of 2002:
  - Thule (Greenland)
  - Sal (Cape Verde), replacing Dakar
  
- ➔ Theoretical orbit coverage (when all stations are operating):
  - “Low” satellites (SPOT-2 , 4, 5 & Envisat) : 88 %
  - “High” satellites (Topex & Jason): 98 %
  
- ➔ Stations renovated in 2002:
  - Tristan da Cunha, Terre Adélie, Port Moresby, Kauai
  
- ➔ Stations renovated in 2003:
  - Manila, St Helena, Ascension
  
- ➔ Mount Stromlo destroyed by fire in January; should be rebuilt by mid-2003

# DORIS Network

## Third generation beacons

### ➔ Main new features:

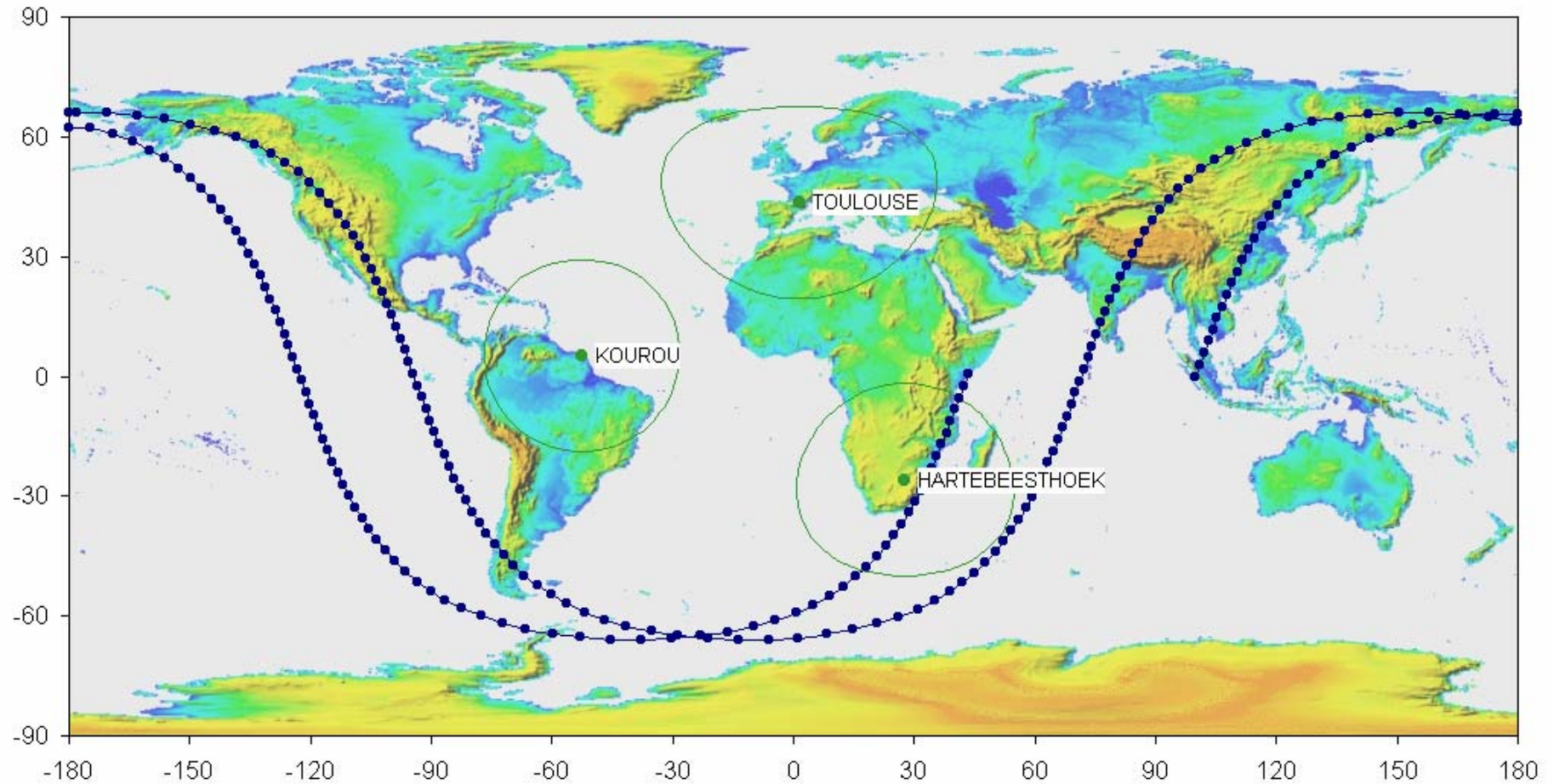
- Possible frequency shift, avoiding jamming by nearby stations
- Higher transmitted power
- Modulated 2 GHz channel
- Unambiguous internal International Atomic Time

### ➔ Installation progress :

- Toulouse Master beacon (December 2001)
- Tristan Da Cunha (January 2002)
- Cibirong, Easter Island, Mahe, Terre Adélie, Thule, Kauai, Sal, Manila, Saint Helena
- Kourou, HBK Master beacons (soon)

# A new Master Beacon

Visibilités TOULOUSE, KOUROU, HARTEBEESTHOEK pour JASON (site mini 12 deg)  
Avec 2 traces d'orbites consécutives, 1 minute entre 2 points



# IDS Workshops

- ➔ Toulouse, France, May 2-3, 2000
  - DORIS program, system performances and evolutions
  - Products
  - International DORIS Service
  - [http://ids.cls.fr/html/report/doris\\_days\\_2000/programme.html](http://ids.cls.fr/html/report/doris_days_2000/programme.html)
  
- ➔ Biarritz, France, June 13-14, 2002
  - DORIS Pilot Experiment - IDS, Orbits and related products
  - DORIS analysis results, IDS analysis campaign
  - Analysis workshop, Network workshop
  - [http://ids.cls.fr/html/report/ids\\_workshop\\_2002/programme.html](http://ids.cls.fr/html/report/ids_workshop_2002/programme.html)

# IDS Workshops

- ➔ Marne La Vallée, France, February 20-21, 2003
  - DORIS project, network, data, analysis strategies, Orbits, ionospheric sounding,
  - Comparison/combination of DORIS products, the future IDS, the working connection with IERS
  - [http://lareg.ensg.ign.fr/IDS/events/prog\\_2003.html](http://lareg.ensg.ign.fr/IDS/events/prog_2003.html)
  
- ➔ Next Analysis Workshop: September 2003 ?

## IDS candidature

- ➔ IUGG, Birmingham, Great Britain, 19-30 July 1999
  - DORIS Pilot Experiment
  
- ➔ September 1999
  - call for participation
  
- ➔ Steering Committee, Central Bureau, Data, Analysis, Stations, Workshops
  
- ➔ IUGG, Sapporo, Japan, June 30 - July 11, 2003
  - International DORIS Service Candidature