



## **GGOS Retreat 2007**

# **Building GGOS on the IAG Services IDS and GGOS**

February , 19-21

Oxnard, California, USA



# Summary

- ◆ Future Missions
- ◆ DORIS Network
- ◆ New IDS web site
- ◆ DORIS Special Issue / Journal of Geodesy
- ◆ IDS and GGOS
- ◆ IDS and GGOS 2020 Strategy process
- ◆ Standardization and the GGOS data portal
- ◆ Recommendations



## Future Missions: decided

- ◆ JASON-2
  - ◆ June 2008
  - ◆ T2/L2 (Laser Time Transfer Link), Carmen & JTD (radiation dose)
  
- ◆ CRYOSAT-2
  - ◆ March 2009
  
- ◆ ALTI-KA (3 years)
  - ◆ ISRO proposal: SSB platform with ALTIKA + ARGOS 3 payload
  - ◆ end 2009 ?



# Future Missions: possible

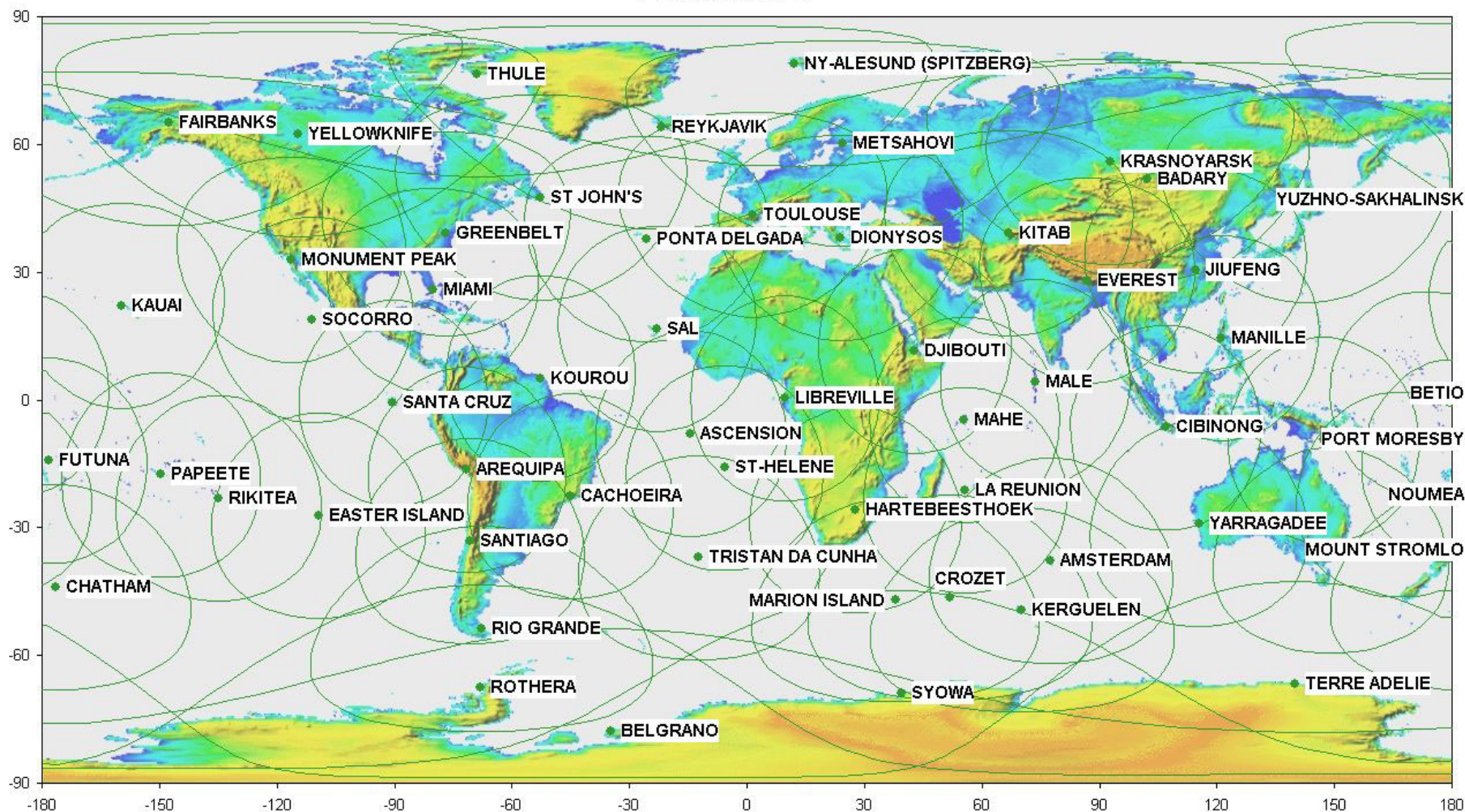
- ◆ SENTINEL 3 (European GMES programme, ESA mission)
  - ◆ CNES proposal for a DORIS receiver
  - ◆ Possible proposal for other ESA missions
  
- ◆ Jason-3
  - ◆ Jason-2 recurrent: 5th PROTEUS platform
  - ◆ CNES system foreman, clients : NOAA & EUMETSAT
  - ◆ GMES programme - 2013 ?



# DORIS Network

Jason-1 DORIS stations visibilities

Elevation 12°







## New IDS web site

International  
**DORIS**  
Service

Search for...

| Site map | FAQ | Mails | Bibliography |  
| Sitelogs | System events | Performance plots | Time series |

| What's new on IDS | What's new on DORIS |

**Acknowledge IDS:**  
Whenever your use of IDS data or products results in a publication, please include a proper [citation](#).

[2006 IDS Workshop presentations](#)

**DORIS** is a Doppler satellite tracking system developed for precise orbit determination and precise ground location. It is onboard the Jason-1 and ENVISAT altimetric satellites and the remote sensing satellites SPOT-2, SPOT-4 and SPOT-5. It also flew with SPOT-3 and TOPEX/POSEIDON.

**IDS** is an international service which provides a support, through DORIS data and products, to geodetic, geophysical, and other research and operational activities. New proposals for Analysis Centers and temporary or permanent DORIS stations are welcome. See the [call for participation](#).

This site is composed of three parts:

- "IDS" describes the organization of the service and includes documents, access to the data and products, event announcements, contacts and links.
- "DORIS" allows to access general description of the system, and gives information about the system events and the tracking network.
- "Analysis Coordination" provides information and discussion areas about the analysis strategies and models used in the IDS products. It is maintained by the [Analysis Coordinator](#) with the support of the Central Bureau.

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## New IDS web site

- ◆ improved organization
  - ◆ Easier navigation
  
- ◆ Analysis Coordination pages
  - ◆ beside the usual "IDS" and "DORIS system" headings
  
- ◆ virtual tour of the DORIS network via Google Earth



## New IDS web site

### Network on Google Earth

Make a virtual tour of the DORIS network with [Google Earth](#).



#### DORIS network on Google Earth:

 [Download the file](#) (February 2007).

Depending on the resolution of the image, we sometimes adjusted the position of the antenna of the station according to our knowledge of the site. Some positions could still be improved with your help. Comments, maps and pictures are welcome at any time to help us to improve the virtual tour and should be e-mailed to the [Central Bureau](#).



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**DORIS**

# DORIS Special Issue / Journal of Geodesy

- ◆ Guest Editor: P. Willis (+J. Ries, F. Lemoine):
  - ◆ Plate motion of India and interseismic strain in the Nepal Himalayas from GPS and DORIS measurements, P Bettinelli, J-P Avouac, M Flouzat, F Jouanne, L Bollinger, P Willis, GR Chitrakar
  - ◆ DORIS and the Determination of the Earth's Polar Motion, D Gambis
  - ◆ DORIS: System Description and Control of the Signal Integrity, C Jayles, B Nhun-Fat, C Tourain
  - ◆ Error Analysis of Weekly Station Coordinates in the DORIS Network, SDP Williams, P Willis
  - ◆ Total Electron Content Variations Observed by a DORIS Station During the 2004 Sumatra-Andaman Earthquake, F Li, M Parrot
  - ◆ On-Line Resources Supporting the Data, Products, and Information Infrastructure for the International DORIS Service, C Noll, L Soudarin



**DORIS**

# DORIS Special Issue / Journal of Geodesy

- ◆ Ionospheric Applications of the Scintillation and Tomography Receiver in Space (CITRIS) Mission when used with the DORIS Radio Beacon Network, PA Bernhardt, CL Siefring, IJ Galysh, TF Rodillo, DE Koch, TL MacDonald, MR Wilkens, GP Landis
- ◆ DORIS contribution to ITRF2005, Z Altamimi, X Collilieux, C Boucher
- ◆ A Corrective Model for Jason-1 DORIS Doppler Data in Relation to the South Atlantic Anomaly, J-M Lemoine, H Capdeville
- ◆ DORIS Time Bias Estimated using Jason-1, TOPEX/Poseidon and ENVISAT orbits, NP Zelensky, J-P Berthias, FG Lemoine
- ◆ First Results of DORIS Data Analysis at Geodetic Observatory Pecný, P Št pánek, U Hugentobler, K Le Bail
- ◆ Geocentre Motion Measured with DORIS and SLR, and Predicted by Geophysical Models, M Feissel-Vernier, K Le Bail, P Berio, D Coulot, G Ramillien, J-J Valette



**DORIS**

# DORIS Special Issue / Journal of Geodesy

- ◆ Estimating the Noise in Space-geodetic Positioning: The Case of DORIS, K Le Bail
- ◆ Twenty Years of Evolution of the DORIS Permanent Network: From its Initial Deployment to its Renovation, H Fagard
- ◆ Plate Kinematics of Nubia-Somalia using a Combined DORIS and GPS Solution, J-M Nocquet, P Willis, S Garcia
- ◆ The International DORIS Service: Genesis and Early Achievements, G Tavernier, H Fagard, M Feissel-Vernier, K Le Bail, F Lemoine, C Noll, R Noomen, JC Ries, L Soudarin, JJ Valette, P Willis
- ◆ A Model of Present-day Tectonic Plate Motions from 12 Years of DORIS Measurements, L Soudarin, J-F Crétaux



# IDS and GGOS

- ◆ What is the role the IDS should and want to play in the GGOS family?
  - ◆ routine delivery of geodetic products
  - ◆ network improvements
  - ◆ keeping of a suitable satellite constellation
  
- ◆ What individual outside relations does the IDS want to continue independently of GGOS?
  - ◆ Relations with the altimetry community



## IDS and GGOS

- ◆ Would the IDS be ready to implement and adhere to standards agreed upon in GGOS, both as a reaction of internal decisions and outside requirements?
  - ◆ *Maybe, provided that there is no conflict with already existing standards*
  
- ◆ What does IDS expect from GGOS, and, in particular, what new functions would IDS like GGOS to fill?
  - ◆ IDS is ready to contribute in the measure that we have resources available
  
- ◆ Where does IDS see the added value of GGOS as a family?
  - ◆ Coordination of services
  - ◆ Lobbying for space geodesy





DORIS

## IDS and GGOS 2020 Strategy process

- ◆ Does IDS agree with the organizational structure of GGOS as proposed in Chapter 9 (lead author Gerhard Beutler) of the Reference document or does IDS have comments and suggestions for improvements?
  - ◆ Yes provided that it doesn't require excessive manpower, which is already limited within the existing structures such as the technique-specific services
- ◆ What are your/IDS thoughts and comments concerning the technical components of GGOS as proposed in Chapter 8 (lead author: Markus Rothacher)?
  - ◆ 8.4: No specific chapter about the global network of DORIS stations?
    - Homogeneous global distribution of sites, covering all major tectonic plates
    - State of the art beacons and antennas
    - Antennas long term stability
    - Stations requirements: multi-paths, masks (measurements quality), power supply (availability)...
    - Fundamental sites



**DORIS**

## IDS and GGOS 2020 Strategy process

- ◆ 8.4.6 Co-location of instruments: what does “the 1-mm level” exactly mean? Shouldn't we distinguish a x-mm requirement and a 1-mm goal (a local tie on the 2-mm level, though not perfect, shouldn't be dismissed)
- ◆ 8.5 Level 2: Satellite missions : Jason-2 and ALTI-KA (ocean altimetry) should be added
  
- ◆ To which of these components would the IDS contribute?
  - ◆ IDS is a very small community with very limited manpower available
  - ◆ The global network of DORIS stations
  
- ◆ Does IDS find itself appropriately represented and described in the document?
  - ◆ IDS will provide a proposal for the DORIS related part of chapter 2.4.2 Terrestrial tracking techniques



# Standardization and the GGOS data portal

- ◆ What would be the appropriate level of standardization needed for a GGOS portal?
- ◆ Should the data from all services be linked through a common portal?
  - ◆ Why not, provided that it doesn't disturb existing data distribution
- ◆ Should GGOS portal access be limited only to meta data?
  - ◆ See Carey Noll
- ◆ Would IDS as a service be ready to comply to GGOS meta data standards to be delivered by the service with each product?
  - ◆ It will depend on the manpower required for that
- ◆ Should there be a common layout of web-pages for all the services contributing to GGOS?
  - ◆ Why not, but who would implement these web-pages?



# Recommendations

## ◆ General

- ◆ 1. Integrated geodetic observatories, with colocated techniques and colocation site vectors that are well defined, measured, and maintained.
- ◆ 2. Geodetic observatories with a homogeneous global distribution (unlike SLR/VLBI at present, and more like DORIS), and that build on current geodetic sites in terms of occupation histories.

# Recommendations

## ◆ DORIS

- ◆ 1. Expansion of the network to take advantage of the 2GXX satellite receivers (2GXX receivers have up to seven discrete channels, allowing multiple DORIS signals to be received simultaneously; SPOT-2, TOPEX could receive DORIS signals in one channel; ENVISAT & SPOT-5 have 2GXX receivers) (*more near-simultaneous tracking would allow more reduced-dynamic parameterization in the orbit determination.*)
- ◆ 2. We need to rigorously monitor the stability of the monumentation (cf examples like Ascension, Marion Island, etc.)
- ◆ 3. Advocate the use of DORIS on LEO satellites, particularly those with other techniques (SLR, GPS). We want collocation on orbit as well as on the ground. THIS IS ALSO IMPORTANT TO THE HEALTH OF THE DORIS SYSTEM, AS POSITIONING QUALITY IS PROPORTIONAL TO THE NUMBER OF DORIS SATELLITES USED. E.G., No. of Satellites in 1990's; See Altamimi et al., 2006; Tavernier et al., DORIS Special issue, J. Geodesy, 2006; Willis, Advances in Space Research, 2007)



# Recommendations

## ◆ DORIS (continued)

- ◆ 4. DORIS in combination with other techniques remains a prime mode of tracking for altimetric satellites whose purpose is to measure cryosphere height or ocean height change (or for river/lake monitoring).  
==> Only because of on-orbit collocation, do we know for example that we can do 1 cm orbits on Jason [e.g. Luthcke et al., 2003; Haines et al., 2004, *Marine Geodesy*], and only that way can we ensure that the TRF and associated orbits will be stable enough to reliably measure global mean sea level change and interconnect altimetric time series across different satellite missions.
- ◆ 5. Coordinate with other services (e.g. GNSS, PSMSL) for new DORIS stations in the immediate future; E.G., DORIS would like to install stations at Adak Island (Aleutians) and Midway Island, but the logistics are difficult and contacts difficult to establish.
- ◆ 6. In the framework of integrated geodetic observatories, DORIS/VLBI interferences issues should be investigated