

3.4.4 International DORIS Service (IDS)

Overview The current report presents the different activities held by all components of the International DORIS Service (IDS). First, we present the current status of the DORIS system (available satellites and tracking network). Second, we present the activities of the IDS Central Bureau (IDS Web site management and DORIS-related email distributions). We then focus on the most recent activities conducted by the Analysis Centers (ACs) and the Analysis Coordination. Finally, we will present other activities related to meetings and publications.

1 DORIS system The DORIS system celebrates in 2010 its 20th anniversary. It was first tested on the Spot-2 satellite, launched on the 22nd January 1990.

1.1 DORIS satellites During this report period (2010), the number of DORIS satellites has remained between five and six (see Table 1).

On April 8, 2010, a new DORIS satellite (Cryosat-2) was launched including the newest-generation receiver (DGXX). The new receiver is digital, can track up to 7 beacons simultaneously, and allows direct phase measurement like GPS (instead of Doppler data).

In the near future, several new DORIS satellites are already planned (and approved): HY-2A, SARAL, Sentinel-3A, Jason-3, ... This should increase or at least stabilize the number of DORIS satellites in the 2011–2016 time period.

Table 1: DORIS data available at IGN. As of December 2010

Satellite	Start	End	Type
SPOT-2	31-MAR-90 04-NOV-92	04-JUL-90 15-JUL-09	Remote sensing
TOPEX/Poseidon	25-SEP-92	01-NOV-04	Altimetry
SPOT-3	01-FEB-94	09-NOV-96	Remote sensing
SPOT-4	01-MAY-98	–	Remote sensing
SPOT-5	11-JUN-02	–	Remote sensing
Jason-1	15-JAN-02	–	Altimetry
ENVISAT	13-JUN-02	–	Altimetry, Environment
Jason-2	12-JUL-08	–	Altimetry
Cryosat-2	30-MAY-10	–	Altimetry

1.2 DORIS tracking network The DORIS permanent tracking network remains very stable (Figure 1). About 50% of the DORIS stations are in co-location with other geodetic space techniques: GPS (38), SLR (9) and VLBI (6). A new station was installed in Cold Bay (Alaska peninsula) on November 2010. It replaced the Fairbanks station which has been down since July 2010 and was removed on October 7th.

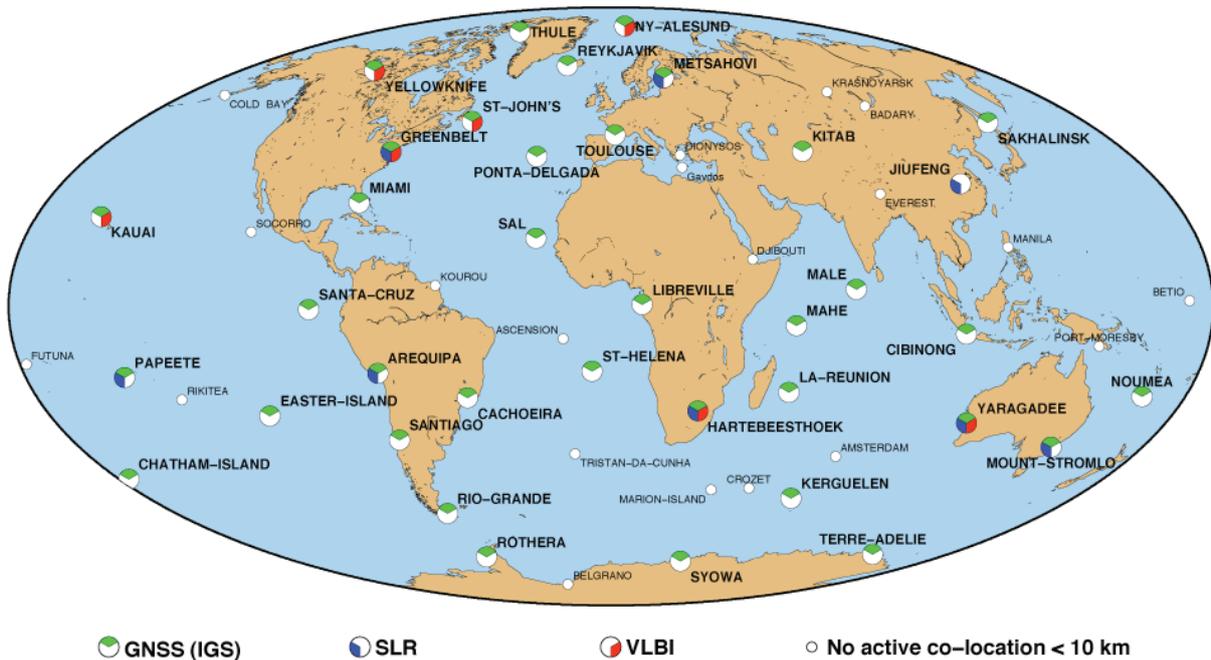


Fig. 1: DORIS stations co-located with other techniques (VLBI, SLR, GNSS) (as of Nov. 2010).

In Santiago, the station has undergone a shift of 30 cm caused by the magnitude 8.8 Chile/Maule earthquake of February 27th, 2010. At Monument Peak, broadcasts were permanently halted on February 6th, 2010, due to conflict in frequency of transmission between the DORIS beacon and a nearby US TV 2GHz microwave relay system. This conflict arose because of a reallocation of frequency use in the United States that took affect in 2009. The 2 GHz channel used by DORIS now overlaps that used by mobile television relay.

2 IDS Governing Board

The current Governing Board was elected at the end of 2008 (see Table 2). In 2010, Hervé Fagard resigned as network representative and was replaced by Bruno Garayt (IGN). Activities related to DORIS tracking network is now performed by Jérôme Saunier who becomes a member of the Central Bureau.

Table 2: Composition of the IDS Governing Board (since January 2010)

Name	Institution	Country	Mandate
Pascale Ferrage	CNES	France	Member at large
Bruno Garayt	IGN	France	Network representative
Frank Lemoine	GSFC	USA	Analysis Coordinator
Chopo Ma	GSFC	USA	IERS representative
Carey Noll	GSFC	USA	Data flow Coordinator
Michiel Otten	ESOC	Germany	IAG representative
John Ries	U. Texas/CSR	USA	Member at large
Laurent Soudarin	CLS	France	Director IDS Central Bureau
Pascal Willis (chair)	IGN/IPGP	France	Analysis Center representative

3 IDS Central Bureau

3.1 IDS Web and ftp sites

The IDS Central Bureau maintains the IDS web and ftp sites. In 2010, a new version of the web site was made available at <<http://ids-doris.org>> (DORISmail 654). It is developed with a CMS (Content Management System) which offers new capabilities for the management and the update of the site. The structure stays the same but the system address has changed. New pages were developed: site updates (history of the main page updates), station events (new sites, new antennas, removed sites, data gaps, invalidated data...), list of the main events that occurred on each DORIS mission impacting the data delivered to the Data centers.

The ftp site has been moved to a new server. All the documents are now available at <<ftp://ftp.ids-doris.org/pub/ids>> (DORISmail 647).

Access to the IDS website has been steadily increasing from month to month since Spring 2000. In early 2010, this website was accessed about 2000 times each month on a regular basis.

3.2 IDS Mail system

Several types of emails are distributed by the IDS Central Bureau:

- DORISMail: general DORIS interest
- DORISReports: reports related to DORIS data and products
- AWG and IDS Analysis Forum: technical discussion between analysis centers, combination and coordination
- DORISstations: information about station events (data gap, positioning discontinuities)

Everyone is welcome to subscribe to any of these emails. See more details on <<http://ids-doris.org/report/emails.html>>.

4 IDS Data Centers

The IDS data flow organization remains the same, but is now more robust. It is based on two data centers: one on the East Coast of the U.S. (CDDIS at NASA GSFC) and one in Europe (IGN in France). They are both exact mirrors of each other, and so, are able to continue on an operational basis, even if one of them is inaccessible due to a temporary failure.

These two data centers archive the DORIS data as well as the IDS products (station coordinates and velocity, geocenter motion, earth orientation parameters, ionosphere data, etc.).

5 IDS Analysis Centers

Like the other technique services in IAG, IDS has now a large number of independent Analysis Centers.

All seven analysis centers that participated in ITRF2008 continue to remain active, participating in the IDS activities. In addition TU Delft (E. Schrama) participated in the IDS AWG in 2010 with his evaluation of the POD performance of Cryosat-2 with SLR and DORIS data. The CNES POD center (L. Cerri, A. Couhert) was also an active IDS participant in all POD analyses, including the ITRF2008 station coordinate evaluation.

Table 3: List of IDS Analysis Centers routinely participating in the analysis activities in 2010.

Acronym	Analysis Center	Country	Software package
ESA	ESOC	Germany	NAPEOS
GAU	Geoscience Australia	Australia	GEODYN
GOP	Geodetic Observatory Pecny	Czech Rep.	Bernese
GSC	GSFC	USA	GEODYN
IGN	IGN	France	GIPSY/OASIS
INA	INASAN	Russia	GIPSY/OASIS
LCA	CNES/CLS	France	GINS/DYNAMO

The analysis activities consisted of: (1) follow-up activities related to the development of ITRF2008, including the extension of the data processing to include data in 2009; (2) the development of satellite-only time series of SINEX solutions as part of an analysis campaign to try and ascertain the causes of scale and Tz variations in IDS solutions; (3) the evaluation of the IDS3 solution with respect to ITRF2008 and the EOP performance for the cumulative solution and per Analysis Center (AC); (4) the assessment of the Jason-2 contribution to the IDS combination (Jason2 was not included in the IDS combination solution created for ITRF2008); (5) the first assessment of the Cryosat2 DORIS data; (6) the evaluation of the DORIS and SLR complements of the ITRF2008 solution using POD and other tests.

6 IDS Combination

In line with the successful DORIS contribution to ITRF2008, IDS decided to extend the combination process to an operational service.

At this stage of the service development, the ACs agreed to deliver every three months, with three months of delay, three months of their latest combined SINEX series. Then, a few days after the submission deadline, the Combination Center will download the ACs solutions and will start to evaluate each SINEX series. This evaluation step has been designed to check the internal continuity of the individual solutions and will be used to create weekly lists of ACs contribution to the combined solution. After delivery of an evaluation report to the ACs, combination of weekly SINEX series will be performed.

At the end of 2010, the routine combination is still in development. Meanwhile, evaluation of the first two deliveries (first six months of 2010) has been done and associated evaluation report is available for all the contributing ACs (ESA, GAU, GOP, GSC, INA, IGN and LCA).

7 Meetings

In 2010, the IDS organized the following meetings:

- DORIS Analysis Working Group Meeting, Darmstadt, Germany, 26–27 May, 2010

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- DORIS Analysis Working Group Meeting, Lisbon, Portugal, 22 October, 2010
- IDS Workshop, Lisbon, Portugal, 21–22 October, 2010

All presentations from these meetings are made available by the Central Bureau on the IDs website at <http://ids-doris.org/meetings/ids-meetings.html>.

8 Publications

In 2006, a DORIS Special Issue was published in the *Journal of Geodesy* 80(8-11), including 17 peer-reviewed articles.

A second DORIS Special Issue was published in 2010 in *Advances in Space Research* (volumes 45 and 46, issue 12). It included 22 manuscripts written by a large number of authors and co-authors from different countries.

IDS published a 2010 activity report that was broadly distributed to all DORIS participants and relevant services (see <http://ids-doris.org/report/governing-board.html#activity>).

All DORIS related articles published in international peer-reviewed journals are available on the IDS Web site <http://ids-doris.org/report/publications/peer-reviewed-journals.html>.

Conclusions

In conclusion, the DORIS community had a productive year in 2010. Seven analysis centers routinely participated in the analysis activities. The combination process has been extended to an operational service. The ACs were asked to continue their series in so far as was possible to be consistent with their ITRF2008 submissions.

A second DORIS/DGXX has been placed in orbit on board the Cryosat-2 satellite. This new receiver generation brings more data (7-channel receiver), better quality (equivalent to 0.3 mm/s) and the possibility to process these data using a GPS-type technique (access to raw DORIS phase measurement instead of Doppler data). In the near future several new satellites equipped with DGXX instruments should be launched, insuring a minimum of four DORIS satellites for the 2011–2016 time period.

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