

International DORIS Service (IDS)

Chair of the Governing Board: **Frank Lemoie** (U.S.A.)
 Director of the Central Bureau: **Laurent Soudarin** (France)

<https://ids-doris.org/>



Terms of Reference (ToR)

Accepted by the IAG Executive Committee at the XXIIIth IUGG General Assembly, Sapporo, Japan, July 1, 2003. Revised by the IDS ToR Working Group, and approved by the IDS Governing Board on, June 23, 2011.

Addenda issued by the IDS Governing Board, approved by the IAG Executive Committee at the XXVth IUGG General Assembly, Prague, Czech Republic, June 26, 2015

Introduction

The DORIS (Doppler Orbit determination and Radio-positioning Integrated on Satellite) system for satellite orbit determination and precise positioning was developed by the Centre National d'Etudes Spatiales (CNES) in conjunction with the Institut Géographique National (IGN) and the Groupe de Recherche de Géodésie Spatiale (GRGS).

A proof of concept for the International DORIS Service (IDS) was conducted through a pilot phase prior to the establishment of the International DORIS Experiment in 1999 by the International Association of Geodesy (IAG). The IDS formally began on July 1, 2003 after the IAG official approval at the IUGG General Assembly in Sapporo. The IDS is an IAG Service and operates in close cooperation with the International Earth rotation and Reference systems Service (IERS).

The IDS Mission

The primary objective of the IDS is to provide a service to support geodetic and geophysical research activities through DORIS data and derived products.

The IDS collects, archives and distributes DORIS observation data sets of sufficient accuracy to satisfy the

objectives of a wide range of applications and experimentations. From these data sets the following products are derived:

- Coordinates and velocities of the IDS tracking stations
- Geocenter and scale of the Terrestrial Reference Frame
- High accuracy ephemerides of the DORIS satellites
- Earth orientation parameters (EOPs)

The accuracies of these products are sufficient to support current scientific objectives including:

- Realization of global accessibility to and the improvement of the International Terrestrial Reference Frame (ITRF)
- Monitoring deformations of the solid Earth
- Monitoring crustal deformation at tide gauges
- Monitoring variations in the hydrosphere (sea level, ice-sheets, etc.)
- Orbit determination for scientific satellites

The IDS Organization

The IDS accomplishes its mission through the following components:

- Satellites carrying a DORIS receiver
- Network of tracking stations
- Data Centers
- Analysis Centers, Associate Analysis Centers and Analysis Coordinator
- Combination Center
- Working Groups
- Central Bureau
- Governing Board

Satellites Carrying a DORIS Receiver

Since July 2003, the CNES and the European Space Agency (ESA) have provided DORIS data to the IDS. Data from additional agencies are expected and welcome. DORIS receivers are flown on LEO satellites for precise orbit determination as well as for geodetic applications. Satellites with DORIS receivers are listed on the IDS website at <https://ids-doris.org/>.

A representative of the DORIS system serves as a voting member of the Governing Board.

Tab. 1 DORIS data available at IDS Data Centers (Jan. 2020)

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-94	Remote sensing
SPOT-3	01-FEB-94	09-NOV-96	Remote sensing
SPOT-4	01-MAY-98	24-JUN-13	Remote sensing
SPOT-5	11-JUN-02	11-DEC-15	Remote sensing
Jason-1	15-JAN-02	21-JUN-13	Altimetry
ENVISAT	13-JUN-02	08-APR-12	Altimetry, Environment
Jason-2	12-JUL-08	10-OCT-19	Altimetry
Cryosat-2	30-MAY-10	–	Altimetry
HY-2A	1-OCT-11	–	Altimetry
SARAL	14-MAR-13	–	Altimetry
Jason-3	17-JUN-16	–	Altimetry
SENTINEL-3A	16-FEB-16	–	Altimetry
SENTINEL-3B	25-APR-18	–	Altimetry

Network of Tracking Stations

The IDS network is composed of DORIS permanent tracking stations located at host institutions and maintained by the IGN. A list of the sites (past and present) is included on the IDS website at <https://ids-doris.org/>.

The network also includes additional DORIS stations proposed by the IDS to observe during specific campaigns of scientific interest. A representative of the Network serves as a voting member of the Governing Board.

Data Centers

The Data Centers are in direct contact with the CNES, which provides the DORIS data. The Data Centers archive the DORIS data, derived products, and ancillary information required to process these data.

A representative of the Data Centers serves as a voting member of the Governing Board.

Analysis Centers, Associate Analysis Centers and Analysis Coordinator

The Analysis Centers (ACs) are committed to provide at least one of the above IDS products on a regular basis. Expertise in DORIS data analysis and operational capability are essential factors in the selection of Analysis Centers. ACs adhere to IDS recommendations for the creation of high-quality products and their timely archiving and distribution. Currently, only groups providing IDS products routinely may be considered as Analysis Centers.

Tab. 2 List of IDS Analysis Centers and Associate Analysis Centers (January 2020)

Analysis Center	Country	Software
ESA/ESOC	Germany	NAPEOS
Geod. Observatory Pecny	Czech Rep.	Bernese
NASA/GSFC	USA	GEODYN
IGN	France	GIPSY/OASIS
INASAN	Russia	GIPSY/OASIS
CNES/CLS	France	GINS/DYNAMO
Associate Analysis Center		
GFZ	Germany	EPOS-OC
CNES/POD	France	Zoom
TU Delft	Netherlands	
DGFI-TUM	Germany	DOGS

The Analysis Coordinator assists the Analysis Centers and monitors their activities to ensure that the IDS objectives are carried out. The Analysis Coordinator, working with the Analysis Centers, is expected to provide quality control, performance evaluation, and continued development of appropriate analysis standards. The Analysis Coordinator, with the support of the Combination Center, is also responsible for the appropriate combination of the Analysis Centers products into a single set of prescribed data products.

The Analysis Coordinator and a representative of the Analysis Centers serve as voting members of the Governing Board.

Associate Analysis Centers provide specialized or derived products, not necessarily at regular intervals (such as precise orbits, station positions, Earth Orientation Parameters, ionospheric products, tropospheric delays, or any scientific data products of a mission specific nature). They are recognized as such by the Governing Board, upon recommendation of the Analysis Coordinator. The Associate Analysis Centers are encouraged to present their results at IDS meetings and to submit their final results in IDS Data Centers for dissemination to researchers and other users. An Associated Analysis Center (AAC) may become an Analysis Center after demonstrating its expertise and operational capability during a test period.

Combination Center

The IDS appoints a Combination Center (CC) to combine individual AC solutions and to generate IDS data products for submission to the IERS for the formulation of the periodic update of the ITRF and other geodetic products. The CC is selected by the Governing Board every four years through a Call for Participation initiated six months prior to the end of the current CC term. Interested centers submit proposals outlining their plan for operation of the CC and the resources that they will commit.

A representative of the Combination Center serves as a voting member of the Governing Board.

Working Groups

IDS Working Groups provide expertise on particular topics related to the IDS components and on development of particular IDS product(s) or service(s) relying on the IDS infrastructure.

All Working Groups are created when needed and retired by the IDS Governing Board when their work has been completed or they are no longer needed. Each Working Group must develop a charter that includes a mandate, a list of specific tasks, a schedule, and an identified Chairperson.

The Chairpersons of the Working Groups are non-voting members of the IDS Governing Board (see below).

Central Bureau

The Central Bureau (CB) is the executive arm of the IDS Governing Board and as such is responsible for the general

management of the IDS consistent with the directives, policies and priorities set by the Governing Board.

In this role the CB, within available resources, coordinates IDS activities, facilitates communications, maintains documentation, and organizes reports, meetings, and workshops. The CB responds to external inquiries about the IDS, promotes the use of IDS data and products, and coordinates interactions with other services, including the IERS.

The CB supports the Combination Center in combining the various Analysis Centers products and providing all information necessary to validate the final combined products.

The CB operates the information system for the IDS and produces the IDS Annual Reports and IDS Associates directory. The CB coordinates the publication of other documents required for the satisfactory planning and day-to-day operation of the Service, including standards and specifications regarding the performance, functionality and configuration requirements of all Service elements.

Although the Chairperson of the Governing Board is the official representative of the IDS to external organizations, the CB, consistent with the directives established by the Governing Board, is responsible for the day-to-day liaison with such organizations.

The long-term function of the IDS is assured through redundancy and emergency contingency plan for all of its components except for the CB. The Central Bureau serves for a term of four years. One year prior to the end of each term, the GB formally reviews the performance of the Central Bureau. At the behest of the GB, the CB may be asked to reconfirm its commitment to serve another four years. If the CB agrees, it submits a proposal for GB approval. If the CB declines or if the GB chooses to change CB operators, the GB announces a Call for Proposals for a new IDS Central Bureau to take over responsibilities including a six-month transition phase with the outgoing Central Bureau.

In summary, the Central Bureau performs primarily a long-term coordination role to ensure that IDS participants contribute to the Service in a consistent and harmonious manner and adhere to IDS standards.

The Director of the Central Bureau serves as a voting member of the Governing Board.

Governing Board

The principal role of the Governing Board (GB) is to set policy and to exercise broad oversight of all IDS functions and components. It also controls general activities of the Service, including restructuring, when appropriate, to maintain Service efficiency and reliability.

The Governing Board (GB) consists of eleven voting members and a number of nonvoting members. The membership is chosen to try to strike the right balance between project specialists and the general community. The voting membership of the GB is distributed as follows:

Elected by IDS Associates (see below):

Analysis Centers' representative:	1
Data Centers' representative	1
Analysis Coordinator:	1
Members-at-Large:	2

Appointed members:

Director of the Central Bureau:	1
IERS representative to IDS:	1
IAG representative to IDS:	1
Combination Center representative:	1
DORIS System representative (CNES):	1
Network representative (IGN):	1

Total number of voting members: 11

During their mandate, the Working Group chairpersons are GB members with voice but without vote.

The elected members have staggered four-year terms, with elections every two years. There is no limit to the number of terms that a person may serve, however he or she may serve only two terms consecutively as an elected member. The Analysis Center representative, the Data Center representative, and one Member-at-Large are elected during the first two-year election. The Analysis Coordinator and the other Member-at-Large are elected in the second two-year election. Although no formula is prescribed, efforts should be made to keep the GB membership properly balanced with regard to supporting organizations and geographic representation.

Members of the GB become IAG Fellows with the appropriate rights and privileges, as described on the IAG website, after an initial two-year period.

Composition of the IDS Governing Board (January 2020):

Claudio Abbondanza, NASA/JPL, USA, Member at Large
Hughes Capdeville, CLS, France, Analysis Coordination
Petr Štěpánek, Geod. Observatory Pecny, Czech Rep.,
 Analysis Coord.

Denise Dettmering, DGF/TUM, Germany, Member at
 Large

Pascale Ferrage, CNES, France, System Representative
Frank Lemoine (Chair) NASA/GSFC, Analysis Center
 Representative

Brian Luzum, GSFC, USA, IERS Representative

Guilhem Moreaux CLS, France, Combination Center Repr.

Patrick Michael, GSFC, USA, Data Flow Coordinator

Ernst Schrama, TU Delft, The Netherlands, IAG Rep-
 resentative

Jérôme Saunier, IGN, France, Network Representative

Laurent Soudarin, CLS, Director of Central Bureau

GB Elections

The GB elects a Chairperson from its members to serve a term of four years with the possibility of re-election for one additional term. The Chairperson does not vote on GB decisions, except in the case of a tie. The Chairperson is the official representative of the IDS to external organizations.

Five members of the GB are elected by the IDS Associates. A nominating committee conducts the elections for membership on the IDS Governing Board. The nominating committee consists of three members. The Chair of the nominating committee is appointed by the Chair of the GB, and must be a member of the GB not currently up for re-election. The GB chooses the remaining two members of the nominating committee from the list of IDS Associates.

The nominating committee solicits nominations from the IDS Associates for each position to be filled; at least two candidates are required for each position. The Central Bureau runs the election. All IDS Associates are eligible to vote. Election is by a simple majority of votes received for each position. The two Member-at-Large positions are filled by the two candidates receiving the most votes; a vote by the GB will resolve any situation of a tie.

Appointed Members

The IAG and IERS representatives to the IDS Governing Board are appointed by the IAG Executive Committee and by the IERS Directing Board, respectively, for a maximum of two four-year terms. The DORIS System representative and the Network representative are appointed by CNES and IGN, respectively, for four-year terms without limitation. The Director of the Central Bureau and the Combination Center representative are the two other appointed members.

In case of a resignation from the Governing Board, the CB, after consulting with the appropriate IDS components, nominates a replacement candidate for election by the GB. The replacement will serve until the end of the term of the resigned Board member.

GB Decisions

Most decisions at GB meetings are to be made by consensus or by a simple majority vote of the voting members present, provided that there is a quorum consisting of at least six voting members of the GB. GB decisions can be made through email or other correspondence by a majority vote of the GB voting membership. Changes in the IDS Terms of Reference and

Chairperson of the GB can only be made by a 2/3 majority of the members of the GB, i.e., by seven or more votes.

GB Meetings

The Board shall meet at least annually and at such other times as shall be considered appropriate by the Chairperson or at the request of three members. The Central Bureau provides the secretariat of the GB.

IDS representatives to the IERS and the IAG

Through the existing reciprocity agreement between the IDS and the IERS, the IDS Analysis Coordinator serves as the DORIS Technique Center representative to IERS, and as such, subject to Governing Board approval, is a member of the IERS Directing Board (together with another person selected by the IDS Governing Board). This arrangement ensures full cooperation between the two services.

IDS Associates

IDS Associates are persons representing organizations that participate in any of the IDS components. A participating institution can submit a person's name, email, and primary IDS function in its organization to the Central Bureau for application to become an IDS Associate, with a limit of ten. The Governing Board approves all memberships. The Governing Board reserves the right to appoint additional associates who do not participate in any IDS components but who contribute significantly to the IDS or whose activities rely on DORIS data and products. Such names are nominated directly by the IDS GB.

The Central Bureau maintains the current list of IDS Associates and makes the list available on the IDS website.

IDS Associates vote for the incoming Analysis Centers' representative, the Data Centers' representative, the Analysis Coordinator, and the Members-at-Large representatives as members of the GB.

The GB must approve the list of IDS Associates eligible for voting in the elections at least three months prior to the election process. For the purposes of the election, current and former GB members are also considered IDS Associates.

IDS Associates are considered IAG Affiliates.

IDS and DORIS quick reference list

1. **IDS website**
<https://ids-doris.org/>
2. **Contacts**
Central Bureau ids.central.bureau@ids-doris.org
Governing Board ids.governing.board@ids-doris.org
3. **Data Centers**
CDDIS: <ftp://cddis.gsfc.nasa.gov/doris/>
IGN: <ftp://doris.ensg.eu> and <ftp://doris.ign.fr>
4. **Tables of Data and Products**
<https://ids-doris.org/ids/data-products/tables-of-data-products.html>
5. **IDS web service**
<https://ids-doris.org/webservice>

DOR-O-T for DORis Online Tools (pronounced in French like the given name Dorothée) is the IDS web service developed to promote the use of the DORIS products. The current version of the service provides tools to browse time series in an interactive and intuitive way, and a network viewer.

6. Citation

The following article is suggested for citation in papers and presentations that rely on DORIS data and results: Willis, P.; Lemoine, F.G.; Moreaux, G.; Soudarin, L.; Ferrage, P.; Ries, J.; Otten, M.; Saunier, J.; Noll, C.; Biancale, R.; Luzum, B., 2016. The International DORIS Service (IDS), recent developments in preparation for ITRF2013, IAG SYMPOSIA SERIES, 143, 631-639, DOI: [10.1007/1345_2015_164](https://doi.org/10.1007/1345_2015_164)



7. DORISmail

The DORIS mail service is used to send information of general interest to the DORIS community. To send a DORISmail, use the following address: dorismail@ids-doris.org

8. List of the documentation

It gives a table compiling links to the various pages providing documents, grouped in four categories: DORIS system components; IDS information system; Publications, presentations; Documents

<https://ids-doris.org/ids/reports-mails/documentation.html>

9. List of presentations given at DORIS or IDS meetings

Full list of presentations given at DORIS or IDS meetings with the corresponding access links

<https://ids-doris.org/ids/reports-mails/meeting-presentations.html>

10. List of documents and links to discover the DORIS system

<https://ids-doris.org/analysis-coordination/documents-related-to-data-analysis.html>

11. List of DORIS publications in international peer-reviewed journals

<https://ids-doris.org/ids/reports-mails/doris-bibliography/peer-reviewed-journals.html>

12. Overview of the DORIS system

<https://www.aviso.altimetry.fr/en/techniques/doris.html>

13. Overview of the DORIS satellite constellation

<https://ids-doris.org/doris-system/satellites.html>

14. Site logs

DORIS stations description forms and pictures from the DORIS installation and maintenance department:

<https://ids-doris.org/doris-system/tracking-network/site-logs.html>

15. Virtual tour of the DORIS network with Google Earth

Download the file at <https://ids-doris.org/doris-system/tracking-network/network-on-google-earth.html> and visit the DORIS sites all around the world.

16. IDS video channel

Videos of the DORIS-equipped satellites in orbit

<https://www.youtube.com/channel/UCiz6QkabRioCP6uEjkKtMKg>

17. IDS Newsletters

Find all the issues published in color with live links on the IDS website

<https://ids-doris.org/ids/reports-mails/newsletter.html>

18. Photo Gallery

<https://ids-doris.org/ids/gallery.html>

