



Contents

General Announcements	3
Activities of IAG Commission 1 "Reference Frames" in the term 2015-2019	3
IDS Combination Center - Call for participation	3
IDS election announcement	5
IDS Newsletter #2.....	5
Videos of the DORIS-equipped satellites in orbit (to watch and to create) online on the IDS video channel	5
Meeting Announcements	6
20th International Workshop on Laser Ranging	6
IDS workshop.....	7
IAU Symposium 330.....	7
Meetings Calendar	8
41st COSPAR Scientific Assembly	8
AOGS 13 th Annual Meeting.....	8
IAG Commission 4 „Positioning and Applications” Symposium.....	8
18th General Assembly of WEGENER.....	8
ION GNSS+ 2016.....	8
16 th International Mine Surveying Congress.....	8
GGHS2016.....	8
13 th European VLBI Network (EVN) Symposium	8
4 th International School on “The KTH Approach to Modelling the Geoid”	9
First International Workshop on VLBI Observations of Near-field Targets	9
20th International Workshop on Laser Ranging.....	9
ICTRS 2016.....	9
INTERGEO, Geodätische Woche	9
5th International VLBI Technology Workshop.....	9
RFI 2016: Coexisting with Radio Frequency Interference.....	9
GGOS Days	9
IDS Workshop.....	9
SAR Altimetry Workshop.....	9
OSTST 2016.....	9
SIRGAS2016.....	9
IGNSS 2016	9
AGU 2016 Fall Meeting	9
EGU General Assembly 2017	10
IAU Symposium 330	10
23rd Working Meeting of the European VLBI Group for Geodesy and Astrometry (EVGA)	10
EUREF 2017 Symposium	10
FIG Working Week 2017.....	10
TransNav 2017	10
IAG and IASPEI Joint Scientific Assembly.....	10
AOGS 14 th Annual Meeting.....	10
Workshop on Glacial Isostatic Adjustment and Elastic Deformation	10
AGU 2017 Fall Meeting	10
EGU General Assembly 2018	10
AOGS 15 th Annual Meeting.....	10
10 th IVS General Meeting.....	10
42nd COSPAR Scientific Assembly.....	10
IAU XXXth General Assembly	11
21 st International Workshop on Laser Ranging.....	11
AGU 2018 Fall Meeting	11
EGU General Assembly 2019	11
27th IUGG General Assembly	11
AOGS 16 th Annual Meeting.....	11
Reports	11
Geoid Schools at the International Service for the Geoid	11

The *IAG Newsletter* is under the editorial responsibility of the *Communication and Outreach Branch* (COB) of the IAG.

It is an open forum and contributors are welcome to send material (preferably in electronic form) to the IAG COB (newsletter@iag-aig.org). These contributions should complement information sent by IAG officials or by IAG symposia organizers (reports and announcements). The *IAG Newsletter* is published monthly. It is available in different formats from the IAG new internet site: <http://www.iag-aig.org>

Each *IAG Newsletter* includes several of the following topics:

- I. news from the Bureau Members
- II. general information
- III. reports of IAG symposia
- IV. reports by commissions, special commissions or study groups
- V. symposia announcements
- VI. book reviews
- VII. fast bibliography

General Announcements

Activities of IAG Commission 1 "Reference Frames" in the term 2015-2019

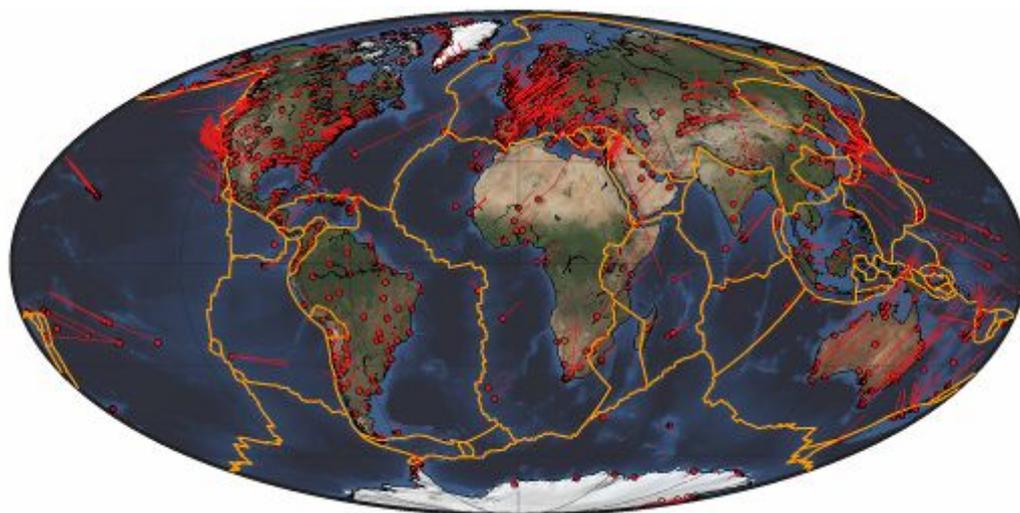
Reference systems and frames are of primary importance for Earth science based research and applications, satellite navigation as well as for practical applications in geoinformation. A precisely defined reference frame is needed for an improved understanding of the Earth's rotation and its gravity field, sea level change with time, tectonic plate motion and deformation, glacial isostatic adjustment, geocentre motion, deformation due to Earthquakes, local subsidence and other crustal displacements.

Commission 1 activities and objectives deal with the theoretical aspects of how best to define reference systems and how reference systems can be best realized and used for practical and scientific applications. This covers the definition, establishment, maintenance and improvement of geodetic reference frames along with the development of advanced terrestrial and space observation techniques. Commission 1 objectives do also comprise promoting the definition and establishment of vertical reference systems at global level, considering the advances in the regional sub-commissions.

Commission 1 is closely linked to the other IAG Commissions, to ICCT, and to all established IAG Services (IVS, IGS, IDS, ILRS and the IERS) including their Working Groups and Combination Centers. Additionally, it will build new links to activities such as Relativistic Geodesy with height measurements by frequency comparisons of atomic clocks or the co-location in space with new missions like GRASP or E-GRASP/Eratosthenes. Commission 1 is identical with Sub-commission B2 of COSPAR.

In the term 2015-2019, Commission 1 will consist of four Sub-Commissions with in total eight Working Groups, one Joint Study Group, and five Joint Working Groups. The Sub-Commissions are: SC 1.1: Coordination of Space Techniques (Chair: Urs Hugentobler), SC 1.2: Global Reference Frames (Chair: Xavier Collilieux), SC 1.3: Regional Reference Frames (Chair: Carine Bruyninx) and SC 1.4: Interaction of Celestial and Terrestrial Reference Frames (Chair: Zinovy Malkin). Sub-Commission 1.3 also includes the regional entities for Europe, South and Central America, North America, Africa, Asia-Pacific, and Antarctica.

A website for Commission 1 has been set up at <http://iag.geo.tuwien.ac.at/c1>. We plan to hold a Commission 1 Meeting on Reference Frames for Applications in Geosciences (REFAG) in autumn 2018.



ITRF2014 velocities as provided at http://itrf.ign.fr/ITRF_solutions/2014/
(this plot was created at TU Wien)

JOHANNES BÖHM

IDS Combination Center - Call for participation

Summary

The International DORIS Service (IDS) invites proposals for the successor to the current Combination Center starting in 2017 for a four-year term.

Background

The IDS Combination Center (CC) combines individual solutions of IDS Analysis Centers (ACs) (i.e. time series of SINEX files including station position and Earth orientation parameters) and generates IDS data products (combined SINEX files and relevant geodetic products) for submission to the International Earth rotation and Reference systems Service (IERS) for the formulation of the periodic update of the International Terrestrial Reference Frame (ITRF). A representative of the Combination Center serves as a voting member of the Governing Board.

Specific CC tasks

- Generating combined IDS products on a regular basis (every 3 months, starting in March 2017)
- Participating in meeting of the Analysis Working Group (1-2 meetings per year)
- Participating in IDS Workshops (1 every two years)
- Developing new research activities and participating in specific IDS campaigns
- Providing combined IDS products for the IDS Website
- Providing an annual report to IDS
- Participating and suggesting IDS outreach activities

Potential candidates are encouraged to contact the current IDS Combination Center (Guilhem Moreaux <gmoreaux @ cls.fr> at CLS) and/or the IDS Governing Board (Laurent Soudarin <laurent.soudarin @ cls.fr> or Pascal Willis <pascal.willis @ ign.fr>) for any technical question related to this call for participation.

Responses

Expressions of interest should be addressed to the IDS Central Bureau at [ids.central.bureau @ ids-doris.org](mailto:ids.central.bureau@ids-doris.org) together with the following information:

- names of key personnel
- level of support to be provided
- computing system and available software package to be used and other technical information
- planned starting date of operation
- duration of commitment (at least 4 years)

This proposal should contain:

- letter of intent (1 page max) signed by the director of the institute or the director of the department
- a short technical description (2 pages max)

Schedule

- 15 October 2016: submission deadline of letter of intent
- 01 November 2016: selection of the new IDS Combination Center by the IDS Governing Board and announcement during the IDS Workshop in La Rochelle
- 01 January 2017: start of the four-year term of the CC, overlap with current IDS CC and validation phase
- 20 March 2017: delivery of first operational products by the new IDS CC

References

Moreaux, G.; Lemoine, F.G.; Capdeville, H.; Kuzin, S.; Otten, M.; Ľ tĂ^ŰpĂ~nek, P.; Willis, P.; Ferrage, P., in press. The International DORIS Service contribution to the 2014 realization of the International Terrestrial Reference Frame, ADVANCES IN SPACE RESEARCH, DOI: 10.1016/j.asr.2015.12.021

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

LAURENT SOUDARIN
Director of IDS Central Bureau

IDS election announcement

The terms of three members of the IDS Governing Board will end in December 2016:

- Data Center representative (currently Carey Noll, NASA/CDDIS),
- Analysis Center representative (currently Pascal Willis, IGN-IPGP),
- Member-at-large (currently R. Biancale, CNES/GRGS).

IDS Associates are invited to propose candidates for the three open positions for the next 4-year term 2017-2020.

Persons wishing to apply can express their intent to one of the IDS Associates whose names are listed on the IDS website at <http://ids-doris.org/organization/associate-members.html>. Propositions of the IDS Associates will be collected by the Nominating Committee formed for the elections up to September 15. A short CV (1 page) will be requested.

Elections by the IDS Associates will be held in early October for two weeks so that the three new elected members could attend the Governing Board meeting (with voice but without vote) to be held on October 31 in La Rochelle, France, in conclusion of the IDS Workshop 2016 <http://ids-doris.org/report/meeting-presentations/ids-workshop-2016.html>

The Governing Board meets at least annually, usually twice in conjunction with meetings of the Analysis Working Group and IDS Workshop. The principal role of the Governing Board 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.

Questions regarding these elections may be directed to the IDS Central Bureau at [ids.central.bureau @ ids-doris.org](mailto:ids.central.bureau@ids-doris.org)

LAURENT SOUDARIN

IDS Newsletter #2

The International Doris Service publishes its second newsletter (July 2016).

This Newsletter aims to provide regular information on the Doris system and the life of the International DORIS Service (IDS) to a wide audience, from the host agencies to the other sister services. The premiere issue published in April 2016 features the new station in Goldstone, the new receivers onboard Jason-3 and Sentinel-3A, and the IDS contribution to ITRF2014. The second issue contains three articles “Nepal Earthquakes moved the DORIS station on Everest by a few centimetres”, “DORIS-VLBI compatibility tests at the Geodetic Observatory Wettzell”, “DORIS in Managua”, and a short report of IDS Analysis Working Group meeting at the TU Delft.

The newsletter is published in color with live links on the IDS website at:

<http://ids-doris.org/report/newsletter.html>

LAURENT SOUDARIN

Videos of the DORIS-equipped satellites in orbit (to watch and to create) online on the IDS video channel

With the objective of helping DORIS data analysts in the understanding of attitude laws and solar panel orientation and rotation of the DORIS-equipped satellites, CNES has provided to IDS:

- videos showing the satellites in 2D and 3D environments,
- predefined scenarios for the DORIS missions to be used with VTS (Visualization Tool for Space Data), a free software of CNES.

All of this material, as well as the link to the VTS website, is available on the IDS webpage

<http://ids-doris.org/satellites.html>

You can also watch the videos on the IDS video channel
<https://www.youtube.com/channel/UCiz6QkabRioCP6uEjkKtMKg>

LAURENT SOUDARIN

Meeting Announcements

20th International Workshop on Laser Ranging
"The Path Toward the Next Generation Laser Ranging Network"
October 9-14, 2016

GFZ Potsdam and the International Laser Ranging Service (ILRS) are pleased to announce that the 20th International Workshop on Laser Ranging will be held in Potsdam Germany during the week of October 09-14, 2016 at GFZ Potsdam, Telegrafenberg, Building H, Lecture Hall.

PROGRAM TOPICS:

- Advances in laser ranging technology and new applications
- Co-locations and other intra- and inter-technique calibrations
- Strategies and priorities for laser ranging
- Understanding and addressing SLR station systematics
- Progress in laser ranging analysis
- Current trends in lunar ranging
- SLR tracking of space debris
- Automation of laser ranging systems
- Interplanetary ranging and time transfer
- Advances in retroreflector arrays and their modeling
- Station clinics
- Poster sessions
 - ILRS station posters: Progress, developments, and plans at current and future ILRS Stations;
 - ILRS mission posters: Current missions - status of the missions, benefit provided by ILRS services; future needs; Future missions - status, plans, and requirements;
 - Addendum posters to the oral sessions
 - General topics in laser ranging

Oral sessions for the workshop will include a keynote talk, short presentations, and discussion leading to recommendations where appropriate. Station representatives are **STRONGLY** encouraged to submit posters detailing progress at and plans for their stations. Similarly, the program committee requests posters from contacts for missions tracked by the ILRS to let us know how we are doing in our support of these missions and what is being done with the data provided.

The local organizing committee has created a web portal for meeting registration:

<http://iwslr2016.gfz-potsdam.de/international-workshop-on-laser-ranging>

REGISTRATION

Registration for IWSLR participants is now open through the workshop website. The registration fee is 200 Euro.

We urge attendees to **REGISTER EARLY!** Attendees can pay this fee by credit card (Visa, Mastercard, American Express) until September 25, 2016. Following that time, the registration fee must be paid in cash at the reception desk.

After a successful registration, attendees can view additional information, make a hotel reservation, and submit abstracts.

PROGRAM COMMITTEE:

- Graham Appleby (UK)
- John Degan (USA)
- Ludwig Grunwaldt (Germany)
- Georg Kirchner (Austria)
- Cinzia Luceri (Italy)
- David McCormick (USA)
- Carey Noll (USA)
- Toshi Otsubo (Japan)
- Erricos Pavlis (USA)
- Mike Pearlman (USA)
- Ulli Schreiber (Germany)
- Andrey Sokolov (Russia)
- Zhang Zhongping (China)

IMPORTANT DATES

- Registration and abstract submission is now open. The abstract submission deadline is Sunday, September 7, 2016 23:59 UTC.
- A limited number of rooms in hotels at a special rate are reserved until August 15. Details about the hotel reservation are available only after registration.

If you have any questions, please contact:

Ludwig Grunwaldt (GFZ, Coordinator of Program Committee) at: grun [at] gfz-potsdam.de or the organizing committee at: iwslr2016-organizers [at] gfz-potsdam.de

We look forward to meeting you in October!

CAREY NOLL

IDS workshop

La Rochelle, France

October 31- November 1, 2016

The *IDS workshop 2016* will be held in La Rochelle, France,

in conjunction with the *2016 Ocean Surface Topography Science Team (OSTST) meeting* and a *SAR Altimetry Workshop*.

As a reminder, the 3 events representing "New era of altimetry, new challenges" will be held at Espace Encan in La Rochelle, France, from 31 October to 4 November 2016.

Logistical details are available on the meeting website <http://www.ostst-altimetry-2016.com>

The IDS workshop will highlight current developments and the status of scientific results that use DORIS data, and will provide a platform for discussion and coordination of future activities.

LAURENT SOUDARIN

IAU Symposium 330

Nice, France

April 24-28, 2017

We are pleased to announce the opening of the registration for the IAU symposium 330 - Astrometry and Astrophysics in the Gaia sky, to be held in Nice (France), from 24-28th April 2017.

The goal of this IAU symposium is to ensure the world-wide sharing of the Gaia mission results, foster international collaborations and discussions that will enhance the Gaia scientific return. This symposium will

mark the first step of the Gaia revolution in astrometry, our understanding of the Milky Way galaxy, stellar physics and the Solar system bodies. The astrometry and reference frames science will be one of the conference highlights. The Gaia DR1 is indeed confirmed for the end of summer 2016. It will include the five-parameter astrometric solution - positions, parallaxes, and proper motions - for 2.5 million stars in common between the Tycho-2 Catalogue and Gaia (TGAS).

All these topics will be at the heart of the interdisciplinary scientific discussions of the symposium. We indeed hope to bring together the diverse scientific communities that will be impacted by the Gaia data. The conference will also be a tribute to Francois Mignard, expert in astrometry and reference frames, and chair of the Gaia Data Processing and Analysis Consortium since its formation and until the end of 2012.

Please visit the IAUS 330 website for more information: <http://iaus330.sciencesconf.org/>

The deadline for abstract submission and early registration are December 4, 2016 and January 10, 2017, respectively.

We are looking forward to seeing you in Nice in April 2017!

Alejandra Recio-Blanco, Anthony Brown and Timo Prusti (for the SOC)
Patrick de Laverny (for the LOC)

Meetings Calendar

41st COSPAR Scientific Assembly

July 30 – August 7, 2016, Istanbul, Turkey

URL: <http://www.cospar-assembly.org/>

AOGS 13th Annual Meeting

July 31 – August 5, 2016, Beijing, China

URL: <http://www.asiaoceania.org/aogs2016/>

IAG Commission 4 „Positioning and Applications“ Symposium

September 4-7, 2016, Wroclaw, Poland

URL: <http://www.igig.up.wroc.pl/IAG2016/>

18th General Assembly of WEGENER

September 12-15, 2016, Azores, Portugal

WEGENER 2016: Understanding earth deformation at plate boundaries

URL: <http://wegener.segal.ubi.pt>

ION GNSS+ 2016

September 12-16, 2016, Portland, USA

URL: <http://www.ion.org/gnss/index.cfm>

16th International Mine Surveying Congress

September 12-16, 2016, Brisbane, Australia

URL: <http://www.ism2016.com/>

GGHS2016

September 19-23, 2016, Thessaloniki, Greece

URL: <http://www.gghs2016.com>

13th European VLBI Network (EVN) Symposium

September 20-23, 2016, St. Petersburg, Russia

URL: <http://www.ipa.nw.ru/EVN2016/>

4th International School on “The KTH Approach to Modelling the Geoid”

September 25-29, 2016, Johor Bahru, Malaysia

URL: <https://www.kth.se/en/abe/inst/som/avdelningar/geo/geodesi/handelser-1.78120>

First International Workshop on VLBI Observations of Near-field Targets

October 5 – 6, 2016, Bonn, Germany

URL: <http://ivscc.gsfc.nasa.gov/meetings/index.html>

20th International Workshop on Laser Ranging

October 9 – 14, 2016, Potsdam, Germany

URL: <http://iwslr2016.gfz-potsdam.de/international-workshop-on-laser-ranging>

ICTRS 2016

October 10 – 11, 2016, Milan, Italy

URL: <http://www.ictrs.org/>

INTERGEO, Geodätische Woche

October 11 – 13, 2016, Hamburg, Germany

URL: <http://www.intergeo.de/>

5th International VLBI Technology Workshop

October 12 – 14, 2016, Haystack Observatory, Westford, MA, USA

URL: <http://www.haystack.mit.edu/workshop/ivtw2016/Index.htm>

RFI 2016: Coexisting with Radio Frequency Interference

October 17 – 20, 2016, Socorro, NM, USA

URL: <http://go.nrao.edu/rfi2016>

GGOS Days

October 24 – 28, 2016, Cambridge, MA, USA

URL: <http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html>

IDS Workshop

October 31 – November 1, 2016, La Rochelle, France

URL: <http://ids-doris.org/meetings/ids-meetings.html>

SAR Altimetry Workshop

October 31 2016, La Rochelle, France

URL: <http://www.aviso.altimetry.fr/en/news/events-calendar.html>

OSTST 2016

November 1 – 4, 2016, La Rochelle, France

URL: <http://ids-doris.org/meetings/ids-meetings.html>

SIRGAS2016

November 16 – 18, 2016, Quito, Ecuador

URL: www.sirgas.org

IGNSS 2016

December 6 - 8, 2016, Sydney, Australia

International Global Navigation Satellite Systems 2016 Conference

URL: <http://www.ignss2016.unsw.edu.au>

AGU 2016 Fall Meeting

December 12 – 16, 2016, San Francisco, California, USA

URL: <http://meetings.agu.org/upcoming-meetings/>

EGU General Assembly 2017

April 23-28 , 2017, Vienna, Austria

URL: <http://www.egu2017.eu/>

IAU Symposium 330

April 24-28 , 2017, Nice, France

URL: <http://iaus330.sciencesconf.org/>

23rd Working Meeting of the European VLBI Group for Geodesy and Astrometry (EVGA)

May 15-19 , 2017, Gothenburg, Sweden

URL: <http://iag.dgfi.tum.de/index.php?id=291>

EUREF 2017 Symposium

May 24 – 26, 2017, Wroclaw, Poland

URL: http://www.euref.eu/euref_symposia.html

FIG Working Week 2017

May 29 – June 2, 2017, Helsinki, Finland

URL: <http://www.fig.net/fig2017/>

TransNav 2017

June 21 – 23, 2017, Gdynia, Poland

URL: <http://transnav2017.am.gdynia.pl>

IAG and IASPEI Joint Scientific Assembly

July 30 – August 4, 2017, Kobe, Japan

URL: <http://iag.dgfi.tum.de/index.php?id=291>

AOGS 14th Annual Meeting

August 6-11, 2017, Singapore, Singapore

URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

Workshop on Glacial Isostatic Adjustment and Elastic Deformation

September 5-7, 2017, Reykjavik, Iceland

URL: <http://www.polar.dtu.dk/english/Workshop-on-Glacial-isostatic-adjustment-and-elastic-deformation-2017>

AGU 2017 Fall Meeting

December 11-15, 2017, New Orleans, LA, USA

URL: <https://meetings.agu.org/>

EGU General Assembly 2018

April 8-13 , 2018, Vienna, Austria

URL: <http://www.egu2018.eu/>

AOGS 15th Annual Meeting

June 3-8, 2018, Hawaii, USA

URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

10th IVS General Meeting

June 3-8, 2018, Longyearbyen, Spitsbergen, Norway

URL: <http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html>

42nd COSPAR Scientific Assembly

July 14-22, 2018, Pasadena, CA, USA

URL: <https://cosparhq.cnes.fr/events/scientific-assemblies>

IAU XXXth General Assembly

August 20-31, 2018, Vienna, Austria

URL: <http://astronomy2018.univie.ac.at/>

21st International Workshop on Laser Ranging

October 27-31, 2018, Canberra, Australia

URL: <http://www.iers.org/IERS/EN/NewsMeetings/ForthcomingMeetings/forthcoming.html>

AGU 2018 Fall Meeting

December 10-14, 2018, Washington, D.C., USA

URL: <https://meetings.agu.org/>

EGU General Assembly 2019

April 7-12, 2019, Vienna, Austria

URL: <http://www.egu2019.eu/>

27th IUGG General Assembly

July 8 – 17, 2019, Montreal, Canada

URL: <http://www.iugg.org/assemblies/>

AOGS 16th Annual Meeting

July 28 – August 2, 2019, Singapore, Singapore

URL: http://www.asiaoceania.org/society/public.asp?view=up_coming

Reports

Geoid Schools at the International Service for the Geoid

ISG has been founded in 1992 (as International Geoid Service – IgeS by prof. Fernando Sansò) as a working arm of International Geoid Commission (IGeC), and it is actually an official Service of the International Association of Geodesy (IAG). (President: Mirko Reguzzoni, Director: Giovanna Sona)

In 2003, a new unified IAG Service for the Gravity Field has been created to coordinate and integrate broad gravity field activities: the International Gravity Field Service (IGFS). The activities coordinated by IGFS are developed by many Centres: International Gravimetric Bureau (BGI), International Service for the Geoid (ISG), International Geodynamics and Earth Tide Service (IGETS), International Centre for Global Earth Models ([ICGEM](#)) and International DEM Service (IDEMS).

ISG' activities are on educational, research, and data distribution sides: principal purposes of ISG are the collection and distribution of geoid models, the collection and distribution of software for geoid computation, the organization of technical schools and training on geoid determinations.

At present the following scientists are ISG advisors:

N. Pavlis (USA), M. Sideris, J. Huang (Canada), R. Forsberg (Denmark), U. Marti (Switzerland), H. Denker, L. Sanchez (Germany), I. Tziavos (Greece), W. Kearsley (Australia), D. Blitzkow (Brazil), F. Sansò (Italy), R. Barzaghi (Italy).

One of the main tasks of ISG consists in organizing or supporting technical schools on geoid estimation and related topics, to be held possibly every two years.

The First International School for the Determination and Use of the Geoid was organized in Milan in 1994, and since then many [other editions of the School followed](#), held in many countries, with the support of local organizing committees.

The following table shows the years, the locations, the number of participants and the number of involved countries of the past editions of the International Geoid School :

year	1994	1997	1999	2000	2002	2005	2006	2008	2009	2010	2013
location	Italy	Brazil	Italy	Malaysia	Greece	Hungary	Denmark	Italy	Argentina	Russia	Ecuador
student	34	31	23	41	30	49	24	25	23	15	15
countries	17	13	12	13	13	19	15	12	5	5	9

During the schools both theoretical and practical aspects are illustrated, and students are trained in the use of the relevant software for geoid computation.

The general purpose of the full-week intensive Geoid School is to prepare new graduate students, young scientists, employees of national agencies and services or industry staff, to compute and use gravimetric geoids for scientific and technical applications in geodesy, primarily in transforming ellipsoidal (GPS) heights into orthometric ones. The School provides a good opportunity to familiarize with the latest development in geoid determination, and to improve international contacts and collaborations among scientists dealing with gravity field modelling.

The School is structured in a way to be self-contained for any participant at graduate level with basic knowledge of geodesy. Theoretical lectures are followed by computer exercises based on the available software.

The lectures are given according to the following general scheme, distributed over a full week:

- introduction to physical geodesy and to collocation theory in geoid computation;
- computation and use of high degree and ultra-high degree geopotential models;
- geoid computation using Stokes' integral;
- terrain effects in geoid estimation;
- FFT techniques in geodesy.
- some seminars on specific topics (e.g. height datum unification).

Lecture notes of the courses are distributed to the participants as well as a CD containing software and exercises. The CD containing software and examples on geoid computation, as well as the lecture notes, can be [requested through the ISG website](#), under the same restrictions applied when distributed during the geoid schools: freely available after a declaration stating for non commercial use of the software.

The 12th International Geoid School in Mongolia

The last School was organized in Ulaanbaatar, Mongolia in June, 2016. This was stated during the IAG/IUGG meeting 2015 in Prague by IAG and ISG, and it was the 12th of the series.

As officially stated by ISG, the school was entitled to Carl Christian Tscherning who passed away in 2014. Thus, starting from this school, to honor him, the IGS Geoid School will be named "***Tscherning Geoid School***".

This geoid school was the second one in Asia after the one held in Johor-Baru (Malaysia) at the Department of Survey and Mapping, 21 - 25 February, 2000. Thus, this school was important in order to establish again new contacts in this important area of the world. Furthermore, the central topic of the school, i.e. the estimation of the geoid, is strictly related to height determination and height system unification that are important subjects of particular relevance in Mongolia.

To prepare this Geoid School, a Local Organizing Committee (LOC) was established, constituted by representatives from the Mongolian University of Science and Technology (MUS) and MonMap Engineering Services Co., Ltd, as local hosting organizations, and the Mongolian Association of Geodesy, Photogrammetry and Cartography (MAGPC), the Administration of Land Affairs, Geodesy and Cartography (ALAGAC) and the Ministry of Construction and Urban Development (MCUD) as local supporting organizations.

A dedicated web site for this Geoid School was established at the address: www.monmap.mn/geoidschool2016/

In February, 2016 advertising through Internet started and since February to June it had over 300 access.

Over 100 online registration form submissions were registered, but many of willing participants from developing countries were not able to attend due to lack of budget and travel support.

Finally, the total number participants of this Geoid School was 30, consisting of 15 domestic and 15 foreigner people coming from 9 different countries: Bhutan, China, India, Latvia, Mongolia, Philippines, Poland, Russia and Sri Lanka.

The International Geoid School was held in Ulaanbaatar, in June 6 -10. 2016 at the campus 5 of the Geodesy Department of MUST (in a student training class room with 30 computer terminals).

Five teachers were invited from Canada, Denmark, Italy and USA to give lectures and practical exercises during four full day's sessions. During the last day a final session was held for summarizing all the school topics. During this session, the training certificates were distributed to the people attending the school.

The teachers that gave their lessons during the school were:

Prof.R.Barzaghi, Politecnico di Milano, Italy
Prof.F.Sansò, Politecnico di Milano, Italy
Prof.R.Forsberg, National Space Institute, Denmark
Prof.M.Sideris, Univ.of Calgary, Canada

Dr.S.Holmes, SGT Inc. USA.

The detailed program of the week :

Sunday, June 5 - Arrival

Afternoon – The sightseeing tour

Monday, June 6 –Registration and Opening session

08:00 AM – 09:00 AM – Registration at the Geodesy Department,1st floor, Campus 5 Building, MUST

MORNING SESSION - LECTURE 1:

GENERAL THEORY ON GRAVITY FIELD (F. SANSÒ)

09:00 AM-10:30 AM – Lecture 1 (A)

10:30 AM-11:00 AM – Tea break

11:00 AM-12:30 PM – Lecture 1 (B)

12:30 PM-01:30 PM – Lunch

AFTERNOON SESSION – LECTURE 2:

THE HEIGHT DATUM UNIFICATION (M.SIDERIS)

01:30 PM-03:00 PM – Lecture 2 (A)

03:00 PM-03:30 PM – Tea break

03:30 PM-05:00 PM – Lecture 2 (B)

Tuesday, June 7 - Sessions

MORNING SESSION – LECTURE 3:

TERRAIN EFFECT COMPUTATION AND REMOVE/RESTORE (R.FORSBERG)

09:00 AM-10:30 AM – Lecture 3 (A)

10:30 AM-11:00 AM – Tea break

11:00 AM-12:30 PM – Lecture 3 (B)

12:30 PM-01:30 PM – Lunch

AFTERNOON SESSION – PRACTICAL EXERCISES 1:

TERRAIN EFFECT COMPUTATION AND REMOVE/RESTORE (R.FORSBERG)

01:30 PM-03:00 PM – Practical exercises 4 (A)

03:00 PM-03:30 PM – Tea break

03:30 PM-05:00 PM – Practical exercises 4 (B)

06:30 PM – ICE BREAKER DINNER

Wednesday, June 8 - Sessions

MORNING SESSION – LECTURE 4:

RESIDUAL GEOID ESTIMATION (R.BARZAGHI)

09:00 AM-10:30 AM – Lecture 5 (A)

10:30 AM-11:00 AM – Tea break

11:00 AM-12:30 PM – Lecture 5 (B)

12:30 PM-01:30 PM – Lunch

AFTERNOON SESSION – PRACTICAL EXERCISES 2:

RESIDUAL GEOID ESTIMATION (R.BARZAGHI)

01:30 PM-03:00 PM – Practical exercises 6 (A)

03:00 PM-03:30 PM – Tea break

03:30 PM-05:00 PM – Practical exercises 6 (B)

Thursday, June 9 - Sessions

MORNING SESSION – LECTURE 5:

GLOBAL GEOPOTENTIAL MODELS (S.HOLMES)

09:00 AM-10:30 AM – Lecture 7 (A)

10:30 AM-11:00 AM – Tea break

11:00 AM-12:30 PM – Lecture 7 (B)
12:30 PM-01:30 PM – Lunch

**AFTERNOON SESSION – PRACTICAL EXERCISES 3:
GLOBAL GEOPOTENTIAL MODELS (S.HOLMES)**

01:30 PM-03:00 PM – Practical exercises 8 (A)
03:00 PM-03:30 PM – Tea break
03:30 PM-05:00 PM – Practical exercises 8 (B)

Friday, June 10 - Summary session
GhinggisKhaan hotel , 5th Floor, The II Khaad room

MORNING SESSION – PRESENTATIONS AND CASE STUDIES

09:00 AM – 10:30 AM – From Terrestrial to Airborne Gravimetry: One Small Leap for Spherical Harmonic Models by (Dr. Simon Holmes)
10:30 AM – 11:00 AM – Coffee break
11:00 AM – 11:45 AM – Presentation on the case study: The Geoid of Mongolia by R. Forsberg, S. Kenyon, M.Saandar and D. Munkhtsetseg
11:45 AM- 12:00 PM – Estimation of the Vertical Transformation between the MONGEOID2012 and Mongolian Baltic Sea Level Datum using ArcGIS: Preliminary version by K.M Kelly and M. Saandar
12:00 PM- 01:00 PM – Q&A AND FINAL DISCUSSIONS.
The certificate of training and wrapping up.

Saturday, June 11 – Departure

An ice-brokeed dinner and two sightseeing tours were organized by LOC, for the Geoid School participants (just before and after the School), and photos of the Geoid School participants and social activities were collected.



Mongolian University of Science and Technology (MUST)
N: 47° 55' 39", E: 106° 56' 35"



Photo 1. Opening session by Dr. Saandar and Prof. Fernando Sansò



Photo 2. Training sessions



Photo 3. Group photo



Photo 4. Summary session and handover the certificate

GIOVANNA SONA