

## IAGA, the International Association of Geomagnetism and Aeronomie

is the premier international scientific association promoting the study of terrestrial and planetary magnetism and space physics

## Foreword



This issue of IAGA News contains information about IAGA activities throughout 2022. I am happy to report that several topical workshops sponsored by IAGA took place in person again, for the first time after the start of the pandemic.

Read reports from these workshops in section 4. Moreover, find information about the preparations for the IUGG General Assembly in July 2023 in Berlin, Germany (section 2). We all hope that a strong in-person participation will be possible and look forward to seeing you there next year! This newsletter further contains reports on IAGA activities of different kinds and remembers several IAGA scientists who passed away over the past year. The reader is also referred to the IAGA website and social media (see below) for more on IAGA and for updates between the annual Newsletters.

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IAGA News is distributed – in its electronic form – to the National Correspondents in the Member Countries, to all IAGA officers and to IAGA scientists who have attended recent IAGA assemblies. Please feel free to distribute IAGA news around, mainly to the national policy makers and leaders, whose decisions can affect the activities of IAGA.

Monika Korte  
Secretary-General

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## IAGA on the Web

Information on IAGA is regularly updated at the IAGA site:

<http://www.iaga-aiga.org/>

## 1 Message from the President

I became the President of IAGA three and half years ago, and one pleasure of my position has been the ability to interact with and learn from researchers from all fields of our associations. Therefore, this is again a good occasion to write to you, since sadly I cannot meet you in person, over a complicated COVID-period.



After a long, confusing period of remote working and virtual meetings, we have moved to in-person post-COVID activities. Events and meetings are now allowed without capacity limits or physical distancing requirements for attendees. The “return to normalcy” post-COVID has been discussed ad nauseum both within and outside of our community. There is of course much to consider in this regard for IAGA main activities such as research, teaching, and service. In my estimation, no aspect of research life will be slower developing than the return to in-person meetings and conferences. This is due to the location-specific nature of the events and their relative infrequency compared to the day-to-day research activities post-pandemic. In-person opportunities will be more impactful than ever in the short-term. With this in mind, we should focus on how to maximize the opportunities for the early years of this transition. This year, we slowly moved to some in-person meetings and workshops supported by IAGA, about which there is more information later in this Newsletter.

In this same vein, we do not wish to pass on the opportunity presented by in-person events, such as our next major one: the 28th IUGG General Assembly that will be held 11-20 July 2023 in Berlin, Germany. Jürgen Müller has been working tirelessly as Chair of the Scientific Program Committee, along with Monika Korte, IAGA Secretary General and the Secretaries-General of the other Associations, to ensure an attractive scientific program. Harald Schuh, as Chair of the Local Organizing Committee, has continuously

taken actions to offer us the possibility to enjoy the Berlin-Brandenburg region, one of the largest geoscientific clusters in the world. The Local Organizing Committee prepares an exciting program for young scientists – to provide them with opportunities for exchange, presentation, and discussion beyond the scientific sessions.

Associated with the IUGG General Assembly we will have a new edition of the IAGA School, based on the outstanding success of the previous Schools. I would like to thank in advance all those who have agreed to give up their time to contribute to the 6<sup>th</sup> IAGA School, which will be held in early July 2023 at the Niemegk geomagnetic observatory of GFZ – near to and just before the IUGG General Assembly.

Finally, I would like to thank you all for the superb support that you have given to IAGA throughout the past year. Special thanks to our early career scientists, who are very active; due to their efforts, IAGA is now present on social media. Take a tour on Facebook, Twitter, Instagram, Blog, and share your research or enjoy the latest news!

This will be my last message as IAGA President. It has been my privilege to serve you for the last three and a half years or so, together with a very active Executive Committee and especially Secretary-General and Treasurer. I will continue to serve IAGA as an ex-officio member of the IAGA Executive Committee or simply in my capacity as a scientist.

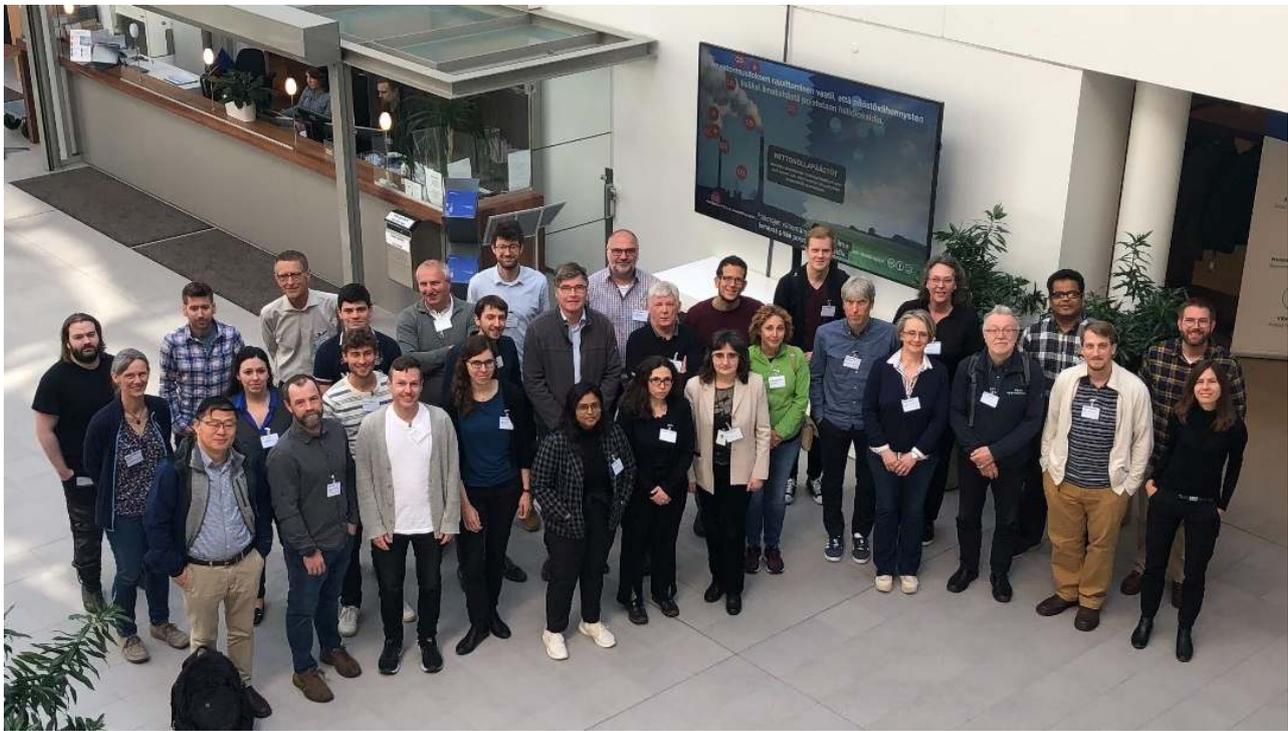
I wish you all the best for the New Year and I look forward to seeing as many of you as are able to attend in Berlin next summer.

Mioara Mandea  
President

## 2 Preparations for the IUGG General Assembly 2023

As one of the eight associations of the International Union of Geophysics and Geodesy (IUGG), IAGA is looking forward to the 28<sup>th</sup> IUGG General Assembly (IUGG2023), which will be held from 11 to 20 July 2023 in Berlin, Germany. After more than two years of pandemic, when direct personal scientific interactions were severely limited, we are looking forward to a lively in-person meeting that provides opportunities for





Participants of the 11<sup>th</sup> Workshop on Long-term Changes and Trends in the Atmosphere.

There were given over 50 scientific presentations on

- a) observed and modelled trends and long-term variations in the middle atmosphere;
- b) trends and long-term changes in the ionosphere and thermosphere;
- c) dynamic, physical, chemical and radiative mechanisms of trends and long-term variations;
- d) role of the middle atmosphere for climate.

As a specific feature of this workshop, two side meetings were organized by SPARC during the same week: Atmospheric Temperature Changes (ATC) and Long-term Ozone Trends and Uncertainties in the Stratosphere (LOTUS).

A special issue of Atmospheric Chemistry and Physics is planned. The workshop program and the book of abstracts is available on the [website of the workshop](#)<sup>6</sup>.

Viktoria Sofieva  
On behalf of the Local Organizing Committee

## 4.2 8<sup>th</sup> IAGA/ICMA/SCOSTEP Workshop on Vertical Coupling in the Atmosphere-Ionosphere System

July 6 - 10 (Sopron, Hungary)

The 8<sup>th</sup> IAGA/ICMA/SCOSTEP Workshop on Vertical Coupling in the Atmosphere-Ionosphere System took place at the Institute of Earth Physics and Space Science in Sopron, Hungary on 6-10 July 2022. The workshop program and the abstracts are available at the homepage of the [VCAIS workshop](#)<sup>7</sup>.

This traditional meeting brought together scientists with different backgrounds from the lower-middle- and upper neutral atmosphere, iono-

sphere and magnetosphere communities in order to present their recent work and discuss ongoing issues relating to theoretical, modelling and observational aspects of all kind of processes which transfer energy and momentum from the lower atmosphere to the upper atmosphere and ionosphere and vice versa.

For the first time, the workshop was conducted in a hybrid format due to the ongoing COVID-19 pandemic. In combination with the current



Participants present in person and by video conference of the 8<sup>th</sup> IAGA/ICMA/SCOSTEP Workshop on Vertical Coupling in the Atmosphere-Ionosphere System.

political situation several of our colleagues from China, Russia, and also North and South America expressed their regret for not being able to attend the meeting. However, the audience consisted of 41 participants (20 online) from 29 institutions across 20 countries in Europe, Asia, and America. During the duration of the workshop, 39 presentations were given: 5 solicited talks, 28 oral, and 6 poster/pico presentations. Further, we conducted two open discussion rounds in order to enhance the exchange between online and onsite participants.

Especially after the pandemic with a significantly reduced scientific exchange, we reserved several time slots for discussions, poster inspections and support of PhD students and young scientists during the time in Sopron.

Since our last meeting in Potsdam, Germany in 2018, considerable progress has been achieved in observing and quantifying the variability through

out the atmosphere-ionosphere system driven by dynamical coupling, as well as identifying their respective driving mechanisms. Special attention has been paid to space weather effects on the upper neutral atmosphere and ionosphere from both theoretical and experimental sides. Further central topics dealt with the occurrence and morphology of several types of ionospheric irregularities, the impact of geological processes like Hunga Tonga volcano eruption on the upper atmosphere and also the diverse types of atmospheric waves and their crucial role in the atmosphere system have been intensively discussed.

I like to highlight an outstanding presentation of the PhD student Jinee Gogoi entitled: "A comprehensive study of Sudden Stratospheric Warming (SSW) events and their effects on the ionosphere".

The participants agreed on the idea of having a topic-related special issue in *Frontiers of Astron-*

omy and Space Science. The submission is already open also for other scientists dealing with atmospheric coupling processes. The deadline for submission is expected to be in February 2023.

Dr. Christina Arras  
Chair of the Scientific Organizing Committee  
Dr. Veronika Barta  
Chair of the Local Organizing Committee

### 4.3 Biennial Symposium “EMSEV 2022” – ElectroMagnetic Studies of Earthquakes and Vulcanoos

August, 22 - 24 (Taiwan)

From August 22 to 24, 2022, EMSEV2022 was held at National Central University in Taiwan. The meeting was initially scheduled for the summer of 2020 but was postponed for two years due to COVID-19. Regarding the postponement, there was an idea to postpone it for one year, but the IAGA-IASPEI Joint Scientific Assembly was postponed to the summer of 2021 due to the influence of COVID-19, so the EMSEV General Assembly will be postponed for two years to avoid overlapping.

EMSEV2022 was planned mainly by Professor J. Y. Liu of National Central University (NCU), Taiwan (EMSEV Bureau, IAGA liaison). Originally EMSEV2022 was scheduled from August 22 to 26. The last two days have originally planned a visit to the Taiwan Volcano Observatory (TVO) on August 25 and a visit to the 921 Chi-Chi Earthquake Museum on August 26. However, due to the low number of participants from overseas, they were canceled. The meeting was held both face-to-face and online using the Webex system provided by CISCO.

EMSEV2022 was hosted by NCU and co-sponsored by Academia Sinica and NCU Space Physics and Engineering Center.

During EMSEV2022, six sessions were organized:

- Session 1 Electromagnetic methods for seismicity and volcano monitoring
- Session 2 Theoretical and laboratory studies for understanding seismic and volcanic phenomena
- Session 3 Satellite observations for volcanic and seismic hazard assessment and monitoring
- Session 4 Earthquake and volcano related phenomena investigation by multidis-

ciplinary and multiparametric approaches

- Session 5 Magnetospheric, ionospheric, atmospheric, and lithospheric coupling
- Session 6 Electromagnetic signals associated with earthquakes and volcanic eruptions

In addition, a special session, “Hunga Tonga Hunga Ha’apai volcano eruption on January 15, 2022” was held. Incidentally, this Tonga eruption special session was held as all invited lectures.

The final submitted abstracts were 60. The number of participants was slightly over 80. There were 10 participating countries and regions (Taiwan, China, USA, Japan, France, Italy, Russia, Greece, India, and Fiji).

- [Program of EMSEV 2022](#)<sup>8</sup>.

Some speakers were asked to give lectures early in the morning or late at night due to the time difference, but they were held without any problems. Finally, EMSEV2022 has successfully been held thanks to the excellent work of Professor Liu et al.

After the scientific session, on September 9, a bureau meeting was held to summarize the meeting and discuss the venue of the 2024 EMSEV General Assembly.

Professor S. Kumar of The University of the South Pacific in Fiji and Professor F. Vallianatos of the National and Kapodistrian University of Athens in Greece have proposed to invite the next EMSEV General Assembly, therefore the bureau asked them to give the presentations.

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Athens in Greece have proposed to invite the next EMSEV General Assembly, therefore the bureau asked them to give the presentations.

- [Proposal of Professor Kumar<sup>9</sup>](#)
- [Proposal of Professor Vallianatos<sup>10</sup>](#)

Both proposals were extremely attractive, and it was difficult to decide which was better. However, since EMSEV2022 was mainly organized through networks, many bureau members wanted to hold a face-to-face meeting next time.

It is unknown what the pandemic will be like in two years, however, most bureau members believe that it will be easier to travel to Greece in comparison with Fiji. Therefore, we agreed that EMSEV2024 will be held in Crete, Greece in late September 2024.

Toshiyasu Nagao  
EMSEV chair

#### 4.4 The 17<sup>th</sup> Castle Meeting

August, 28 - September, 3 (Trakošćan, Croatia)



I would first like to draw attention to the great tradition and significance of this prestigious series of international meetings called “Castle meeting”. It was started by Professor Eduard Petrovsky from Prague, who is the original creator

of this series of conferences, and it started way back in 1988, when the 1<sup>st</sup> Castle meeting was held in Liblice in the Czech Republic. Until 2014, Castle gatherings were organized every two years alternately in the Czech Republic and Slovakia, and since that year they have been held in a different country each time - so far Portugal, Belgium and Poland have participated, and this year the host was Croatia (17<sup>th</sup> Castle meeting), and was held from August 28 to September 3, 2022 in Trakošćan, which is famous due to the nicest and best preserved castle in Croatia. The gathering was organized through the Ruđer Bošković Institute from Zagreb, Croatia, and the president of the Local Organizing Committee was Dr.sc. Stanislav Frančišković-Bilinski from the Division

for Marine and Environmental Research of the RBI.

The name “Castle meeting” came from the fact that the first gatherings of this series were held in old castles in the Czech Republic and Slovakia, and even after hosting the conference in other countries, this tradition was maintained, which Professor Petrovsky pays special attention to - it is always held in or near some castle, or a fortified old town, and therefore Trakošćan was indeed an ideal location for its maintenance. Castle meetings are organized under the auspices of the International Association for Geomagnetism and Aeronomy (IAGA), and represent the most important meeting place of the world’s most famous scientists dealing with the field of magnetism in the geosciences (Earth’s magnetic field, rock magnetism, paleomagnetism, environmental magnetism).

These meetings gained a worldwide reputation, especially due to the pleasant and relaxed atmosphere, which has always combined scientific work with an excellent social program consisting of local tours, cultural events, food and drink tastings, etc. During the 17<sup>th</sup> Castle meeting two nice excursions have been organized and among other things participants visited Varaždin - the nicest town of the Northern Croatia famous for its baroque, new world famous Krapina Neanderthal and evolution museum, Veliki Tabor Castle, a traditional feast in Desinić, wine tastings at Zlatne Gorice and Vuglec Breg. The final event of the meeting was the farewell dinner at Vuglec Breg winery, during which winners of best presentations of young scientists have been announced.

The participants of the Castle meeting series were very diverse: from respected professors and international recognized experts, to doctoral and master’s students, and many of the latter later developed into good and well-known scientists. Castle meetings are ideal training for young colleagues - they learn to act as meeting leaders, be evaluated for their work and nominated for an IAGA award, etc. It should also be noted how many work collaborations and projects have been established here, and numerous personal friendships.

Castle meetings have successfully “survived” over three decades with regular meetings every two years, with one exception: the 17<sup>th</sup> Castle meet-



Conference participants in front of the Krapina Neanderthal and evolution museum during the final excursion (Friday, September 2, 2022).

ing in Croatia was supposed to take place in 2020, but due to the pandemic, it was postponed for two years and moved to this year, 2022. This year's meeting was very successful and gathered over 100 participants from 22 countries - the list of countries with the number of participants: Czech Republic 15, Germany 15, Spain 11, Italy 9, France 7, Netherlands 5, Bulgaria 4, Croatia 4, Poland 4, United Kingdom 4, Belgium 3, Brazil 3, Norway 3, Portugal 3, Austria 2, Mexico 2, Switzerland 2, China 1, Greece 1, Serbia 1, Sweden 1 and USA 1.

During the 2 days prior to the start of the 17<sup>th</sup> Castle meeting, a short course related to it was held - a summer school called: "Short course on the use of magnetic susceptibility in Earth Sci-

ences", which had 25 participants - students and young scientists who want to start to engage more seriously in this field of science and learn the basics of these methods. The course was coordinated by Professor Bjärne Almqvist from Sweden, and was taught by 8 world-renowned scientists, and one of the lecturers was the organizer of the 17<sup>th</sup> Castle meeting, Ph.D. Stanislav Francišković-Bilinski.

The participants of both events were extremely satisfied with their stay in Croatia and the organization of the Croatian hosts, and the next one, the 18<sup>th</sup> Castle meeting, will be held in Utrecht in the Netherlands.

Stanislav Franciskovic-Bilinski  
Ruđer Bošković Institute, Zagreb, Croatia

#### 4.5 Report on the Course "Radiation Belt Dynamics and Remote Sensing of the Earth's Plasmasphere" of the International School of Space Science

September, 26 - 30 (L'Aquila, Italy)

The course "Radiation Belt Dynamics and Remote Sensing of the Earth's Plasmasphere" of the International School of Space Science took place at the University of L'Aquila (Italy) over the period 26 - 30 September, 2022. It was directed by János Lichtenberger (Eötvös Loránd University Budapest, Hungary), Geoffrey Reeves (Los Alamos National Laboratory, USA) and Massimo Vellante (University of L'Aquila, Italy).

The course consisted in 15 lectures of 90 minutes length (including questions and discussion) given by 15 leading scientists of the sector (7 from Eu-

ropean institutions, 7 from USA and 1 from New Zealand). It provided an overview of the current knowledge of a key Space Weather region, the radiation belts and in particular on its related energization and loss processes due to wave-particle interactions and particle precipitation into the atmosphere. It also covered several aspects of the plasmasphere dynamics and the interrelationship between these two magnetospheric regions. A few lectures were also dedicated to illustrate the use of the most advanced techniques of data analysis for the detection and quantification of the

phenomena under study. All lessons will be also available at the [ISSS website](#)<sup>11</sup>.

The course was attended by 33 students (29 in presence and 4 online) selected on the basis of their curriculum: 12 were from Italy, 13 from other European countries, 3 from USA, 2 from Brazil, 1 from Australia, 1 from Algeria and 1 from India. Most of them (18) were PhD students. The students had also the opportunity to

present their recent research activity in the form of posters which were displayed near the conference hall for the whole duration of the course. The course took place in a friendly atmosphere with continuous opportunities for close interactions among students and lecturers.

Massimo Vellante  
Director of the Course

## 5 IAGA Division, Commission and Working Group Updates

### 5.1 Division V

Working Group V-OBS is organizing the two upcoming geomagnetic observatory workshops at Sopron and Tihany, Hungary, from May 22 to 26, 2023 as well as at Vassouras, Brazil, in 2024. Working Group V-DAT keeps working on topics regarding geomagnetic field data and indices, and also discussing data DOI. Working Group V-MOD has been active regarding reference geomagnetic field models: International Geomagnetic Reference Field (IGRF) and World Digital Magnetic Anomaly Map (WDMAM). The present IGRF-13 model is performing well.

Masahito Nosé  
Chair of IAGA Division V

### 5.2 Working Group Social Media

As a subset of the cross-division working group, the IAGA Social Media Working Group is continuing to work hard to bring news, updates, and promote the work of IAGA members on Twitter, Instagram, Facebook, LinkedIn, YouTube, and on our blog. This is our second year of existing as a working group and we have had a great year expanding our work through new projects. Highlights of the group include:

- Katia Pinheiro has overseen the creation of an outreach film describing the “Magnetic Mosaic” of the Earth. Despite 972 submissions to the Earth Futures Festival from 89 countries, Magnetic Mosaic was short-listed into the top 3 films in the “Women in GeoScience” category and came 5<sup>th</sup> in the People’s Choice award. A truly fantastic

achievement and the video can be viewed on the website of the [Earth Future Festival](#)<sup>12</sup>.

- The IAGA blog has been going strong and published three blog posts a month for the last year. Highlights have included experiences from PhD students, Sci-Fi film analysis, and promotion of IAGA supported events. Thanks to all the writers who have been involved and a special thank you to the head blog editor, Shivangi Sharan. If you would like to write a blog, irrespective of the length, then please get in touch at: [iagasocialmedia@gmail.com](mailto:iagasocialmedia@gmail.com).
- The IAGA Social Media team is growing in number and platforms! Our YouTube will also see more activity from the new year and Sarasija Sanaka has set up a LinkedIn profile for IAGA members to connect in new ways. Please consider linking with IAGA for more updates and links to the IAGA community at [LinkedIn](#)<sup>13</sup>.
- IAGA is continuing to produce outreach videos with Katia Pinheiro and Shivangi Sharan winning an outreach Grant from the IUGG. The selected IUGG project will include a documentary and short movies connecting a variety of subjects under the 8 associations. The documentary will be about the structure and science of IUGG while the short movies will contain interviews of Early Career Researchers (ECRs). This will be finished by early 2023 and broadcast at IUGG 2023 in Berlin. Watch any of our social media platforms for more details on this!

- Another exciting opportunity for IUGG 2023 in Berlin is an ECR networking event which will link to one of the Big Themes at the conference. The SM WG is involved in the organisation of this and more details will be released ASAP!

The Social Media WG are always willing to promote papers, research, outreach, conferences, workshops and other relevant material. Please get in touch if you are interested in contributing as a one-off time or in being a longer term member of the group. We hope to see you promoting the work of IAGA members online (and in-person!) very soon!

Hannah F. ROGERS  
Co-Chair IAGA WG Social Media

## 6 IAPS - IAGA interaction

Since July 2021, the International Association of Physics Students (IAPS) has established a formal collaboration with the International Association of Geomagnetism and Aeronomy (IAGA). IAPS is a student-run educational association that aims to encourage students in academic and professional growth as well as build connections between physics students to break social and cultural barriers.

IAPS is hosting several annual events to give students the opportunity to connect and gain new experiences. As part of the cooperation with IAPS, IAGA supported the most recent edition of "PLANCKS" in 2022 in Munich (Germany), which is an international theoretical physics competition of four to five days for Bachelor and Master students. Besides the core of this event, the competition, there are numerous excursions and cultural activities in the host country. PLANCKS offers physics students from all over the world the opportunity to have a unique experience of solving diverse physics problems as a team and exchanging ideas and experiences with the other participants.

Further, IAGA has not only supported IAPS through PLANCKS, but we have also organized events collaboratively. In August 2021 we organized the IAPS@IAGA event, a lecture seminar

that covered a range of interesting topics from ancient magnetic fields over machine learning in geoscience to black auroras in form of lectures and discussions. Highly positive feedback has been received for the event type and interest in the fields of physics, IAGA is engaging with, has been raised amongst our membership.

Additionally, IAGA established contacts with potential speakers with high expertise and reputation in their field of research to be involved in IAPS events. The most recent event organized by IAPS was "IAPS4Materials" together with the Institute of Physics (IOP) in London in November this year. For this event, we had the opportunity to invite one of the leading researchers in the field of Earth Sciences from the University of Oxford. This gave the participants of our event a unique insight into possible career paths as a scientist in the field of natural and material science based on a panel discussion.

IAPS currently includes approximately 90 000 members all around the globe, reaching from bachelor students up to Ph.D. students. The cooperation between IAGA and IAPS ensures that the departments represented by IAGA receive greater visibility. In particular, we try to give young students who have not yet specialized the opportunity to come into contact with as many different disciplines as possible within the framework of events. We hope to make the study of magnetism and aeronomy of the earth and other bodies in the solar system more visible, in particular as these topics have become increasingly relevant in recent decades and there is a greater need than ever for young dedicated researchers to conduct research and work on some of humanity's greatest challenges. In summary, we as the International Association of Physics Students share similar values with IAGA, especially international exchange and networking within a scientific community, and are proud to be able to maintain such an intensive collaboration. We are looking forward to the next year of lively exchange and joint events and especially to the 150<sup>th</sup> anniversary.

Maurice Rieger  
IAGA Liaison Officer at IAPS

## 7 In Memorium

### Josef Boška (1947-2022)

Dr. Josef Boška (born 13 May 1947) passed away on 22 November 2022. Josef was an excellent researcher motivated by his enormous curiosity. He devoted his life to ionospheric research and operation of ionosonde and digisonde in Průhonice Observatory.



He loved the wild part of the botanical garden where the observatory is located. At his core, he was a scientist who never stopped thinking about why nature works in such a way. After receiving his degree he was working in the Geophysical Institute and later in the Institute of Atmospheric Physics, Czech Academy of Sciences in Prague. He was active in IAGA, URSI, SCOSTEP and European COST communities. Beside being a great and curious scientist, he was an excellent flamenco guitar instrumentalist. Flamenco was his life's love. Josef enjoyed many things in his life. He loved science, music, books, art and good wine. Those of us who knew and interacted with him over many years lost a good friend, passionate and formidable colleague. He stayed a tenacious and curious scientist till his last days.

Petra Koucká Knížová  
Institute of Atmospheric Physics  
Czech Academy of Sciences

### Roberto Stanley Molina Garza (1960-2021)

We are deeply saddened to inform that our dear friend and esteemed colleague Roberto Molina Garza passed away unexpectedly on Tuesday December 29, 2021. He was a professor at the Centre for Geosciences, Universidad Nacional Autónoma de México (UNAM). He studied geophysical engineering and a master's in sciences at UNAM and obtained his PhD from the University of Michigan, Ann Arbor, with a thesis on paleomagnetic studies of the tectonic rotation of the

Yucatan Block and opening of the Gulf of Mexico and on magnetostratigraphy of the Kiaman superchron.

He then moved to the University of New Mexico in Albuquerque and joined the paleomagnetic research group of John Geissman, where he continued his research on paleomagnetism, tectonics and magnetostratigraphy. He loved challenges and was a resourceful and creative researcher.

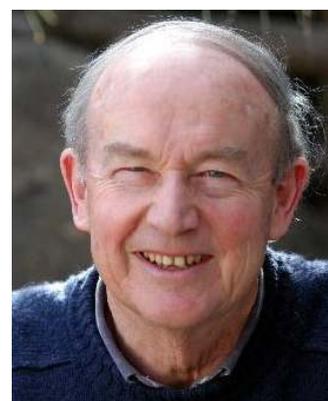
After several years, he moved back to Mexico, to the UNAM Centre of Geosciences in Juriquilla in central Mexico, where he continued to expand his interests, applying paleomagnetic methods to an increasing number of geological and tectonic problems. He was a devout mentor forming a group of students from different countries while developing a network of collaborators. He devoted time and energy to promote international collaboration and was active member of the American Geophysical Union, Geological Society of America, Union Geofísica Mexicana and Latin-Mag, serving on the committees and as associate editor.

Roberto was an outstanding scientist and a generous committed mentor and friend, who enjoyed life, family and work. He will be greatly missed by his sons, family, students and friends.

Jaime Urrutia Fucugauchi  
National University of Mexico UNAM

### Frederick Edward Mulhearin Lilley (1940-2022)

F.E.M. (Ted) Lilley, a pioneer of electromagnetic induction studies in Australia, passed away on 4 July 2022 in Canberra following some years living with cancer. Ted's life-long study of geomagnetic-field changes with time and space helped build a new understanding of the electrical structure of the Australian continent and fuelled his



wonder at being able to measure geophysical processes in the Earth.

Ted was born in Tasmania. After graduating from Hutchins School in Hobart he won an Australian Atomic Energy Commission cadetship to undertake a BSc (Honours) degree at the University of Sydney between 1957 and 1960.

Upon graduation, Ted joined the Bureau of Mineral Resources (BMR) Airborne Group in Melbourne. The Group was then pioneering airborne magnetic-field measurements in Australia using a World War II-era DC3 aircraft (VH-MIN) and AN/ASQ-8 fluxgate magnetometer originally developed for maritime patrol and submarine detection applications. Ted led field testing of newer, lighter BMR-designed MNZ1 proton-precession magnetometers in a smaller, more-maneuvrable Cessna 180-B aircraft (VH-GEO).

In the early 1960s Ted began an MSc and PhD program at the University of Western Ontario. Here he initially continued working in aeromagnetism, investigating the practical problem of how flight direction affected the detection of magnetic anomalies on the ground. His later doctoral research, on "Magnetoelastic effects in a non-uniform field", investigated how seismic waves travelling through Earth's core would be affected by the intense and highly non-uniform magnetic fields there. This interest in core studies was further fuelled by Sir Edward Bullard during post-doctoral research at the University of Cambridge. Here his investigation of models of fluid flow in Earth's core required the use of the recently built IBM 360/model 91 computer at the NASA Goddard Space Flight Center, at that time the most powerful in operation.

Ted returned to Australia in 1968 to take up a research position in the Australian National University (ANU) Department of Geophysics and Geochemistry. Established by John Conrad Jaeger in 1952, the Department became the Research School of Earth Sciences (RSES) in 1973 with Anton Hales its first Director. Some of the buildings used to house the new Research School included weatherboard-style buildings from the old Canberra Hospital that originally occupied that part of the ANU campus. For the latter part of Ted's tenure at RSES he and his students occupied what was once a maternity ward of the old hospital. While at RSES, Ted delivered ten PhD

graduates and three Honours graduates.

His research there studied the electrical structure of the Australian continent. Initially Ted and his first students used instruments they had built themselves, and then a sabbatical by Ian Gough from the University of Alberta gave access to a pool of 25 instruments, which he later encouraged RSES to copy. These magnetometers recorded magnetic-field variations at field sites for weeks or months at a time. After a survey, each instrument had metres of photographic film that needed to be developed, measured and transcribed to useful numbers for analysis. Ted's Research Assistant Merren Sloane managed this process meticulously.

Ted and his early students Hans Tammemagi, Dave Bennett and Dennis Woods deployed arrays of these instruments in central and southern Australia. They collected magnetic-field data across the south of the Northern Territory and western Queensland, extending to much of South Australia, western and southern New South Wales, all of Victoria, and northern Tasmania. These studies found large electrical conductivity anomalies in the Flinders Ranges of South Australia, the Eromanga Basin in southwest Queensland and the Otway Ranges of southern Victoria. They also found evidence of the "coast effect" in which magnetic-field changes are affected by the strong contrast in electrical conductivity between the continent and the ocean.

In the early 1980s, Ted, B.P. Singh, Baldev Arora and other Indian collaborators used the ANU magnetometers to investigate electrical conductivity anomalies in India. This work identified a major conductor running from the Himalayan foothills southwest towards Delhi, and another running between the southern coast of India and Sri Lanka. Ted always remembered fondly the wonderful hospitality he enjoyed in India, and the chai breaks on trips through the mountains.

The 1980s also brought new students - Ian Ferguson, Nathan Bindoff, Richard Kellett and Graham Heinson. With them, and in collaboration with Jean Filloux from Scripps Institution of Oceanography, Phil Mulhearn from the Royal Australian Navy Research Laboratory, and Tony White from Flinders University, Ted's research began to focus more offshore. Seafloor instruments were deployed off the New South Wales coast using

the naval oceanographic vessel HMAS Cook, the CSIRO research vessel RV Franklin, and a lobster fishing boat out of Ulladulla. They provided the opportunity to study the electrical conductivity of oceanic crust, the electrical and pressure signatures of ocean tides and currents, and the “coast effect” from the ocean side. These new data permitted the first computer models of the electrical structure of the Tasman Sea to be developed using the “thin-sheet” modelling method developed by John Weaver’s group at the University of Victoria, British Columbia.

Into the 1990s, with his final students Robert Corkery, Liejun Wang and Adrian Hitchman, Ted’s research began to bring together some of his work of the past two decades. Rob and Liejun worked with Ted to amalgamate data from all the Australian array studies, including by Francois Chamalaun, Charlie Barton, Tony White and Peter Milligan, to build the first conductivity model of the entire continent. With Adrian, Ted investigated how all this electrical structure might affect aeromagnetic survey data.

Through the 2000s, Ted worked with John Weaver on the inventive use of Mohr circles in the analysis of magnetotelluric data, and authored book chapters, review papers, and, increasingly, articles about boats and yachting – a lifelong passion.

Ted and Penny, his wife and steadfast supporter of 59 years, built a loving, nurturing family life in the Canberra suburb of Aranda with their children Matthew, Jo and Jim. Together they were valued members of their neighbourhood, suburb, school and church communities. Their home was renowned for its warm hospitality, for over 50 years welcoming many visitors, new arrivals to the city, academics and students.

Ted considered himself very fortunate in the colleagues with whom he shared the pleasures and satisfaction of making geophysical studies in Australia, once observing that science is best when it is done with one’s friends. Ted’s colleagues describe him as famously patient, utterly kind, generous and gentlemanly, a mentor and champion, a supreme communicator, always generous with wise counsel, encouragement and carefully considered comment, a scientist to emulate, a strong influence not only on careers but on lives.

Ted is survived by Penny, Matthew, Jo and

Jim, their spouses Elizabeth, Josh and Jane, and grandchildren Lucinda, Francis, Charles, Sophia, Gabriel, Molly, Freya and Eliza. He will also be ever present in the lives of his students and colleagues around the world.

Vale Ted.

Adrian Hitchman  
Geoscience Australia

## Özden Özdemir (1946-2022)

The geomagnetism and paleomagnetism community lost one of its most cherished members this past June. Dr. Özden Özdemir suffered a severe stroke at the home of her brother Hakan in Los Gatos, California and never



regained consciousness. She passed away peacefully the following day, one day short of her 76<sup>th</sup> birthday. For those of us who cared for her, she left us far too soon.

Özden was born in Uskudar (Istanbul) Turkey and completed her undergraduate and master’s degrees at Istanbul University, where she is still fondly remembered. For her Ph.D. degree, she left Turkey for Newcastle-upon-Tyne, UK, then a mecca for the rapidly developing new science of rock and paleomagnetism. She returned to Turkey for a few years as a docent at Istanbul Technical University, then moved to the University of Minnesota, USA, Memorial University of Newfoundland, Canada, and finally in 1983 to the University of Toronto, where she remained for the rest of her career.

Özden was a superb experimentalist, who sought nothing short of perfection in her work. Her friend and mentor, Dr. Subir Banerjee, once said of her, “Özden would let nothing come between her and the results of an experiment”. I can testify to this, having on one occasion, a long-term oxidation experiment on titanomagnetites, shared four long days and nights in and out of a shielded room with her, tending her precious samples. Over four decades, generations of graduate students learned

from her, raised their experimental standards to meet hers, and on occasion brought their personal problems to her sympathetic ear. She was never too busy to listen.

Professionally Özden made her mark with groundbreaking studies in the physics of rock magnetism. In the 1970's she codified the magnetic properties of titanomagnetites with compositions like those that record seafloor spreading; this work remains a fundamental mainstay in the field. In the 1980's she initiated the earliest studies of soil magnetism, now a major field of interest in biogeomagnetism. (When Subir Banerjee asked her to undertake this work, she reportedly said, "You mean dirt is magnetic?!") The 1980's also saw her seminal work on chemical remanent magnetization. The most memorable result was the observation that seafloor basalts can undergo remarkably high degrees of oxidation without losing the direction of their primary thermal magnetization – good news for the preservation of magnetic stripe anomalies over the oceans.

In the 1990's, Özden turned her attention to producing crystal clear photos of magnetic domain walls in magnetite, both pure crystals and inclusions in and accessories to silicate minerals. One of these photos can be seen on the cover of the textbook she co-authored in 1997, *Rock Magnetism: Fundamentals and Frontiers*. For this book alone, she deserves to be remembered, but her experimental trajectory was far from over. Some of her most lasting work from the 1990's and 2000's dealt with hallmarks of oxidation and domain state evident in low-temperature experiments on magnetite and hematite. With the advent of Martian missions, she was increasingly excited about the role of hematite, a weakly magnetic mineral with very long-lasting magnetization. She had notebooks full of data gathered at our second home, the Institute for Rock Magnetism at the University of Minnesota, which she always hoped to find time to write up.

With the passing of Özden Özdemir, we have also seen the end of an era, when fledgling researchers designed and built their own instruments for specialized experiments and laboriously produced magnetic samples from what sometimes seemed like black magic recipes. Off-the-shelf did not exist for the most part and some might argue that our work was more carefully thought through

as a result. Özden was the experimentalist extraordinaire. Her work and her sunny personality will be missed deeply.

David J. Dunlop  
University of Toronto

## Hans Zijdeveld

With sadness we let you know that Hans Zijdeveld has passed away at home on February 26<sup>th</sup>, at the age of 88 years. Hans was the first head of the Paleomagnetic Laboratory Fort Hoofddijk (Utrecht University, The Netherlands) established by professors M.G. Rutten (Geology) and J. Veldkamp (Geophysics) in 1963. Fort Hoofddijk is eminently suited for paleomagnetic measurements, and since 2021 belongs to a Unesco World Heritage site (New Dutch Waterline). Hans started as an assistant to Professor Veldkamp, and headed Fort Hoofddijk until 1995 when he retired early. He defended his PhD thesis on the paleomagnetism of the Permian Estérel rocks (southern France) in 1975, and was appointed as professor in 1981. Some more details can be found in the *Catalogus Professorum* of Utrecht University, while the history of Fort Hoofddijk and Hans Zijdeveld is described in detail in a paper of Dekkers, Langereis and Van der Voo (1997). Hans was elected AGU Fellow in 1993.



Before being focused in Fort Hoofddijk, paleomagnetism in the Netherlands was done at the Royal Netherlands Meteorological Institute (since 1953) and Hans was already part of it. In the early days of his career he worked with Jo As to develop very sensitive astatic magnetometers, but most importantly they developed the alternating field (or alternating current) demagnetization method (As and Zijdeveld, 1958). By selectively cleaning the weakest magnetic components in rocks through stepwise progressive demagnetization a more trustworthy determination of the strongest component was possible

(now typically called the Characteristic Remanent Magnetization or ChRM). Hans Zijdeveld became famous because of his article "A.C. Demagnetization of rocks: Analysis of results" in 1967, a chapter in the book *Methods in Palaeomagnetism*. This seminal paper describes the so-called Zijdeveld diagram and has been cited widely. The Zijdeveld diagram has become the standard method to view and interpret the different superimposed components during progressive stepwise demagnetization.

He was among the first, especially in his work with Rob van der Voo, to recognize rotations of micro-plates, like the rotations of Sardinia (Zijdeveld et al., 1970, *Nature*), Iberia (PhD thesis R. van der Voo, *Tectonophysics*, 1969) and the Italian peninsula (PhD thesis Peter Scheepers). Much more work especially in the Mediterranean would follow, resulting in an overview of Paleomagnetism in the Mediterranean Area (Vandenberg and Zijdeveld, 1982).

An important topic of his research concerned the rock magnetic properties of natural rocks and a considerable number of PhD theses under his supervision were devoted to this subject (Peter Dankers, Bob Hartstra, Mark Dekkers, Adrie van Velzen, Cor de Boer). Also in his own thesis on the Esterel rocks he did many rock magnetic experiments to determine the properties of the min-

erals carrying the NRM.

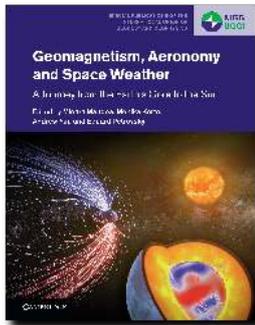
Hans Zijdeveld in his earlier work devoted many studies to old rocks (Permian, Triassic), notably red beds and lavas which were strong enough to be measured on astatic magnetometers. Upon the acquisition of an RF SQUID cryogenic magnetometer (the first in Europe) and later a DC SQUID magnetometer (the first in the world), he decided to investigate much younger rocks (Miocene and Pliocene sediments), initially in the context of IGCP Project no. 1, 'Accuracy in Time'. This led to a renewed interest in magnetostratigraphy both of Miocene (PhD theses Cor Langereis, Wout Krijgsman) and Pliocene (Zijdeveld et al., 1991, *EPSL*) sediments in the Mediterranean. Most importantly, the collaboration with the paleontology group in Utrecht, and notably with Frits Hilgen, led to the development of the astronomically (calibrated) polarity time scale (APTS) which has now become the standard in the geological time scale for the Neogene and Paleogene periods (Hilgen et al., 2004; *The geologic time scale*, 2020).

We remember Hans Zijdeveld as an excellent supervisor, a careful and critical observer and a researcher with integrity who has greatly inspired us.

Cor Langereis, Mark Dekkers and Wout Krijgsman

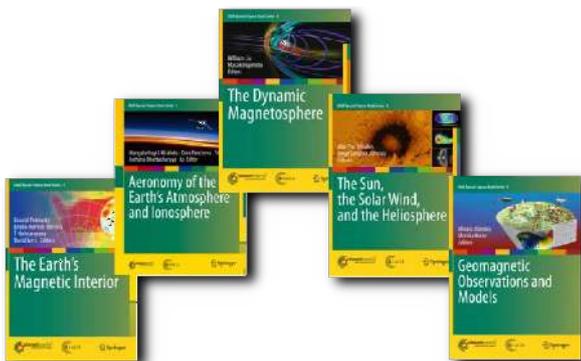
## 8 General Information about IAGA

### 8.1 Book: Geomagnetism, Aeronomy and Space Weather



On the occasion of the IUGG centennial in 2019 IAGA published a book with Cambridge University Press providing a comprehensive overview of the IAGA fields of research. The volume, edited by M. Manda, M. Korte, A. Yau and E. Petrovsky and entitled “Geomagnetism, Aeronomy and Space Weather – A Journey from Earth’s Core to the Sun” was published in November 2019.

### 8.2 IAGA books series



A series of five books, representing the five IAGA Divisions, provides a comprehensive overview over all fields of IAGA science, including the state of the art at the time of writing (~2010). The books are written and edited by experts in their fields. Published by Springer, the income from the books supported scientists to attend the IAGA Scientific Assembly in Sopron.

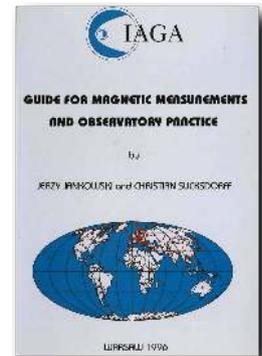
### 8.3 IAGA Guides

IAGA has published four practical guides to observation. These are available as pdf documents from the [IAGA web site](#), or they may be ordered from the IAGA Secretary General.

#### IAGA Guide for Magnetic Measurements and Observatory Practice

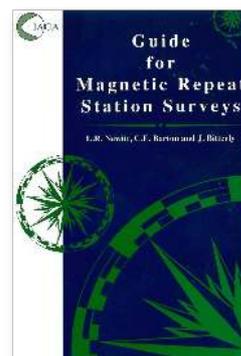
by J. Jankowski and C. Sucksdorff, 1996, 232 pages, ISBN: 0-9650686-2-5; Price: USD 50.

This Guide provides comprehensive information about how to organize and run a magnetic observatory and make magnetic measurements. The main topics are:



- A brief description of the magnetic field of the Earth
- Selection of observatory sites and layout
- Magnetometers
- Absolute magnetic measurements
- Recording of magnetic variations
- Data processing
- Testing and calibrating instruments

#### IAGA Guide for Magnetic Repeat Station Survey



by L.R. Newitt, C.E. Barton, and J. Bitterly, 1997, 120 pages, ISBN: 0-9650686-1-7; Price: USD 25.

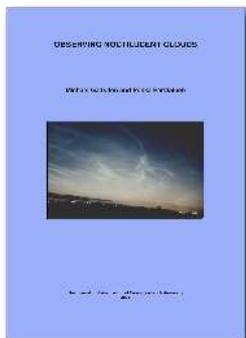
This Guide provides a comprehensive description of the theoretical basis, operational details, and instrumentation for making magnetic repeat station survey measurements.

#### IAGA Guide to Observing Noctilucent Clouds

by M. Gadsden and P. Parviainen, 1995, ISBN: 0-9650686-0-9; Price: USD 25.

This manual and instruction book was written by a group of active researchers, both professional and amateur. There are chapters giving practical

advice for taking visual observations, photographing the clouds with film or with video equipment. A summary of observations from space is included, as well as comments on the connection between noctilucent clouds, seen from the ground, and the polar mesospheric clouds that so far have been measured only from orbit. Noctilucent clouds are seen in the summer months, shining in the poleward sky at night-time.



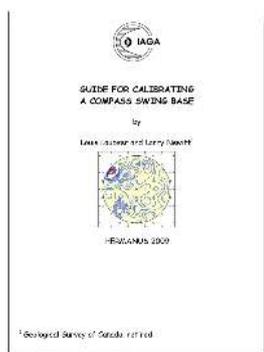
Measurements show that the clouds are higher than any others. Lying at a height of 80-85 kilometres, the clouds mark a boundary between meteorology and space physics.

This book is beautifully illustrated with photographs, and will help everyone recognize and appreciate these “sailors in the summer night”.

#### IAGA Guide for Calibrating a Compass Swing Base

by L. Loubser and L.R. Newitt, 2009, 35 pages, available only as Electronic version (PDF).

In this guide a general description of a compass swing base calibration procedure is presented which was developed at the Hermanus Magnetic Observatory. The procedure is based on the use of DI flux magnetometers as these types of magnetometers are widely in use. Although there are also other methods in use the “DI-method” should be seen as an IAGA recommendation.



#### 8.4 IAGA History

A special issue of the open access journal History of Geo- and Space Sciences (HGSS) was published on the occasion of the IUGG centennial in 2019. It contains articles about the history of IUGG and its eight associations. The IAGA contribution is authored by M. Mandea and E.

Petrovsky, entitled “IAGA: A major role in understanding our magnetic planet” (Hist. Geo Space. Sci., 10, 163–172<sup>14</sup>).

#### 8.5 List of World Data System members

Following is a list of the World Data System (WDS) members as of December 2022 who serve the data closely related to IAGA research fields. The members who serve very wide range of disciplines so called “general repositories” are not included in this list. On the definition of “regular”, “network” (\*A) and “partner member” (\*B), please visit <https://worlddatasystem.org/>. Total 125 repositories/organizations are currently certified as the WDS members.

- Atmospheric Radiation Measurement Data Center<sup>15</sup>
- Atmospheric Science Data Center<sup>16</sup>
- Australian Antarctic Data Centre<sup>17</sup>
- Crustal Dynamics Data Information System (CDDIS)<sup>18</sup>
- Goddard Earth Sciences Data and Information Services Center (GES DISC)<sup>19</sup>
- INTERMAGNET<sup>20</sup> (\*A)
- International GNSS Service<sup>21</sup> (\*A)
- International Service of Geomagnetic Indices<sup>22</sup>
- International Space Environment Service<sup>23</sup> (\*A)
- International Union of Geodesy and Geophysics<sup>24</sup> (\*B)
- NASA ESDIS Project<sup>25</sup> (\*A)
- National Center for Atmospheric Research<sup>26</sup>
- National Centers for Environmental Information<sup>27</sup>
- National Geoscience Data Centre<sup>28</sup>
- National Space Science Data Center<sup>29</sup>
- Research Institute for Sustainable Humanosphere, Kyoto University<sup>30</sup>
- Scientific Committee On Solar Terrestrial Physics (SCOSTEP)<sup>31</sup> (\*B)
- UNAVCO, Inc.<sup>32</sup>
- WDC - Solar-Terrestrial Physics, Moscow<sup>33</sup>
- WDC - Sunspot Index and Long-term Solar Observations (SILSO)<sup>34</sup>
- WDC for Geophysics, Beijing<sup>35</sup>
- WDC for Solid Earth Physics, Moscow<sup>36</sup>
- WDC for Geoinformatics and Sustainable Development<sup>37</sup>
- WDC for Geomagnetism, Copenhagen<sup>38</sup>

- WDC for Geomagnetism, Edinburgh<sup>39</sup>
- WDC for Geomagnetism, Kyoto<sup>40</sup>
- WDC for Ionosphere and Space Weather<sup>41</sup>
- WDC for Solar Activity / BASS2000<sup>42</sup>

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(A) Network member; (B) Partner member;  
Other: Regular member

## 8.6 IAGA website

Information on IAGA can be found at:  
<http://www.iaga-aiga.org>

## 8.7 IAGA on social media

The social media working group within the Interdivisional Commission on Education and Outreach (ICEO) promotes and shares topics of IAGA

## 8.8 IAGA contact

The Secretary-General is the main point of contact for all matters concerning IAGA:

**Monika Korte**

GFZ German Research Centre for Geosciences  
Telegrafenberg  
14473 Potsdam  
Germany

email: [sg@iaga-aiga.org](mailto:sg@iaga-aiga.org)

interest on several platforms. The activities kicked off in November 2019 and you can now follow IAGA on Facebook, Twitter and Instagram at the following sites:

 [www.facebook.com/IAGAandAIGA/](http://www.facebook.com/IAGAandAIGA/)

 [www.twitter.com/IAGA\\_\\_AIGA](http://www.twitter.com/IAGA__AIGA)

 [www.instagram.com/iaga\\_aiga/](http://www.instagram.com/iaga_aiga/)

There also is an IAGA blog:

- <https://iaga-aiga.blogspot.com/>

If you notice any exciting IAGA science that should be advertised there or if you would like to get permanently involved in generating content for regular social media posts and become part of the task group please get in touch at [socialmedia@iaga-aiga.org](mailto:socialmedia@iaga-aiga.org).

# Appendix

1. <https://iaga-aiga.org/index.php?id=statutes>
2. <https://iaga-aiga.org/index.php?id=by-laws>
3. <https://www.iugg2023berlin.org/>
4. <https://www.iugg2023berlin.org/>
5. <https://iaga-aiga.org/iagaschool/>
6. <https://trends2020.fmi.fi/>
7. <https://vcais2022sopron.epss.hu/>
8. <https://www.emsev-iugg.org/emdoc/EMSEV2022program.pdf>
9. [https://www.emsev-iugg.org/BM/Fiji\\_EMSEV2024.pdf](https://www.emsev-iugg.org/BM/Fiji_EMSEV2024.pdf)
10. <https://www.emsev-iugg.org/BM/GreeceEMSEV2024.pdf>
11. <https://www.cifs-iss.org>
12. <https://www.earthfuturesfestival.com/the-films/v/magnetic-mosaic>
13. <https://linkedin.com/company/iaga-international-association-of-geomagnetism-and-aeronomy> (**Account necessary!**)
14. <https://doi.org/10.5194/hgss-10-163-2019>
15. <https://www.arm.gov/about>
16. <https://www.earthdata.nasa.gov/eosdis/daacs/asdc>
17. <https://data.aad.gov.au/about>
18. <https://www.earthdata.nasa.gov/eosdis/daacs/cddis>
19. <https://www.earthdata.nasa.gov/eosdis/daacs/gesdisc>
20. <https://intermagnet.github.io/>
21. <https://igs.org/>
22. <https://isgi.unistra.fr/>
23. <http://www.spaceweather.org/> (**Unsecure website without encryption and verification!**)
24. <https://iugg.org/>
25. <https://www.earthdata.nasa.gov/eosdis>
26. <https://ncar.ucar.edu/>
27. <https://www.ncei.noaa.gov/>
28. <https://www.bgs.ac.uk/ngdc/>
29. <https://www.nssdc.ac.cn/eng/>
30. <https://www.rish.kyoto-u.ac.jp/?lang=en>
31. <https://council.science/what-we-do/affiliated-bodies/scientific-committee-on-solar-terrestrial-physics-scostep/>
32. <https://www.unavco.org/data/gps-gnss/gps-gnss.html>
33. <http://www.wdcb.ru/stp/index.en.html> (**Unsecure website without encryption and verification!**)
34. <https://www.sidc.be/silso/>
35. <http://www.geophys.ac.cn/> (**Unsecure website without encryption and verification!**)
36. <http://www.wdcb.ru/sep/> (**Unsecure website without encryption and verification!**)
37. [https://kpi.ua/en/web\\_wdc](https://kpi.ua/en/web_wdc)
38. [https://www.space.dtu.dk/english/research/scientific\\_data\\_and\\_models/world\\_data\\_center\\_for\\_geomagnetism](https://www.space.dtu.dk/english/research/scientific_data_and_models/world_data_center_for_geomagnetism)
39. <http://www.wdc.bgs.ac.uk/> (**Unsecure website without encryption and verification!**)
40. <https://wdc.kugi.kyoto-u.ac.jp/>
41. <https://wdc.nict.go.jp/IONO/wdc/index.html>
42. <https://bass2000.obspm.fr/home.php>

## Imprint

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