

INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOSCIENCES

Annual Report to the International Union of Geological Sciences for 2018

1. Overall objectives

The mission of the International Association for Mathematical Geosciences (IAMG) is to promote, worldwide, the advancement of mathematics, statistics and informatics in the geosciences. The main duty of the IAMG is to further method development and disseminate results of new research in its fields of interest with outreach within the geoscience, mathematics and geoinformatics communities. This includes sponsoring students and young scientists by means of research and travel grants.

2. Relate goals to overall IUGS scientific objectives

By means of its three scientific journals, the annual IAMG meeting and many other projects including travel by its Distinguished Lecturers, the IAMG aims to further the quantification of three-dimensional geoscientific mapping, numerical time scale development and geological process modelling. Its contributions to predictive geology are concerned with natural disasters as well as the delineation of mineral, hydrocarbon and water deposits in the crust of the Earth. The mathematical and geometrical estimates are accompanied by estimates of their uncertainty.

3. Structure and organization

The IAMG is governed by a Council consisting of its Executive Committee (President, Executive Vice President, Secretary General and Treasurer), two Vice Presidents, Past President, four Ordinary Council Members, special IGC Councillor, three Editors-in-Chief, and Newsletter/Website Editor. It has seven standing committees for Awards, Curriculum Quality, Lectures, Meetings, Outreach, Publications and Student Affairs, respectively, and various commissions for shorter term concerns.

4. Interaction with other International organizations and projects

Currently IAMG membership represents 63 countries across the globe. The IAMG is affiliated with IUGS, IUGG and ISI. It is Scientific International Partner of the Earth Science Matters Foundation (ESM). IAMG has eight Student Chapters and co-organizes international meetings for young earth scientists with YES. IAMG maintains a joint booth with ESM and the International Lithosphere Program. Additionally, the IAMG annually has a booth and co-organizes sessions at the AGU Fall Meeting in San Francisco, U.S.A. The IAMG President (Jennifer McKinley) continues to act as Communications Officer for the IUGS Initiative on Forensic Geosciences (IUGS-IFG). Most recently this involved meeting with the 36th IGC organising committee in New Delhi November 2018 in preparation for an IFG session and workshop at IGC2020. Two IAMG members (Ricardo Olea and Nishi Nishiwaki) serve on the IUGS Nominating Committee.

The IAMG was a sponsoring partner of the First Conference on Resources for Future Generations (RFG 2018) in Vancouver, 16–21 June 2018. In addition to financial IAMG sponsorship, the President, Secretary General and many IAMG members contributed to a

number of sessions and hosted a workshop on Advanced Concepts in Evaluating and Interpreting Geochemical Data.

IAMG continues to collaborate with other international associations including the International Union of Geological Sciences (IUGS), International Union of Geodesy and Geophysics (IUGG), American Geophysical Union (AGU), European Geoscience Union (EGU), European Association of Geoscientists and Engineers (EAGE), Earth Science Matters (ESM), Southern African Institute of Mining and Metallurgy (SAIMM), International Association for Young Earth Scientists (YES), Joint Statistical Meetings (JSM), Future Earth Coast (former LIOCZ), Geological Society of London (GSL), the Royal Irish Academy (RIA), China Union of State Key Laboratories in Solid Earth Sciences, the UNESCO International Centre on Global-scale Geochemistry (ICGG) and the Chinese Academy of Geosciences.

The IAMG has been invited to be involved in a Global Deep Time Digital Earth Initiative (DDE) proposed as an IUGS-recognized 'Big Science Program' to be launched at the 36th International Geological Congress in New Delhi. This is another excellent opportunity for the IAMG to strengthen the relationship with IUGS and other associations. This will be followed by IAMG involvement in the Silk Roads Disaster Risks Reduction and Sustainable Development (SiDRR) conference in May 2019 which presents an important area of applied research in mathematical geoscience.

The IAMG President participated in EAGE2018 June 11-13, 2018. As a committee member of the EAGE Women in Geoscience and Engineering (WGE), the President assisted in the organization and delivery of the WGE Special Session (June 12). A MOU between the IAMG and EAGE has been agreed by Council and the details are currently being currently being finalized to be ratified at EAGE2019 in London (June 2019).

The IAMG also contributed \$8,262 to support meetings for the Compositional Data Analysis Association (CODA) – CoDaWork 2019 and Geostatistics for Environmental Application (GeoENV) -GeoENV2018. The IAMG sponsored geoEnv2018, Belfast, UK through financial support for Keynote speaker Dr Oy Leuangthong RSK, Toronto, Canada and 2018 IAMG Distinguished Lecturer Dr Grégoire Mariéthoz, University of Lausanne. IAMG President Jennifer McKinley, Queen's University Belfast, was the geoENV2018 conference host and Chair of the local organizing committee. IAMG members hosted two workshops on Introduction to Geostatistics in RGeostat and Compositional Data Analysis. Sponsorship and support of these organizations and meetings are a crucial part of the IAMG mandate and outreach.

5. Chief products

The IAMG publishes three scientific journals (*Mathematical Geosciences*, *Computers & Geosciences* and *Natural Resources Research*) in partnership with Elsevier and Springer. In 2017, about 188 articles were published in Computer & Geosciences, 36 articles in Natural Resources Research and 45 articles in Mathematical Geosciences for a total of 269. Annually IAMG publishes two newsletters and the proceedings of its annual meeting on CD and/or book-form. It sponsors the publication of books including those in

the IAMG Monograph Series in partnership with Oxford. IAMG maintains one primary public website: <http://www.iamg.org> and contains general information including Statutes & By-Laws and Minutes of General Assemblies as well as IAMG Council meetings; the other website is for members only.

The 1-year impact factor (IF) of 1.573 for MG for 2018 continues to remain strong with 8 issues and 43 articles. The 1 year-IF for C&G of 2.567 with 152 articles and 12 issues. In February 2018, the first IF for NRR was 3.094 and 33 articles were published in 4 issues based on citations to papers published in 2015 and 2016. There are Special Issues for all three IAMG journals based on from presentations at IAMG2018 promoting excellence in geoscience data analysis, in the quantitative understanding of natural phenomena and mineral potential mapping. The Golden Anniversary open access book: “Handbook of Mathematical Geosciences: Fifty Years of IAMG” edited by Daya Sagar and co-edited by Qiuming Cheng and Frits Agterberg, and published by Springer has achieved over 121,000 downloads.

The IAMG is now affiliated with a new journal published by Elsevier, entitled: Applied Computing and Geosciences. This is an Open Access Only journal that Elsevier has started in anticipation of a greater abundance of Open Access publications. Eric Grunsky, the Secretary General of the IAMG has been appointed as the Founding Editor-in-Chief and is in the process of establishing a number of Associate Editors and an Editorial Board. It is anticipated that the first issue will be published in mid-2019.

Student and postdoctoral research is financially supported by research and travel grants including the Mathematical Geosciences, Computers & Geosciences and Natural Resources Research scholarships. In 2018 student research scholarships came to a total of \$18,750 with an additional \$12,600 provided as travel grants for nine students. The IAMG also provided \$8,000 in support of Student Chapters located around the world.

Financial support is also provided in the form of professional awards and recognition—namely, Krumbein Medal, Chayes Prize, Griffith Award, Vistelius Award, Matheron Lecturer and Distinguished Lecturer. Travel support in 2018 for these awards totalled \$4,311. Prof Christian Lantuéjoul, was selected as the 2018 George Matheron Lecturer and Prof Phillippe Renard as the 2019 IAMG Distinguished Lecturer. Prof Lantuéjoul delivered the George Matheron Lecture at IAMG2018 and Prof Renard will deliver the 2019 IAMG Distinguished Lecture at IAMG2019. This year Prof Ute Mueller was the recipient of the John Cedric Griffiths Teaching Award and Prof Roussos Dimitrakopoulos was the William Krumbein Medallist. The awards were presented at IAMG2018 where the award winners also delivered keynote presentations. In 2018, travel assistance was also provided in the amount of \$1,400 for a senior scientist from India to attend the 1st Conference of the Arabian Journal of Geology, held in Hammamet, Tunisia.

More detailed information on the IAMG and its chief products is available in the updated IAMG brochure that is available on the IAMG website (<http://www.iamg.org>).

6. Chief accomplishments in 2018 and plans for 2019

This has been an important year for the IAMG as the association celebrated 50 years of promoting international co-operation in the development and application of mathematics, statistics and geoinformatics in geoscience research and technology. In 1968 a group of geoscientists were inspired though their shared belief that statistical and mathematical methods were important to address many geological issues. Two important events in this IAMG timeline were IAMG2018, which was held 2-8 September 2018 in Olomouc, Czech Republic and the 50th anniversary of IAMG's founding celebration event in Praha (Prague). Over 250 IAMG members from 37 different countries attended IAMG2018. Short courses covered the topics of machine learning, extracting, visualizing and interpreting structure in geochemical data and stratigraphic forward modelling. Presentation sessions covered topics such as machine learning, predictive modelling for resources and hazards, big data and space-time data modelling, compositional data analysis, applied geoinformatics for mineral exploration, geomathematics for marine geosciences and stratigraphic forward modelling.

IAMG2019, will be held at State College, Pennsylvania, U.S.A. August 10-16, 2019. Prof. Sanjay Srinivasan, Department of Energy and Mineral Engineering, Pennsylvania State University (USA), is the Chair of the Local Organizing committee.

Prof Hari Pandalai, the IAMG IGC Councillor for IGC2020 has been very active in ensuring that the IAMG is well involved in the 36th IGC, New Delhi, India with several IAMG sessions. The IAMG President has agreed to assist Prof Pandalai and act as a coordinator for Theme 35. Prof Hari Pandalai is currently working with Symposium Convenors for sub-themes 35A: Mineral Resource Evaluation and 35D Mathematical Geosciences.

The IAMG has agreed to sponsor the 8th International Workshop on Compositional Data Analysis (CoDaWork2019) in Terrassa (Spain). A MOU between the IAMG and CoDa has been agreed by Council and the details are currently being currently being finalized.

The IAMG remains committed to supporting early career scientist and to encouraging women in science. For the first time in 2019, the Vistelius Award will be awarded to both a female and a male recipient and a Founders Scholarship is being set up for early career researchers. A new IAMG Commission has been set up to look into the opportunities for future development of women in mathematical geosciences. The commission reported back to the Council at IAMG2018.

7. Specify how any IUGS Allocation for 2018 was used

No IUGS Allocation for 2018 was requested.

8. Budget request with justification for 2018 (only applicable to low income affiliates)

No IUGS Allocation for 2019 is requested.

9. **Does your website have a link to IUGS?**

YES.

<https://iamg.org/links-and-datasets.html>