

# **INTERNATIONAL ASSOCIATION FOR MATHEMATICAL GEOSCIENCES**

## **Annual Report to the International Union of Geological Sciences for 2020**

### **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 the development of methods and disseminate the 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 four 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, geological process modelling, spatial and spatiotemporal modelling and estimation. 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. 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, Vice-President, Secretary General and Treasurer), the immediate Past President, six Ordinary Council Members, a special IGC Councillor, and seven non-voting members comprising Editors-in-Chief and Co-Editors-in-Chief of its publications. 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, EAGE and ISI. It is a Scientific International Partner of the Earth Science Matters Foundation (ESM). IAMG has eight Student Chapters and co-organizes with YES international meetings for young earth scientists. Additionally, the IAMG has a booth and co-organizes sessions at the annual AGU Fall Meeting in San Francisco, U.S.A. The immediate Past President of the IAMG (Jennifer McKinley) continues to act as Communications Officer for the IUGS Initiative on Forensic Geosciences (IUGS-IFG). Most recently this involved meeting with the 36<sup>th</sup> IGC organising committee in New Delhi in November 2018 in preparation for an IFG session and workshop at IGC2020, which has been postponed to August 2021 due to the COVID pandemic. Two IAMG members (Ricardo Olea and Nishi Nishiwaki) serve on the IUGS Nominating Committee.

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 for Global-scale Geochemistry (ICGG) and the Chinese Academy of Geosciences.

The IAMG continues to be involved in the Global Deep-time Digital Earth initiative (DDE), the first IUGS-recognized Big Science Programme officially launched during the 73<sup>rd</sup> IUGS Executive Council Meeting held in Beijing (February 2019). Currently the IAMG is contributing \$10,000 USD per year to this project. This involvement further strengthens the IAMG relationship with IUGS and other associations.

Due to the COVID pandemic the IAMG had virtually no participation in conferences that were planned for 2020, almost all of which were cancelled or postponed. This includes the 36<sup>th</sup> IGC, which is now proposed to take place in August 2021. IAMG meetings and conferences scheduled for 2021 and 2022 have been moved to 2022 and 2023 respectively. The IAMG will continue its record of providing financial support and sponsorship for relevant meetings and conferences once it is safe to hold these events.

## 5. Chief products

The IAMG publishes four scientific journals (*Mathematical Geosciences*, *Computers and Geosciences*, *Natural Resources Research*, and *Applied Computing and Geosciences*) in partnership with Elsevier and Springer. In 2020, 146 articles were published in *Computers and Geosciences*, 224 articles in *Natural Resources Research*, 45 articles in *Mathematical Geosciences* and 22 articles in *Applied Computing and Geosciences* for a total of 437 articles. 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 University Press. IAMG maintains one primary public website: <http://www.iamg.org> that contains general information including Statutes and By-Laws and Minutes of General Assemblies as well as IAMG Council meetings; the other website is for members only.

*Mathematical Geosciences* published 45 articles in eight issues in 2020. Issue 1 was a special issue on Data Science for Geosciences. Issue 3 was a special issue on the Importance of Geostatistics in the Era of Data Science. Issue 8 was a special issue on IAMG 2019. The one-year impact factor for 2020 is 2.350, a slight decrease from the 2.471 in 2019.

*Computers and Geosciences* published 146 articles in the 12 issues in 2020. increased to 2.991 with 152 articles and 12 issues. The acceptance rate of 17% reflects the adoption of a

more stringent editorial policy of only accepting manuscripts of high quality. This increased selectivity has resulted in a significant increase in the Impact Factor of the journal over the past four years (2.567 in 2017, 2.721 in 2018, 2.721 in 2019 and 2.991 in 2020). The 2020 Impact Factor is the highest in the journal's history. Two special issues were published in 2019: "Reactive transport modelling and risk assessment for geologic CO<sub>2</sub> sequestration" and "Big data and natural disasters: New approaches for spatial and temporal massive data". One special issue was published in 2020: "Quantitative understanding of natural phenomena in Earth Sciences: concepts and tools for data analysis".

*Natural Resources Research* published 224 articles in six issues in 2020. The one-year Impact Factor for 2019 is 3.708. The number of issues per year increased from four to six in 2020.

*Applied Computing and Geosciences* is a relatively new journal published by Elsevier. As the first issue was published in 2018, it does not yet have any published metrics. No special issues were published in 2020.

The Golden Anniversary open access book, *Handbook of Mathematical Geosciences: Fifty Years of IAMG*, edited by B.S. Daya Sagar and co-edited by Qiuming Cheng and Frits Agterberg, and published by Springer continues to be a valuable international resource and has achieved 721,000 downloads as of 30<sup>th</sup> January 2021.

An Encyclopaedia of Mathematical Geosciences, an extensive reference work, is currently in progress. It is edited by Prof. B. S. Daya Sagar, Prof. Qiuming, Prof. Jennifer McKinley, and Prof. Frits Agterberg, and will be published by Springer Nature Publishers.

Student and postdoctoral research is financially supported by research and travel grants including the *Mathematical Geosciences*, *Computers & Geosciences* and *Natural Resources Research scholarships*. In 2020, a total of \$22,500 was awarded for student research scholarships and student awards. No travel grants were awarded in 2020 because of COVID-19.

In 2019, the IAMG provided \$17,240 USD to support Student Chapters located around the world. In 2020, \$1,000 USD was provided to the University of Wyoming chapter and €1,000 to the University of Nancy chapter.

Financial support is also provided in the form of professional awards and recognition, namely, the Krumbein Medal, Chayes Prize, Griffiths Teaching Award, Vistelius Award, Georges Matheron Lecturer Award and the IAMG Distinguished Lecturer. The recipients of the awards determined in 2020 would normally have received travel funds to attend a conference or meeting in 2021 at which they would make a presentation and be formally presented with their award. As the COVID pandemic has delayed this process, the award will be sent to the recipients and arrangements for their presentations will be made when it is safe to hold appropriate events. The awards determined in 2019 for award in 2020 are:

- 1) The William Christian Krumbein Medal awarded to a senior scientist for career achievement. Awarded to Professor Jaime Gómez-Hernández.

- 2) The Georges Matheron Lecturer awarded annually for a scientist with proven research ability in the field of spatial statistics or mathematical morphology. Awarded to Professor Marc Genton.
- 3) The Griffiths Teaching Award; awarded biannually for outstanding teaching. Awarded to Professor Gang Liu.
- 4) The Founders Scholarship awarded annually to an outstanding student or post-graduate scientist. Awarded to Dr Behnam Sadeghi.

The awards determined in 2020 for award in 2021 are:

- (1) The Felix Chayes Prize awarded biannually for Excellence in Research in Mathematical Petrology. Awarded to Dr Grethe Hystad.
- (2) The Founders Scholarship awarded annually to an outstanding student or post-graduate scientist. Awarded to Shubin Zhao.
- (3) The Andrei Borisovich Vistelius Research Award. Awarded biannually to an early-career female scientist for promising contributions in research in the fields of mathematical geosciences or geoinformatics. Awarded to Dr Vanessa Godoy.
- (4) The Andrei Borisovich Vistelius Research Award. Awarded biannually to an early-career male scientist for promising contributions in research in the fields of mathematical geosciences or geoinformatics. Awarded to Dr Francky Fouedjio.

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 2020 and plans for 2021

The previous Council completed its four-year term of office on 1<sup>st</sup> September 2020, immediately followed by installation of the new Council. The new Council comprises:

President: Peter Dowd (Australia).

Secretary General: Juliana Leung (Canada).

Treasurer: Madalyn Blondes (USA).

Vice President: Christien Thiar (South Africa).

Past President: Jennifer McKinley (UK).

Council members:

Jie Zhao (China)

Renguang Zuo (China)

Pauline Collon (France)

Alessandra Menafoglio (Italy)

Natalie Caciagli (Canada)

Karel Hron (Czech Republic)

IGC Councillor: Jonggeun Choe (South Korea)

Non-voting members:

Editor-in-Chief of *Mathematical Geosciences*: Roussos Dimitrakopoulos (Canada).

Co-Editors-in-Chief of *Computers & Geosciences*: Paulin Collon (France), Dario Grana (USA) and Derek Karssenber (Netherlands).

Editor-in-Chief of *Natural Resources Research*: John Carranza (South Africa).

Editor-in-Chief of *Applied Computing and Geosciences*: Eric Grunsky (Canada).

Editor of *IAMG Newsletter* and Website: Katherine Silversides (Australia).

The new Council will continue to implement the plans of the previous Council that have been delayed by the COVID pandemic. These relate mainly to postponed conferences and events. The new Council has appointed Chairs and members of the various IAMG committees and in 2021, given the pandemic disruptions, will review the format and delivery of future conferences. An option is to consider the use of on-line delivery platforms.

Professor Hari Pandalai, the former IAMG IGC Councillor for IGC2020 (postponed to 2021) has been very active in ensuring that the IAMG is well involved in the 36<sup>th</sup> IGC, New Delhi, India with several IAMG sessions. The IAMG Past President is assisting Professor Pandalai and will act as a coordinator for Theme 35. Professor Pandalai is working with Symposium Convenors for sub-themes 35A: Mineral Resource Evaluation and 35D Mathematical Geosciences.

**7. Specify how any IUGS Allocation for 2020 was used**

No IUGS Allocation for 2020 was requested.

**8. Budget request with justification for 2021 (only applicable to low income affiliates)**

No IUGS Allocation for 2021 is requested.

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

YES.

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