



INTERNATIONAL UNION OF GEOLOGICAL SCIENCES

2022 REPORT

Fostering a global voice for the geosciences

In association with ISC and UNESCO

120+ Adhering Organizations

50+ Affiliated Organizations

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THE UNION'S AIMS

The International Union of Geological Sciences (IUGS) was founded in 1961 with the mission to unite the global geological community in promoting development of the earth sciences.

The Union is the largest member organizations (about 1 million earth scientists) of the International Science Council (ISC) and one of the world's largest scientific organizations.

Origins

In 2012, IUGS redefined its missions according to a new Strategic Plan:

- Produce authoritative scientific standards
- Contribute to earth science education and public understanding of geosciences
- Represent the geological sciences in forums and decision-makers
- Encourage and support new original ideas in basic and applied geological research
- Foster collaboration between developed and developing countries in earth science research, capacity building, and applications
- Encourage more interdisciplinary involvement within the broad spectrum of the geosciences.

2012 Strategic Plan

For the period of 2022, the Union had the following aims:

- Encourage and substantiate the participation of the Adhering organizations and National Committees in promoting Geosciences
- Develop initiatives, (i.e. Resourcing Future Generations, Forensic Geology) of wide societal and applied interest
- Renew and establish closer links to UNESCO, ISC, and Geo-Unions, as well as develop new initiatives together with these organizations
- Improve visibility of IUGS through publications and presence at scientific forums.

Present Strategic Plan

GOVERNING THE UNION

The Council

Meets every four years at the International Geological Congress

Representatives appointed by the Adhering Organizations from the active IUGS member countries/regions

Inactive or non-member countries/regions may send observers (without voting rights) to Council meetings

Executive Committee (2020-2024)

Bureau

Day-to-day decisions and responsibilities

Secretary General



Prof. Dr. Stanley FINNEY

President



Prof. Dr. John LUDDEN CBE

Treasurer



Prof. Hiroshi KITAZATO

Past President



Prof. Dr. Qiuming CHENG

Vice Presidents



Prof. Dr. Hassina MOURI



Prof. Dr. Daekyo CHEONG

Councilors (2020-2024)



Prof. Dr. Jennifer MCKINLEY



Dr. Ludwig STROINK

Councilors (2022-2026)



Prof. Lola PEREIRA



Dr. Yamirka ROJAS-AGRAMONTE

Prof. Dr. John LUDDEN CBE

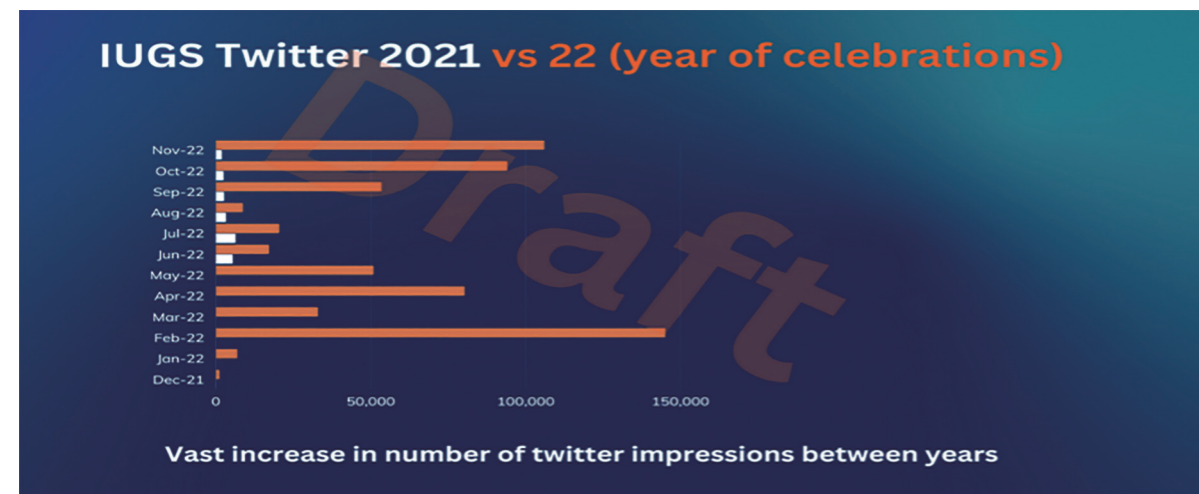


PRESIDENT (2020-2024)

2022 was quite the roller-coaster of a year. The 60th anniversary of IUGS, which had been put off from 2021, was finally celebrated and commemorated all year long.

The decision to increase social media presence was implemented and was ultimately successful by

increasing web presence using Twitter, Facebook, and other platforms. Everyone who participated in these important decisions have been acknowledged in the 2022-2023 annual report. Moving forward, we will continue to stress the importance of our presence on social media and will work towards enhancing what we have already accomplished.



I would also like to underline our continued collaboration with UNESCO, IUGG, and other key partner organizations. Combining our efforts enhances the impact of geosciences, and allows us to link across sub-disciplines and into geoscience education.

Significant progress has also been made through the decision to join the ICS gender inclusiveness action, and through the creation of the IUGS Ethics Commission. We are also part of the International Year on Basic Sciences for Sustainable Development IYBSSD. <https://www.iybssd2022.org/en/home/>

An important event this year was the launch of the first group of 100 Geological heritage sites. This event was highly successful in regards to local, national, and international visibility. The launch took place in Zumaia, Spain.

Please read the Zumaia declaration on the Earth Sciences:

https://www.iugs.org/_files/ugd/f1fc07_8b8c418564474000ad4aaca27aa8b5f3.pdf?index=true

IUGS now includes 125 members. In 2022, Algeria, Kenya, and Cameroon joined.

IGC 36 was celebrated through an online event in the spring. The event was mainly virtual, with one local delegation in Delhi. The Delhi Local Organizing committee was recognized for their efforts, including that of repaying registrants. The next IGC will take place in Busan on the 25-31 of August. http://www.igc2024korea.org/2024/english/main/index_en.asp

To tackle issues associated with climate change and aid in the transition to renewable energy sources, geodata has been put at the center of

many IUGS initiatives. The Deep Digital Earth (DDE) initiative undertook its global launch at UNESCO in November 2022. A technical meeting on Data-Driven Geosciences was held in Paris in the same week. <https://www.ddeworld.org/>

We released version 2022.2 of IUGS-ICS Chart/ Time Scale and placed the Chibanian GSSP Golden Spike. The Installation Ceremony was in Ichihara, Japan in May 2022.

Many other events can be viewed on the IUGS YouTube channel:

<https://www.youtube.com/channel/UCeOx2jJEQrr>

October 25 - 28 th
Zumaia
Basque Coast UGGP
Spain

IUGS 60TH ANNIVERSARY EVENT

THE FIRST 100 IUGS GEOLOGICAL HERITAGE SITES

Limited places. More information and registration at: www.geoparkea.eus/iugs-globalgeosites

[PlxDGbcnTJHA?app=desktop](https://www.iugs.org/_files/ugd/f1fc07_8b8c418564474000ad4aaca27aa8b5f3.pdf?index=true)

Our budget remains balanced with a surplus, which we hope to invest in actions aimed at geological contributions to sustainability in 2023 and through to the 37th IGC.

We are pleased to welcome Professor Lola Pereira and Dr. Yamirka Rojas-Agramonte onto the IUGS Executive council. A new IUGS executive will be elected in summer 2024 in Busan, Korea.

I end this 2022-2023 report by highlighting the importance of geological solutions for sustainability, and for the Union to actively participate in advocating these solutions.

- What is the collective force of the international geoscience unions going to look like?
- What is our science mission for sustainability?
- How are we going to contribute to the SDG framework?

Prof. Dr. Stanley C. FINNEY



SECRETARY GENERAL (2020-2024)

After the challenging years of 2020 and 2021, IUGS activities were many and varied in 2022 for both the Executive Committee and the commissions, task groups, initiatives and joint programs. Many virtual meetings were carried out for their convenience and cost savings – one positive result of the last two years. However, those attending in-person meetings gained a new appreciation for the direct contact and exchange with colleagues, for extended discussion of contentious issues, and for the ability to resolve issues immediately that can take place at in-person meetings. The Executive Committee met in Paris in March of 2022 with the well attended meeting hosted by and held at the office of the Société Géologique de France, and a virtual meeting of the EC was held in October 2022. All meetings of the Bureau were held virtually, were largely informal (without recorded minutes), and allowed for valuable collaboration of the President, Treasurer, and Secretary General.

Normal activities of the Secretary General included making arrangements and developing the agenda for the meetings of the Executive Committee, editing the 2021 IUGS Annual Report, which was distributed in March 2022, managing votes on proposals from the Commission on Stratigraphy – the GSSP for the Artinskian Stage and the GSSA for the Hadeon Eon, and handling correspondence with all constituent groups.

The IUGS celebrated its 60th Anniversary in 2022 (postponed by the epidemic from 2021). Many web-based activities were organized and proved

popular and accessible to a wide audience. The year culminated with an event in Zumaia, Spain at which the First 100 IUGS Geoheritage Sites were presented and announced. The selection of the First 100 sites by the IUGS Commission on Geoheritage launched a major, new initiative of IUGS recognition of geoheritage sites, which over the next 6-8 years will lead to the recognition of 300 or more additional sites with 100 selected and announced every two years. The selection of the First 100, planning of the Zumaia event, and production of a most popular book with the First 100 followed an intense 8 months of work by the Commission on Geoheritage and over 500 experts involved in the process of identifying sites, preparing proposals, evaluating proposals, and selecting those to be included in the First 100. The Zumaia event stimulated further development of the Commission of Geoheritage with the rejuvenation the IUGS recognition of heritage stones and the initiation of a new subcommission on geo-collections. As Secretary General, I participated in and advised the leaders of the First 100 project from beginning to end. Although it required much time and effort, the experience was fun and rewarding. It represents the best that IUGS has to offer – the dedicated enthusiastic contributions of a large, diverse group of geoscientists working towards a well-defined goal.

The Zumaia event was well attended. It was the first exposure to IUGS for most of the participants. The event also served as an excellent venue for presentation of the IUGS medals that was



Asier Hilario, chair of the International Commission on Geoheritage, and Stan Finney make the formal announcement of the First 100 IUGS Geoheritage Sites above the beach at Zumaia, Spain.

planned for the 36th International Geological Congress in India in 2020. The Émile Argand medal was presented to Thure Cerling for his enormous scientific contributions, particularly our understanding of the geologic history of atmospheric CO₂ and its multi-fold impacts on climate, plant, vertebrate and hominid evolution, and ecosystems. His Argand lecture made without illustrations drew the rapt attention of a large audience. Monica Sanchez-Roman was presented with the Early Career Geoscientist Medal – a new award established by the IUGS EC in 2019. Peter Bobrowsky could not attend the Zumaia event and was presented with the medal for the James M. Harrison Award during the IUGS EC meeting in Paris. Past presentations of IUGS awards did not include medals. I found this lacking. As Secretary General, I took the initiative of designing and having produced medals of high quality that add to the prestige of the awards. Seeing them presented for the first

time was rewarding.

Carlos Cónsole-Gonella was elected by the IUGS-IGC Council in 2020 to serve as an IUGS Councillor with a term on the Executive Committee for 2022-2026. Just before his term was to begin, he passed away. As Secretary General, I prepared a report of his passing for Episodes and informed the IUGS community. Then, after a respectful passage of time, I organized a call for nominations for a new person to fill the position. I managed the election. Dr. Yamirka Rojas-Agramonte of Cuba and Germany was elected. Dr. Dolores 'Lola' Pereira of Spain also elected as a Councillor in 2020 began her term of 2022-2026 as a member of the IUGS EC. Together Lola and Yamirka bring new energy and add greatly to the diversity of the Executive Committee.

The Secretary General organized a virtual



Stan Finney pointing to the Golden Spike that marks the level of the base of the Chibanian Stage in stratotype section at Chiba, Japan.

meeting of the IGCC (International Geological Congress Committee) in July. This resulted in a call for Expressions of Interest to host the 38th IGC. The SG served as a representative of the EC on the IUGS Publications Committee since 2017. However, the EC chose to not re-establish the PC after its term ended in 2022. Instead, the Editor of Episodes Jin-Young Lee, the IUGS website manager Giuseppe Di Capua, the editor of the IUGS e-Bulletin Gurmeet Kaur, and the manager of IUGS Social Media Yamirka Rojas-Argramonte will work independently while maintaining close collaborative efforts.

The Secretary General consulted throughout the year with leaders of IUGS constituent groups, serving as their direct link to the Executive Committee, calling for annual reports and budget requests, informing them of budget allocations, giving advice as requested on IUGS procedures and expectations of the EC. The IUGS SG maintains an awareness of all IUGS constituent

groups and conveys their status to the EC. Of note, the IUGS EC approved in 2022 a Task Group on Diversity, Equity and Inclusiveness and following the EC meeting in Paris invited that group to form an IUGS Commission on Geoethics. As SG it is rewarding to be involved with and impressed by the activities of all IUGS constituent groups. They form the heart and are the strength of the IUGS.

Having served as Chair of the International Commission on Stratigraphy in the past, I was invited as SG to attend and participate in the dedication of the GSSP for Chibanian Stage (Middle Pleistocene) held in Japan in June 2022. Ratification of this GSSP excited not only the scientific community in Japan but especially the local community. A major investment in being made in developing the site and surrounding area as a scientific park, and the nature and significance of the Chibanian Stage has already been included in instruction activities at all levels in local schools.

Prof. Dr. Hiroshi KITAZATO



TREASURER (2020-2024)

Ms. Yoshiko OKADA



SECRETARY

General Financial Situation of IUGS

During the period from 01/01/2022 to 31/12/2022, IUGS's income and expense are USD 533,616.07 and USD 609,787.35 respectively, and the net loss is USD 76,171.28.

The balance of IUGS current account as of 31/12/2022 is USD 1,832,882.59. This includes USD 203,768.20 of "Deposit payable" and, net of this, the balance is USD 1,629,114.39

IUGS's financial statements of 2022 prepared by the Treasurer was duly audited by an independent Japanese certified public accountant in January 2023.

The table below reflects more detailed information of the financial situation during the recent four years.

(USD)			
year	revenue	expense	net income
2022	533,616.07	609,787.35	△ 76,171.26
2021	527,766.00	482,627.96	45,148.04
2020	553,016.44	323,610.24	229,406.20
2019	496,303.42	579,104.88	△ 82,801.46

Description of Income

The total income received during 2022 is USD 533,616.07, including membership fee of USD 369,584.99 (compared to USD 400,782.35 in 2021).

The major reason for the decrease of the membership fee income is the suspension of one membership of Category 8 (by the resolution made at Executive Committee meeting in March 2022). On the positive side,

Algeria, Cuba and Kenya became active members in 2022.

The table below reflects detailed information of the income situation in 2022 and 2021.

(Amount in USD)

Income	2022	2021
Membership Fees	369,584.99	400,782.35
For 2019 & 2020	615.48	14,188.52
For 2021	45,479.18	386,593.83
For 2022	323,490.33	-
Contribution from UNESCO	162,500.00	84,100.00
Final payment for last year	50,000.00	-
1st payment for current year	60,000.00	34,100.00
2nd payment for current year	52,500.00	50,000.00
Other Income*1	1,531.08	42,893.65
Total Income	533,616.07	527,776.00

*1 Other Income of 2022 includes royalty and bank interests.

Status of Members by Fees Category – 2022

Category	Active	Inactive	Total	Number of Countries paid for		
				2022	2021	2020
1	22	49	71	17	2	1
2	11	6	17	10	1	
3	12	3	15	10	1	
4	8	1	9	6	1	
5	-	-	-	-	-	-
6	3	0	3	2	1	
7	4	0	4	4	1	
8	4	0	4	3		
Total	64	59	123	52	7	1

Description of Expense

The total expense during 2022 is USD 609,787.35.

As the activities of IGCP (International Geoscience Programme) jointly financed with UNESCO became active again after Covid-19, the financing expense increased to USD 256,196.11, by more than USD 85,000 compared to the previous year (2021).

As the expense for promoting and organizing the events and projects related to the 60th anniversary of IUGS (including "Earth Futures Festival", "First 100 IUGS Geological Heritage Sites", renewal of the website, creation of new materials and photographic galleries), USD 60,247.73 was spent

The table below reflects more detailed information of expenditure situation in 2022 and 2021.

Expense	2022	2021
IGCP	256,196.11	170,600.00
Joint Programs	20,089.05	21,278.98
IUGS Commissions	117,903.13	78,529.07
Initiatives	9,500.00*2	47,165.00
Affiliated Organizations	28,000.00	29,000.00
Contributions	16,100.96	14,226.39
Episodes	28,000.00	28,000.00
Awards*3	6,901.82	12,427.00
Secretariat Expense	15,000.00	15,000.00
IUGS Associated Event	60,247.73*4	5,008.66*5
Other expense	51,848.56	28,031.41
Total Expense	609,787.35*5	449,266.51*5
Net Income	△ 76,171.28*5	78,509.49*5

*2 USD 20,000 for "Deep-Time Digital Earth Research Program" allocated for 2022 is to be paid early in 2023.

*3 In 2022, Argand, Harrison and Early Career (YS) Prize were awarded.

*4 This is the expense for promoting and organizing the events and projects related to the 60th anniversary of IUGS.

*5 Translated exchange loss was included in "Other Income/Expense" in the past. However, in the consideration that it is not the income/expense that IUGS can budget or estimate, it has been moved out of the calculation of Net Income. The translated exchange loss (due to the difference of the balance amount converted to USD between the beginning and the end of 2022) was USD 33,226.57 (with no cash out).

Outlook for 2023

In order to encourage the members of Category 1 that have been inactive for long periods to become active, a special measure will be implemented for 2023.

Mr. MA Yongzheng



PERMANENT SECRETARIAT

The IUGS Secretariat is hosted within the premises of the Chinese Academy of Geological Sciences (CAGS) under the China Geological Survey, the Ministry of Natural Resources of China. Since the relocation of the Secretariat to Beijing in December 2012, the Chinese government has been providing tremendous and stable financial and logistical support for the smooth operation of the Secretariat.

Under the guidance of the IUGS Bureau and Executive Committee, the Secretariat has maintained professional and efficient operation in line with its duties, and played an active role of communication and coordination in the scientific activities and daily administration of IUGS.

In 2022, the Secretariat assisted in the organization of several regular administrative meetings, including the organization of the 77th Executive Committee Meeting (16-18 March, 2022), EC progress meeting (virtual, on 5 October 2022) and IGCC Meeting (virtual, on 14 July 2022), DDE Open Science Forum and Series of Business Meetings (9 November, 2022) and Second IUGS Nominating Committee Meeting (virtual, on 1 January, 2023).

The Secretariat was actively involved in the IUGS 60th anniversary events. We assisted in updating the 60th Anniversary website, showcasing the scientific achievements of the IUGS constituent bodies. We participated in the preparatory work of a series of scientific events, including the IUGS 60th anniversary event held in Basque Coast on October 25-28 on which IUGS announced the First 100 IUGS Geological

Heritage Sites, Geosolutions for Net Zero, International Geodiversity Day, etc.. We invited Chinese scientists to participate in the IUGS 60th anniversary events. We conducted survey on the participation of the IUGS constituent bodies so as to strengthen links within IUGS. We distributed information of the IUGS 60th anniversary events to the IUGS community.

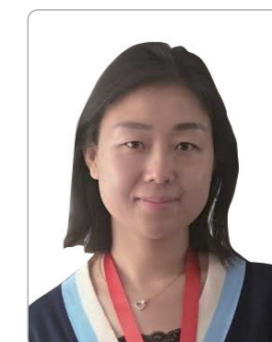
The Secretariat carried out electronic election of the IUGS Councilor (2022-2026), including sent the call of Nominations for position of IUGS Councilor to all the IUGS active adhering organizations, organized two rounds of electronic elections via emails and finished statistics of voting and send the results to the IUGS community.

The Secretariat completed the following work related to the outreach and publications: designing and formatting the 2021 IUGS Annual Report; mailing the hardcopies of Episodes to the IUGS Constituent Groups; distributing E-Bulletins monthly to over 14,000 recipients. The Secretariat updated the IUGS Contact Database on a timely basis and assisted the EC in membership maintenance to strengthen links with IUGS bodies.

The Secretariat would like to thank the Executive Committee for guidance and great support to the Secretariat for its smooth operation during the past year. The Secretariat staff members will continue full devotion to the Secretariat duties with concerted efforts to actively support the work of the IUGS Bureau and Executive Committee and the broad-ranging scientific activities of IUGS.



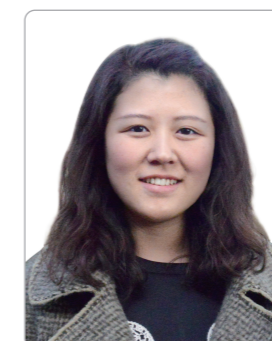
Ms. LI Wei
Secretary



Ms. SITU Yu
Secretary



Ms. GU Yanfei
Secretary



Ms. XU Yaqi
Secretary



Ms. MU Langfeng
Secretary

2022 HIGHLIGHTS

JANUARY 2022

Launch of new website IUGS60: President Professor John Ludden CBE launched this year with his New Year speech in which he describes

IUGS's vision to play a more visible role in the geoscience community.

Ratification of Artinskian Stage GSSP: The proposal received from the International



Subcommission on Permian Stratigraphy (ISPS: <https://permian.stratigraphy.org/>) for the definition of Artinskian Stage GSSP was ratified by the IUGS Executive on 27 January 2022.

IUGS-IFG Student Chapter and Latest Publication: The latest edition of the IUGS-IFG Student Chapter Newsletter contains information on 'Forensic Pedology: Methods and Applications'. This focuses on the use of soil traces to provide evidence for criminal investigations and was published on 9 January 2022.

FEBRUARY 2022

New version of the International Chronostratigraphic Chart published: The latest version of the International Chronostratigraphic Chart (2022/02) was published on the International Commission on Stratigraphy (ICS) website: <https://stratigraphy.org/chart>. The chart is available to all for educational and research purposes without charge.

Women in Forensic Geology: IUGS-IFG has a project to encourage and support 'women in forensic geology' and has appointed an 'Officer for Women in Forensic Geology'. Additionally, IUGS supported the UN International Day of

Women and Girls in Science.

Forensic Geology and the Ibero-American Network of Forensic Researchers: Search for Missing Persons. The Programa Iberoamericano de Ciencia y Tecnología para el Desarrollo, (CYTED), (American Program of Science and Technology for Development) was approved for the period 2022-2025, for the Ibero-American Network of Forensic Researchers. This has a particular focus on the search for missing persons.

Virtual 36th International Geological Congress: The Virtual Congress was formally inaugurated in Delhi at the FICCI Auditorium in the physical presence and online appearance of several Indian officials. E-copy of about 6000 abstracts originally submitted for the Congress scheduled to be held in March 2020 were made available on the Virtual 36th IGC website for free download. Sixty five field guide books which were prepared for various field excursions were printed as hard copy, formally released for free download. 774 pages

of Indian Report to IUGS with 50 scientific articles and 10 institutional reports were accomplished. Two postage stamps commemorating the Virtual 36th IGC were released on the occasion by the Post Master General. At the end of the program, the IGC Presidential Cup was virtually transferred to South Korean team, led by Weon-Seo Kee, President of the Geological Society of Korea. Besides, Pyeong-Koo Lee, President of Korea Institute of Geoscience and Mineral Resources and Heong-Joon Park, Mayor of Busan Metropolitan City delivered a speech at the handover ceremony.

MARCH 2022

IUGS EC Meeting in Paris (France) : From 15 to 18 March 2022 the IUGS met in Paris (France) for its 77th Executive Meeting. The meeting took place in hybrid mode, with fifty-six people attending, 26 present and the rest in virtual mode. Several topics and issues were presented and discussed, such as those related to IUGS Joint Programs, the IUGS Big Science Program Deep-



time Digital Earth (DDE). Information was given on the next International Geological Congress in Busan (South Korea) in 2024. Annual reports were presented by the IUGS Committees, Commissions, Task Groups, and Initiatives, as well as by IUGS Adhering and Affiliated Organizations.

IUGS statement on the Russian Federation's invasion of Ukraine: A discussion also took place at the EC meeting about the present geopolitical situation. The president of IUGS, John Ludden, presented the IUGS statement on the Russian Federation's invasion of Ukraine as follows: The IUGS works with many Russian and Ukrainian geoscientists and has made fundamental contribution to establish global geological standards with Russia. The IUGS executive is appalled by the invasion of Ukraine by the Russian Federation and alongside with Initiative of other government and scientific organizations. IUGS will freeze all activity with the Russian Federation until further notice.

IUGS James M. Harrison award : At the 77th meeting of the IUGS EC in Paris, Dr. Peter Bobrowsky received the IUGS James M. Harrison award for his continuous work and support to the Union. He has always been engaged with the IUGS activities: in Commissions, Committees, and many other working groups. He has also been IUGS Vice-president, elected in 2000, and Secretary General, elected in 2004 and 2008. Peter has always been a great colleague and a role model for the whole IUGS Community.

The overall winner of the January "What on Earth quiz" is Tejaswai Lakkundi from India.

The IUGS photography competition was held. From the stunning geo-image collection provided by talented USA photographer Parker Burkett, the breath-taking image of Iceland's columnar basalts

has been selected by the geoscience community to be entered into the final competition round in December 2022.

The IUGS@60 team have been busy helping various commissions, task forces, programs and initiative leads create engaging social media content to help promote their brilliant work which they carry out for the IUGS and for society as a whole.

As part of the IUGS@60 celebrations the IUGS Earth Stewards attended the 36th IGC meeting in India (virtually) and were commissioned by IUGS to act as independent environmental observers.

World Water Day event, the main IUGS@60 event for March has been very popular. More than 15 world-leading geoscientists took part in it.

APRIL 2022

To mark Earth Day 2022, the IUGS took part and organized a number of online events. The main event 'The State of the Planet' comprised a series of talks, a discussion panel which included world-leading experts from IUGS, UNEP, IPCC, UNESCO, FAO and breakout room discussions, hosted by IUGS Young Earth Ambassadors. The same day, the IUGS joined teams with AGU and a number of other key geoscience organizations to release a joint Earth Day statement.

The IUGS-IFG Student Chapters expanded to include the University of São Paulo.

The London Bullion Market Association (LBMA) and the World Gold Council (WGC) are collaborating to develop and implement an international system of gold bar integrity, chain of custody and provenance determination.

MAY 2022

On 16-17th May, the Geological Association of Canada held its annual conference Halifax. To celebrate the IUGS's 60th and UNESCO IGCP 50th anniversaries, the organisers arranged a special symposium with 19 presentations and 2 panel discussions. These highlighted the important contribution Canadian Geoscientists make to the IUGS, IGCP and discussed the importance of Canadian Geoparks, past, present and in the future.

21st May was a proud day for the IUGS. Members of the IUGS executive including Secretary General Prof. Dr. Stanley C. Finney and Treasurer Prof. Hiroshi Kitazato took part in celebrations held in the city of Ichihara to mark the placement of the Golden Spike in the Chiba Section, Japan. This placement of the golden spike defines the base of the Chibanian Stage which represents the Chibanian Age of the Pleistocene Epoch and Quaternary Period of the Geologic Time Scale.

The Forensic Geology Committee, chaired by an IUGS-IFG Officers for Japan, Dr Ritsuko Sugita and Prof Noriko Kawamura, was established within the Geological Society of Japan to promote and develop forensic geology in Japan. This was approved by the Board of Directors on 9 April 2022, and is proposed to collaborate with IUGS-IFG.

5th Iberoamerican Conference on Forensic Geology, Bogota, Colombia, the fifth in the series, of conferences on forensic geology in Latin America, has been confirmed to take place in Bogota, Colombia, 26-28 October 2022. The main objective is to show forensic geosciences and related discipline (e.g. anthropology, genetics, taphonomy and mycology) can be applied to search and locate the victims of missing persons that are in mass graves.

XXVI National Criminalistics Congress 17-20

May 2022. CNC is the most traditional event of Criminal Forensics and Forensic Sciences in Latin America. In 2022, it will celebrate the XXVI edition, simultaneously with the IX International Congress of Forensic Experts and the XXVI Exhibition of Technologies Applied to Criminalistics. CNC is an event of the Brazilian Criminalistics Association (ABC), held every two years.

JUNE 2022

A session on forensic geology took place at the Japan Geoscience Union Meeting on 25 May 2022. Presentations included crimes in the mineral, mining and metals industries, operational cases demonstrating the application of geological trace evidence, forensic geophysics at Mount Unzen Volcano and the development of forensic geology in Japan.

IUGS-IFG participated in the 2022 GAC-MAC-IAH-CNC-CSPG Joint Meeting. The event had 687 in-person participants (239 students), 127 virtual participants (34 students), 102 field trip participants, 129 workshop participants, several well-attended social events and a very successful teacher's workshop. There was 380 live presentations, 90 posters, and 105 virtual presentations.

The CGGB Steering Committee organised a virtual meeting on the 4th May, 2022, and discussed: a) Publication approval of the "IUGS Manual of Standard Methods for Establishing the Global Geochemical Reference Network". b) Progress on the IUGS Manual of Standard Methods for Global Geochemical Baselines. c) Promotion of the IUGS Manual: Many ideas about the promotion of the Manual were discussed. d) Organisation of a webinar on Compositional Data Analysis. e) Autumn joint Annual Meeting, planned for October. If pandemic situation is under control,

a physical Annual Meeting will be held in Athens.

JULY 2022

The International Geological Congress Committee (IGCC) opens the Call for Bids to Host the 38th International Geological Congress in 2028. Guidelines for Preparation of Bid Documents to Host the 38th IGC is also provided.

Episodes invites applications for position of associate editors (AEs) in the below specified areas of specialisation from scholars working in broad fields of geoscience who wish to participate in shaping the future direction of the journal.

During the 77 IUGS EC meeting in Paris, the IUGS EC decided to create a Task Force that deals with problems related to diversity, equity, and inclusion within the IUGS scientific community. Silvia Peppoloni, IUGS councillor from 2018 to 2022, was appointed chair of the task force. Anna Ladenberger (Co-chair of the IUGS Global Geochemical Baselines) and Asier Hilario (Chair of the IUGS Commission on Geoheritage) joined her as additional members.

The IUGS Commission on Global Geochemical Baselines is pleased to announce the long awaited publication of the "International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network". The work on the manual started way back in 2006, but it was in 2018 when the contents of the Manual really began to take shape (2018 Annual Report). It finalised in 2021 with the addition of geodetic and parametric levelling of existing geochemical data sets.

The Henk Zwart Award was presented to Professor Emerita Renée Heilbronner (University of Basel, Switzerland). The Henk Zwart Award is given by TecTask, the IUGS Commission for

Structural Geology and Tectonics, to further and promote research in structural geology and tectonics in any of its fields.

The organizing committee of the 37th International Geological Congress in 2024 (IGC 2024) and the Geological Society of Korea together with Busan Metropolitan Government, held the Busan International Forum for UNESCO Global Geoparks at BEXCO and the Busan GeoPark on July 28 and 29. In addition, the IGC trophy handover ceremony was held during the Forum. The organizing committee of 36th IGC transferred the IGC trophy to the Organizing Committee of Korea, the next host country, announcing the beginning of IGC 2024.

AUGUST 2022

Due to the untimely passing of IUGS Councillor Carlos Cónsole-Gonella, the IUGS Executive Committee calls for nominations to fill the term of 2022-2026 on the Executive Committee.

IUGS has joined the International Year of Basic Science for Sustainable Development (IYBSSD). The International Year of Basic Sciences for Sustainable Development, focuses on the links between basic sciences and the Sustainable Development Goals. As a partner IUGS will advise and decide about IYBSSD2022 international program and contribute to actions and programs about sustainable development.

IUGS is very pleased to welcome two new African nations into its membership. Kenya which will be represented by the Geological Society of Kenya. Algeria has also joined the IUGS with the membership being covered by the Centre de Recherche en Astronomie Astrophysique et Géophysique (CRAAG) in Algiers, ALGERIA. Thanks to Professor Hassina Mouri from the executive for her work in helping these nations

join IUGS.

Coinciding with our 60th year, our much valued affiliates Geology for Global Development, have prepared a fully open-access module on 'Geoscience and Sustainable Development'. The module includes eight classes: the UN Sustainable Development Goals, Working in the Global South, Decarbonisation, Disaster Risk Reduction, Water Security, Health and Land Degradation, Sustainable Urban Development, and Reducing Inequalities.

On 3 August 2022, IUGS-IFG, in collaboration ISSS, BSSS and GSL-FGG, ran a session called, 'The application of soil science in the criminal justice system' at the World Congress of Soil Science (WCSS), Glasgow, Scotland.

With heavy hearts, the members of the IUGS Executive Committee announce the passing in July of IUGS Councillor Carlos Cónsole-Gonella following a short-lived battle against an aggressive cancer. Carlos was nominated for the position on the EC by the YES (Young Earth Scientists) Network in which he was active for many years. He was elected as Councillor for the term of 2022-2026 by the IUGS-IGC Council in 2020. Carlos was rapidly establishing himself as a researcher for the Argentine Research Council (CONICET). He held teaching positions at the National University of Tucumán, Argentina, from which he received his PhD and at the Autonomous University of Entre Ríos. His passing is a great tragedy for his young family, his colleagues and friends in Tucumán, and the IUGS community.

SEPTEMBER 2022

Two young scholars were the recipients of the newly established INHIGEO Early Career Award and INHIGEO Student Prize for their

presentations at the recently held 47th INHIGEO Symposium in Les Eyzies-de-Tayac, (Périgord region, France) during September 15th-24th 2022.

OCTOBER 2022

The IUGS Earth Sciences Festival, one of the series of public geoscience events to mark the IUGS's 60th anniversary, was held from 4th to 28th October. The festival comprises eight separate geoscience events as well as the Earth Futures Film Festival in late October.

The International Geodiversity Day was held on 6 October, showing a series of interviews and short films on the theme of geodiversity, including interviews between the president of the IUGS John Ludden and IGD founder Dr. Jack Mathews and a very special collection of specially recorded videos documenting the geodiversity of our heritage stone from around the world. For this special event, IUGS had a special live mini-event, 1 hour of interactive talks on the Geodiversity of time, Geoheritage, Permian environments (analogues for climate change), and the Geodiversity of geothermal reservoirs.

On the 8th October IUGS had an INHIGEO event named Roots of a geological Union for the future of the Earth. In this 60th Anniversary year of the IUGS, the team of historians at INHIGEO brought together their experts from around the world, to talk about the origins of the IGC, IUGS and the changing topics of focus at the IGC's through time.

On the 10th October was the Commission on Global Geochemical Baselines (CGGB) event. "A Planetary Health Check, Establishing Global Geochemical Baselines" brought together geochemical experts to talk about the need to have accurate global geochemical baselines and



showcased the most recent CGGB's International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network.

On the 12th October IUGS had the 'Tectonics: the science of the dynamic Earth Event'. Guest talks included "Splitting a continent: Deformation in the Ethiopian Rift", and "How do gold deposits form? Insights from structural geology".

The 13th of October welcomed the Geosolutions for Net Zero event. This event has provided an overview of energy transition progress since COP26, geoeconomics of advocacy for geosolutions, the geoscience communications re-build, the International Science Council's thoughts on science unions developing stronger climate solution advocacy rolls ahead of COP28, the concept of Geological Net Zero. This event culminated in both a panel and round table discussions with participating geoscientists, Geounions, Geosocieties and Geosurveys as to the role of geounions in championing geological

solutions to climate change and discussing who might like to join the IUGS in creating a roadmap of activities and global geological development goals to be raised at COP28.

On the 14th October the IUGS supported the International Commission on Stratigraphy (ICS) in delivering a vibrant event the title of which is 'Extinctions and the Stratigraphical Record: is the past key to the present?' This event comprised six unique talks and a one-hour discussion given by global extinction experts. The event focused on decrypting the great extinctions, key similarities and patterns that could possibly inform us about what Earth has in store for us.

The IUGS Commission on Global Geochemical Baselines organised the Joint Annual Meeting together with the Geochemistry Expert Group of EuroGeoSurveys and the Geochemistry Group of ASGMI (Ibero-American Association of Geological and Mining Surveys). The three-day physical meeting (13-15 October 2022) was hosted by the Hellenic Survey of Geology and Mineral

Exploration and a total of 33 participants from Europe, China and Iran attended in person.

Zumaia (Basque Coast UNESCO Global Geopark), home of one of the most impressive stratigraphic outcrops on Earth, hosted The First 100 IUGS Geological Heritage Sites declaration ceremony. More than 200 specialists from almost 40 nations and ten international organisations, representing different disciplines of Earth Sciences, participated in the event.

Two IUGS medals were given at the 60th IUGS event in Zumaia on 26th October, 2022. Early career geoscientist medal was conferred upon Mónica Sánchez Roman. Emile Argand IUGS medal was conferred upon Thure Edward Cerling.

IUGS-Zumaia declaration was read out on the last day of the IUGS-100 Geosites event in Zumaia. The IUGS Zumaia declaration is one of the important results of this project. This widely supported declaration shows the best spirit of collaboration among all geoscience community.

On 26-28 October 2022 the, '5th IberoAmerican Congress on Forensic Geology' took place in Bogota, Colombia. Delegates included forensic geologists, archaeologist, anthropologists and medical and legal experts. IUGS-IFG co-hosted the event, focused on the search for missing persons and homicide graves, in conjunction with victims' relatives.

The Association of Applied Geochemists (AAG) is an affiliated member of IUGS and actively participates in IUGS activities including IGCs and Commission on Global Geochemistry Baselines (CGGB). IUGS past president Qiuming Cheng made a keynote speech entitled "Basic Laws of Geochemical Element Distribution and Identification of Geochemical Anomalies in

Exploration" at the symposium held in Chile on October 27, 2022. Qiuming Cheng was presented the AAG Gold Medal by the President of AAG John Carranza at the symposium.

NOVEMBER 2022

The Deep-time Digital Earth program of the IUGS held a scientific update meeting in Paris on 7th November, associated with the UNESCO Open Science Forum. The meeting was held at the Maison de la Géologie in Paris, with around 50 attendees from around the world, and around 15 in-person presenters and 5 virtual presenters. This was the first large-scale DDE meeting since the 2019 Fragrant Hills Beijing meeting that kicked off the DDE program.

ICS has organised a special presentation for Commission members and others by our webmaster and computer scientist Nickolas Car. Nick has kindly offered to present the latest developments in the information science field and how these developments are being applied by him and colleagues using the Commission's data.

DECEMBER 2022

The International Commission on Stratigraphy is delighted to announce publication of the 10th Version of the 2022 International Chronostratigraphic Chart. Included are the recently ratified Global Boundary Stratotype Section and Point (GSSP) for the Campanian Stage (Cretaceous System) and the Global Standard Stratigraphic Age (GSSA) for the base of the Hadean (by implication, the age of the Earth). A number of numerical ages, mainly for the Jurassic Period, have been updated. The chart relies on the dedication and engagement of many hundreds of geologists, globally, working across the Commission's seventeen subcommissions.

IUGS BODIES THE REAL LIFE OF THE UNION

The International Union of Geological Sciences promotes and encourages the study of geological problems, especially those of world-wide significance throughout the activities of IUGS Commissions, Task Groups and Initiatives.

At present IUGS gives special consideration to:

- International standards;
- Geoscience education;
- Geoscience information;
- Environmental management.

IUGS believes that it is of mutual benefit to establish close links with other organizations engaged in geosciences activities and especially those organizations whose work relates to some of the major activities of IUGS.

The list of currently active IUGS bodies testifies to these major aims of the Union. Links allowing description of the organization and activities of the IUGS bodies are provided on the IUGS website (www.iugs.org):

Scientific Commissions

Commission on Geoscience Education, Training & Technology Transfer (COGE)
International Commission on History of Geological Sciences (INHIGEO)
Commission for the Management and Application of Geoscience Information (CGI)
International Commission on Stratigraphy (ICS)
Commission on Tectonics and Structural Geology (TECTASK)
Commission on Global Geochemical Baselines (CGGB)
International Commission on GeoHeritage (ICG)
Commission on Geoethics (CG)

Task Groups

Task Group on Isotope Geology and

Geochronology (TGIG)
Task Group on Igneous Rocks (TGIR)
Task Group on Submarine Geohazards (TGSG)
Task Group on Diversity, Equity and Inclusion (TGDEI)

Joint Programs

International Lithosphere Program (ILP)
International Geoscience Programme (IGCP)
International Geological Congress (IGC)

Initiative

Initiative on Forensic Geology (IFG)

Big Science Program

Deep-Time Digital Earth (DDE)

IUGS Website



Giuseppe Di CAPUA IUGS Webmaster

The webmaster's activity was focused to maintain efficient the website of the IUGS, by creating and updating pages regularly. During the year, the webmaster worked in strict cooperation with the Secretary General, the E-Bulletin editor, the Secretariat, and the IUGS60 staff for assuring continuous support to IUGS bodies to promote events and activities organized or supported by the Union.

In order to analyze website accesses and user behaviors, the IUGS website is monitored through Google Analytics. The comparison of access

statistics in the range of years 2019-2022 for the interval 1 January – 31 December are reported in table 1. Data clearly show a marked increase in the number of unique visitors, visits, and page views in 2022, compared to previous years, attributable to the direct promotion of the IUGS image through activities organized for the sixtieth year of the foundation of the Union. In 2022, an average number of 98 visitors, 107 visits, and 196 page views per day were observed. The percentage increase in the number of unique visitors, visits and page views from 2021 to 2022 is shown in table 2. Moreover, there is a

Table 1. Comparison of access statistics to the IUGS website for the years 2019- 2022, period 1 January-31 December (Source: Google Analytics).

	2019	2020	2021	2022
Unique visitors (n)	33786	29227	29930	35736
Visits (n)	35971	31757	32080	38937
Page views (n)	77515	67601	62668	71429
Pages/Visit (n)	2.15	2.13	1.95	1.83
Average visit duration (min.)	1:44	1:41	1:25	1:22
Bounce rates* (%)	65.84	62.39	68.43	70.75

* The Bounce Rate is the percentage of visitors who access the website to visit a page and then leave website from that page rather than continuing to view other pages within the same website. The bounce rate is calculated by counting the number of single page visits and dividing that by the total visits. It is then represented as a percentage of total visits.

decrease in the number of pages consulted for each visit and the average visit duration. Finally, the bounce rates increased in 2022 reaching the

highest value since 2019. This value depends on the fact that IUGS website users visit mainly the homepage (38% of visits), then leave the website.

Table 2. Comparison of access statistics to the IUGS website for the years 2021 and 2022, period 1 January-31 December (Source: Google Analytics).

	2021	2022	Difference 2022-2021 (n)	Difference 2022-2021 (%)
Visitors (n)	29930	35736	+ 5806	+ 19.4
Visits (n)	32080	38937	+ 6857	+ 21.4
Page views (n)	62668	71429	+ 8761	+ 14.0
Pages/Visit (n)	1.95	1.83	- 0.12	- 6.2
Average visit duration (min.)	1:25	1:22	- 0:03	- 3.5
Bounce rates (%)	68.43	70.75	+ 2.32	+ 3.4

In 2022, peaks of visits were reached on 24, 25, 26 and 27 October 2022 with a number of 290, 314, 302, 329 sessions respectively, during the event “First 100 IUGS Geological Heritage Sites”, held in Zumaia (Spain). The number of 329 visits is the second highest since 2016, after the highest peak ever of 439 visits reached on 29 October 2021.

Visits come from 181 countries, mainly from China (15.2%), USA (13.2%), India (11.8%). Less than 4% of visits each comes from all other

countries.

The most visited pages of the website were the following: Homepage (38.3%), Calendar 2022 (6.3%), History (5.9%), ICS (5.2%), IGC (4.7%), Executive (2.8%), Flagship Activities (2.6%), Episodes (2.6%), DDE (2.3%), Organization (2.3%), Calendar 2023 (2.1%). Other pages got less than 2.0% of visits.

In figure 1, the upper part of the IUGS homepage, accessed on 20 December 2022.



Figure 1. IUGS homepage on 20 December 2022 (Source: <https://www.iugs.org>).

IUGS E-Bulletin and Social Media



Gurmeet KAUR E-Bulletin Editor and Social Media Manager

The E-bulletin is the quickest instrument for disseminating news about IUGS initiatives, activities, achievements, events, and publications. All IUGS commissions, task groups, initiatives, IGCP projects, and adhering bodies are invited to provide a steady flow of material, consisting of concise texts accompanied by a few illustrations (photographs, diagrams, etc.). Science reports or papers are excluded. The E-bulletin is widely distributed among the geoscientist community and is published on a monthly basis.

The IUGS social media platforms (Facebook, Twitter, and LinkedIn) regularly report relevant information and activities of the various IUGS

commissions, joint programs, task groups, and initiatives. The exhaustive IUGS e-bulletin and IUGS website are also promoted through social media, with direct web links provided to open the e-bulletin and website for detailed reports. The IUGS publication Episodes and the research articles published therein are also promoted through social media, which are accessible to all free of charge through the links provided. The total number of Facebook followers has surpassed 8,000. The close coordination and cooperation amongst the PC members has been instrumental in the smooth functioning of the IUGS social media platforms.

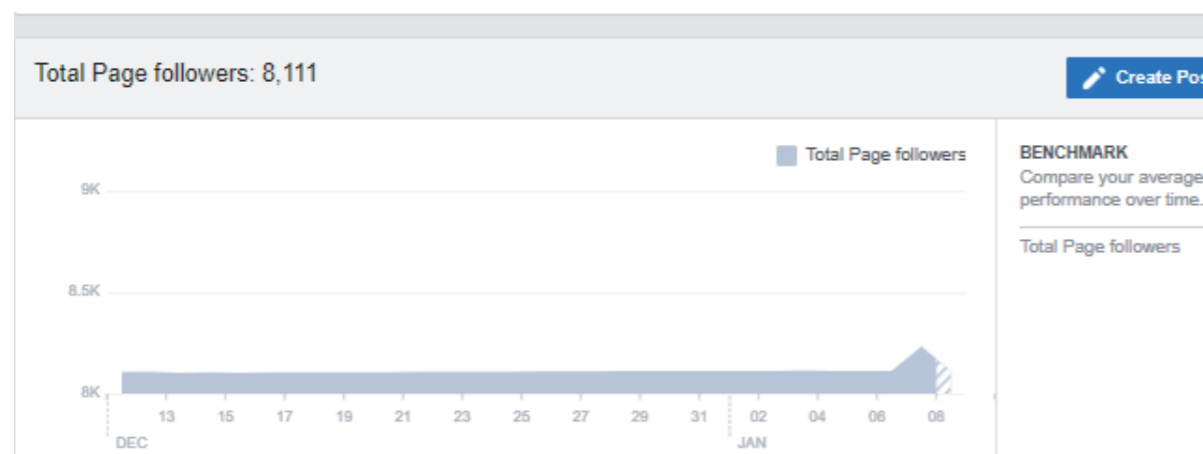


Figure1. Total IUGS facebook followers.

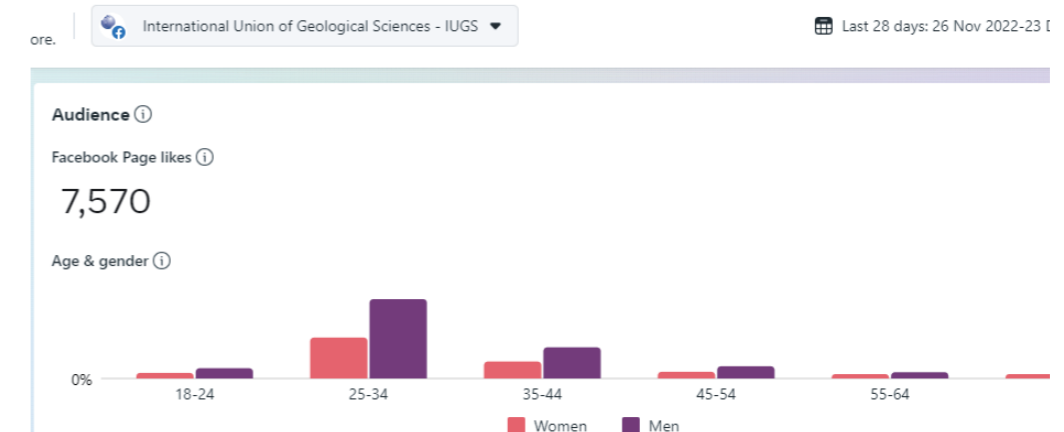


Figure 2. Gives the age group and gender statistics on accessing IUGS facebook posts.

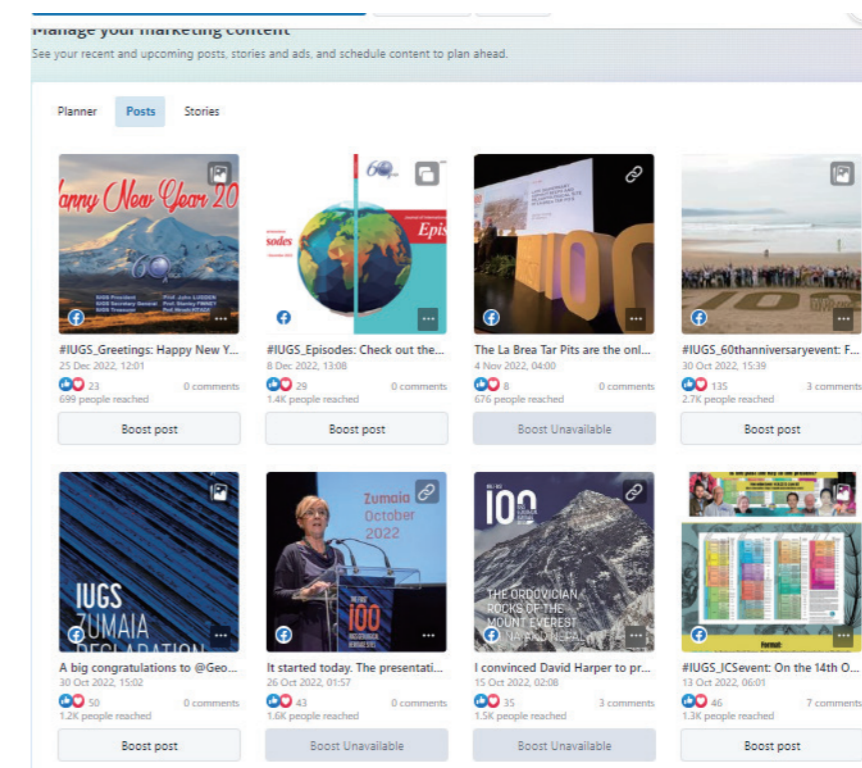


Figure3. The snapshot of the IUGS news publicized through IUGS facebook.

Jin-Yong LEE
Editor in chief



**EPISODES-
Journal of International
Geoscience**



• A total of 88 manuscripts were submitted in 2022 (as of 2022.12.31) through the EM system, and 41 manuscripts (24 original articles, 2 reviews, 4 communication regarding IUGS geological

standards, 1 report, 2 History of Geology, 2 book reviews, 3 obituaries/profiles, and 3 editorials) were published.

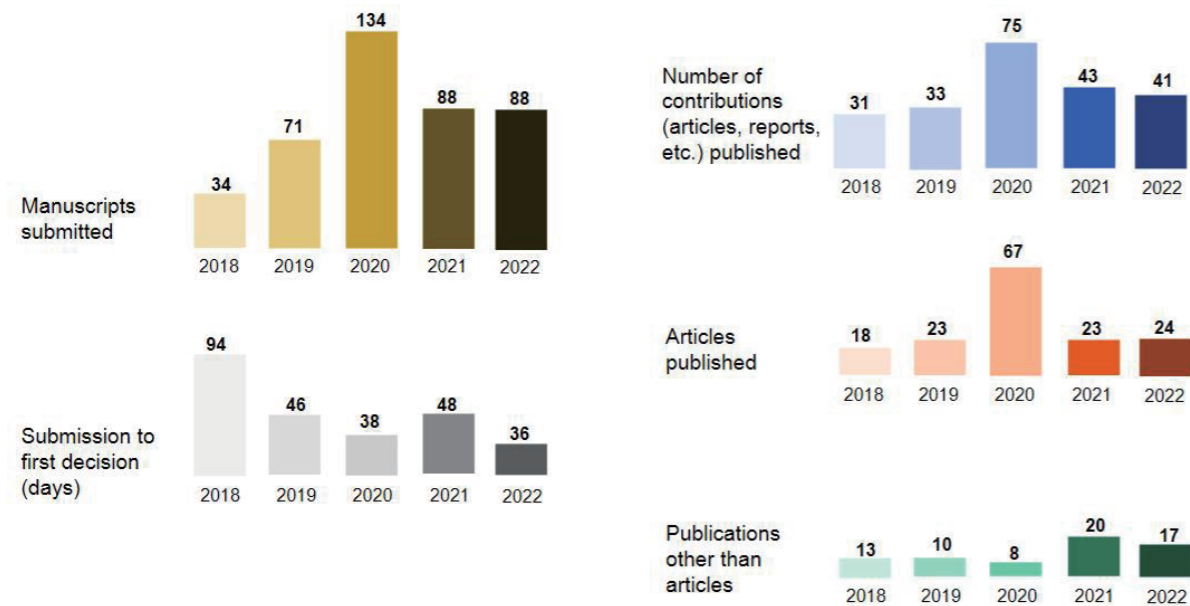


Figure 1. Key figures for Episodes for the period 2018-2022.

• The acceptance rate was 49%, which means that almost half of the manuscripts that were submitted were accepted for publication. The rejection rate was 51%.

In terms of the timeline for manuscript acceptance and first decision notification, there was a 12-day reduction in the period from 48 days in 2021 to

36 days in 2022. This reduction may be attributed to improvements in the editorial process and an increase in the efficiency of the review process.

• The CiteScore for the journal increased by 1.1 from 2.8 in 2021 to 3.9 in 2022 according to Elsevier's Scopus as of May 5, 2022. The percentile also rose from Q2 to Q1 (Figure 2).

The latest CiteScoreTracker data (as of March 5, 2023) shows that the CiteScore for the journal is 5.2. The impact factor for the journal, which will be announced by Clarivate in June this year, is expected to rise. The journal is ranked 47th out

of 191 academic journals in the field of Earth and Planetary Sciences (Geology). Overall, Episodes has experienced positive growth and is continuing to increase its impact and influence in the field of Earth and Planetary Sciences.



Figure 2. CiteScore of Episodes.



The International Commission on Stratigraphy (ICS)



David A.T. Harper
Chair



Shuzhong Shen
Vice Chair



Philip L. Gibbard
Secretary General

The International Commission on Stratigraphy is the largest of the clusters within the International Union of Geosciences. It has 17 active subcommissions involving over 600 scientists, globally. Two key areas, the ICS Chronostratigraphic Chart itself and the Webpages continue to be a focus. The 2022 version was regularly updated on the ICS website: ten versions appeared in 2022 as new GSSPs were ratified and a substantial number of numerical ages revised including that for the base of the Hadian (i.e., the age of the planet). Korean

and Japanese translations were published, in addition to the 20 that already exist.

The Commission supported the Union's 60th anniversary with a number of events. The Commission led on a webinar on Extinctions and the Stratigraphical Record and contributed to a webinar on Geodiversity. The Commission was actively involved in the First 100 IUGS Geological Heritage Sites. Some 20 sites nominated by the ICS are included in a section on Stratigraphy and Sedimentology (<https://iugs-geoheritage.org/>).



Figure 1. Figure 1. Site 017: Mountain Everest viewed from Gokyo Rio. Above the sandstones of the Yellow Band, pale grey limestones contain Middle Ordovician (Darriwilian) fossils. Photo: Luis Carcavilla.

Figure 1. Site 017: Mountain Everest viewed from Gokyo Rio. Above the sandstones of the Yellow Band, pale grey limestones contain Middle Ordovician (Darriwilian) fossils. Photo: Luis Carcavilla.

A number of key publications, reflecting the work of the Commission, appeared in Episodes over the last year (see <https://www.episodes.org/>): Ratification of subseries/subepochs as formal rank/units in international chronostratigraphy; The Standard Auxiliary Boundary Stratotype: a proposed replacement for the Auxiliary Stratotype Point in supporting a Global Boundary Stratotype Section and Point (GSSP); The Global

Boundary Stratotype Section and Point (GSSP) of the Campanian Stage at Bottaccione (Gubbio, Italy) and its Auxiliary Sections: Seaford Head (UK), Boceniec (Poland), Postalm (Austria), Smoky Hill, Kansas (U.S.A), Tepayac (Mexico); The Global Boundary Stratotype Section and Point (GSSP) for the base of the Coniacian Stage (Salzgitter-Salder, Germany) and its auxiliary sections (Stupia Nadbrzeżna, central Poland; Střeleč, Czech Republic; and El Rosario, NE Mexico); The Global Stratotype Section and Point (GSSP) for the base of the Kimmeridgian Stage (Jurassic System), at Flodigarry, Staffin Bay, Isle of Skye, Scotland, UK.

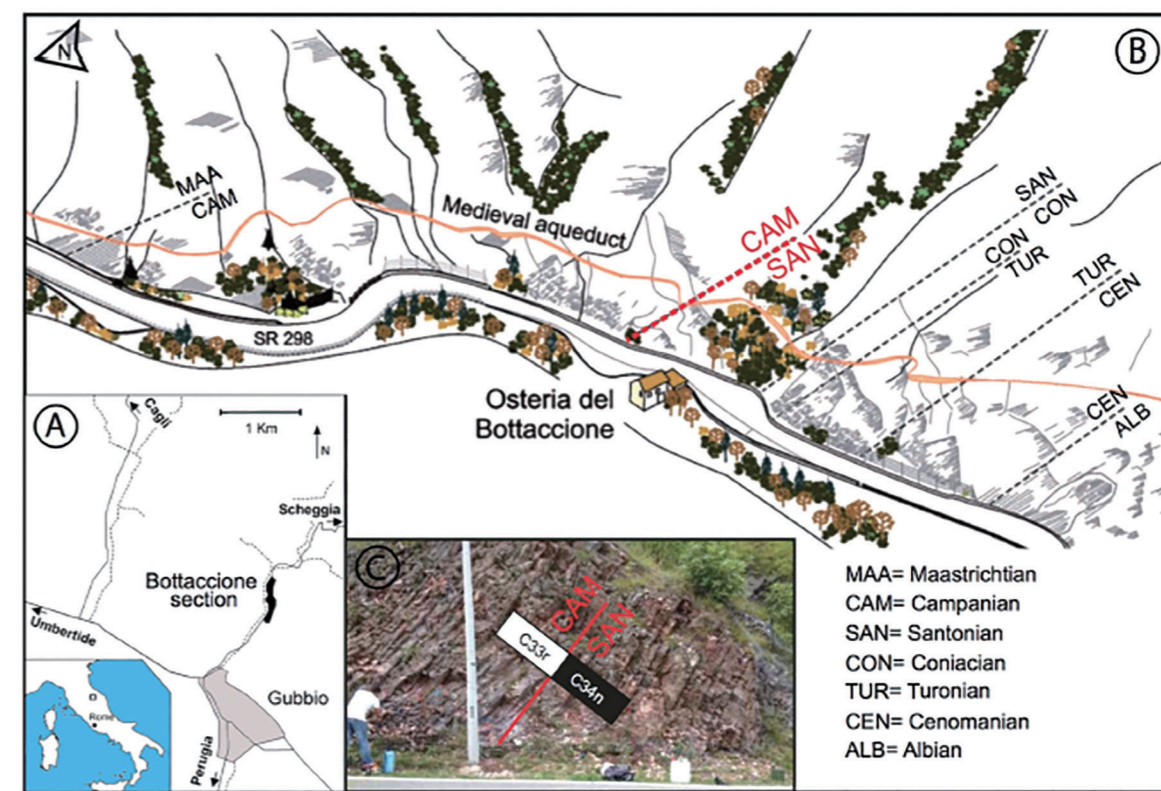


Figure 2. A. Map showing location of the Bottaccione section at Gubbio; B. Sketch of the section; C. The GSSP for the base of the Campanian (see Gale et al. 2022, Episodes).

The two most downloaded papers in Episodes involved the debate over the status of the Anthropocene: A practical solution: the Anthropocene is a geological event, not a formal study; The Great Acceleration is real and provides a quantitative basis for the proposed Anthropocene Series/Epoch.

Data remodelling work on the Semantic Web representation of the Chart (<http://resource.geosciml.org/vocabulary/timescale/gts2020>) to better represent and communicate stratigraphic and temporal typologies continues with a new Knowledge Graph of Chart and related information continues at <https://github.com/i-c-stratigraphy/geologic-timescale-kg>.

In education, the chart continues as a teaching resource for schools and colleges. A number of authors, university teachers and other educators together with professional societies were granted permission to use and reproduce the ICS International Chronostratigraphic Chart in their publications. Many members of the Commission have contributed to 'Deciphering Earth's history' a guide to stratigraphical practice (edited by Angela Coe) published in 2022 by the Geological Society and supported by the ICS and IUGS. The Timescale Calibration Subcommittee continues develop teaching materials for the Cyclostratigraphy Intercomparison Project (CIP: cyclostratigraphy.org) to explain the use of tools for detecting cyclicity in the stratigraphical record.

The chart has consistently initiated and supported a range of research programmes in the earth and planetary sciences. The chart continues be used extensively in scientific papers, sometimes cited (the original chart-describing paper by Cohen, Finney, Gibbard & Fan 2013 in Episodes has been cited some 2750 times, whereas specific versions of the chart published in the last three years have been cited some 80 times). It is the authorized geological timescale and the single point of truth for global chronostratigraphy. A two-volume work on 'Global Synthesis of the Ordovician' published by the Geological Society is now online, supported by the ICS and IUGS (see lyellcollection.org). The volumes include a global coverage of Ordovician successions and includes topical subjects such as orbital-tuning,

palaeobiogeography, sea-level changes and the Ordovician timescale.

Strong links remain and are being enhanced with the DDE (Deep-time Digital Earth) program (OneStratigraphy.ddeworld.org) and the Geobiodiversity Database (Geobiodiversity.com) which has been recently rejuvenated. The ICS, through the DDE's Stratigraphy Working Group, has worked with DDE to build a so-far most comprehensive domain ontology for stratigraphic knowledge, which contains ontologies for seven major stratigraphic subdisciplines and over 1200 knowledge nodes. This work forms the foundation for the interchange of stratigraphic data in a computer-readable way in the future.

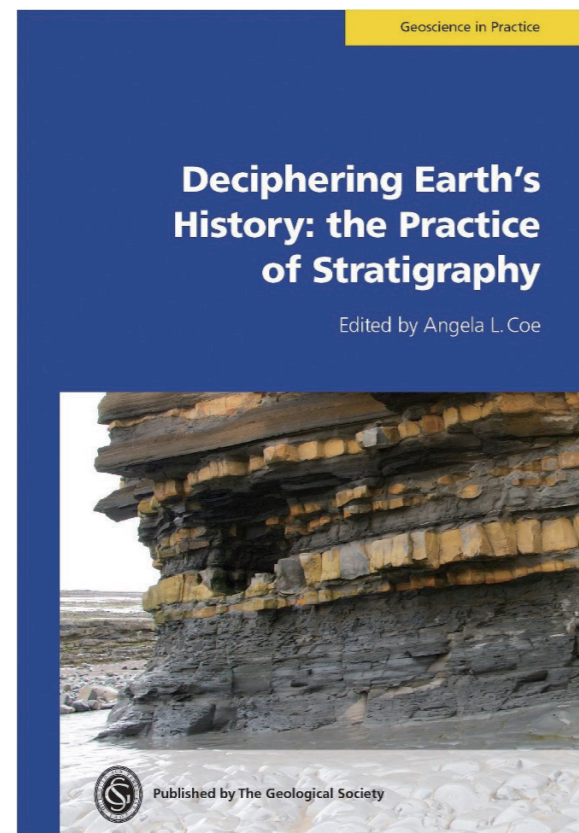


Figure 3. Stratigraphy in Practice: Coe et al. 2022. A community project with authors drawn from the International Commission on Stratigraphy.



COMMISSION ON GEOSCIENCE EDUCATION (COGE)

The Commission on Geoscience Education (COGE) is a scientific committee established by the International Union of Geological Sciences (IUGS) in 2004 to support countries worldwide in improving Earth science education. The COGE accomplished several significant milestones under the leadership of the newly elected chair, Dr Sandra Villacorta, despite the devastating loss of previous chairman Professor Chis King.

The COGE implemented a new working strategy plan, developed organizational documents such as the COGE Terms of Reference (ToR) and the Geoscience Education Field Officer (GEFO) Policy (Fig. 1), and established a nomination process for new members. This resulted in the recruitment of new members, who can effectively communicate with the COGE Board via email, virtual meetings, and online file-sharing.

The COGE was able to expand its reach by engaging with geoscientists worldwide using social media. They were also able to resume collaborations with organizations such as the European Geosciences Union (EGU) Education Committee to co-lead the GEFO program.

In May, eight new IUGS-COGE field officers,

along with two previously trained GEFOs, underwent a two-day training program in Barcelona. These field officers are actively helping science educators develop and deliver effective teaching strategies and approaches, as well as presenting interactive workshops to conference participants. Evaluation data from each workshop is also collected and analysed in order to enhance future workshop experience.

The COGE members were also able to support the organization of Earth Science Olympiads in various countries, including Korea, the USA, Peru, and Chile. Additionally, there are plans in place to expand support to other countries. In honour of Professor Chris King's legacy, the COGE proposed the Chris King Medal for Excellence in Geoscience Education, which recognizes geoscience educators' outstanding work and vocation of service, efficiency, and moral and ethical values at any educational level. The award will be offered biannually.

To conclude, the COGE has continued to make significant strides in 2022 towards achieving its goal of enhancing geoscience education worldwide.



GEFO

Geoscience Education Field Officer Program



<https://iugscoge.org/>

Fig. 1. Geoscience Education Field Officer program announcement



INTERNATIONAL COMMISSION ON THE HISTORY OF GEOLOGICAL SCIENCES (INHIGEO)



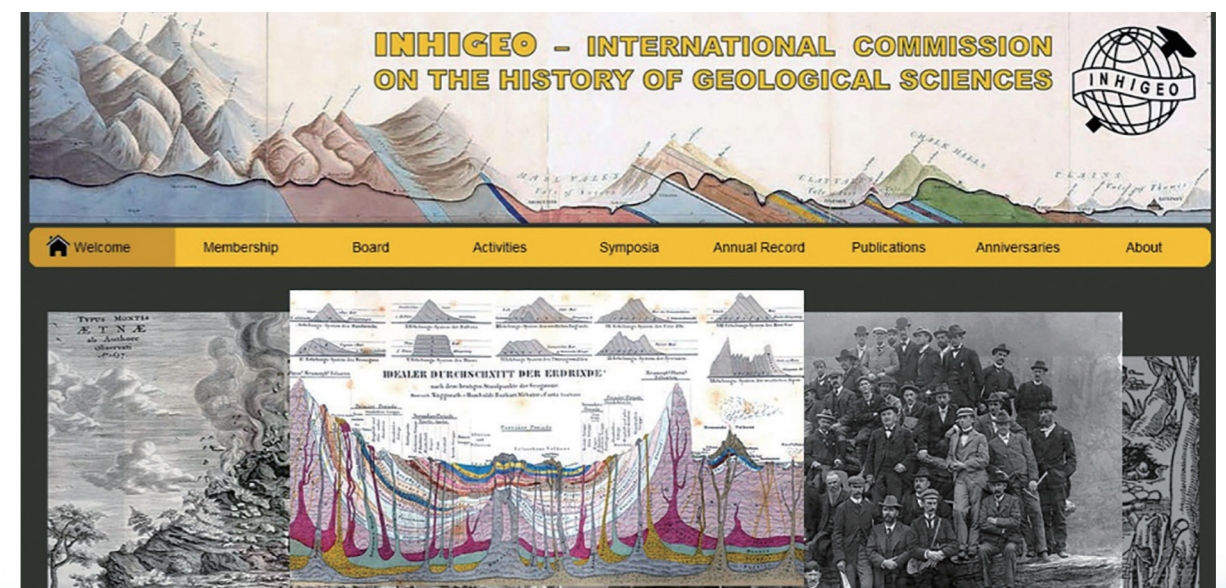
Ezio Vaccari
President




Martina Kölbl-Ebert
Secretary General

The International Commission on the History of Geological Sciences (INHIGEO) includes an active and growing community of individuals and institutions around the world. Our aim is not only the historical study of geological sciences in all their forms, but also its promotion and dissemination, as well as the creation of effective links between this historical knowledge and the broader contemporary context of the Earth sciences and humanities.

This truly multicultural approach is one of our main strengths, together with a general attitude of mutual collaboration, scientific curiosity and friendship, which has developed particularly within the INHIGEO annual meetings and fieldtrips down through the years. In order to continue this positive trend, the Commission encourages proposals of new memberships, in particular from non-represented countries and from young researchers (including post-graduates and PhD students).






Check out the book:


Exploring Geoscience Across the Globe

Exploring Geoscience Across the Globe




Chris King


Approved by:
the International Geoscience Education Organization
the International Union of Geological Sciences
the European Geosciences Union
for the teaching of the International Geoscience Syllabus



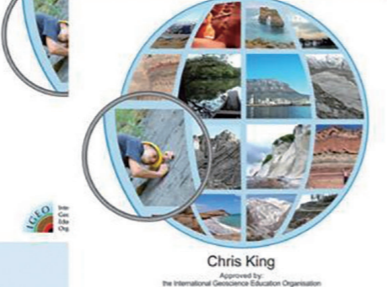
Yerbilimini Dünya Çapında Keşfetmek



Explorando as geociências ao redor do globo




Explorando las Geociencias en todo el mundo



Chris King

Approved by:
the International Geoscience Education Organization
the International Union of Geological Sciences
the European Geosciences Union
for the teaching of the International Geoscience Syllabus



Translated into

04

Languages

➔

- Turkish
- Japanese
- Portuguese
- Spanish

Fig. 2. Exploring Geoscience Across the Global has been translated and used in four languages in addition to English.



The INHIGEO website (<http://www.inhigeo.com/>) has been updated. It features the Anniversaries Series of historical papers that INHIGEO prepares monthly for the IUGS E-Bulletin: 13 short papers were published in 2022, on historical topics related to stratigraphy, palaeontology, volcanology, mineralogy, geomorphology, geophysics, oceanography, cartography and geological institutions. A special Anniversary was dedicated to the history of the establishment of the IUGS. In 2022 INHIGEO contributed to Episodes with six papers published online on the IGCs held in 1888, 1903, 1922, 1968, 1992 and 1996, as well as with a classic paper by Martin Rudwick on Georges Cuvier's international and successful appeal (printed in 1800), addressed to correspondents from all over the world in order to receive accurate images of bones of fossil mammals and reptiles.

The proceedings volume of the 44th INHIGEO Symposium held in Varese and Como (Italy) in 2019 was published early in 2022 as a set of 26 collected papers and introduction, comprising more than 400 pages, in the International Journal of History of Science Physis. Rivista Internazionale di Storia della Scienza, 56 (2021). The abstracts and contents page of this volume, edited by Ezio Vaccari, may be downloaded in pdf from the journal website: <https://www.olschki.it/riviste/17#indici>

The 47th INHIGEO Annual Symposium took place at Les Eyzies in southern France, the area of major Paleolithic finds since the creation of the discipline of pre-history in the mid-19th century. It included a five-day conference, 17 to 21 September 2022, and several field trips to prehistoric caves and shelters, geological sites such as the impact crater of Rochechouart, and

other noteworthy sites of the region.

Two young scholars were the recipients of the newly established INHIGEO awards, both for their presentations at the Symposium in Les Eyzies: the INHIGEO Early Career Award was assigned to Maddalena Napolitani for her presentation Painting the mountains between art and Earth sciences during the 2nd half of the 19th century: some French case studies and the INHIGEO Student Prize was given to Timothé Lhoste for his talk Making the fossil man: investigation around the remains of 'Denise' and their stratigraphic context.

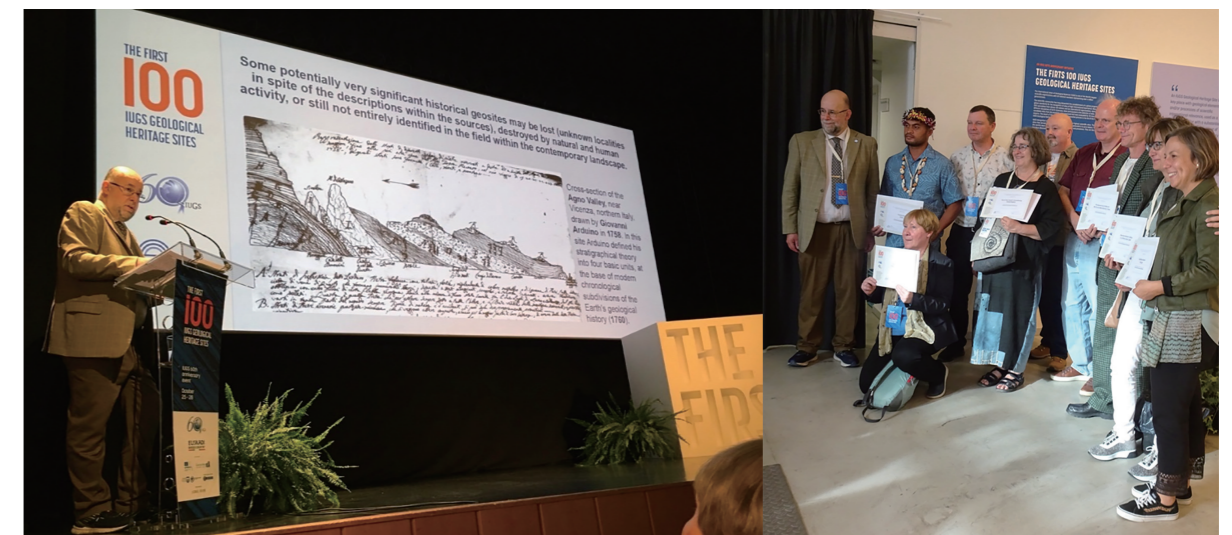
In October 2022, INHIGEO Vice President for Europe Marianne Klemun (University of Vienna, Austria) received the GSA History and Philosophy of Geology Division's Mary C. Rabbitt Award at the Geological Society of America annual meeting in Denver. Later in the year Marianne was also awarded the Medal of Honour from the Carinthian Society for History for her research on history of natural and Earth sciences.

A new online series of INHIGEO webinars started in 2022, with the aim to provide an open virtual forum for discussion of a wide range of topics on the history of geological sciences through panels and roundtables, book presentations, workshops for exchange of views on methodology for those new to historical research, archives and what to look for. The first webinar, History of the geological sciences – providing resources for society, held on July 11, 2022, was attended by INHIGEO members and colleagues from around the world.

A virtual roundtable, organized by INHIGEO in collaboration with the IUGS@60 Team, was held online on October 8, 2022, as part of the celebrations for the 60th anniversary of the IUGS, concerning the history of the International Geological Congress (IGC) within the development of the geosciences from the late 19th century to the end of the 20th century. The aim of this event, entitled The roots of a geological union for the future of the Earth was to



Award ceremony at 47th INHIGEO Symposium in Les Eyzies, France, on September 21, 2022: (from left) Ezio Vaccari, Timothé Lhoste, Maddalena Napolitani, Martina Kölbl-Ebert



INHIGEO President Ezio Vaccari giving his keynote lecture (left) and the participants to the session on History of Geosciences (right) in Zumaia on October 26, 2022.

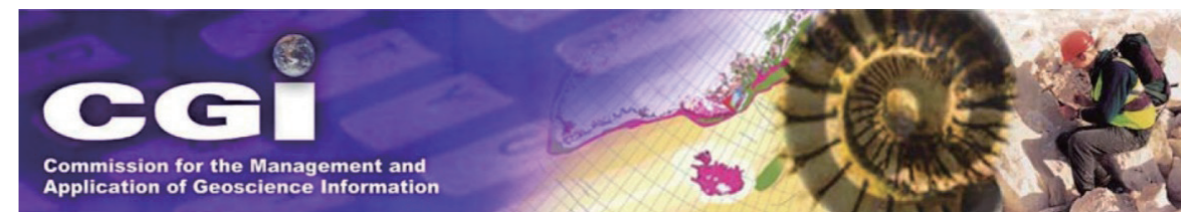
emphasize and discuss the role of the IGCs for the idea of the foundation of the IUGS and for its development from the 1960s onward.

An active and fruitful collaboration has been established during 2022 with the IUGS International Commission on Geoheritage (ICG). INHIGEO has provided its contribution for the aspects concerning the history of geosciences within the project on IUGS Geological Heritage Sites, proposing sites of geohistorical relevance, taking part to the evaluation process and contributing to the editing of the book on the First

100 IUGS Geological Heritage Sites.

Ezio Vaccari opened the session with a keynote lecture on The beautiful history of a beautiful science: the historical value of Geosites.

The extent of the activities carried out during 2022 show that communication, interdisciplinary dialogue and new possible interactions with other groups, communities, commissions and associations within the sciences and humanities are always very important aspects of the research work and the outreach commitment of INHIGEO.



COMMISSION FOR GEOSCIENCE INFORMATION (CGI)

Chair Harvey Thorleifson



The IUGS Commission for the Management and Application of Geoscience Information (CGI) fosters the interoperability of geoscience information through leadership, collaboration, education, as well as provision of geoscience information standards and best practices.

CGI represents IUGS on geoscience information matters, provides the means for transferring knowledge on geoscience information and systems, assists international dissemination of best practice in geosciences information, stimulates and supports initiatives that are developing standards, and its Council members hold leadership positions in the information community.

CGI was active throughout 2022. We now have 526 members in 82 countries. We have a Chair, Past Chair, Co-Secretaries General, Treasurer, and five Councilors, from Australia, Brazil, Canada, China, France, Japan, Namibia, NZ, UK, and USA. CGI hosts or co-hosts the DDE Standards Task Group (DDE-STG) and five working groups, and we coordinate with partners

such as Open Geospatial Consortium (OGC), CODATA, CGMW, Loop, and OneGeology.

CGI Council meetings were held on January 26th, April 12th, June 30th, and October 26th. We participated in the November DDE meetings in Paris. Also last year, GeoSciML GitHub repositories were rationalized. With the DDE-STG, we further developed the DDE review procedure, metadata standard, evaluation guide, standards framework plan, and metadata app. DDE-STG workshops were held on March 16th and July 27th.

Our 2022 highlight was a series of GeoInfo Summit meetings, co-hosted with CGMW, Codata, DDE, Loop, OGC, and OneGeology, whose consensus focused on a global solid earth digital twin. On February 24th, we heard superb talks from CGI, CGMW, Codata, DDE, Loop, OGC, & 1G. We considered leadership, gov't/ university/industry coordination, sustainability, and goals. We saw the increasing importance of machine-readable, data-rich knowledge. On May 19th, we recognized we need to be needed, by

making sure that our activity is relevant. We saw that standards are maintained if used. We need to better identify a problem that calls for our role.

On September 20th and 22nd, we outlined a spatial geoscience paradigm for the 21st century. Our vision is an accounting of how the solid earth works, with defined objects, some invisible. This is the logical next step after the

great success of DDE. This goes beyond paper, to dynamic modeling like a climate model that answers questions. We need multiple resolutions, and coordination with marine, soil, hydrology, and atmosphere. We need to ensure that all countries will want to be involved. Our next step is to revise our white paper to define practical applications. We are addressing coordination and communication, and defining roles.



COMMISSION OF TECTONICS & STRUCTURAL GEOLOGY (TECTASK)

The Commission on Tectonics and Structural Geology (TecTask) of the International Union of Geological Sciences (IUGS) represents an initiative of Earth Scientists dedicated to stimulating communication and coordination within the international science community and aims to provide information to the public. The group encourages innovative research and continued education in Tectonics and Structural Geology, the growth of intellectual capital, and the impact of science on the wealth of the global society. TecTask reaches out to scientists and students, particularly those from developing countries and early career researchers, to share cutting-edge research and development, and state-of-the-art training. Dialogue and cooperation are welcomed with organisations, industry, and administrations regarding applications in Structural Geology and Tectonics for sustainable use of the world's natural resources, preservation of the environment, prevention of natural hazards.

The current TecTask executive committee (EC) has the mission to focus on the activities that the commission has been running over the years and to carry out the transition of the commission to form the International Association for Structural Geology and Tectonics (IASGT).

The main activities of the TecTask commission in 2022 were:

1. Transition of the TecTask commission towards an International Association for Structural Geology and Tectonics (IASGT):

In the last ad-hoc review of TecTask by the IUGS Executive Committee (EC), TecTask was requested to evolve to form the International Association for Structural Geology and Tectonics (IASGT), and to focus the 2020-2024 mandate to achieve this goal. The TecTask executive committee started this process in 2020, deciding to launch the new association based in Kharagpur (India) and to appoint an IASGT founding executive committee in 2022. Prof. Manish A. Mamtani (Indian Institute of Technology in Kharagpur) is the leader of the foundation of the IASGT during the transitional period, and is supported by a committee of 26 members with a wide representation of geographic origin, gender, and career stage. An announcement to the community was made, and IASGT currently has 896 registered members.

2. Maintenance of the TecTask Web Portal (<http://www.tectask.org/>) and social media accounts:

The TecTask Web Portal and social media platforms are crucial for communication and exposure to both the public and science community. These include Facebook (<https://www.facebook.com/Tectask/>), Twitter (<https://twitter.com/iugsc>) and LinkedIn (<https://www.linkedin.com/company/tectask>) accounts.

3. Open Terminology & Standards initiative with a Wiki-like Internet Platform:

This is a major initiative that aims to define and maintain a database of professional terminology

and scientific standards. It provisionally works as a dynamic wiki (<https://terminology.iasgt.org>). This platform is populated with terms and definitions, which can be publicly discussed by the enrolled members, prior to publication into a formal glossary on a regular basis (e.g., every five years). The open-source and open-access nature of Open Terminology & Standards aim to provide a tool to promote the dynamic changes in geological terminology over time. It is intended to link it to Outcropedia (see below).

4. Organization of the YORSGET conference series:

TecTask is the umbrella organization for the YORSGET conference series (International Conference of Young Researchers in Structural Geology and Tectonics). This is a conference series in which PhD, MSc students, postdocs, and early career researchers present their research to a wide audience that also include more senior academics. The 3rd YORSGET took place in Catania (Italy) in June-July 2022 (<http://www.dipbiogeo.unict.it/it/content/young-researchers-structural-geology-and-tectonics>), organized by the University of Catania, and included field visits to key outcrops.



Group Foto of the Yorsget 2022 attenders in Agrigento

5. Co-organization and support to the DRT conference series:

The International Conference on Deformation Mechanisms, Rheology and Tectonics (DRT) has been held every two years since 1976. TecTask supports and contributes to organize DRT conferences. The 23rd edition was held in Catania (Italy) in July 2022, organised by the University of Catania and the DRT-Society (<https://drt-society.org/>), with TecTask support and participation.



Group photo of DRT-2022 in Catania

The conference was highly successful and was attended by 130 participants. Participants had the opportunity to visit the volcanic area of Etna, the Hyblean carbonate platform area, and the crystalline basement of Calabria in several excursions and fieldtrips.

During the conference, the 4th Henk Zwart medal was given to Professor Emerita Renée Heilbronner (University of Basel, Switzerland), for her enormous contribution to Structural Geology.

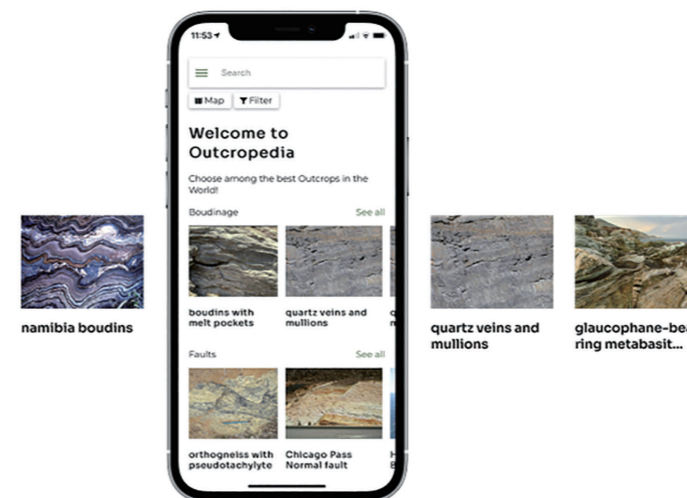


TecTask vicechair, Taija Torvela, gives the Henk Zwart award to Prof. Heilbronner

6. Outcropedia portal and new phone app:

Outcropedia, created in 2004, is a tool to collect, publish, and disseminate key outcrops, as well as

Geo-Tours. Now available in an app, Outcropedia allows collecting and uploading georeferenced outcrop photos, descriptions, and geotours from the field. It launched in 2021.



COMMISSION ON GLOBAL GEOCHEMICAL BASELINES

<https://www.globalgeochemicalbaselines.eu/>

The Commission on Global Geochemical Baselines (Figure 1) is striving to develop a Standard Methods Manual for the Global Geochemical Reference Network project; establish a global Geochemical Reference Network; prepare a harmonised global geochemical database, and document the

concentration and distribution of chemical elements and species in the Earth's near-surface environment. To reach these goals, the Commission works with applied geochemists throughout the world to establish standards for global-and regional-scale geochemical mapping.



Figure 1. Group photograph taken during the Joint Annual Meeting in Athens, Hellenic Republic (October, 2022).

1. Publication of the Manual of Standard Geochemical Methods

The newly published International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network (Figure 2, left) presents, for the first time,

a comprehensive overview of the standardised geochemical methods that should be employed across the land surface of the Earth to map the distribution of chemical elements in various media. Applying these methods will produce internally consistent quality-controlled data sets for each sampling medium for multipurpose use.



Figure 2. Front covers of three Commission Special Publications. Left: "International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network"; Centre: "R-scripts for Generation of 5, 8 and 16 Random Sampling Points Within Predefined Rectangles" and Right: "Program ROBCOOP4A for Estimation of Balanced Classical and Robust Analysis of Variance: Instructions for Use and Source Code".

The Manual provides extensive information on sampling protocols for rock, residual soil, humus, stream water, stream sediment, and overbank and floodplain sediments (Figure 3). There are also chapters discussing sample site selection, sample preparation, and quality control procedures. These include the development of project reference materials, analytical methods, data management, map preparation, project management, and information on how to level existing geochemical data sets. An applied geochemist carrying out a geochemical mapping project at any scale should find a wealth of useful information within the pages of this Manual.

The Manual of Standard Methods is truly an international effort, and the IUGS-CGGB would like to thank all contributors, reviewers and providers of material for their engagement and dedication (51 contributors from 25 countries, 23 reviewers from 13 countries and 10 colleagues from 5 countries that provided material).

2. Publication of the R-scripts for the generation of random sampling sites

The Global Geochemical Reference Network (GRN) consists of 19,833 total grid cells of 160x160 km that cover the whole globe. The land surface of the Earth is covered by 7356 grid cells (Global Terrestrial Network, GTN), and the marine surface by 12,477 grid cells (Global Marine Network, GMN). Planning the sampling campaigns in both realms requires the generation of random sampling points within each of the 160x160 km grid cells. For this purpose, the e-book (Figure 2, centre) makes available three R-scripts for the generation of 5-, 8- and 16-random sampling points within each 160x160 km grid cell, provides instructions for their use, and the format of input and output files. The three R-scripts can be used to generate random sampling points within any other size rectangular grid cell.



INTERNATIONAL COMMISSION ON GEOHERITAGE



Asier Hilario
Chair



2022 has been very important for the recently rejuvenated International Commission Geoheritage. Our commission has consolidated its internal structure and operational guidelines and a new sub-commission on geo-collections has been created. This commission has gained huge visibility and credibility with the organization of the IUGS 60th anniversary event at Zumaia (Spain), where the First 100 IUGS Geological Heritage Sites were announced. and the IUGS

declaration of Zumaia was adopted.

“The First 100” has been a long demanded huge collaborative endeavour that has brought together more than 10 international affiliated organizations and more than 500 geologists from 50 nations. The First 100 represents the best of the collaborative spirit of the IUGS. This recognition identifies the selected sites as being of the highest scientific value. They are sites that

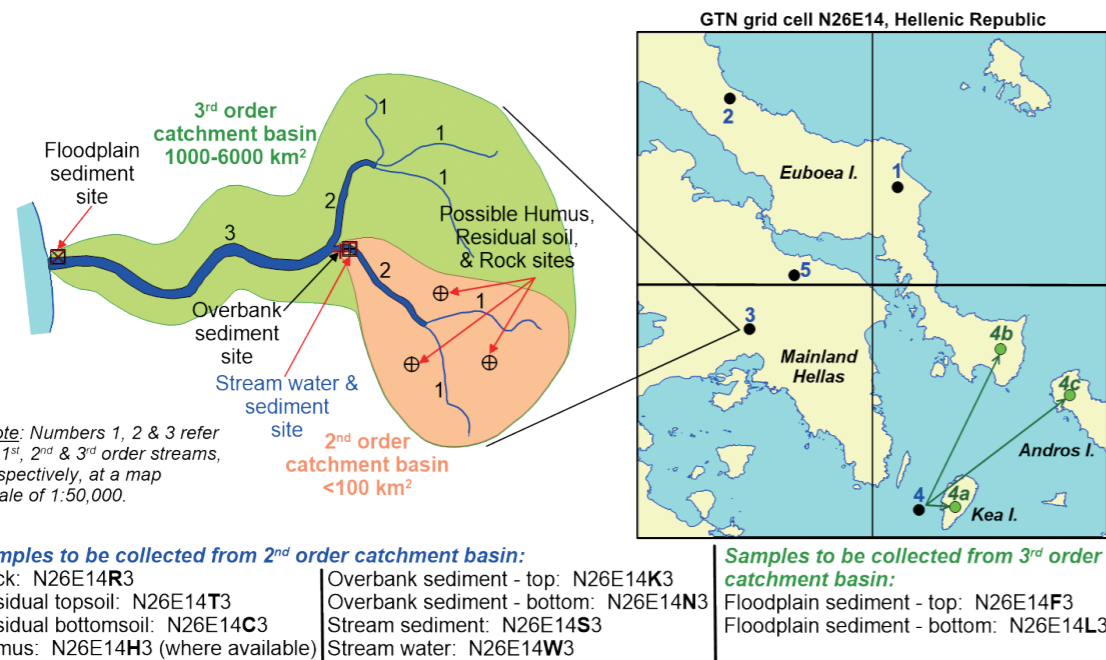


Figure 3. Example of a GTN grid cell N26E14 with 5 random points, and a schematic diagram showing the possible sample sites of rock, residual soil, humus, stream water and sediment, overbank sediment, and floodplain sediment from the catchment basin representing random point number 3. Two random points fall on mainland Hellas (3 & 5), two on Euboea Island (1 & 2), and one in the sea (4), which should be moved to a nearby land site.

3. Publication of the ROBCOOP4A.EXE program

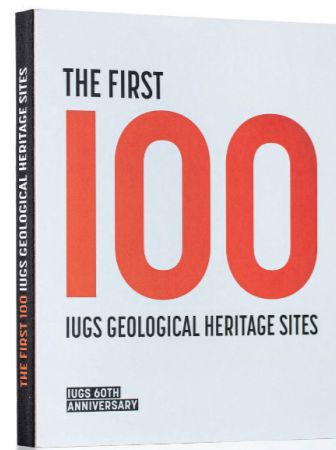
The program ROBCOOP4A can be used to estimate the balanced classical and robust analysis of variance parameters (i.e., sampling, analytical, geochemical), measurement uncertainty and the expanded uncertainty factor.

It can process up to 500 variables determined on 2000 samples by 4 analyses (2 for the routine and 2 for the field duplicate samples). As the source code is provided the program can be translated into other languages. The e-book (Figure 2, right) and software programme can be downloaded from the Commission's webpage.a



served to develop the science of geology. They are the world's best demonstrations of geological features and processes. They are the sites of fabulous discoveries of the Earth and its history.

All the sites have been compiled in a nicely edited book that can be downloaded or purchased from



the new website: www.iugs-geoharitage.org. More than 20.000 visitors from 158 nations have visited this site in the last 5 months. The Commission on Geoheritage is now working for the selection of "The Second 100", which will be announced during the IGC 2024 in Busan (Korea).

The First 100 were announced at the IUGS 60th anniversary event in October in Zumaia (Spain) with 150 participants from 42 nations. During this event the IUGS adopted the IUGS declaration of Zumaia. This declaration is supported by a wide range of international organizations related to Earth Sciences and gives value to: (1) the role of geological sciences in addressing the current social and environmental challenges, (2) the collaborative and interdisciplinary science and (3) the recognition of geological heritage as part of the natural heritage. Sign the Zumaia declaration at <https://iugs-geoharitage.org/the-iugs-zumaia-declaration/>

The Sub-commission on Heritage Stone has also reactivated its program and announced 10 new Heritage Stones in Zumaia.

The IUGS International Commission on Geoheritage provided also a very valuable work for the development of the UNESCO Global Geoparks program with 17 desktop assessments of the international value of the aspiring

Geoparks.

Last but not least, IUGS International Commission on Geoheritage has recently launched a new initiative: THE GRAND CANYON IUGS GEOHERITAGE ADVENTURE, a 9-day field conference by raft through the Grand Canyon. Join us at <https://iugs-geoharitage.org/grand-canyon-geoharitage-adventure/>

OVER 50 YEARS OF EARTH SCIENCE COLLABORATION THROUGH THE INTERNATIONAL GEOSCIENCE PROGRAMME (IGCP)

The United Nations Educational, Scientific and Cultural Organization (UNESCO) is an intergovernmental organization whose mandate includes contributing to peace and security by promoting scientific collaboration among nations. Since 1972, UNESCO has been in collaboration with the International Union of Geological Sciences (IUGS) through the International Geoscience and Geoparks Programme (IGCP). The two partners achieved great milestones in geosciences, through global scientific research, advancing gender equality in geosciences, prioritising collaborations with African scientists and establishing the International Geodiversity Day.

To commemorate the 60th anniversary of IUGS and the 50th anniversary of IGCP, the symposium entitled “IUGS, Geoparks, and IGCP – Retrospection, today and the future” was coordinated at the GAC-MAC-IAH-CNC-CSPG 2022 Conference in Halifax (16-18 May 2022) with the participation of IUGS President and UNESCO Secretariat where multiple IGCP projects presented along.

In 2022, 59 IGCP projects continued to contribute to the United Nations (UN) 2030 agenda, the Sendai Framework for Disaster Risk Reduction, and international agreements by delivering IGCP’s vision as defined by its council. Special focus was given to society development and climate change mitigation. 155 IGCP capacity-building events were organised, outreaching more than 4,975 scientists in 148 countries. The capacity-building activities aim to develop the skills of the youth and peoples from developing nations, in 2022, the IGCP consisted of 44% youth participation

and 43% of participants were from developing countries.

UNESCO Priority Africa and Gender Equality

In accordance with UNESCO priority on gender equality and Africa, the International Geoscience Programme Council has been prioritising projects led by female and early career scientists from developing nations since 2015.

In 2022, the IGCP projects were led by 42% female leaders, and 16% African leaders (from 23 countries), out of 377 project leaders. Where, these were only 19% and 10.7% in 2015, respectively. Gender equality and focus on developing countries further extends to scientists participating and benefiting from capacity-building activities, where 68% of African nations were active in the Programme in 2022. In addition, 2 in 5 of participants were women, 45% of which were youth.

THE COUNCIL EVALUATED 57 ACTIVE PROJECTS AND 27 NEW PROJECT PROPOSALS

The seventh closed session of the IGCP Council was held online and in-person on 14 – 15 March 2022. The Council assessed 27 new IGCP project proposals, five projects of which were approved, in addition to the 54 projects that were already endorsed by the programme. The council decision led to a total of 59 active IGCP projects in 2022, including one new IGCP project (4GEON: Geoparks’ People of Four Continents Connected through Playful Earth Heritage Education - IGCP 751) to be delivered in collaboration between the UNESCO and Global Geoparks Network (GGN)



Figure 1. the International Geoscience Programme (IGCP) secretariat delivering a capacity-building workshop in Kenya © UNESCO



Figure 2. Earth Futures Festival screening in UNESCO HQ, Paris © UNESCO

using UNESCO Global Geoparks territories as learning laboratories.

HIGHLIGHTS OF SELECTED PROJECTS

Geoscience and Society for Sustainable Development

The IGCP Project 685: **Geology for Sustainable Development** has been a flagship project in 2022, with several deliverables related to geoscience and sustainability. Earth Futures Festival was delivered by IGCP 685 team in collaboration with the IUGS, and aimed to raise international awareness of the role of Earth Science in sustainable development by connecting geoscience and art. The festival

was a global collaboration with a key focus on education, diversity and inclusion aiming to educate and inspire others, create diverse role models, motivate positive global change, and attract a diverse range of people towards both study and careers in the field of geoscience.

There were 972 film submissions to the Earth Futures Festival in 2022 from 89 countries, the festival culminated with in-person screenings hosted in New York City, Paris (held at UNESCO HQ), and Sydney, where the awards event was also hosted. Finalist Films, Official Selection and Honourable Mention films are listed here .

Geology for Renewable Energy Production and Scale-up

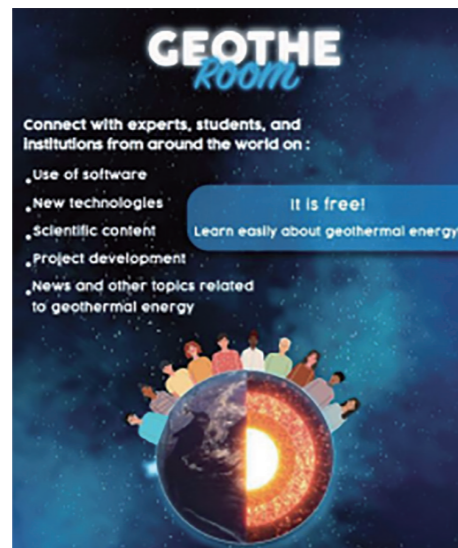


Figure 3. IGCP Project 636 seminar flyer

Only 30 countries currently generate geothermal energy, although the adoption of the Paris Agreement in 2015 established that the acceleration to the global energy shift towards low carbon sources is critical. **IGCP Project 636: geothermal resources for energy transition** promotes the use of geothermal resources as a clean, low-carbon, baseload, and renewable

energy. Through increasing the knowledge of deep geothermal reservoirs, conducting outreach activities with focus groups, and promoting the installation of geothermal heat pumps.

The “Geotheroom” free online school was held from February to November 2022, consisting of 19 webinars. The series of webinars addresses

several geothermal topics, to expand the outreach among different fields in the geoscientific, environmental, and energy communities. All webinars can be found here.

Medical Geology, a Key Pillar for Human Well-

Being

Artisanal and Small-Scale Gold Mining (ASGM) is carried out by individuals or groups of miners, mostly operating informally. It is the largest source of mercury (Hg) pollution globally. **IGCP**



Figure 4. IGCP Project 696 workshop in Madre de Dios, Perú © Bridget Bergquist

Project 696: Impacts from Artisanal and Small-Scale Gold Mining in the Amazon investigates the cycling of mercury (Hg) in Amazonian ecosystems, particularly in areas with ASGM, given their often illegal and transient nature. It integrates and generates scientific knowledge to better understand how mercury pollution from ASGM is transported, transformed, bioaccumulated and sequestered in Amazonian

ecosystems. In November 2022, the project team held a workshop in Madre de Dios, Perú, one of the largest regions of artisanal and small-scale gold mining in the Amazon, to develop an active network of regionally based mercury researchers, communicators, and government representatives who work on determining the fate of mercury released by ASGM in Amazonian ecosystems.



INTERNATIONAL LITHOSPHERE PROGRAM (ILP)



Hans Thybo, President

The lithosphere forms the connection between deep Earth and the surface. This basic observation was the background for International Union of Scientific Unions (ICSU - today ISC) to form ILP in 1980 charged to:

- promote interdisciplinary research on the lithosphere
- at the interface between IUGS and IUGG
- through multidisciplinary research projects

ILP's activities build on the understanding that major breakthroughs in the study of the Lithosphere require integration of imaging, monitoring, reconstruction and process modelling. ILP seeks to achieve a fine balance between "addressing societal needs", e.g. understanding natural catastrophes and other solid earth processes that affect the biosphere, providing information for improved resource exploration and environmental protection; and "satisfying scientific curiosity" to promote high-level fundamental research.

ILP is financed through national contributions from member countries and annual contributions from IUGS and IUGG. Nanjing University complimentary runs the secretariat.

ILP is a bottom-up organisation that takes initiatives to bring together individuals and organisations in Task Forces and Regional Committees, selected solely on the basis of scientific quality and societal needs. Key features

of the projects are their dynamic nature and focus on bringing in new talent. Task forces exist for a period of five years, which may be extended for one term after successful review. The task forces are organised within four thematic subjects:

- Geoscience of Global Change
- Contemporary Dynamics and Deep Processes
- Continental Lithosphere
- Oceanic Lithosphere

Several major successful international research programmes have grown from ILP projects, and many continue as high-level organisations outside ILP, including International Continental Drilling Program (ICDP), Global Seismic Hazard Map, World Stress Map, Global Geoscience Transects and regional committees, such as EGT, EUROPROBE, TOPOEUROPE, TOPOASIA.

The activities in 2022 were still affected by the pandemic, but the projects began to revitalise and several meetings (in-person and virtual) were held. ILP was represented through several symposia and workshops held by its task forces and regional committees at the annual meetings of EGU and AGU, where the ILP projects organised symposia. Italy and Hungary have renewed their membership of ILP. The IUGS President, John Ludden, has replaced Kristine Asch and the IUGG General secretary, Alexander Rudloff, has replaced Harsh Gupta in the ILP bureau. The advisory board has been enlarged with V. Ramos, Argentina; Atalay Ayele, Ethiopia;

and Kristine Asch, Germany.

The ILP awards were presented during a hybrid business meeting held in Vienna on 24 May 2022. The Evgenyi Burov medal was awarded to Prof. Jun Korenaga, Yale for "his outstanding contributions to studies of Geodynamics based on excellent questions, integration of a huge range of observations and approaches, and his noteworthy scientific leadership". Dr. Pietro Sternai, University of Milano-Bicocca, Italy, received the Flinn-Hart award in recognition of "his important achievements in exploring the feedbacks between geodynamic and climate changes throughout the

Earth's geological history through quantitative analyses and numerical modelling constrained by all sorts of geological observables". The medallists gave presentations with overview of their scientific achievements.

The record number of 13 active projects has led to an increase in activities within ILP, cf. IUGS Year Book, 2021. A few highlights from 2022: 2019-CC2 and 2021-TF4 have initiated an educational programme in Nepal, Bhutan and Himalayan India on "Improving earthquake preparedness through geoscience education in the Himalaya", 2021-TF3 has opened a new website where user may



The Flinn-Hart Award to an outstanding young scientist was awarded to Dr. Pietro Sternai (left) in recognition of "his important achievements in exploring the feedbacks between geodynamic and climate changes throughout the Earth's geological history".



The Evgenii Burov Medal for 2021 was awarded to Professor Jun Korenaga (right) for "his outstanding contributions to studies of Geodynamics based on excellent questions, integration of a huge range of observations and approaches, and his noteworthy scientific leadership".

create their own stress map online; 2021-TF4 has completed a new crustal borehole in Italy; 2021-TF5 has acquired a large amount of new data during three ocean scale expeditions; 2021-TF8 has initiated a series of annual Global Heat Flow Days with 24 h online discussions; 2021-CC5 has defined a new best practice for field work in Antarctica.

The Task Forces and Coordinating Committees

include researchers from all continents and represent a broad coverage of lithosphere research. We are in particular pleased that the group of PIs include an increasing number of early career scientists.

Hans Thybo, President, Mian Liu, Secretary General and Qin Wang, Executive Secretary March 2023, web-site: <https://ilp.nju.edu.cn>



TASK GROUP ON DIVERSITY, EQUITY, AND INCLUSION (TGDEI)



Silvia Peppoloni
Chair

The Task Group on Diversity, Equity, and Inclusion was established during the 77th IUGS EC meeting in Paris (March 2022). Its purpose is to encourage the IUGS constituent groups (commissions, sub-commissions, task groups, initiatives) to reach a reasonable balance of member inclusion with regards to gender, geographical provenance, discipline, and career stage.

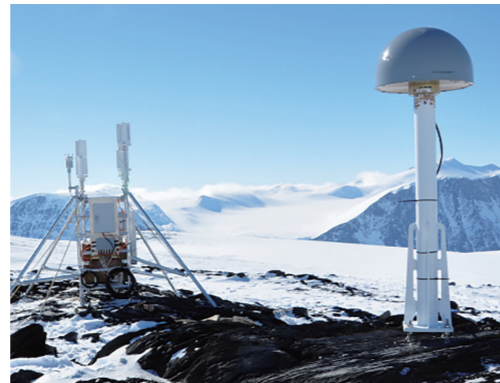
Analysis of the current situation within the IUGS constituent groups related to gender has been the first activity carried out by the task group. It started from a survey conducted by the IUGS Secretariat based on the list of official participants in all IUGS constituent groups. In particular, the full gender analysis was conducted both by country and by constituent groups. An imbalance for most of the groups was highlighted, with the percentage of men often exceeding that of women.

The task group continued to monitor the composition of the IUGS constituent groups, sharing information and experiences on gender equality with other scientific organizations, in order to identify common barriers and find shared

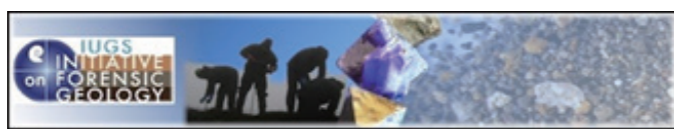
strategies to progressively fill the gaps and eliminate existing unbalances. Members of the TGDEI participated in meetings organized by the SCGES in March and October of 2022 in order to mitigate these unbalances, as well as participate in initiatives organized by the IUGS, such as the IUGS Women in Geosciences event.

To further encourage the IUGS community to work on the gender inequality issue, the task group invited Marie-Françoise Roy, emerita professor and leading expert on the issue of gender equality within the science field, to give a talk during the 2022 IUGS EC meeting. She suggested policies and useful tools (web addresses, booklets, etc.) to be adopted in order to guide the activities of the IUGS aimed at addressing gender inequality.

Finally, to ensure that IUGS policies reflect and affirm a longstanding commitment to diversity, equity, and inclusion, starting in 2023, related issues will be carried out by the new IUGS Commission on Geoethics, through the creation of a specific task group that will take the legacy of goals and activities of the TGDEI.



Activities of the ILP- Coordinating Committee on "Lithosphere of East Antarctica" include data acquisition of large amounts of geophysical data through deployment of instruments in harsh environment (photos by M. Burke, K. Selway and A. Reading).



INTERNATIONAL UNION OF GEOLOGICAL SCIENCES (IUGS), INITIATIVE ON FORENSIC GEOLOGY (IFG):

SUMMARY FOR THE IUGS 2022 ANNUAL REPORT

The International Union of Geological Sciences, Initiative on Forensic Geology (IUGS-IFG) promotes and advances the global applications of geology, to assist police and law enforcement investigate crimes. In 2022, there were 89 recorded events and activities including reviews, notifications, outreach lectures, seminars, workshops, conferences, congresses and the provision of training in forensic geology. Four of these key events held in 2022 are provided below.

5th Iberoamerican Congress on Forensic Geology, Bogota, Colombia.

In October 2022, IUGS-IFG co-organised the '5th Iberoamerican Congress on Forensic Geology'. The event was held in Bogota, Colombia, in collaboration with the Universidad Antonio Nariño, Colombia; Unidad Científica para la Construcción de Paz UAN, Colombia; Red Iberoamericana Investigadores Forense, Colombia; Ciencia Y Tecnología Para Del Desarrollo and Geoscience Forensi, Italia. According to the International Commission on Missing Persons (ICMP) there are 63,800 reported missing people in Colombia with 45,154 missing persons being investigated, suspected to be buried in unknown graves. There were 33 presentations that had a missing persons and search focus, and provided practicable advice, expertise and operational case studies from Colombia, Argentina, Brazil, Mexico, Chile, El Salvador, Italy and England. In attendance were

a mix of professionals that included geologists, forensic geologist, geophysicist, remote sensing experts, palynologists, botanists, archaeologists, anthropologists, legal experts and police. Also present were family members and relatives of missing persons that were interested to learn the methods and strategies available to locate graves. The Geoforensic Search Strategy (GSS) was presented, which was developed by IUGS-IFG over a period of several years, and is based on mineral exploration, engineering geology ground investigations and law enforcement operational search strategies. As part of this event, IUGS-IFG delivered training on search at a secure location to the south of Bogotá, at Universidad Antonio Nariño, Sede Usme. The training had a focus on design of a conceptual geological model, the evaluation of diggability and the choice of search assets. The training was supported by resources such as ground penetrating radar and electrical conductivity and a search drone. Following the discovery of buried items at a simulated crime scene the graves, containing clothes and animal remains, were forensically recovered to demonstrate the correct procedures for the collection and preservation of geological trace evidence. IUGS-IFG was also invited to the headquarters of the Colombian Police, with INTERPOL, to discuss collaboration and to inspect the forensic laboratories.

The Clean Gold Program, Brazilian Federal

Police and INTERPOL, Brasil

Crimes in the minerals, mining and metals industries typically includes; illegal mining, fraud, theft, adulteration, substitution, smuggling, fakery and the trading of conflict minerals (e.g. tin, tungsten, tantalum and some gold). Illegal minerals enter global trade supply chains and the beneficiaries are often organised crime groups; syndicates, criminal gangs, cartels and terrorists. These are linked with associated crimes that includes people trafficking, human rights violations and money laundering. In particular, illegal gold mining impacts negatively on the people and environment in the Yanomami Indian Territory, in Amazonia, Brazil. In July 2022, IUGS-IFG together with a colleague from the Federal Bureau of Investigation (FBI), was invited by INTERPOL and the Brazilian Federal Police (BFP) to attend an international seminar on 'gold forensics and illegal gold trade investigation' at the National Institute of Criminalistics in Brasília, Brazil. The Clean Gold Program was launched in 2019 to enable Federal Police to investigate illegal gold. Geochemical fingerprints of samples are used as a baseline to cross-reference questioned samples and to assist in the provenance determination of illegal or suspicious gold. The developing strategy could also be aligned with techniques such as mineralogical, geochemical and isotope analysis to verify if the reported origin and authenticity align with the actual provenance. The programme also aims to track the global movement of gold and transactions using blockchain technology, and to inform on regulations governing the mining and minerals industry. IUGS-IFG provided support, advice and expertise on minerals tracking and provenance determination, the illegal smuggling of diamonds and gemstones and the Geoforensic Search Strategy (GSS) to locate burials. The IUGS-IFG Special Project on mining and minerals crimes was also aligned with the Clean Gold

Program. IUGS-IFG collaborated with the United Nations Office on Drugs and Crime (UNODC), the Organisation for Economic Co-operation and Development (OECD), public oversight institutions, ministries and mining companies and law enforcement personnel from about 19 countries, raising the profile of IUGS and bringing positive exposure for new global applications of geology.

Ground Searches for Burials, Royal Canadian Mounted Police (RCMP)

In May 2022, IUGS-IFG took part in a conference and joint Annual Meeting of the Geological Association of Canada (GAC), Mineralogical Association of Canada (MAC), the International Association of Hydrogeologists – Canadian National Committee (IAH-CNC) and the Canadian Society of Petroleum Geologists (CSPG). IUGS-IFG also provided a separate forensic geology training session for the Royal Canadian Mounted Police (RCMP) and the regional police. The delegates that attended the course were provided with specific training in a range of forensic geology and related subject matters. The Geoforensic Search Strategy (GSS), was outlined and how this brings together geological and law enforcement methods of searching the ground for burials. The science behind the applications of ground penetrating radar (GPR) and its uses for crime scene searches was also presented with follow-on practical session at a simulated crime scene and search area. The importance of archaeological responsibilities in forensic excavations was emphasised including the forensic recovery of buried items and the importance of determining whether archaeological artefacts and remains might exist at a crime scene. The provision of expert evidence was also part of the training and the importance of qualified experts providing opinions on stated facts.

Forensic Soil Science and the World Congress of Soil Science (WCSS), United Kingdom

In August 2022, IUGS-IFG held a session on, 'The Application of Soil Science in the Criminal Justice System', in collaboration with the Geological Society of London, Forensic Geoscience Group (GSL) at the WCSS in Glasgow, Scotland. There was over 100 attendees from England, Scotland, Wales, Italy, Germany, Australia and USA. The programme included forensic geological hazards investigations, geological trace evidence on footwear and physical geological evidence used in the investigations of major crimes, and soil science. There was also a focus on illegal mining, illicit minerals crimes and geological methods to mitigate the risks aligned with the IUGS-IFG Special Project on mining crimes. The event was supported by a serving, major crime police officer, with experiences in the use of geological evidence. Following the conference the speakers

were invited to join a debate on the applications of geology in support of police investigations. A training session was also organised by IUGS-IFG for approximately 26 crime scene managers and forensic scientists from Police Scotland. Also in attendance were two research scientists from the Federal Bureau of Investigation (FBI) and a member of the German Federal Police. At a simulated crime scene the training focussed on the IUGS-IFG developed Geoforensic Search Strategy (GSS), the evaluation of geology and diggability, target preservation and decomposition and the forensic recovery of buried targets. As with the training delivered in Colombia and Canada, the delegates were given IUGS-IFG endorsed training materials and hand-out sheets on search strategies and methods, augering, forensic recovery and giving geological evidence in court; for future use as an aide memoir and for reference on operational cases.



IUGS-IFG training in searches for shallow, unmarked, homicide graves in Colombia (source: Dr Laurance Donnelly).



Delegates at the 5th Iberoamerican Conference on Forensic Geology, Bogota, Colombia (source: Mr Carlos Molina and Dr Laurance Donnelly).



A course on soil forensics for students held in Pelotas, Brazil, which include crime scene examination and the collection of geological trace evidence (source: IUGS-IFG Latin America).



IUGS-IFG forensic geology training in search for school children, aged 14-17, Pendle Hill, Lancashire, UK

37TH INTERNATIONAL GEOLOGICAL CONGRESS

25-31 AUGUST 2024, BUSAN, KOREA

1. The Busan International Forum for UNESCO Global Geoparks

The IGC 2024 organizing committee held the International Forum for UNESCO Global Geoparks in Busan, South Korea, July 28 to 29, 2022



Fig.1. Participants at the Busan International Forum for UNESCO Global Geoparks

2. Field Trip Courses for IGC 2024 BUSAN

Field trip courses and scientific programs for IGC 2024 have been finalized. The relevant information will be disseminated through the 2nd Circular on June 30th, 2023.

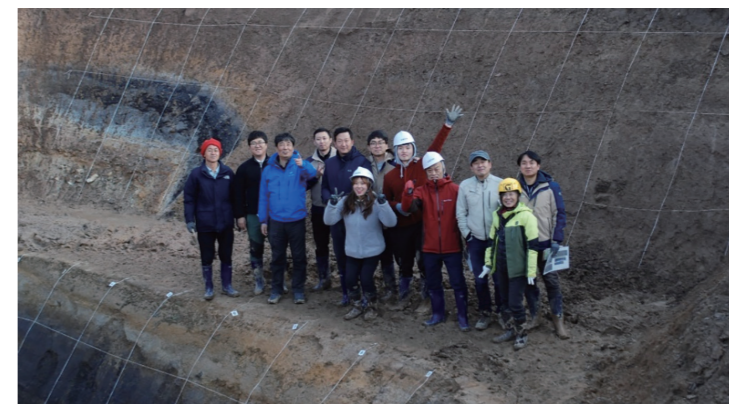


Fig. 2. One designated site out of total 32 sites for the field trip.



Dr Laurance Donnelly presenting a copy of the IUGS book 'A Guide to Forensic Geology', and giving a presentation on illegal mining and the IUGS-IFG Special Project, Bogota, Colombia (source: Dr Laurance Donnelly).



3. Public Relation Activity for IGC 2024 BUSAN in AGU 2022

The IGC 2024 organizing committee attended the AGU fall meeting on December 2022 in Chicago, USA, where they promoted the 38th IGC, raised an awareness of the conference, and encouraged the submission of session proposals.



DDE ENTERS IT'S 5TH YEAR WITH A GLOBAL LAUNCH AND OPENING ITS DIGITAL PLATFORM TO USERS

On 9 November 2022, nearly 4 years after it won backing of the Executive Committee of IUGS in December 2018, DDE was launched globally at the DDE Open Science Forum co-organized by UNESCO, IUGS, IYBSSD (International Year of

Basic Sciences for Sustainable Development) and DDE at UNESCO Headquarters in Paris, France.

The Forum was attended by more than 150 participants representing UNESCO Country



Delegations, IUGS Commissions and Programs, UNESCO Category 2 Centers, DDE Governing Council and Science and Executive Committees and Working and Task Groups, multi-lateral institutions such as the World Bank industrial organizations with an interest in geodata sciences, for example Schlumberger, France, and individual scientists, and researchers from all parts of the world.

Two days before the Forum, on 7 November 2023, DDE, IUGS and CGMW (Commission on Geological Mapping of the World) co-organized a DDE technical workshop, at the Maison de la Geologie, Paris, France, providing an update on products and services delivered by DDE for the

benefit of the international geological sciences community at the end of its 4th year. Initiatives of DDE, such as that of the Paleogeographic Reconstruction Network, Marginal Seas Task Force and "Fieldwork at any time – DDE 3D Outcrop Modelling" attracted significant attention and interest of more than 60 participants who attended the event on-site. There were also lively debates and discussions on the future of DDE, in particular, the extent to which DDE should focus on geological sciences fundamentals that could help to address Anthropocene challenges such as energy transition, access and use of critical minerals and enabling UN Members to deliver on sustainable development goals (SDGs).

(2 photos side-by-side: Panel discussion chaired by Matt and with John Ludden, Jennifer and others; one of Mike or Manuel making a presentation)

DDE's most significant achievement at the end of its 4-year growth is the DDE Platform anchored

on the DDE Cloud. A collaborative effort of more than 100 international scientists over a period of three years, the DDE Platform was launched during the final stages of the 5th session of the DDE Governing Council (GC) held in UNESCO on 8 November 2022. The Platform is ready for use by geological scientists from all parts of the

Meolek MGIMBA, a young geologist from Tanzania achieved African geothermal analysis

Africa Map Series on DeepTime.org (Geological, Earthquake, Landslide)

Africa Geothermal Analysis Result

International Efforts on the Development of DDE Cloud

100+ international experts contribution over 3 years.

2019.12-2022.5.15 Propose & Develop	2022.5.16 Alpha 0.1 version	2022.8.10 Alpha 0.2 version	2022.11.8 Alpha 1.0 version
			Today

world; its performance and ease-of-use would be continuously monitored based on user-feedback and its performance efficiency regularly updated.

The 5th session of the DDE GC was the first-ever face-to-face gathering of a majority of GC Members, with others attending on-line. The DDE Science Committee also met for its 3rd session, parallel to the 5th DDE GC session, in UNESCO, Paris on 8 November 2022. DDE SC evaluated 11 proposals submitted for financial support from the DDE Seed Grant Fund established in 2022 with the generous support of the Kunshan City Government. DDE SC recommended 4 of the 11 proposals for funding under the Seed Grant Fund and the DDE Executive Committee which met on-line during 19-20 December endorsed the DDE SC recommendation. Implementation of the 4 projects will begin in 2023 and continue till the end of 2025.

The DDE SC also reviewed reports of 3 projects, implemented by CGMW, DDE Marginal Seas Group and DDE Standards Task Group, respectively, which were approved for DDE funding in 2021 and made recommendations about their continued funding. During 2021-2022,

DDE has approved a total of between 750,000 to a million US\$ for 7 projects, each of them granted a maximum of US\$ 150,000 over 2-3 years duration.

There were many other achievements of DDE during the year of 2022: several new organizations such as the Geological Surveys of Argentina, Columbia and Zimbabwe became DDE Members; new DDE Working or Task Groups were established on themes such as earthquakes and natural disasters, engineering geology and for enhancing participation of early career scientists in DDE; a DDE competition for young scientists using the DDE Platform was launched in China with great success and there are plans to replicate that experience in a DDE "World Cup Competition" in 2023; DDE was represented by its scientists, Secretariat staff, GC, EC and SC Members and Working and Task Group Leaders and Members in several international, regional and national events of significance to geodata sciences which helped improve awareness and recognition of DDE's work; and the DDE website has been upgraded and further improvements are foreseen.

ACKNOWLEDGEMENT

Prof. Stanley Finney, IUGS Secretary General is acknowledged with deep appreciation and gratitude for his great efforts in and contributions to compiling the 2022 IUGS Annual Report.

Sincere gratitude are also given to those who have contributed to the 2022 IUGS Annual Report.

