



INTERNATIONAL UNION OF
GEOLOGICAL SCIENCES

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2020 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

2012 Strategic Plan

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.

For the period of 2019, 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 (2018-2022)



Dr. Silvia PEPOLONI



Dr. Claudia Inés MORA

Councilors (2020-2024)



Prof. Dr. Jennifer MCKINLEY



Dr. Ludwig STROINK

Prof. Dr. Qiuming CHENG



PRESIDENT (2016-2020)

This report provides a summary of the president's activities until the Extraordinary Session of the IUGS-IGC Council was held at which new IUGS EC members were elected on November 28-30, 2020. First, I would like to congratulate and thank the delegates for choosing the new IUGS EC members who have taken over the responsibility of IUGS EC under the leadership of President Professor John Ludden. I must say that 2020 was the most difficult year for everyone all over the world. It has been more than a year since the outbreak of the COVID-19, which has disrupted the whole world, claimed millions of lives, and caused devastating social and economic consequences. I must thank IUGS EC for its constant dedication and cooperation. Dealing with the frustration of postponement of the 36th IGC and organizing the Extraordinary Session of IUGS-IGC Council virtually were both handled with great efficiency.

1. 74th IUGS EC Meeting in Busan (South Korea)

The 74th IUGS Executive Meeting (IUGS EC) was held in conjunction with the first DDE Science Committee Meeting (DDE SC) from January 15th to 18th 2020 in Busan (South Korea). Several topics and issues were presented and discussed, such as those relating to IUGS Joint Programs, and to the IUGS Big Science Program Deep-time Digital Earth (DDE). Information was exchanged regarding the following International Geological Congresses, in particular on the imminent 36th IGC, that would have been held in Delhi (India) 2-8 March

2020, and the 37th IGC, that will be organized in Busan (South Korea) in 2024. More than 50 participants (33 for IUGS EC and 20 for DDE SC) interacted and delegated with the local geoscience community during the field excursion and at receptions. They were organized by the LOC of the 37th IGC, the Director General of the Korean Geological Institute (KACAM) and the Mayor of the Busan city, respectively. Moreover, participants observed the Convention Centre where the IGC 2024 will be celebrated: BEXCO (Busan Exhibition and Convention Centre).

2. The 36th International Geological Congress

Less than two weeks before the 36th IGC, the Government of India announced the postponement of the 36th IGC considering the risk caused by the Covid-19 pandemic. Such momentous decision came abruptly when preparations for the IGC were being finalized and delegates were getting ready to travel to India. Following a proposal by the LOC on February 24th to postpone the IGC to November, the IUGS EC conducted various consultations including an informal poll amongst the National Delegates to the IGC and the other Council participants. After a thorough review of the proposal from the LOC of 36th IGC and suggestions from IUGS EC, the International Geological Congress Committee (IGCC) formally casted a vote and unanimously endorsed the LOC proposal on February 26th. IUGS urged that all registered participants receive clear information on the new program



Figure 1. The 74th IUGS EC Meeting in Busan Korea, January 14-18, 2020

and activities as soon as possible, as well as details on the handling of previous hotel and Congress registrations.

Unfortunately, several months later, the LOC of 36th IGC on June 6th, 2020 informed IUGS that "...under the prevailing circumstances holding of 36th IGC on rescheduled dates (9-14th Nov., 2020) may not be a viable proposition due to uncertainty about continuance of the Covid-19 pandemic situation worldwide.", "the proposed re-revised dates of 16-21 August 2021, for holding the 36th IGC have been approved by the Secretary, Ministry of Mines & Chair, Governing Body of 36th IGC as also by the Hon'ble Minister of Mines, Government of India". Both IUGS EC and IGCC had respective open discussions and reached censuses of agreeing the proposal of rescheduling the 36th IGC in the new date. On June 18th, the IGCC proposed a motion and unanimously approved

the new dates of August 16th to 21st 2021 as per the LOC of the 36th IGC. The IGCC appreciated and urged the Government of India to continually provide necessary support to the LOC for planning the rescheduled congress.

3. Extraordinary Session of IUGS-IGC Council

The postponement of the 36th International Geological Congress (IGC) also led to the postponement of the Ordinary Session of the IUGS-IGC Council, which is held every four years at the IGC. The Extraordinary Session of the Council was organized virtually on October 28th to 30th 2020. Nearly 200 participants including 95 delegates from 55 adhering member countries, and 90 non-voting participants registered for the meeting. Among other business, the IUGS EC election was conducted virtually. Several resolutions regarding financial reports, host of Secretariat, recognition of Big Science Programs, diversity and inclusion, and expan-



Figure 2. The 74th IUGS EC Meeting in Busan Korea, January 14-18, 2020

sion of Statute proposed by the IUGS National Committees were also discussed and ratified. One week later, the outgoing EC and incoming EC members had a hand over meeting on Nov. 5th.

4. Progress of IUGS New Big Science Program – DDE

After it was officially announced at the 73rd IUGS EC meeting held in Beijing on February 26th to 29th, 2019, the DDE made significant progress both in enhancing structural and management development and expanding membership. DDE established three governing bodies: Governing Council (GC), Executive Committee (EC), and Scientific Committee (SC). DDE SC had its first meeting in Busan in conjunction with the 74th IUGS EC meeting. Both DDE GC and DDE EC had their first meetings virtually. I would like to mention that five new members joined DDE as founding members over the last year. These members include Geological Survey of Canada (GSC), Russian Federal Geological Foundation (FBGU), Coordinating Committee

for Geoscience Programs in East and Southeast Asia (CCOP), Korea Institute of Geoscience and Mineral Resources (KIGAM), and Geological Survey of India (GSI). This gives a total number of 18 founding members of DDE. The scientific issues targeted in the DDE program are contemporary Earth Science issues as reflected by the newly released Earth in Time, a Vision for NSF Earth Sciences 2020-2030 by National Academies of Sciences, Engineering, and Medicine (2020). Several DDE pilot collaborative projects have been developed jointly by DDE and its founding members “Data Driven Earth Science Knowledge Graph” by DDE, CGI and CODATA; “a 5-million Scale Global Geological Map” by CGMW, CAGS and DDE; “New Geological Time Scale and Chart” by ICS and DDE; “Eurasian Marginal Seas Study: past and future” by IAMG and DDE; and “DDE – Geological Survey” by DDE and China Geological Survey. DDE progress have been regularly updated in the IUGS E-Bulletins and in scientific publications including in Science.

Prof. Dr. John Ludden



PRESIDENT (2020-2024)

I am very proud to accept the Presidency of the IUGS, a Union that is entering its 60th anniversary in 2021 and which has achieved so much for the geological sciences globally. This mission statement taken from the IUGS statutes underlines that the fundamental reason for the existence of the Union have not significantly changed.

“The mission of the IUGS is to unite the global geological community in (i) promoting development of the earth sciences through the support of broad-based scientific studies relevant to the entire earth-system, and (ii) applying the results of these and other studies to preserving Earth's natural environment, using all natural resources wisely, and improving the prosperity of nations and the quality of human life.”

The drivers have changed and the general public perception of our science is shifting; the geosciences are at a critical point as we transition from carbon burning fuels to cleaner sources of energy and we address the issues posed by the UN Sustainable development goals SDGs.

I would like to thank the outgoing President Professor Qiuming Cheng and those members of the IUGS Council who will have ended their mandates. I will work with the IUGS Bureau which comprises Professor Stanley Finney as General Secretary and Professor Hiroshi Kitazato as Treasurer, both of whom have worked with the previous president and will

provide continuity for IUGS. Also, the Chinese Academy of Geological Sciences will continue to provide the IUGS Secretariat. I am also joined by two vice-presidents and four councillors with diverse backgrounds and good geographic spread, and their names and contact details are given in the IUGS web site <https://www.iugs.org/executive>.

You might be interested to learn what experience I have for this role and what expertise I hope to bring to IUGS. I am a geologist with a petrological focus, and I have worked professionally in five countries and in both English and French. I worked on geological systems from the Archaean of Canada and Russia to modern sea-floor processes. As I have moved more into administrative roles, I have increasingly concentrated my efforts on the applications of geoscience to resources and to environmental change. I am one of few geologists having reached a high-level in Academia, in government, and in a research institute.

Currently, I am a Professor in Heriot-Watt University (HWU) in Edinburgh and prior to that was the Executive Director of the British Geological Survey, from 2006-2019. Before moving back to the UK, I was the associate director for Earth Sciences for the CNRS and Directeur de recherche classe-exceptionnelle for the CNRS, France. I moved back to Europe in 1994 and in North America I was a Professor at the Université de Montreal, Canada and



Figure 1. Signing Ceremony between IUGS and the Chinese Government for Hosting the IUGS Secretariat. Representatives of the Chinese government (from left to right): Mr. Wang Qian, Deputy Director-General of the Department of International Cooperation, Ministry of Natural Resources of China (MNR); Dr. Zhong Ziran, Vice Minister for Geological Survey, MNR; President of China Geological Survey (CGS) and Chinese Academy of Geological Sciences (CAGS); Dr. Li Jinfa, Vice President of CGS and Executive Vice President of CAGS; Representative of IUGS: Prof. John Ludden CBE, IUGS President; Prof. Hassina Mouri, IUGS Vice President.

research scientist at Woods Hole in the USA. My PhD is from Manchester University, UK and my undergraduate studies were in Environmental Sciences at Lancaster University, UK..

In my presentation to the Extraordinary Council of IUGS, I stressed the fact that the geological sciences are at a turning point and also face an identity crisis. Although an important part of our science is about discovery of how the planet formed and has evolved, geology was largely built on the need to find resources – initially coal, ironstone and limestone to underpin the industrial revolution, and then oil and gas and base metals that have allowed us to prosper throughout the 20th century and into the present one.

At the start of this new decade in the 21st century,

we find ourselves confronted with daunting tasks. The most important is climate change and the environmental and social adaptations associated with reducing carbon and other emissions, so that we can reach NetZero-C emissions as rapidly as possible.

The climate change community has been proactive in identifying the problem of climate change and I believe that the geological sciences community has a role in developing a programme for resourcing the Earth's future in a world of changing demands. The IUGS can champion this programme through its funding groups, but more importantly by using its global reach to bringing people's attention to the need for new resources and a NetZero-C economy. The resources which fall in the geological

science's remit are metals, materials for infrastructure, water and soils and associated energy systems of the future.

I must underline that data itself is a resource and a new infrastructure underpinning all sectors of the geological sciences. We will need to better link our geological data with other data sets as it is inconceivable to not integrate geological and geophysical data with infrastructure, environment and social factors, if we are to make significant advances in providing full value-chain solutions.

It is very unfortunate that my first role in IUGS was to withdraw support for the postponed 36th IGC, scheduled in August 2021 in Delhi, India. I have done this in concert with the 36th IGC local organising committee and we have now put a process of reimbursement of the registration costs off 36th IGC in place.

I intend to increase the activities of the IUGS

between the four-yearly cycle of International Geological Congresses. The 37th IGC will now be in Busan, Republic of Korea, and the executive has recommended that the 38th IGC should be in St. Petersburg in 2028. The step change in communication technology that has resulted since the advent of the COVID-19 pandemic, has allowed for better electronic communication and more wide-reaching meetings. The IUGS will build on this and hold more enlarged executive meetings so that we can build a more active community. IUGS will also sponsor integrating activities between its different components, with other GeoUnions and with the International Science Council.

Together, we need to refine and redevelop the IUGS to respond to what the public and governments now expect of the largest global union of geological sciences - the International Union of Geological Sciences.

I count on your continued support.

Prof. Dr. Stanley C. FINNEY



SECRETARY GENERAL (2020-2024)

The year 2020 was difficult for all in the world. It started fresh with expectations for successful activities that were well planned. Then abruptly, all were cancelled; all plans were ruined, and no new ones could be made. The 74th Executive Committee meeting held in Busan, South Korea in January was enthusiastic. The 36th International Geological Congress was to begin in six weeks. The Executive Committee was wonderfully received and hosted in Busan by the Geological Society of Korea and the City of Busan. It was apparent to all that the city, the Congress Center, and the geoscience community in Korea will ensure a most successful 37th IGC. At the meeting in Busan, the IUGS EC, in the last meeting of its officers' terms, approved and finalized all plans and activities for the 36th IGC. New prestigious medals were ready for presentation to three esteemed recipients of IUGS awards; twenty Hutchison Fund travel awards had been presented to young geoscientists from all continents; the meeting of the IUGS-IGC Council was largely organized. Invitations to the IUGS reception were ready to send. Materials and plans for the Exhibit Booth had been shipped to Delhi. Then the roof collapsed. Lack of knowledge of future spread and intensity of the pandemic left all waiting. The Congress was rescheduled, and then again rescheduled. No plans could be made. By late summer 2020, it was apparent that the Ordinary Session of IUGS-IGC Council, scheduled for the

36th IGC, would not be possible in 2020. The alternative was to organize an Extraordinary Session and to hold it as a virtual meeting. The agenda comprised action items for the Council: election of EC officers for the term of 2020-2024; election of members of Nominations Committee; approval of 4-year reports to Council of the IUGS Officers, Committees, Constituent Groups; discussion and approval of resolutions presented to Council. Also on the Agenda was the status of the rescheduled 36th IGC. The Virtual Extraordinary Session held 28-30 October was a success. The registration of 182 delegates from 55 adhering members and an additional 85 guests and observers was most significant given the 20-hour span of time zones represented by participants. Use of the ElectionRunner app, managed by the Secretariat, was successful. Although results for each ballot were not received and reported for 12+ hours, all voting was completed flawlessly. All critical IUGS business was completed. Following reports and discussions on the 36th IGC and with no prospect of dates to which it might be rescheduled again, the Council was surveyed on the 36th IGC with the majority voting that it should be cancelled.

The new Executive Committee began work soon after election with a Handover meeting together with the outgoing EC, followed by the 75th IUGS Executive Committee meeting held

virtually on November 6. It was a closed meeting largely devoted to problems with reimbursements of registration fees from the cancelled 36th IGC, new initiatives driven by the EC, and plans on carrying out IUGS business virtually through the duration of the pandemic.

During 2020, The Secretary General and Secretariat produced and widely distributed the 2019 IUGS Annual Report. The Secretary General served as the EC representative to the IUGS Publications Committee supporting and contributing to the work of PC chair, the editors of *Episodes*, the IUGS website manager, the social media manager, the E-Bulletin editors. In order to move forward important decisions of the EC that required approval by Council, the Secretary General managed a vote of the Council by email to 1) ratify officers of all commissions, task groups, and initiatives for terms of 2020-2024, 2) to dissolve the Task Group of Geohazards and the Task Group on Global Geoscience Professionalism, and 3) to dissolve the current Commission on Geoheritage in order that the IUGS EC could establish a new Commission with directions on its restructuring and its administration. The Secretary General has since worked closely with the new officers of the Commission on Geoheritage and its Subcommissions to establish a new administrative structure, to re-evaluate all criteria and procedures for IUGS recognition of global geosites, geologi-

cal collections, and heritage stone resources. Furthermore, as an ex-officio member of the Council of the UNESCO Global Geopark program, the Secretary General delegated the Chair of the Geoheritage Commission to represent the SG and to oversee the work of the Commission in evaluating the geologic basis of proposals to UNESCO for new Global Geoparks. Together with IGCP (the International Geoscience Program), the IUGS is strongly linked with the two major geoscience programs at UNESCO.

Also in 2020, the Secretary General managed online votes of the Executive Committee that approved a new Task Group on Igneous Rocks. Its goal is to revise the IUGS Classification of Igneous Rocks, which has long been the global standard for igneous rock classification. The SG managed votes of the EC on GSSPs for the Priabonian Stage (uppermost Eocene) and the Chibanian Stage (Middle Pleistocene). The Chibanian Stage GSSP is the first such global geostandard for Japan. Its approval received extensive publicity in the Japanese news media. The SG helped revised and move forward for approval and signatures the MOU for the 37th IGC, the MOU with the Geological Survey of China for hosting the Permanent Secretariat, and the renewal of the MOU with the Geological Society of Korea for the production of *Episodes*.

Prof. Dr. Hiroshi KITAZATO



TREASURER
(2020-2024)

General Financial Situation of IUGS

During the period from 01/01/2020 to 31/12/2020, IUGS’ income and expense are USD 553,016.44 and USD 323,610.24 respectively, the net income of USD 229,406.20.IUGS current account USD 639,706.13 includes the amount of Hutchison Award, Russia Reserve and IUGS Awards (USD 75,520.17). It is noteworthy that two countries, Iran and Tajikistan, became IUGS active members.

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

2020-2024			
(USD)			
year	income	expense	net income
2020	553,016.44	323,610.24	229,406.20
2019	496,303.42	579,104.88	-82,801.46
2018	605,233.43	418,611.07	186,622.36
2017	494,755.49	401,008.60	93,746.89

Description of income

The total income we received is USD 526,825.95, including USD 493,002.01 for membership dues.

The table below reflects detailed information of the income situation in 2019 and 2020.

Income	2020		Amount (USD) 2019	
Membership Fees		493,002.01		374,522.79
For 2017 & 2018	6,608.82		8494.90	
For 2019	55,365.79		365,455.98	
For 2020	431,036.40		571.91	
Contribution from UNESCO		26,317.58		118,080.22
Final payment for last year	20,382.16		13,436.22	
1st payment for current year	5,935.42		74,711.91	
2nd payment for current year			29,932.09	
35th IGC Capitation Fee		0.00		
1st payment	0.00			
balance payment	0.00			
Other Income*1				3,700.41
Total Income	553,016.44	33,696.85		496,303.42

* 1 Other income includes royalty and bank interest

Status of Countries by Fees Category – 2020

Category	Active	Inactive	Total	Number of Countries paid for			
				2020	2019	2018	
1	20	50	70	11	4	0	-
2	13	4	17	10	3	1	-
3	13(1)	3	16(1)	12(1)	2(1)	2(1)-	-
4	7	1	8	7	-	-	-
5	-	-	-	-	-	-	-
6	2	-	2	2	-	-	-
7	4	-	4	4	-	-	-
8	5	-	5	5	1	-	-
Total	66(1)	56	122(1)	51(1)	10(1)	3(1)	

Description of Expense

The total expense is USD 323,610.24. Compared to the last year, it is very little expenses. Because of COVID-19 pandemic, a lot of projects and conferences could not be conducted.

The table below reflects more detailed information of expenditure situation in 2019 and 2020.

Expense	(USD)	
	2020	2019
IGCP	34,555.53	185,346.80
Joint Programmes	21,106.50	20,592.00
IUGS Commissions	72,200.00	112,600.00
IUGS Task Groups	1,400.00	16,600.00
Initiatives	3,600.00	14,400.00
Committees	2,539.07	27,808.07
Affiliated Organizations	27,000.00	29,200.00
Contributions	14,717.89	26,168.32
Episodes	28,000.00	28,329.00
Hutchison Award	8,000.00	18,000.00
Secretariat expense	15,000.00	15,000.00
Russian Reserve expense	6,517.60	6,486.74
DDE	0.00	784.13
Special Funding Program	47,000.00	-
IGC Special Expense	9,297.95	33,984.00
IGC Cancellation fee	6,973.30	-
Other expense	25,702.40	43,805.82
Total Expense	323,610.24	579,104.88
Net Income	229,406.20	-82,801.46

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.

In December 2020, IUGS President Prof. John Ludden signed the Memorandum of Understanding (MoU) with Dr. Zhong Ziran, Vice Minister for Geological Survey, Ministry of Natural Resources of China and President of China Geological Survey (CGS), for hosting the IUGS Secretariat in China from 2021 to 2028 through a virtual signing ceremony.

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 2020, the Secretariat assisted in the organization of several regular administrative meetings, including the organization of the 74th Executive Committee Meeting (Busan, South Korea on 15-18 January, 2020) and 75th Executive Committee Meeting (virtual, on 6 November 2020). Due to the COVID-19 pandemic, the Secretariat organized several virtual meetings, including the Meetings with the Local Organizing Committee of the 36th IGC (14 August 2020 & 19 September 2020), the informal virtual EC Meetings (15 September 2020 & 23 September 2020), and the Handover EC Meeting (5 November 2020).

The Secretariat sent timely notice to all the IUGS constituent groups, Adhering Organizations and Affiliated Organizations about the postponement of the 36th IGC; organized the Zoom meeting between the IUGS Bureau and the Local Organizing Committee of the 36th IGC about the rescheduling and reorganization of the 36th IGC; and sent the letter from the IUGS President on reimbursement to all the IUGS bodies.

The Secretariat made extensive preparations for the Extraordinary Session of the IUGS-IGC Council (virtual, 28-30 October, 2020). The Secretariat distributed a call for Extraordinary Session of the IUGS-IGC Council as well as the proposed agenda and survey on delegation attendance and voting; assembled four-year reports of the IUGS constituent groups and prepared the whole set of meeting documents based on the meeting agenda; assembled and prepared the list of the Adhering Delegates (from 56 Adhering Members;) and Observers as well as the list of the voting delegates and their contact information; assembled the video presentations of the EC candidates and sent the CVs of the EC and NC candidates to all the IUGS bodies; drafted and distributed the Guideline for Online Voting; designed electronic ballots and sent the ballots through electionrunner.com to all the voting delegates in a timely manner; assembled the voting results and reported to the IUGS President for announcement at the Extraordinary Session; maintained the large amount of correspondence for the preparation of the Extraordinary Session.

The Secretariat completed the following work related to the outreach and publications: designing and printing the hardcopies of the 2019 IUGS Annual Report and mailing to the IUGS Constitu-

ent Groups; 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 also actively supported the activities of the IUGS Big Science Program Deep-time Digital Earth (DDE). The Secretariat attended the DDE Science Committee Meeting in Busan, South Korea in February 2020; and coordinated with the Local Organizing Committee of the 36th IGC about the DDE activities during the Congress, including

GeoExpo exhibition, Townhall Meeting, reception etc.

The Secretariat would like to thank the whole Executive Committee, including the outgoing and the new EC Members, 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.



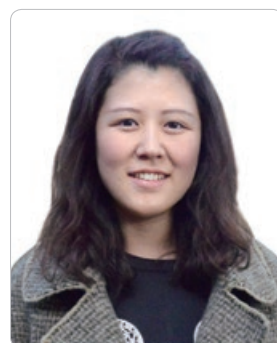
Ms. LI Wei
Secretary



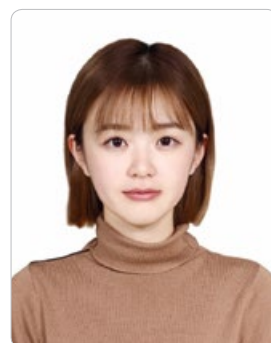
Ms. SITU Yu
Secretary



Ms. GU Yanfei
Secretary



Ms. XU Yaqi
Secretary



Ms. MU Langfeng
Secretary

2020 HIGHLIGHTS

JANUARY 2020

From 15 to 18 January 2020 the IUGS met in Busan (South Korea) for its 74th Executive Meeting. Several topics and issues were presented and discussed, such as those related to IUGS Joint Programs, and to the IUGS Big Science Program Deep-time Digital Earth (DDE). Information was given on the next International Geological Congresses: in particular on the imminent 36th IGC, that will be held in Delhi (India) this March, and the 37th IGC, that will be organized in Busan (South Korea) in 2024.

On 17 January, the Executive Committee of the International Union of Geological Sciences, meeting in Busan, South Korea, ratified the proposal for the Global Stratotype Section and Point (GSSP) that defines the base of the new Chibanian Stage and the Middle Pleistocene Subseries.

FEBRUARY 2020

Following evaluation and ranking by an ad-hoc committee, the IUGS EC awarded IUGS Special Funding to the proposal "Regenerating the Time Lords: Towards the completion, calibration, digitation and outreach of the geological timescale" from the International Commission on Stratigraphy and the proposal "Forensic Geological Analysis of Crimes in International Mining, Minerals and Metals (FGACIMMM)" from the Initiative on Forensic Geology over two years.

The International Geological Congress Committee (IGCC) approved the request from the Local Organizing Committee of the 36th IGC to postpone the 36th IGC to November 9-14, 2020 due to the COVID-19 pandemic based on an

opinion survey to a total of 7,235 registered participants.


The GSSP for the base of the Eocene Priabonian Stage, were ratified by IUGS.

MARCH 2020

Prof. Dr. Attilio (Lio) Boriani, age 83, passed away on March 12. The IUGS community knows Lio well because of his long-standing involvement with the Union in many capacities, most notably Secretary General 1996-2002 and President of the highly successful 32nd International Geological Congress in Florence (2004). He chaired the IUGS Strategic Planning Committee which released in 2012 the blueprint document for the development of the Union.

The International Geoscience Programme Council, during their 5th Session of the annual Council meeting held online through teleconferencing on 12-16 March 2020, decided to continue supporting 24 ongoing projects and approved 18 new projects, totaling 42 active IGCP projects in 2020. In this meeting, the progress of the 31 ongoing projects was assessed and 26 new proposals - submitted as of October 2019 according to the guidelines of the Council – were reviewed. The IGCP has supported over 650 projects from 150 countries.

The 36th IGC scheduled between March 2 and 8, 2020 had to be cancelled unexpectedly and deferred to a later date in the wake of the global Covid19 pandemic. Subject to the normalization of the global situation the Congress was rescheduled for November 9-14, 2020. Meanwhile, several major publications supposed to be formally released in the first week of March at the 36th Congress had been published. The



publications were available on-line and the IUGS members and their colleagues could freely download these articles for their personal use.

The 2020 version of ICS Chronostratigraphic Chart, which includes revised numerical ages, was posted on the ICS website (there were about 3 versions of the chart in 2020).

APRIL 2020

The IUGS Initiative on Forensic Geology (IFG) is continuing the IUGS “Special Project” to evaluate the current global scale of crimes that take place in the mining, minerals and metals industry, and assess geological methodologies and strategies, which may aid in the detection, prevention, management and mitigation of these crimes.

IUGS SP498 Cretaceous Climate Events and Short-Term Sea-Level Changes published. Sea-level constitutes a critical planetary boundary for both geological processes and human life. This volume presents high-resolution sea-level records from globally distributed sedimentary archives of the Cretaceous involving a large group of scientists from the International Geoscience Programme IGCP 609.

The IUGS Heritage Stones Subcommission (HSS) will continue activities on the recognition of natural stones in the context of architectural and cultural heritage. The project: Project 637 - Heritage Stones: a step towards to widen up the recognition of stones used in the building of heritage in emerging countries will work on the recognition of stones with emphasis on those from emerging countries from Africa, Middle East and South Asia.

MAY 2020

A new article co-authored by IUGS President

Qiuming Cheng and IUGS Past President Roland Oberhaensli is published by the Geological Society of London (GSL) as a special paper in a volume of RFG2018 which contains papers based on the materials presented at the RFG2018 on “Changing Roles of Geological Surveys”. The article introduces the principle and evolution of the IUGS new initiative big science program, Deep-time Digital Earth (DDE), the first IUGS big science program.

The first of the Earthlearningidea online teacher education workshops, is now available. It was developed from one of the Earth Science Education Unit (ESEU) professional development workshops for teachers.

The IUGS Heritage Stones Subcommission (HSS) organized live chat session at EGU on May 7, 2020. It was a fruitful session as it led to sharing of ideas on heritage stones from different countries and it aroused curiosity and queries from those who participated.

JUNE 2020

The IUGS EC approved a new category of articles for Episodes titled “Communication of IUGS Geological Standards.” This category is limited to manuscripts that are proposals ratified by the IUGS EC. Today, these only include GSSP proposals from the Commission on Stratigraphy; in the future, they may be standards developed by other IUGS Commissions and also ratified by the IUGS EC.

IFG has now commenced a ‘Special Project’ on behalf of the IUGS. The project will extend over two years and will focus on the use of geology to investigate, manage and mitigate crimes that take place in the minerals, mining and metals industries.

The report on the first year of the IUGS/EGU

Field Officer programme has just been released. It showed that the four European Geosciences Union (EGU) Field Officers (France, Italy, Portugal, Spain) and the two IUGS/International Geoscience Education Organisation (IGEO) Field Officers (India, Morocco) had presented 21 workshops in 15 locations with 379 participants.

The International Commission on the History of Geological Sciences (INHIGEO) Board decided that the 2020 Tikhomirov Award be awarded to David Branagan from Australia. David is well known internationally via his active INHIGEO membership including a term as INHIGEO President (1992-1996).

On 20 June, both the IUGS EC and the IGCC agreed the proposal of rescheduling the 36th IGC in the new dates (16-21 August, 2021).

JULY 2020

On July 15, IUGS and the Local Organizing Committee of the 36th IGC signed the new MoU for the Hosting of the 36th IGC.

Four books from IUGS activities were published by the Geological Society of London as Special Publications. More books are in final production and others at different stages. Some of them have already papers online first.

AUGUST 2020

Several authors, university teachers and other educators and professional societies were granted permission to use and reproduce the ICS International Chronostratigraphic Chart in their productions.

SEPTEMBER 2020

IUGS sent a letter to all registered participants to inform them of the IUGS’s concern on status of refunds from the 36th IGC. IUGS strongly

encourage the leadership of the 36th IGC to immediately and fully reimburse delegates and national committees for all fees paid to the Congress.

A recent By-Election by the IUGS Council ratified officers of IUGS Commissions, Task Groups, and Initiatives for terms of 2020-2024. The Council also voted to approve the recommendation of the IUGS Executive Committee to re-establish a new International Commission on Geoheritage in order to affect a reorganization of the Commission.

The IUGS-CGGB announces a Special Publication on black soil geochemistry, released as an e-book in September: International Union of Geological Sciences Manual of Standard Geochemical Methods for the Global Black Soil Project.

On 21-22 September 2020, the 1st Undergraduate Geoforensic Research Workshop took place in Brazil. This was organized by the Brazilian Student Chapter of the IUGS Initiative on Forensic Geology (IFG). This focused on forensic geology research applied to policing and law enforcement and was developed by undergraduate students in Brazil.

OCTOBER 2020

The postponement of the 36th IGC led also to postponement of the Ordinary Session of the IUGS-IGC Council, which is held every four years at the IGC. In order to conduct their important business, and with international travel greatly constrained by the pandemic, an Extraordinary Session of the Council was organized and held 28-30 October as a Virtual Meeting. 95 delegates from 55 adhering member countries registered for the meeting; 90 non-voting participants registered. These discussions



Figure 1. The Extraordinary Session of the IUGS Council, 28-30 October 2020



Figure 2. ISC President Dr. Daya Reddy Delivering an Address at the Extraordinary Session



Figure 3. UNESCO ADG Natural Sciences Ms Shamila Nair-Bedouelle Delivering an Address at the Extraordinary Session

were followed by a ballot and survey of the Council. All resolutions were approved as written or amended. The Council members were surveyed on whether or not the rescheduled 36th IGC should be terminated and whether or not there ought to be a virtual Congress. The results of the survey were not in favor of continuing with the 36th IGC.

On 1 October, 2020, Prof. Qiuming Cheng, IUGS President and Member of the Chinese Academy of Sciences, participated in a Panel Discussion concerning DDE for the International Conference of the American Association of Petroleum Geologists (AAPG). The goal of the Panel Discussion was to introduce the IUGS & DDE to the oil and gas industry, laying out the goals, vision, tactics and capabilities of the DDE

Program.

On 5 to 7 October 2020, the IUGS-IFG Student Chapter organized an event to explore collaboration between academic and forensic geology investigators. This included the Brazilian Federal Police, and IUGS-IFG Officer for Latin America, Fabio Augusto da Silva Salvador, and other forensic geology practitioners and a forensic biologist.

The IUGS Council approved the establishment of a new Task Group on Igneous Rocks (2021-2024) with the goal of integrating and revising the classification and nomenclature of igneous rocks. The IUGS Subcommittee on the Systematics of Igneous Rocks published its first classification guidelines in 1989 (R. Le

Maitre, Ed.) and revised and updated the guidelines in 2002.

UNESCO Secretariat, upon the IGCP Council decision, launched a new call for proposals. By 15 October 2020, UNESCO Secretariat received 24 new project proposals led by 143 project leaders from 58 countries. These 24 new IGCP project proposals will be reviewed by the Council and the scientific board members.

The first EC meeting of DDE was held on 9-10 October, 2020. Representatives of DDE EC, GC, SC, DDE Scientists, DDE Secretariat and IUGS attended the meeting via Zoom.

The first session of the GC of the DDE Program was held on 21 October 2020. Prof. Mike Stephenson, Chaired the session which was attended by EC Members, SC Chair and Members, Secretariat and representatives of a number of Founding Members and WTGs.

NOVEMBER 2020

IUGS Past President Prof. Qiuming Cheng was invited by the International Consortium on Landslides (ICL) to deliver a greeting message on behalf of IUGS at the Launching Session of Kyoto Landslide Commitment 2020 (KLC2020) on 5 November 2020.

On 19 November, IUGS signed a MoU with the Local Organizing Committee of the 37th IGC for the hosting of the 37th IGC.

On 29 November, IUGS signed a MoU with the Standing Committee on Gender Equality in Science (SCGES), a partnership of international unions to promote equal access of women and girls to science education, as well as equal opportunity and treatment throughout their careers.

DECEMBER 2020

A joint letter signed by IUGS President John Ludden and Dr. Ranjit Rath, Co-President and Secretary General of the 36th IGC Local Organizing Committee has been published on the IUGS website <https://www.iugs.org/>. The letter updates the community on the status of the meeting and reimbursements to meeting registrants.

A letter from Professor John Ludden, President of IUGS to all IUGS members is posted on the IUGS website <https://www.iugs.org/>. The letter serves as an introduction to Prof. Ludden and his thoughts for an invigorated IUGS community that can champion the essential role of the geosciences in resourcing the Earth's future.

IUGS President Prof. John Ludden and IUGS Vice President Prof. Hassina Mouri joined Dr. Zhong Ziran, President of China Geological Survey (CGS) and Vice Minister of the Geological Survey, Ministry of Natural Resources of China in a virtual ceremony on 17 December 2020 to sign a Memorandum of Understanding (MoU) for hosting the IUGS Secretariat in China from 2021 to 2028. The Secretariat will continue to be hosted within the premises of the Chinese Academy of Geological Sciences (CAGS) under CGS.

The 1st Brazilian Geoforensic Virtual Workshop, supported by IUGS-IFG and in collaboration with the Brazilian Federal Police, was held 30 November to 4 December. The workshop attracted ~120-150 delegates per day. Of particular interest was a focus on crimes that take place in the minerals, mining and metals industries, which aligns with a 'Special Project' being implemented by IUGS-IFG. In Brazil, eight universities have established student chapters to work with IUGS-IFG to promote and develop forensic geology. English-Portuguese translations facilitated international collaboration.

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 Stratigraphy (ICS)
International Commission on History of Geological Sciences (INHIGEO)
Commission for the Management and Application of Geoscience Information (CGI)
Commission on Tectonics and Structural Geology (TECTASK)
International Commission on GeoHeritage (ICG)
Commission on Global Geochemical Baselines (CGGB)

Joint Programs

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

Task Groups

Task Group on Isotope Geology and Geochronology (TGIG)
Task Group on Igneous Rocks (TGIR)

Initiatives

Resourcing Future Generations (RFG)
Initiative on Forensic Geology (IFG)

Big Science Program

Deep-Time Digital Earth (DDE)

Mr. Edmund NICKLESS



NASIC /RFG

The New Activities Strategic Implementation Committee (NASIC) was established in 2013 to implement the Resourcing Future Generations (RFG) initiative. Global economic and social development relies upon the discovery and extraction of mineral, energy and water resources and the rationale in establishing RFG is to consider:

- How demand for these resources can be met with continued population growth and the right of all peoples to improved living standards;
- How to secure resources for future generations in ways that are economically, environmentally and socially responsible.

The prime objective of RFG is to help ensure the multigenerational needs for raw materials, energy and water while ensuring social equity. To do that requires four fundamental actions by the global geoscience community:

- Comprehensive evaluation and quantification of 21st century supply and demand;
- Enhanced understanding of the subsurface as it relates to resource deposits;
- Assessment of where new resources are likely to be found;
- Building the needed and advanced skills capacity, particularly in lesser developed nations, to discover and responsibly develop mineral resources.

Figure 1 shows the growth in demand for

copper over the last 120 years due to population increase and increased consumption, and the same upward trend is shown by almost every mineral and energy commodity.

One of the biggest challenges facing our profession is the future supply of well-trained practitioners. So, without doubt, the highlight of work of in 2019 in advancing the RFG initiative was an international Summer School organised with iCrag (Irish Centre for Research in Applied Geosciences) held from 1 to 5 July at University College Dublin, Ireland. The event, called ReSToRE (Researching Social Theories, Resources and Environment), attracted 90 applications from which 42 early career researchers and recent graduates under the age of 35 years were selected representing 28 nations, including 18 developing countries. The Summer School aimed to build on several themes that had emerged strongly the previously year at the RFG2018 Vancouver, inter-IGC meeting, namely:

- The need to connect our understanding of the human system with our understanding of the earth system in order to address societal challenges;
- The need for much stronger interdisciplinary research between the social sciences and geosciences;
- The enthusiasm, especially among students and recent graduates, to create these interdisciplinary links;

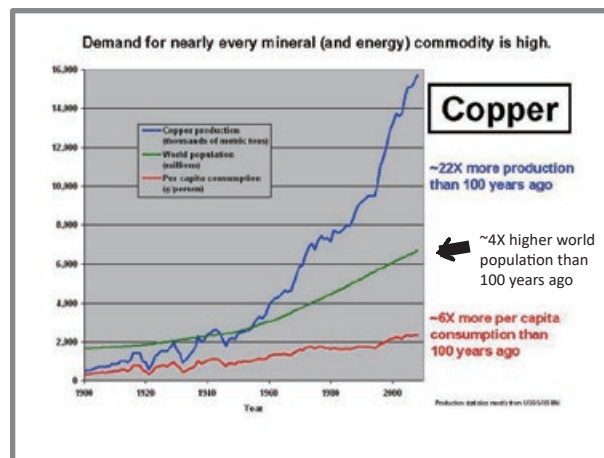


Figure 1: The growth in demand for copper from 1900 to the present due to population increase and increased consumption. The same upward trend is shown by almost every mineral and energy commodity.



Figure 2: ReSToRE students in the classroom.



Figure 3: ReSToRE students on fieldwork in the Wicklow Mountains.

- The need to develop a community of practice that will encourage and support researchers and practitioners in this somewhat unconventional subject area.

Under the guidance of eight distinguished mentors the students worked collectively in workshops to consider and report on four Grand Challenges

- Public acceptance of the extraction industry;
- Community engagement in earth resource extraction and use;
- Earth resources and the circular economy;
- Ethical and responsible sourcing of earth resources.

Figures 2 and 3 show students at work in the classroom and field. A short video clip may be viewed at <https://www.youtube.com/watch?reload=9&v=igKWCBATA0E&t=5s>

The organising sponsors were iCrag, IUGS and the Geological Survey Ireland. The event

was under the patronage of UNESCO. IUGS was the main financial contributor. Other sponsors were BHP, Boliden, Rio into and Teck, with additional support from the Irish Research Council, the School of Business, UCD and Geoscience Ireland.

ReSToRE was very much seen as a precursor event to IGC36 and planned symposium 1.12, under Theme 1, Geology for Society, entitled “The roles of UNESCO, IGCP and IUGS in realizing the UN Sustainable Development Goals”. Several of the students who attended the Summer School submitted abstracts which were accepted for oral presentation and were enabled to do so, supported by Geohost grants,

With cancellation of IGC36 and restrictions on travel and face-to-face meetings because of the COVID pandemic, the focus of work during 2020 has been on advancing the RFG initiative in different ways, recognising that since the RFG initiative was launched in 2013, the world has changed in many ways

- The concept of the circular economy is now mainstream, but does not recognise primary mineral production;

- Much work has been done by groups mainly in Australia and The Netherlands forecasting future mineral demand needed to realise the energy transition;

- There is increasing concern among major manufacturers about security of supply and ethical supply chains;

- There is increasing emphasis on design for recoverability;

- In 2015 the UN launched the Sustainable Development Goals (Figure 4);

- In December of the same year the Paris Agreement to combat Climate Change was adopted

During 2020 work has continued on broadening the RFG initiative to involve three elements

designed to support the professional development of young researchers and professionals, especially those in developing countries, who are working on issues relating to earth resources. The goal is to build global capacity, expand understanding, and improve practice in the societal aspects of earth resources, particularly among early career academics, professionals, and practitioners in Africa, Latin America, and Asia.

To that end, considerable effort was spent putting together a proposal to UNESCO and the IGCP for funds to support a series of six professionally produced lectures to be broadcast and made freely available online. The UNESCO Lecture Series is entitled ‘Earth Materials for a sustainable and thriving Society’. There are eleven speakers plus introductory remarks from UNESCO and IUGS. The lecturers include six women and five men from nine countries in four continents who provide expertise in the geosciences and social sciences.



SUSTAINABLE DEVELOPMENT GOALS



Figure 4. The seventeen UN Sustainable Development Goals were adopted by all United Nations Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030.

Lecture 1 Earth materials: the foundation for development – Dr Larry Meinert (USA) & Dr Nellie Mutemeri (South Africa)

Lecture 2 Climate neutrality, the circular economy and Earth materials – Prof John Thompson (Canada) & Prof Frances Wall (UK)

Lecture 3 The neglected minerals and materials of development – Prof Daniel Franks (Australia)

Lecture 4 Mineral extraction and communities – Dr Rajiv Maher (Mexico) & Dr Melba Kapesa Wasumma (Kenya)

Lecture 5 Suppliers, consumers, and the global minerals supply chain – Dr Kathryn Moore (UK) & Dr Judy Muthuri (UK)

Lecture 6 Earth materials and a sustainable

future – Prof Murray Hitzman & Ms Halleluya Naantu Ekandjo (Namibia)

The lectures will be broadcast as webinar-style events at approximately weekly intervals between 26 January 2021 and 9 March 2021.

Looking ahead, a tripartite approach is proposed that will deliver tailored capacity-building activities to three specific audiences. All activities would be held under the umbrella of the IUGS Resourcing Future Generations initiative.

- ReSToRE Summer Schools, modelled on the 2019 ReSToRE summer school, that will bring together early-career researchers and practitioners at the intersection of the social sciences and geosciences from developing and developed countries to address critical issues related to resources. Summer schools would be

held every second year. Because of COVID restrictions, the second summer school will not be held in 2021 and is tentatively planned for 2022.

- RFG Technical Workshops series to address locally identified training needs. The workshops would be run on an as-needed basis in collaboration with local entities. Topics would be selected through a competitive proposal process. In collaboration with the Society for Geology Applied to Mineral Deposits, as part of their 7th Short Course on African Metallogeny, it is hoped to hold an event in Windhoek, Namibia in late 2020 or during the Spring of 2021.

- RFG Developing Researchers Programme (FoRGe - Fostering Researchers in Geosciences: potentially in collaboration with UNESCO, a workshop-based programme to be held in developing countries in collaboration with third-level educational institutions aimed at building research capacity and supporting professional development among early career university faculty who study earth resource topics. Experienced mentors would lead the 3- to 5-day workshops and would maintain a mentoring role with participants after the workshop.

But in addition to supporting the next genera-

tion of geoscientists there are important RFG-related multidisciplinary research topics that deserve attention including:

- the integration large regional geophysical, structural and geochemical data sets to predict mineralisation at greater depth;
- investigation of new, in situ recovery, non-intrusive mining technologies;
- development of novel, less energy intensive, processing and metallurgical beneficiation techniques.

Resourcing Future Generations is a strong brand and has had impact. IUGS was prescient and should be proud that back in 2013, it established the initiative to provide impartial advice from the global geoscience community when the issue of future mineral supply was rarely discussed. There is potential to broaden the discussion and to continue to work with other disciplines on a topic which will become increasingly important, if humankind is to address the issues of decarbonising the global economy to mitigate climate change while improving the standard of living of many of the world's poorest.

Dolores PEREIRA



IUGS PUBLICATIONS AND SOCIAL MEDIA COMMITTEE

The Publications Committee consists of:

- Chair – Prof Dolores Pereira
- Prof. Stanley J Finney – IUGS Secretary General
- Mr Giuseppe di Capua – Webmaster
- Dr Gurmeet Kaur – member responsible for social media
- Prof. Jin-Yong Lee – Editor of Episodes

Dr Heejung Kim is Managing editor of Episodes

Dr Silvia Peppoloni and beginning October 2020 Prof. Claudia Mora managed the eBulletin.



Figure 1. IUGS PC annual meeting took place via online, through Blackboard, due to COVID-19

Prof Dolores Pereira, chair of the PC, procured news monthly from different IUGS bodies and IGCP leaders to include in both eBulletin and Social Media. She was in continuous contact with the editor and manager of Episodes to secure complete, punctual and quality issues of

the journal quarterly. She also dealt with permits to publish Episodes contents (e.g. figures) in other publications. The PC met once, virtually, in 2020 (Fig. 1); ongoing business within the PC was managed via e-mail.

The MOU between Episodes and IUGS was

renewed in 2020. A total of 129 manuscripts were submitted through the EM system, and a total of 76 manuscripts (67 original articles, 4 reports, 2 book reviews, 1 obituary, and 2 editorials) were published in 2020. Two Special Issues were published about Geodynamic Evolution of the Indian Subcontinent – Hadean to Recent and about Asbestos, elongated mineral particles, and other hazardous geomaterials: occurrence, use and health implications (Vol 43-1 and Vol 43-3 respectively). The time for decision after first review decreased about two weeks (48 days in 2019 to 35 days in 2020). The rejection rate was greater than 30%, and more when the manuscript went through the iThenticate website, detecting nonconformities in content, non-compliance with re-submission regulations, and serious format errors (53.5% in 2019 and 55.8% in 2020). The order of importance in thematic submissions was: Economic

Geology (15%) > Geochemistry; Geochemistry - Aqueous; Mineralogy (11%) > Engineering Geology; Geoheritage / Geophysics (8%) > Archaeological Geology; Petrology – Sedimentary / Geodynamics; Geophysics / Geomorphology (5%). The order of submissions by country is: India (15%) > China (11%) > Italy (6%) > Brazil, Iran, Pakistan, Spain > South Korea, Poland > Russia. Episodes has been providing e-TOC services since September 2020 (Vol. 43, No. 3) as well as Online-first update information mail services. The Episodes website was visited 81,714 time in 2020, and the monthly average is 6,809. This is a slight increase compared to last year (Fig. 2; March, June, September, and December). The country order by visitors is as follows: the United States (Maximum 3,672), Canada, India, China, South Korea and United Kingdom, and shows similar trend as in 2019 (Fig. 3).

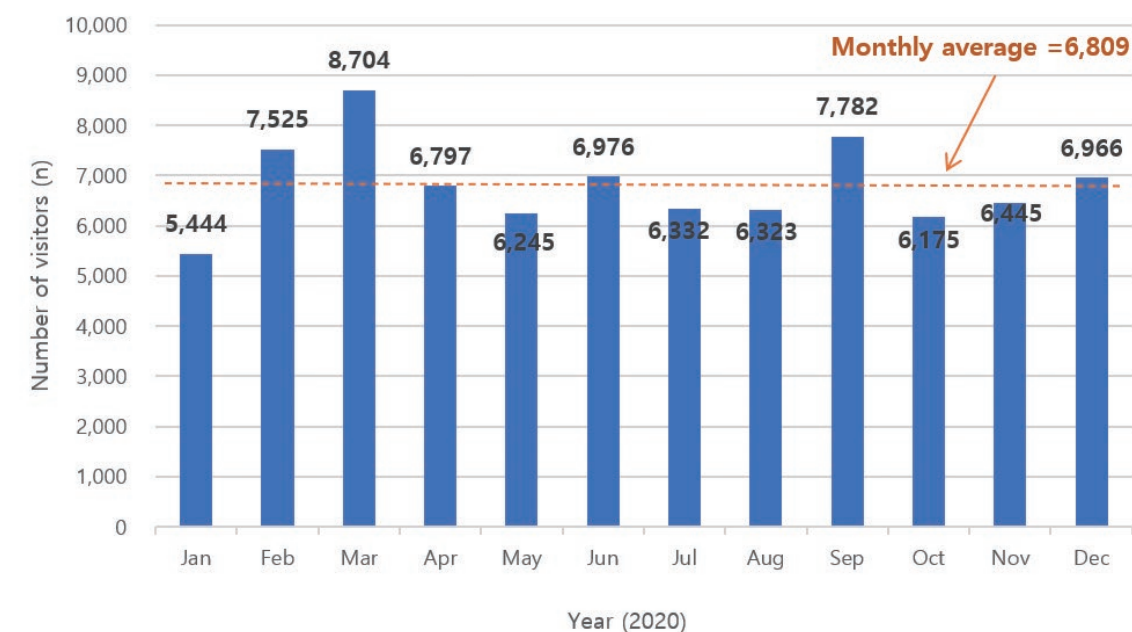


Figure 2. Monthly number of access to the website of Episodes (2020, January to December)

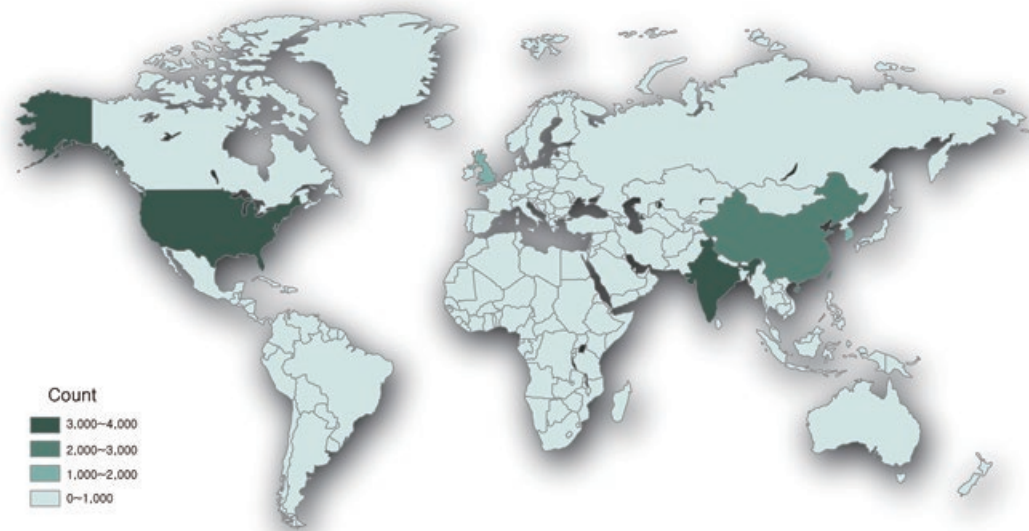


Figure 3. Distribution of visitors to the Episodes website (2020, January to December)

IUGS Social media is handled by Gurmeet Kaur. Gurmeet deals with the platforms Facebook, Twitter and LinkedIn. The IUGS social media platforms regularly report relevant information and activities of the various IUGS commissions, joint programs, task groups and initiatives. The exhaustive IUGS eBulletin and IUGS website are also promoted through social media with direct web links provided to open the eBulletin 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 cost through the links provided. The year 2020 saw surge of posts pertaining to the 36th IGC, including information about cancellation due to COVID-19. Most reports of IUGS activities are accompanied by links and figures.

On average, 3-4 posts are done every week and the total Facebook followers have crossed a 7.5 k mark. The close coordination and cooperation amongst the PC members has been instrumental in the smooth functioning of the IUGS social media platforms.

The webmaster continued to develop the new website of the IUGS (<https://www.iugs.org>), published in December 2019), creating new pages on the basis of contents progressively available during 2020 and updating pages already existing. In particular, new pages were created under the section "Activities" on "Gender Equality in Science" and "UNESCO Lecture Series" (Figs. 4 and 5). The IUGS organization chart was fully updated after elections of the new Executive Committee and officers in November.

The IUGS website is monitored through Google Analytics: more than 29,200 unique visitors from 176 countries accessed the website in 2020 in more than 31,750 visits, with an average value of 80 visitors/day, 2.3 pages/visit, 1:41 minutes/visit. Visitors reach the website mainly from google.com or direct access.

During the year, the webmaster has worked in strict cooperation with the Secretary General, the eBulletin editor, and the Secretariat, assuring continuous support to IUGS bodies to promote their events and activities.



Figure 4. IUGS website "Activity": page on Gender Equality in Science (<https://www.iugs.org/scges>)



Figure 5. IUGS website "Activity": page on UNESCO Lecture Series (<https://www.iugs.org/unesco-lectures>)

The eBulletin 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 few illustrations (photographs, diagrams, etc). Science reports or papers are excluded.

The eBulletin is distributed to more than 16,000 recipients and it appears regularly every month.

Four books from IUGS activities were published by the Geological Society of London as Special Publications (Fig. 6). More books are in final production and others at different stages. Some of them have already papers online first. Downloading data for the articles published in these books, available at the web page of GSL Special Publications, are very positive. The chair of the PC is in permanent contact with GSL editorial manager to keep updated and promote IUGS books.

THE GEOLOGICAL SOCIETY PUBLISHING HOUSE IUGS Books

Title and expected publication year*	Type	Proposal received	Accepted	Fee due	Status	Series	Vol	Published	Comments
2020									
Cretaceous Climate Events and Short-Term Sea-Level Changes	IUGS	Jan 18	Feb 18	£1250	Print production	SP	498	April 2020	https://sp.lyellcollection.org/online-first/498
Global Heritage Stone Vol 2	IUGS	Nov 16	Feb 17	£1250	In production - Online First	SP	486	October 2020	http://sp.lyellcollection.org/online-first/486
The Changing Role of Geological Surveys	IUGS	Sep 18	Nov 18	£1250	In production - Online First	SP	499	October 2020	https://sp.lyellcollection.org/online-first/499
Subaqueous Mass Movements and Their Consequences: Advances in process understanding, monitoring and hazard assessments	IUGS	March 19	May 19	£1250	In Prep	SP	SP500	Published June 2020	https://sp.lyellcollection.org/online-first/500
A Guide to Forensic Geology	IUGS	Mar 16	Jul 16	£1250	Received - final permissions pending	None	n/a	Feb 2020	n/a
Forensic Soil Science and Geology	IGC26	Feb 16	April 16	£1250	In production - Online First	SP	492	Introduction to submit	https://sp.lyellcollection.org/online-first/492
Characterization of Modern and Historical Seismic-Tsunami Events, and Their Global-Societal	IUGS	Jul 18	Sep 18	£1250	In production - Online First	SP	501	Introduction to submit	https://sp.lyellcollection.org/online-first/501

Figure 6. List of books published by GSL during 2020 and others in preparation.

William CAVAZZA



FINANCE COMMITTEE

The Finance Committee (FC) is an independent body overseeing the financial aspects of the various IUGS activities. As such, the FC reports directly to the Executive Committee and every four years, on the occasion of the International Geological Congresses, to the Joint IUGS-IGC Council. According to the IUGS Statutes and Bylaws "The Finance Committee ... plan(s) for the finances of the Union, evaluate(s) proposals for the independent auditing of the Union for Council, and advise(s) the Executive Committee on the management of funds and improving the funding of the Union. ... Its primary roles are to identify external financial opportunities for the IUGS and to propose to the Executive Committee ways to improve IUGS financial operations, including (i) the allocation of funds in relation to the strategic priorities and missions adopted by the Executive Committee; and (ii) overseeing the conduct of an independent external audit of IUGS finances..." [1]

After a long time of quiescence, the FC was reestablished in 2018. The members of the 2018-2020 FC (see photograph, left to right) were: William Cavazza (Chair; IUGS Vice-President), Edmund Nickless (formerly Executive Secretary, Geological Society of London), Jack Hess, (formerly President, Geological Society of America Foundation and GSA Executive Director); Andy Fleet (Chair and Trustee, Dorset County Museum, formerly Assistant Director of Science, Natural History Museum, London).

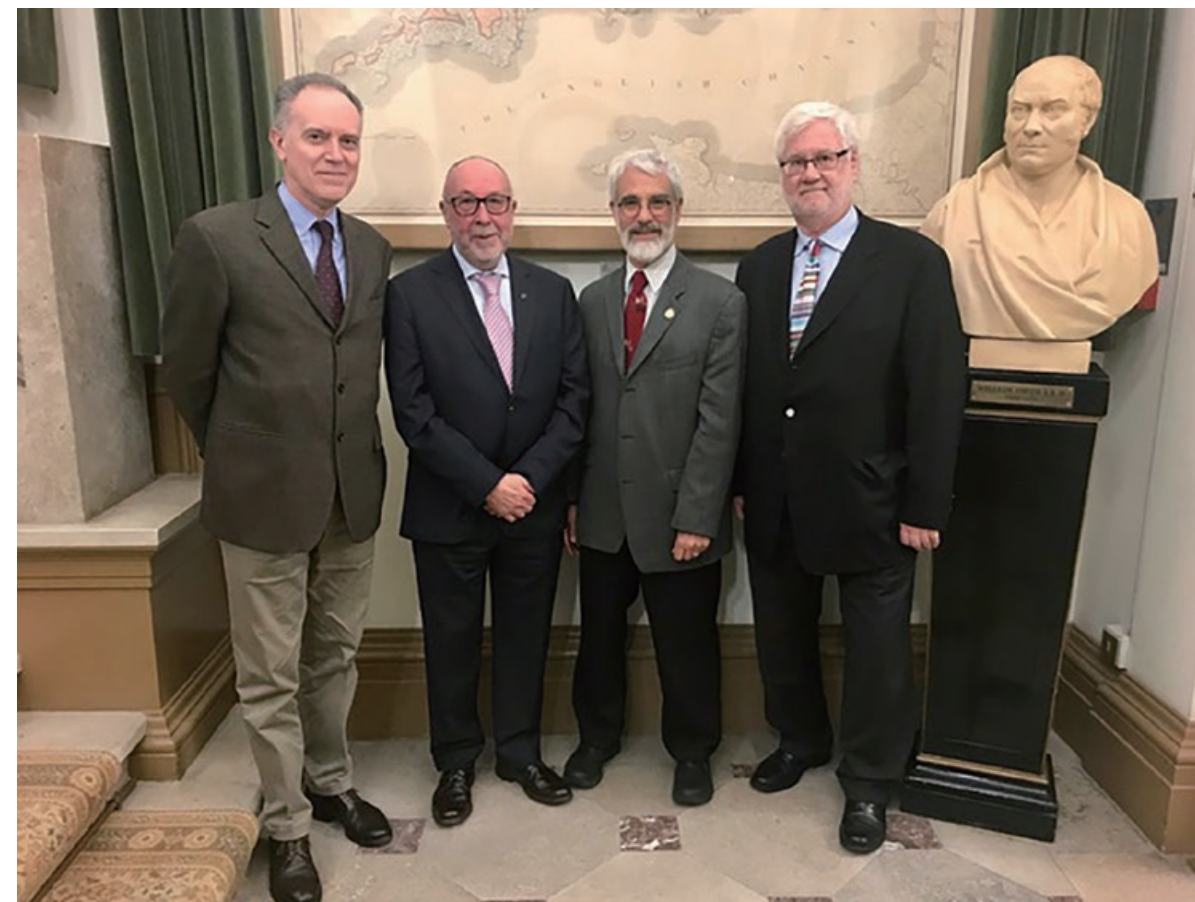
RESULTS

The main results of the FC activity during 2020 can be summarized as follows:

- quantitative analysis of the financial situation of the Union;
- identification and analysis of sources of income and expenses;
- definition of historical trends in the Union's finances;
- evaluation and consolidation of financial investments;
- search for alternative business models for Episodes;
- development of a competitive funding program for the IUGS constituent groups;
- preliminary analysis of copyright issues and marketing value of IUGS intellectual property;
- alignment of IUGS expenses with strategic priorities;
- increased level of auditing.

2020 RECOMMENDATIONS

Periodically, the FC has made a number of recommendations to the IUGS Executive Committee. Following are those needing further consideration during the 2021-24 quadrennium.



IUGS Finance Committee photo

They are to be considered as priorities by the current IUGS EC.

1. Increasing the transparency of the Union's budget. Overall, IUGS financial operations are well run and the Treasury provides adequate technical support. A minor concern regards the detail of the annual Treasurer's report and Episodes financial report. Detailed reporting allows for more informed decisions. In recent years, the IUGS financial reports have been somewhat streamlined compared to the past ones. Similarly, the budget published annually in Episodes has been significantly simplified. The FC recommends (i) presenting financial data in a

fixed and coherent manner through the years in order to facilitate comprehension and comparison and (ii) adopting the previous detailed format for both the Treasurer's and Episodes reports.

2. Increasing the level of auditing. According to the Statutes and Bylaws, the IUGS financial operations must undergo an independent financial audit every four years. Results of the audit are to be presented during the Joint IUGS-IGC Council Meetings. In recent times (e.g. Brisbane 2012 and Cape Town 2016 IGCs), financial auditing was done by an external auditor which assured that the yearly IUGS financial state-

ments were drafted in conformity with the principles generally accepted in the country where the IUGS Treasury resided. The FC recommended in 2018 that IUGS financial auditing ideally should be undertaken at a higher level of detail, in line with similar organizations. The 2020 audit represented a significant improvement. In order to follow best practice and attract potential sponsors and donors the detail of financial auditing must be increased further.

3. Alternative business models for Episodes. The FC was tasked to explore alternative business models for the journal Episodes. The mandate dictated three pre-requisites to which all alternatives to be considered should adhere: (i) IUGS should retain title ownership; (ii) considering that most IUGS funding comes from public sources, Episodes should remain freely available to the public; (iii) the journal should become cost-neutral if not income-generating. In 2020, after several months of contacts and negotiations, the responses from both non-commercial and commercial publishers to the FC initiatives have underlined the weakness of Episodes in the competitive world of scientific publishing. In the face of major changes within the sector, the IUGS Publications Committee should make all steps necessary to improve further the IUGS flagship publication. Whatever will be the attitude of the next IUGS EC, no significant alternative business models will be achievable unless the journal publishes a higher number of

articles and reaches higher bibliometric indices.

4. Improving the Union's funding. How to improve funding has been the topic of much debate within IUGS in the past and during 2020. Several documents have outlined potential strategies[2-5]. It is the opinion of the FC that the EC should consider this issue as one of its primary goals. As there is little margin for additional income from membership fees, we recommend to focus the efforts on other potential sources. Some of the strategies identified in previous IUGS documents toward this goal have been implemented successfully (capitation fees from IGCs, financial investments), others could be improved (income from publications), others have failed to materialize (income from special events like the International Year of Planet Earth). Plans for the set-up of an IUGS Foundation (other than the Hutchison Fund) should be considered to tap donations from individuals, agencies, private and public bodies and foundations. It is important as a first step for IUGS to identify and clearly communicate its unique role. Unless a strong case can be made for financially supporting IUGS efforts, it will be impossible to effectively and successfully solicit philanthropic support from individuals, groups, or industrial partners. Technically, it will be relatively easy to implement the activities of an IUGS Foundation, as the IUGS is already an organization exempt from income tax. Donations and gifts will be tax deductible to the extent of the law.



INTERNATIONAL COMMISSION ON STRATIGRAPHY (ICS)



David A.T. Harper
Chair



Shuzhong Shen
Vice Chair



Philip L. Gibbard
Secretary General

The work of the International Commission on Stratigraphy has continued through the pandemic with some notable achievements. Fieldwork has not been possible to pursue the context, indicative markers and sections for Global Stratotype Sections and Points, nevertheless discussions have continued by way of Teams and Zoom meetings across the Commission.

During the 2020 cycle, the bases of the Lower/Early, Middle/Mid-, and Upper/Late Pleistocene Subseries/Subepochs at the same GSSPs as the Pleistocene stages (the Chibanian and the previously defined Gelasian Stage GSSP, i.e., base Pleistocene/Quaternary) were ratified by the IUGS. The definition of the Chibanian Stage in the Chiba gorge in Japan, marks the first ever GSSP definition in that country. The base of the stage coincides with the Brunhes-Matuyama geomagnetic field reversal which is dated to 773,000 years and is one of the most detailed records of this geomagnetic field reversal in the World. In detail, the Chiba sections record the directional midpoint of the Brunhes-Matuyama reversal. The entire directional reversal event was completed within 1.9 thousand years. The base of the Chibanian Stage and Middle Pleistocene Subseries is defined by a regionally extensive ash bed, the Ontake-Byakubi-E bed, dated at 774.1 thousand years ago and occurring just 1.1 m below the

reversal midpoint. This distinctive bed gives visible expression to the boundary.

The proposal for the base of the Priabonian Stage was approved by ICS and ratified by IUGS in February 2020. The primary marker for the GSSP coincides with the base of a prominent crystal tuff layer, the Tiziano bed, at 63.57 metre of the Alano section (NE Italy). The ratified proposal is now available in Episodes (doi.org/10.18814/epiugs/2020/020074).

The GSSP for the Hauterivian Stage of the Cretaceous System, ratified in December 2019 is now available in Episodes ([10.18814/epiugs/2020/020072](https://doi.org/10.18814/epiugs/2020/020072)). The stratotype section at La Charce, with boundary at the base of bed 189, is coincident with the FAD of the ammonite *Acanthodiscus*. A dedication ceremony was held in 2020, a significant event for the La Charce community, attended by the mayor (cutting the ribbon) and other local dignitaries.

Celebration of the definition of the base of the Hauterivian Stage, La Charce, France by the local community and some of our colleagues involved in the proposal. The mayor is pictured cutting the ribbon.

The proposal for the base of the Kimmeridgian (Jurassic), Scotland was ratified by the IUGS. The Kimmeridgian Stage was originally named



after the tiny village of Kimmeridge which lies on the Jurassic Coast, a UNESCO World Heritage Site in southern England, UK. The boundary sections on the Dorset coast are like many sections, condensed and associated with at least one small hiatus and so were not suitable for defining an international standard. The International Subcommission on Jurassic Stratigraphy are pleased to announce that the Global Stratotype Section and Point for the base of the Kimmeridgian Stage (Upper Jurassic) has been formally agreed and ratified. The proposal received unanimous support from the International Commission on Stratigraphy (ICS) and International Union of Geological Sciences. The boundary will be placed 1.25 ± 0.01 m below the base of Bed 36 in the foreshore at Flodigarry, Staffin Bay, Isle of Skye, Scotland. The point is marked by the appearance over a short stratigraphic interval of several new ammonite taxa. The agreement represents the culmination of two decades of work by an international team lead by Professor Andrzej Wierzbowski (University of Warsaw, Poland).



Figure 1. *Pictonia flodigarriensis* Matyja one of the three key ammonites that mark the base of the Kimmeridgian Stage. The ammonite is named after the hamlet of Flodigarry where the stratotype is defined. Note that, although flattened, the details of the fine ribbing and the original nacreous shell are exquisitely preserved.

The GSSP at Flodigarry is on the publically owned foreshore accessed by a short footpath from the road in the small rural community of

Flodigarry (Fig. 2). The site is managed for the Scottish Government by The Scottish Government Rural Payments and Inspections Director-

ate and lies within the Trotternish Ridge Site of Special Scientific Interest which provides statutory protection from development.

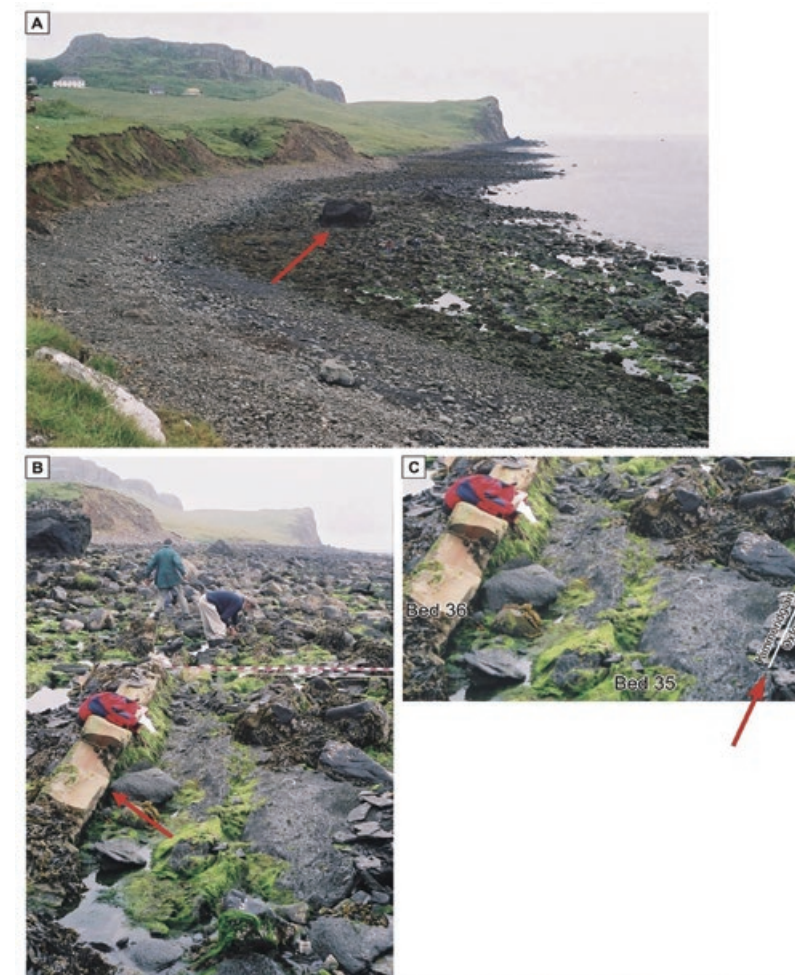


Fig. 2. View along the beach at the Flodigarry showing the position of bed 36 and the top of bed 35 where the base Kimmeridgian/ Oxfordian boundary lies: A. General view of the foreshore at Flodigarry; this was taken during the summer when the algae partially covers the rocks. Note the large boulder (arrowed) – which enables the section to be easily located. This boulder is possibly part of a large upstanding in situ dolerite sill; B. View looking north along the beach at Flodigarry showing the marker limestone bed 36 and, on the left-hand side the large boulder shown in A; C. Limestone bed 36 and the top of bed 35.

The Salzgitter-Salder (Germany) is the proposed candidate global stratotype section for the Coniacian Stage of the Cretaceous System. Primary criterion is the appearance of the inoceramid *Cremnoceramus deformis erectus* (Fig. 3). Secondary criteria include a negative excu-

sion in the $\delta^{13}\text{C}$ values (Navigation Event), and bivalve, planktic foraminiferal and peridinioid dinocyst datums. The GSSP was approved unanimously by the ICS and awaits ratification by the ICS.

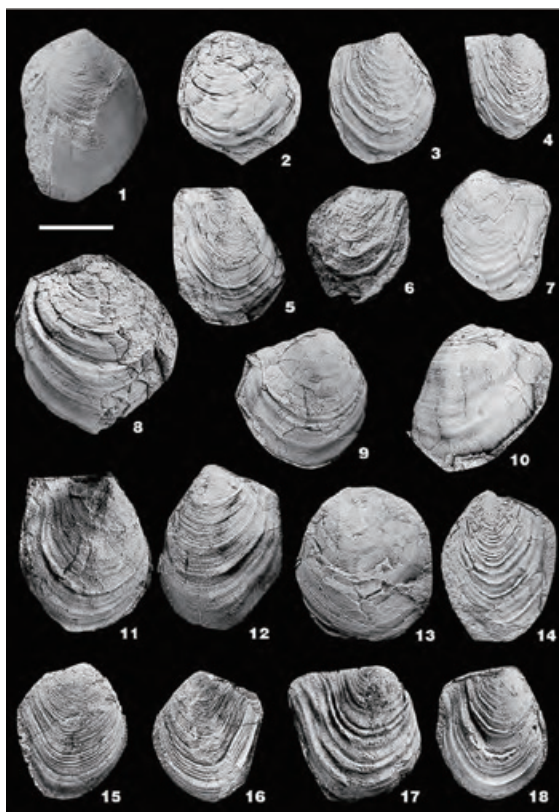


Fig. 3 1, 3-7, 9-13, 15-18 – *Cremnoceramus waltersdorfensis waltersdorfensis* (Andert); 1, 11, 12, 15, 16, 17, 18 – *Słupia Nadbrzeżna*; 1, 15, 16 – *C. deformis erectus* Zone; 11, 12, 16-18 – *C. w. waltersdorfensis* Zone; 3, 4, 5, 6, 7, 9, 10, 13 – Salzgitter-Salder, bed 45. 2, 8 – *Cremnoceramus waltersdorfensis hannovrensis* (Heinz); *C. w. hannovrensis* Zone; Salzgitter-Salder; bed 52. 14 – *Cremnoceramus deformis erectus* (Meek); Salzgitter-Salder, *C. d. erectus* Zone; bed 47. Scale bar is 2 cm.

Following ratification of the Global Stratotype Section and Point (GSSP) for the base- Sakmarian Stage (Cisuralian, Lower Permian) in 2018 the definitive article detailing the stage characteristics was published by Chernykh et al. in Episodes during the year (2020; 43(4): 961-979, <https://doi.org/10.18814/epiugs/2020/020059>).

Members of the Precambrian community including the Ediacaran, Cryogenian and Precambrian subcommissions have completed a fundamental rethink of Precambrian stratigraphy and its division. This green paper has now been accepted by the Journal of the Geological Society - Towards a new geological timescale: A template for improved rock-based subdivision of pre-Cryogenian time is available in final draft (<https://doi.org/10.31223/X5FW25>). This is part of an ongoing conversation with and within the ICS together with a large number of stakeholders. Following wide consultations, a white paper will be presented to the ICS for final discussion and a vote.

The Subcommittee on Stratigraphic Classification has debated again the status the availability of the rank of subseries. A strong proposal laying out the rationale for this development was published by Aubry et al. in Episodes 2020; 43(4): 1041-1044 <https://doi.org/10.18814/epiugs/2020/020066>. There is general agreement that the rank should be available in the Stratigraphic Guide but it is within the ambit of individual subcommissions to apply the rank if appropriate. This was approved by the ICS and is awaiting ratification.

The Timescale Calibration Subcommittee is currently focused on cyclostratigraphy and with ICS support is building a platform for potential users (<https://www.cyclostratigraphy.org/>). The project leader is Matthias Sinnesael on behalf of the Subcommittee.

Following ratification of the Global Stratotype Section and Point (GSSP) for the base- Sakmarian Stage (Cisuralian, Lower Permian) in 2018 the definitive article detailing the stage characteristics was published by Chernykh et al. in Episodes during the year (2020; 43(4): 961-979

<https://doi.org/10.18814/epiugs/2020/020059>).

Following the appointment of a new ICS webmaster, Dr Nicholas Carr (Surround Australia Pty Ltd, Canberra) it was agreed to incorporate the web pages of the individual subcommissions on the main ICS website with a standardised design. This is a major task but it is progressing rapidly, with several subcommissions's sites already installed.

The timescale chart was enhanced by the addition of the new GSSPs, with some three versions published in 2020 and some 20 versions of the chart now available in almost 20 different languages, most recently supplemented by the addition of a Hungarian chart with supporting literature. A number of absolute dates have been revised for several GSSPs.

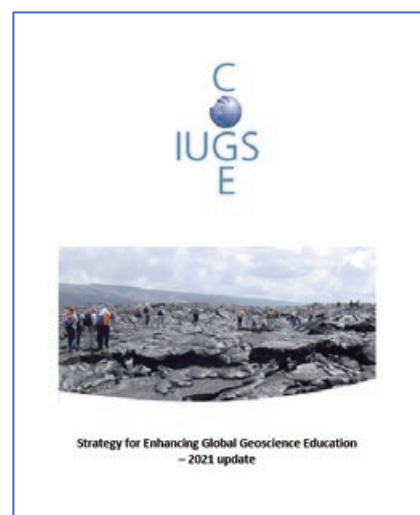
During the year, the executive attended a number of key, international meetings. The chair attended the IUGS council meeting in October 2020, meeting of the North American Stratigraphic Commission in the same month and held an opening address to the Geological Congress on the Geology of Colombia and the launch of the landmark publication of the multi-volume book on the Colombia's geology in October 2020. The chair continues to attend meetings of the Deep Digital Earth (DDE) project, of which the ICS is a founding member.

Finally we are delighted to announce the Commission's first Treasurer. Dr Stuart Jones (Durham University) will be responsible for the ICS's financial affairs and transactions.

COMMISSION ON GEOSCIENCE EDUCATION(COGE)

The IUGS Commission on Geoscience Education (IUGS-COGE) published its 2021 update document during 2020 and the Commission is very grateful to IUGS for its full endorsement and funding of the report and its budget bid.

The Commission had been due to meet at the International Geological Congress (IGC) in New Delhi, India last year, but this was sadly cancelled when the IGC was cancelled. In the meantime concern had been expressed about the gender balance of the Commission and it's spread of membership across the world. As a result, three more women have been appointed to the Commission from Africa and South America to address this issue. The first meeting of the augmented Commission ran virtually recently.



IUGS-COGE 2021 Strategy update document.

As in previous years and previous 'Strategy' documents, the focus of the Commission has remained on the five areas detailed below. However, as last year, our efforts have sadly been curtailed by the Covid pandemic. Nevertheless, with challenge comes opportunity, and the opportunity has been taken for further develop-

ment of the activities for teachers on the Earthlearningideas website and of the international textbook initiative.

1. Teachers of geoscience in schools and colleges with strong geoscience backgrounds

This group of several thousand people worldwide, has continued to be supported by the International Geoscience Education Organisation (IGEO). IGEO Council was due to meet at the IGC, but had to be cancelled when the IGC was cancelled. A plan is being developed to run a virtual IGEO Council meeting. Meanwhile the 14th International Earth Science Olympiad (IESO) in Russia which had to be cancelled last year do to Covid is being run, through Russia this year, with a virtual format. Both IGEO and the IESOs are supported by IUGS.

2. Teachers of science or geography with some geoscience in their teaching, who have weak geoscience backgrounds

The tens of thousands of teachers across the world with Earth science in their teaching curriculum, but with poor backgrounds in their understanding of Earth science and in how to teach it well, continue to be catered for through COGE activities.

The Field Officer network, which currently comprises two IUGS/IGEO Field Officers and four European Geoscience Union (EGU) Field Officers, as only been able to offer online workshop this year, because of the Covid pandemic. Three new IUGS/IGEO Field Officers had been invited for training (from Chile, Malaysia and Togo) together with four new EGU Field Officers (from Albania, Germany, Hungary and Turkey), but sadly their training and appointment had to be postponed because of Covid. Thanks to the

IUGS for rolling over their funding to this year. IUGS has also very kindly provided funding for the training of a further four IUGS/IGEO Field Officers this year and EGU will provide funding for another four EGU Field Officers too, but advertising cannot go out until training dates and times have been fixed, and this is not currently possible due to the pandemic.

It was because of the pandemic that many Earthlearningideas were videoed, combined into online workshops and added to the Earthlearningidea website at: https://www.earthlearningidea.com/home/Teaching_videos_workshops.html. These have proved very popular, with video downloads averaging more than

8000 per month and workshop downloads averaging 250 per month, contributing to the overall monthly download figures of 50,000 Earthlearningideas per month.

Following the publication of the open-source textbook for 16 year olds: Exploring Geoscience: across the world, partially supported and approved by IUGS, two companion volumes were published in the IGEO website, linked to the IUGS-COGE website in 2020. These were: Exploring geoscience: activities and questions and Exploring geoscience: activities and questions – some answers. Meanwhile the first full translation of the book was published, in Turkish. Other translations are in development.

Stills from some of the videos are shown below:



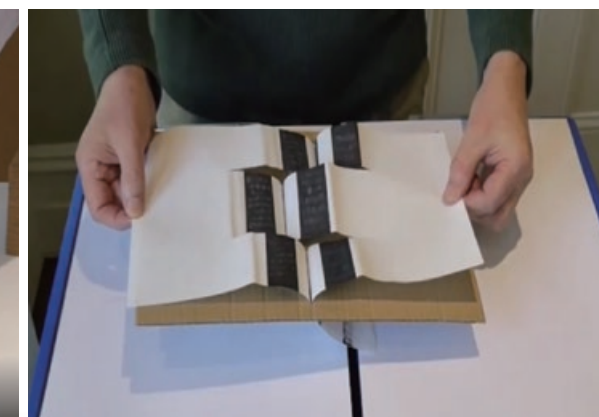
Screenshot from the 'Atmosphere and ocean in a tank' video.



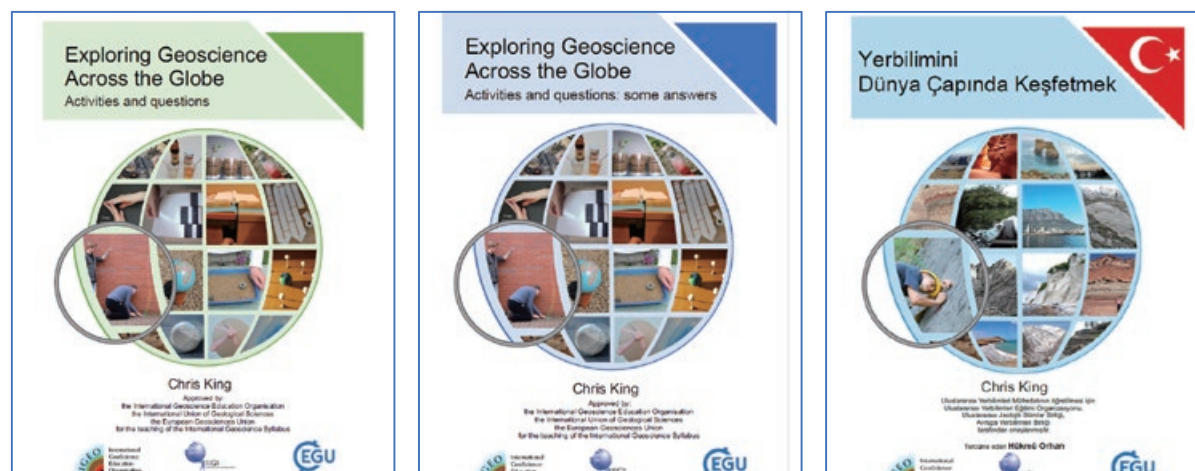
Screenshot from the 'Magnetic Earth' video.



Screenshot from the 'Himalayas in 30 seconds' video.



Screenshot from the 'Magnetic stripes' video.



Exploring geoscience: activities and questions – approved by IUGS.

Exploring geoscience: activities and questions – some answers – also approved by IUGS.

IUGS-COGE 2020 Strategy update document.

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 interdisciplinary and 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.

Our commission, with 260 members and fifteen affiliated organisations, has addressed the several topics of history of Earth sciences in different contexts such as meetings, symposia, lectures, exhibitions, articles, books, collections

of documents and digitalisation projects, such as the virtual bibliography and archive. Communication and outreach are also very important for the promotion and diffusion of information regarding our research and activities: for this purpose the INHIGEO website (<http://www.inhigeo.com/>) has been enriched and now also features the Anniversaries Series historical papers, that INHIGEO prepares for the IUGS E-Bulletin, as well as the links to all the contributions published by INHIGEO members on the IUGS journal Episodes on 'Classic Papers' on history of geology and on the history of the International Geological Congress.

We have also extended our cooperation with the international History of Earth Sciences Society (HESS). Several papers by INHIGEO members are printed within the journal of the society 'Earth Sciences History' and in particular one of our main publications in 2020 collected some papers presented at the 43rd INHIGEO Annual Symposium in Mexico City (2018), including the session on "Geological Agency in the Early Modern Period", printed in 'Earth Science History' 39/2, December 2020, pp. 227-473 and

3. Teachers of geoscience in Higher Education

The EGU is developing teaching resources for Geoscience lecturers in Higher Education through teaching grants. Fourteen teaching packages are currently being developed on a diverse array of topics. When these are eventually published on the EGU website they will be made available globally through a link on the IUGS-COGE website. Eight new EGU teaching grant opportunities are currently being offered.

4. Providers of informal geoscience education

Work to support this group through the Field Officer network is currently on hold due to the pandemic.

5. Researchers into geoscience education

The EGU is providing support for this group through its publication: Science Communication. Extra support will be provided through the next GeoSciEd conference planned by IGEO in Japan in 2022. Progress in this area will be

highlighted through the IUGS-COGE website and the IUGS Bulletin.

The poor state of geoscience education worldwide has been highlighted by the publication of King, C., Gorfinkiel, D. & Frick, M. (2021) International comparisons of school-level geoscience education – the UNESCO/IGEO expert opinion survey. *International Journal of Science Education*, 43:1, 56-78, and the EGU pilot survey into geoscience education at HE level last year. However, the popularity and impact of all the initiatives described above are having some impact on this issue. Meanwhile the IUGS President has drawn attention to the role of IUGS in delivering the UN Sustainable Development Goals. In that context, the work of COGE is central to SDG4 on 'Quality education' but also impinges directly on many of the other goals, where knowledge and understanding of situations (or education about them) are vital in moving towards solutions. COGE will continue to support IUGS in meeting its aims, particularly the aim to 'advance geological education in the widest sense'.



The home page of INHIGEO website (<http://www.inhigeo.com/>), managed by webmaster Johannes Mattes (Austria).

edited by Luz Azuela.

The highlight of INHIGEO achievements in 2020 concerned one of the IUGS Scientific Awards of Excellence, the V.V. Tikhomirov Award for History of Geology, which was presented to our honorary senior member and former INHIGEO President (1992-1996) David Branagan, a well known geologist, scholar and historian from Sydney, Australia.

Moreover, for their contributions to the history of geological sciences, our current President Ezio Vaccari (University of Insubria, Varese, Italy) was the recipient of the 2020 Mary C. Rabbitt History of Geology Award of the Geological Society of America, while our current Editor of

the INHIGEO Annual Record, John Diemer (University of North Carolina at Charlotte, USA) was the recipient of the 2020 Gerald M. and Sue T. Friedman Distinguished Service Award of the Geological Society of America. Also our young colleague and INHIGEO member Maddalena Napolitani was awarded in 2020 by the Italian Geological Society with the new prize "Quintino Sella for the History of Geosciences in Honour of Nicoletta Morello and Bruno Accordi".

Following the aim of strengthening the relationships with other commissions and affiliated groups within the IUGS and the IUHPST (International Union on the History and Philosophy of Science and Technology), by supporting dialogue among scholars of different disci-



David Branagan holding the 2020 V.V. Tikhomirov Award Medallion

plines, in particular organizing specific sessions within their congresses, INHIGEO has continued the positive experience of 2019, when a thematic session on history of stratigraphy was organized within the 3rd International Congress STRATI sponsored by the IUGS International Commission on Stratigraphy (ICS). The restrictions imposed throughout the year by the Covid-19 pandemic did not allow us to hold the usual INHIGEO annual meeting in March, "The History of Geology and the Dissemination of

Geological Knowledge" organized by Barry Cooper (Australia) and Marianne Klemun (Austria) within the IGC planned in New Delhi and then postponed. On the other hand, our Commission sponsored a symposium on the topic "From technical practice to the visual representation of the features of the Earth: travels, tools, fieldwork" at the 9th Conference of the European Society for the History for Science (ESHS), held online in September 2020 and organized by INHIGEO members.



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 strives to ensure that geoscience information can be exchanged, understood, used without limitation, and readily integrated with standards-based information from other domains. Geoscience information needs to be semantically rich and structured to enable seamless interaction in all environments. Global education about the management, modeling, exchange, and use of information enables its application for the benefit of society.

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 Council held online meetings in June, October, and November 2020. The new Council

elected for the term 2020-2024 includes the new Chair, Harvey Thorleifson of the USA, who is a University of Minnesota Professor, State Geologist of Minnesota, Director of the Minnesota Geological Survey, Association of American State Geologists Information Committee Chair, and a former Geological Survey of Canada Research Scientist.

The new Chair thanked outgoing Council members François Robida, Ollie Raymond, and Jouni Vuollo for their dedication and contributions. Harvey Thorleifson reported for CGI at the IUGS extraordinary session on 28-30 October 2020. The CGI secretariat (CGIsecretariat@mail.cgs.gov.cn) is located at the Development Research Center of China Geological Survey, Ministry of Land and Resources. As of November 2020, the new CGI bank account is in New Zealand.

CGI now has 520 members in 82 countries. Since the last face to face council meeting in Madrid in 2019, CGI gained 57 members mostly from Africa and Asia. From 2016-2020, 109 members from 91 organizations in 41 countries joined CGI. CGI works in collaboration with Open Geospatial Consortium, the Young Earth Scientists (YES) Network, CODATA, and

OneGeology.

CGI working groups include: GeoSciML Standards Working Group (GeoSciML) – led by Éric Boisvert of Canada in collaboration with the Open Geospatial Consortium (OGC); EarthResourceML Working Group (ERML) – Jouni Vuollo, Finland, followed by Michael Sexton, Australia, as of January 2021; Geoscience Terminology Working Group (GTWG) – Mark Rattenbury, New Zealand; Geoscience Domain Working Group – Mickael Beauflis, France in collaboration with the Open Geospatial Consortium (OGC); Geoscience Information in Africa – Network (GIRAF) – Mesfin Wubeshet Gebremichael, Tanzania.

The GeoSciML Working Group is working on switching their encoding from XML to more web friendly JSON, and looking into ontologies. Discussion is addressing linking of 3D activity to GeoSciML. The EarthResourceML group is working on their version 3. The Geoscience Terminology program is working closely with DDE leadership on their needs for standards and vocabularies. For the CGI/OGC Geoscience Domain, the borehole standard is the main activity, with major contributions to standardization activities by groups such as

OGC MUDDI.

CGI is active in supporting the Deep-time Digital Earth Standards Task Group (DDE-STG), in collaboration with CODATA and other DDE working groups. The focus is on the short-term plan for the DDE knowledge system review, based on CGI Geoscience Terminology experience, GeoSciML, and EarthResourceML. There will be training for DDE cross-disciplinary scientists, especially for DDE national nodes, and DDE metadata standards based on ISO19115 as well as implementation metadata standards.

In 2020, funding from IUGS was directed to projects that align with geoscience data interoperability goals, including digital docker containers to more easily rollout and install geoscience data model installations, and multi-lingual vocabulary implementation and GitHub hosting of vocabulary services. CGI will have a busy 2021, focusing on the DDE Standard Task Group, the joint CGI/OGC Geoscience DWG work, GeoSciML, EarthResourceML, geoscience vocabularies, communications, representing IUGS in geoscience information matters, collaboration, functioning through online meetings, and completing a draft 4-year plan.



Group photo of the DDE-STG face-to-face meeting, Beijing, Jan. 12-13, 2020

COMMISSION OF TECTONICS & STRUCTURAL GEOLOGY (TECTASK)

The Commission on Tectonics and Structural Geology (TecTask) of the International Union of Geological Sciences represents an initiative of Earth Scientists dedicated to stimulate communication and coordination within the international science community and 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 hence the impact of our 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 is welcomed with organisations, industry and administrations regarding applications in Structural Geology and Tectonics for sustainable use of the world's natural resources, the preservation of the environment and the prevention of natural hazards.

In August 2020 there was a change of the TecTask executive committee (EC), including the appointment of new officers with a balance of country of origin, gender and career stage. The new team has the mission to focus on the activities that the commission has been running over the years and explore the potential transition of the commission to form the International Association for Structural Geology and Tectonics.

The main activities of the TecTask commission in 2020 were:

1. Maintenance of the TecTask Web Portal (<http://www.tectask.org/>) and social network accounts, as our arena for communication and exposure to the public and science community. These include Facebook (<https://www.facebook.com/Tectask/>),

book.com/Tectask/), Twitter (<https://twitter.com/iugsc>) and LinkedIn (<https://www.linkedin.com/company/tectask>) accounts.

2. 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 works as a dynamic wiki (<http://www.tectonique.net/ttt>). The basic concept is to develop a platform populated with terms and their definition, which can be publicly discussed by the enrolled members before those are elevated into formal glossaries or a dictionary published regularly (e.g., every five years). The open-source and open-access nature of Open-Terminology aims to provide a tool to promote the dynamic changes in geologic terminology over time.

3. Organization of YORSGET conference series (<http://www.dipbiogeo.unict.it/it/content/young-researchers-structural-geology-and-tectonics>) and workshops for knowledge sharing, exchange and training opportunity for young scientists. TecTask is the umbrella organization for the Yorsget conferences and provides support to run them. Additionally, the TecTask commission supports and contributes to organize DRT conferences. The Deformation Mechanisms, Rheology and Tectonics conference series is run every two years since 1976. TecTask also organises other workshops, such as the meeting “Structural Geology in the 21st Century”, which took place in Kharagpur (India) in February 2020, with more than 200 participants.

4. Monthly world Web Cast seminars on Structural Geology and Tectonics published at the TecTask YouTube channel. Long before the

popularization of online seminars, TecTask created a global monthly seminar on structural geology and tectonics in the TecTask YouTube channel: (<https://www.youtube.com/channel/UCXFY-iccBYXw85bneuMm4Xgg>).

We started and we launched this new initiative in June 2018 periodically recording and uploading a seminar, with 21 talks being recorded and broadcasted to date, with more than 25,000 views of the seminars.

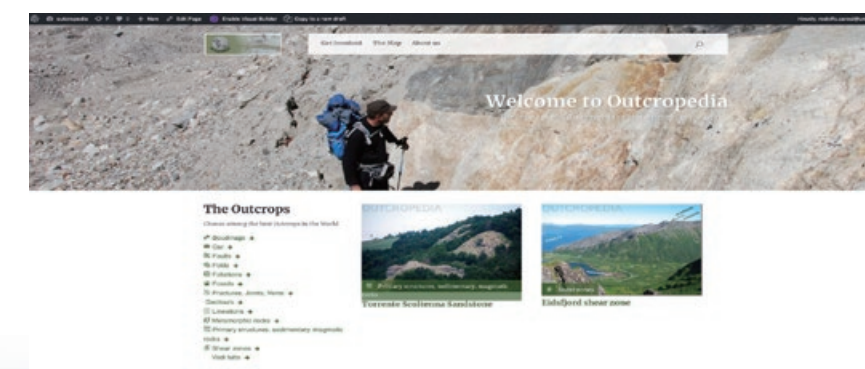
5. Outcropedia portal and new phone app: This is definitively our primary show piece, born in 2004. Outcropedia is tool to collect, publish and disseminate key outcrops. The site was refurbished in 2018 (<http://outcropedia.tectask.org/>) and collects about 800 photos of world-class outcrops. Outcropedia also allows creating Geo-Tours. A new smartphone app is to be launched in 2021. It will allow collecting and uploading georeferenced outcrop photos and descriptions directly from the field.

sk.org/) and collects about 800 photos of world-class outcrops. Outcropedia also allows creating Geo-Tours. A new smartphone app is to be launched in 2021. It will allow collecting and uploading georeferenced outcrop photos and descriptions directly from the field.

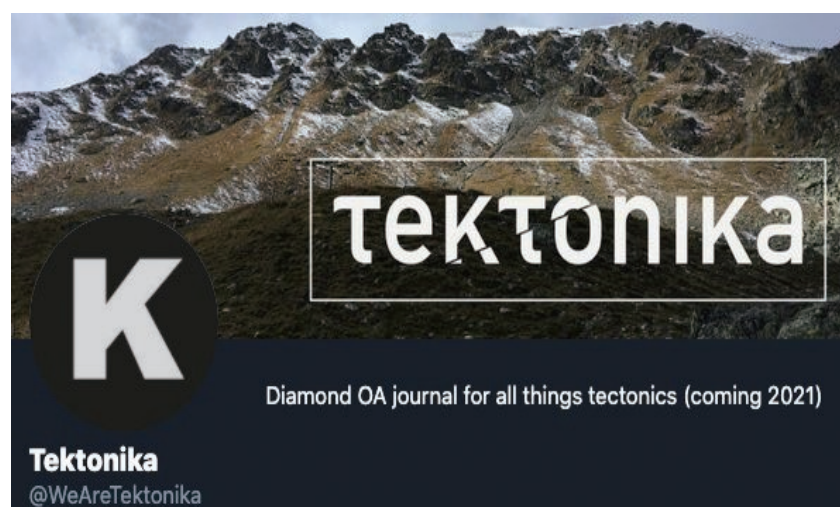
6. Support to Diamond Open Access journals: TecTask supports initiatives that allow full open-access publications in structural geology and tectonics. This means journals that are free for readers and also free for authors and in which authors retain copyright (Diamond or Platinum Open Access). These publications guarantee equal opportunities for all scientists and to make science 100% accessible to everyone. A group of scientists, including TecTask executive



Participants of the TecTask workshop “Structural Geology in the 21st Century”, IIT Kharagpur (India)



committee members and officers, are launching a new Diamond Open Access journal on tectonics and structural geology called Tektonika (<https://twitter.com/wearetektonika?lang=en>). This journal follows the example of the already existing journal Volcanica (<http://www.jvolcanica.org/ojs/index.php/volcanica>) and aims to promote the first fully accessible journal for our community.



achieve this. Following this recommendation, the new TecTask executive committee has started this process with a strategy in three steps:

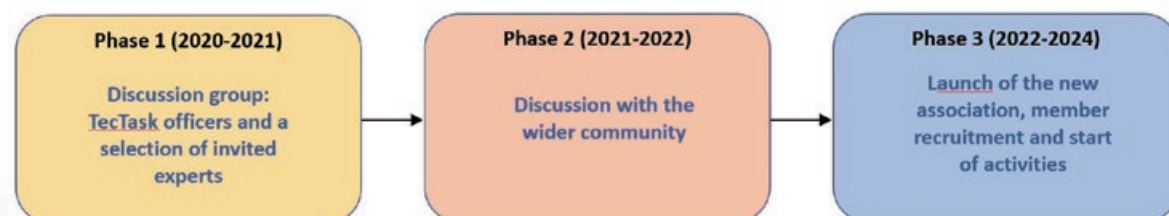
Step 1 (2021): we have established a discussion group composed of TecTask officers and a series of invited experts within the community to discuss key aspects about the new association, such as the society scope and aims, main activities, potential membership, etc. This discussion group will make a joint decision and will provide a report to the community.

7. Transition of the TecTask commission towards an International Association for Structural Geology and Tectonics:

In the last ad-hoc review of TecTask by the IUGS Executive Committee TecTask was requested to evolve to form an International Association for Structural Geology and Tectonics, and was asked to focus the 2020-2024 mandate to

Step 2 (2021-2022): the discussion about the foundation of a new association will be opened to the wider community. We will seek to involve scientists from different backgrounds, career level and expertise into this discussion and will seek to form a first group of members.

Step 3 (2023-2024): if the previous steps are successful the new association will be launched. The potential activities that these association could have will probably follow those by TecTask plus a series of new initiatives.



COMMISSION ON GLOBAL GEOCHEMICAL BASELINES (CGGB)

The mission of the Commission is to:

- (i) Develop a Standard Methods Manual for the Global Geochemical Reference Network project.
- (ii) Establish a global Geochemical Reference Network (GRN) similar to a geodetic network for levelling existing databases (prime objective).
- (iii) Prepare a global geochemical database and its representation in map form, and
- (iv) Document the concentration and distribution of chemical elements and species in the Earth's near-surface environment.

The database encompassing global geochemical data is urgently needed by a broad audience including policy makers, environmental and natural resource managers and researchers throughout the world. To reach this goal, the Commission works with applied geochemists throughout the world to establish standards for global-and regional-scale geochemical mapping. The Commission also promotes and facilitates the implementation of harmonised protocols for sample collection, preparation, quality control, and laboratory analysis for geochemical mapping programmes at any scale.

1. Steering Committee

The Commission's Steering Committee members for the 2020-2024 period are:

Co-Chairs: 1st Co-chair: Anna Ladenberger, Geological Survey of Sweden

2nd Co-chair: Kate V. Knights, Consultant Geochemist, Dublin, Ireland

Deputy-Chairs: 1st Deputy-chair: Gloria Prieto, Servicio Geológico Colombiano

2nd Deputy-chair: Gloria Simubali, Geological Survey of Namibia

Scientific Secretary: Paula Adánez, Instituto Geológico y Minero de España

Public Relations and Finance: Ariadne Argyraki, Department of Geology and Geoenvironment, National and Kapodistrian University of Athens

Treasurer: Christina Stouraiti, Department of Geology and Geoenvironment, National and Kapodistrian University of Athens

Advisory Panel: David B. Smith, United States Geological Survey

Patrice de Caritat, Geoscience Australia

Alecos Demetriades, Institute of Geology and Mineral Exploration, Hellas

Two virtual Steering Committee meetings were organised. The first one on the 25th of June 2020, which was chaired by the outgoing 1st Co-chair Dave Smith. At this meeting, all outgoing members of the Steering Committee participated together with all new members. The second virtual meeting of the Commission's Steering Committee was held on the 2nd of October 2020 and was chaired by the new 1st Co-chair Anna Ladenberger.

2. Manual of Standard Geochemical Methods for the Global Black Soil Project

The 'International Union of Geological Sciences Manual of Standard Geochemical Methods for the Global Black Soil Project' (BASGES manual) was completed, and the Executive Committee of the International Union of Geological Sciences approved its publication at its 74th meeting in Busan of South Korea on the 17th of

January 2020.

'Black Soil' is the popular name used in many countries of the world (Figure 1) for soil with a thick and dark coloured humus-rich surface horizon, and is placed in different categories, depending on the soil classification system used. In the 2014 classification system of the U.S. Department of Agriculture, Black Soil belongs to Mollisols. While in the 2015 World Reference Base (WRB) soil classification system of the United Nations Food and Agricultural Organization, Black Soil types belong to reference soil groups of Chernozems, and partly to Kastanozems and Phaeozems. Globally, Black Soil occupies approximately 7% of the ice-free land area (approx. 9,200,000 km²). It is very important to world economy because is used extensively for growing cereals or for raising livestock.

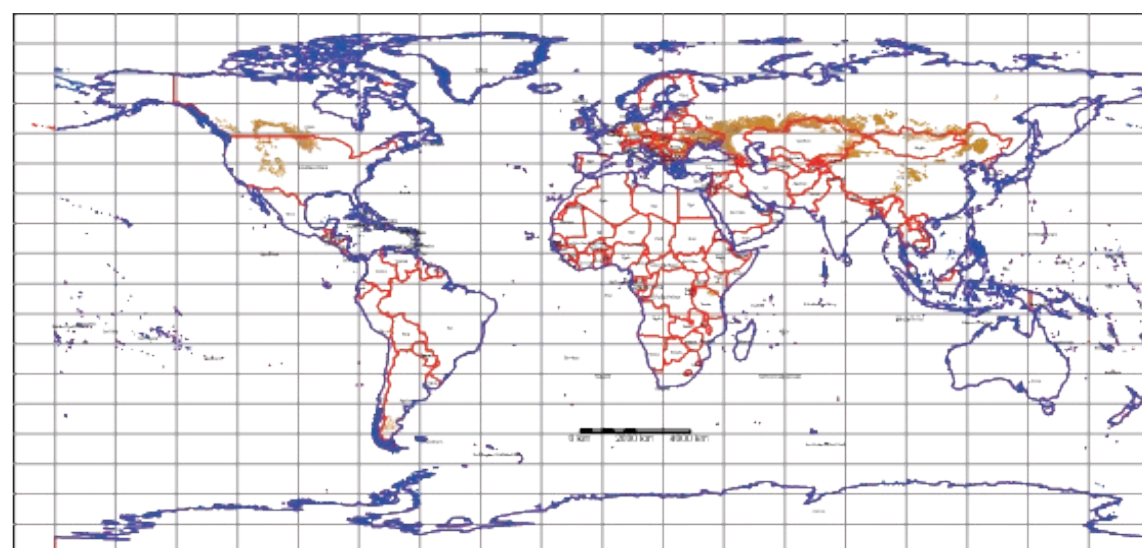


Figure 1. Map showing the global occurrence of Black Soil. Brown colour intensity on the map refers to the percentage of Black Soil (the darker – the greater is the Black Soil acreage).

The overall objective of the geochemical survey of Black Soil regions of the World is the establishment of a global Geochemical Reference Network for Black Soil, which will be used for monitoring future changes, such as impact of intensive agriculture and the global climate

change on its nutritional status.

Following the approval for publication of the BASGES manual, an ISBN number was acquired, and directly afterwards was uploaded to the Commission's website from where it can be freely downloaded (Figure 2).

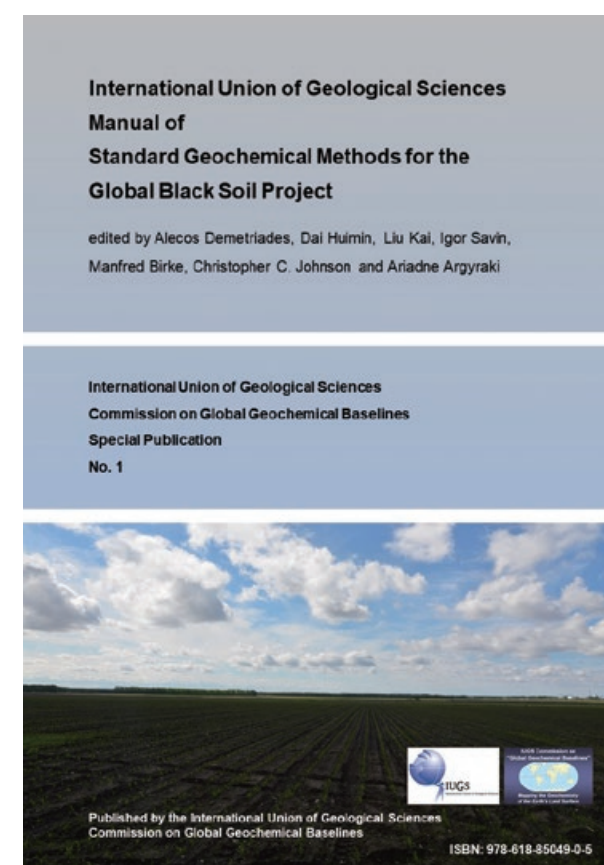


Figure 2. Cover page of Demetriades, A., Dai, H., Liu, K., Savin, I., Birke, M., Johnson, C.C., Argyraki, A. (Editors), 2020. International Union of Geological Sciences Manual of Standard Geochemical Methods for the Global Black Soil Project. International Union of Geological Sciences, Commission on Global Geochemical Baselines, Special Publication No. 1, 107 pages, 49 figures, 4 Tables, and 4 Appendices.

3. Manual of Standard Methods for Establishing the Global Geochemical Reference Network

The work on the 'International Union of Geological Sciences Manual of Standard Methods for Establishing the Global Geochemical Reference Network' is on-going with slight delay due to field

mapping logistics. The fieldwork in the Chilean sub-Arctic terrain was delayed and the geochemical survey in Tierra del Fuego (Figure 3) was carried out in the spring 2020. The final report was submitted to the Commission by the Geological and Mining Survey of Chile (SNGM) in October 2020, and is included as Appendix 4 in the Commission's 2020 Annual Report.



Figure 3. Field sites from Tierra del Fuego reconnaissance geochemical survey: (a) Overbank sediment profile site JP-765 (photograph by Juan Lacassie, SNGM), and (b) Rock sampling site JP-763 on the road connecting Lake Fagnano and Yendegaya (road under construction); the presence of granite blocks derived from the erosion of its outcrops in Cordillera Darwin are observed; Felipe Astudillo on the left and Juan Lacassie Reyes on the right (photograph by Carlos Johnson, SNGM).

The various concepts on sampling procedures have additional impact on the work, which has to include all the morpho-climatic zones. The chapter that rose vibrant discussions is the Residual Soil Sampling. It has been agreed that the bottom or deep soil sample must be collected from the C horizon because this is the reference horizon. However, the sampling of the topsoil horizon is more complicated when different morpho-climatic environments are considered. Therefore, a consensus was needed to be reached and a new version of the Soil Sampling Chapter is presently being revised and will be

sent to all co-authors for review in the spring 2021.

The plan, or rather the attempt, was to complete the manual by the end of 2020 in order to be approved by the 2016-2020 IUGS Executive Committee. However, the job is more difficult than originally anticipated, mainly because the international team of contributing authors and reviewers has to be coordinated resulting in shifts in planned deadlines. Hence, according to the revised plan the Manual should be finalised and published by the end of 2021.



INTERNATIONAL COMMISSION ON GEOHERITAGE(ICG)

IUGS International Commission on Geoheritage was created in 2016 with two sub-commission: 1) Sub-Commission on Sites and Collections, 2) Sub-Commission on Heritage Stones. The

IUGS Executive Committee has dissolved the International Commission on Geoheritage in 2020, to create a more robust and workable structure.

IUGS International Commission on Geoheritage	
Chair: Asier Hilario	
Basque Coast UNESCO Global Geopark, Spain	
Vice Chair: Angela Ehling Bundesanstalt für Geowissenschaften und Rohstoffe, Germany	Vice Chair: Zhang Jianping China University of Geoscience, China
Secretary General: Juana Vegas Instituto Geológico y Minero de España. Geological Survey of Spain (IGME)	
Sub-commission on Geoheritage Sites and Collections	
Chair: Benjamin van Wyk de Vries Clermont Auvergne University, France	Secretary General: Ezzoura Errami Chouaib Doukkali University, Morocco
Sub-commission on Heritage Stones	
Chair: Gurmeet Kaur Panjab University, India	Secretary General: Victor Cardenes Oviedo University, Spain

Commission's main goals for 2020

- To increase the visibility of IUGS in the frame of Geological Heritage. To become a global reference on Geological Heritage at international level.
- To coordinate and check the main activities of the existing two sub-commissions within a unified strategic plan.
- Recruitment and clarification of voting members for both sub-commissions.
- Establishment of clear criteria, methodology and procedures for the IUGS recognition of

Global Geosites, Global GeoCollections and Global Heritage Stones Resources of international significance.

- To strength the collaboration of IUGS with UGGP program through the annual assessment of the international significance of the geological heritage of new candidates to UNESCO Global Geoparks and activating new lines of cooperation.

Main actions made by the new Commission on Geoheritage in 2020

- Opening of a participatory process among the key representatives of the new commission to

create a clear and agreed strategic plan with defined actions for the next 4 years.

- 2nd December 2020. 1^o online Meeting of the new Commission. Discussion about main goals and challenges for 2020-2024.

- Application of an IGCP project 2020 called “Working for a new methodology for the recognition of IUGS Geological heritage sites (IUGS Global Geosites)”. This project will last 3 years and has brought together geological surveys, scientific institutions and UNESCO Global Geoparks from all over the world to work towards the definition and implementation of the new IUGS Global Geosite program.

- Evaluation of 20 aspiring UGGp coordinated by Benjamin van Wyk de Vries as Chair of the Sub-commission on Geoheritage Sites and Collections. This is a very important IUGS contribution to the development of UGGp program.

- IUGS-ICG has created a new working group with representatives from GGN, UNESCO and ICG-IUGS to produce the guidelines and methodology by which IUGS will assess Geological heritage of International significance of aspiring UGGp. This clarification has been demanded since long time ago and it is of critical importance for the collaboration between IUGS and UNESCO Global Geoparks

Sub-commission on Sites and Collections

1. IUGS-ICG Activities for UNESCO Global Geoparks

Evaluation of new candidacies of UGG

The duties in providing reviews, consultation and discussion with UNESCO and the global geopark movement is time consuming and requires a global team of dedicated and available geoheritage experts. By May 2020, a full set of evaluations was delivered, on time, to UNESCO, along with an IUGS appraisal, that

was first approved by the IUGS EC.

Assessment Guidelines for Geoheritage of International Significance

This is an ongoing element of discussion with the new IUGS Geoheritage commission structure. Asier Hilario, as president of ICG, has pushed for negotiations to move forward on this issue. A new working group has been formalized to achieve the methodology for the assessment of the geological heritage of international significance for aspiring UGGP. A new proposal will be ready by mid 2021 and will be approved by the Geoparks Council before the end of the year. The new working group is formed by:

- .- Prof. Jianping Zhang (China). IUGS, UGGP council and GGN.

- Prof. Benjamin Van Wyk de Vries (France). IUGS. Coordinator of the desk-top evaluation process.

- .- Prof. Jose Brilha (Portugal). Coordinator of the previous IUGS Working group.

- .- Prof. Nickolas Zouros (Greece). President of the GGN

- .- Dr. Marie-Luise Frey (Germany). UGGP Council and GGN.

- .- Prof. Asfawossen Asrat (Ethiopia). UGGP Council

- .- Margarete Patzak.(France). UNESCO IGGP secretariat

- .- Dr. Asier Hilario (Spain). Chair IUGS - ICG and GGN.

2. Sustainable Resource use in Geoheritage.

The project has started with a survey sent to Latin American geoparks and geoheritage areas. In June 2020, a working document was produced of the results in Spanish, and is being translated into English, it should be ready for UNESCO publication shortly.

3. EGU 2020

The Geodiversity session is again supported by the Commission, as is the invited ERASMUS+ virtual Reality booth for 2020.

4.International Geosciences Programme project 692 – Geoheritage for Geohazard Resilience

This project was accepted in 2019 and is the first Geoheritage IGCP project dedicated to geosites and natural hazards. The project will set up a global network of geoheritage sites that deal with geoheritage aspects of the resilience to natural hazards. A Website, email listserv and global webinars have been set up and the projects started in the participating countries. Two papers have been published and a number submitted, as well as several conference abstracts.

5.International Geosciences Programme project 731 “ IWorking for a new methodology for the recognition of Geological Heritage sites (IUGS Global Geosites)

This new proposal, supported by UNESCO and GGN with more than 50 initial participants will push the activity of the Sites sub-commission in the future.

Heritage Stone Sub-commission

HSS primary goal is to facilitate formal designation of natural stones that have achieved widespread recognition in human culture (i.e. heritage stones) as “Global Heritage Stone Resource” (GHSR), as an internationally recognised heritage stone designation granted by IUGS. In the year 2020 no stones have been designated as GHSRs due to reframing of the ToRs for designation. There are many pending proposals awaiting review by HSS and many new proposals have been submitted in form of publications in international journals.

- .- HSS has activated a working group to redefine the ToRs and the evaluation procedure and

guidelines for the recognition of the GHSR.

Notable activities and achievements in 2020:

- # Grant of new IGCP project : HERITAGE STONES RECOGNITION: A STEP FORWARD (2020-2023); which is an extension of the one we successfully completed. To know more open the link:

<http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-programme/igcp-projects/earth-resources/igcp-637/>

<http://www.herstones.eu/the-project/#Symposia/Conferences>

- EGU Heritage Stone Subcommission session 2020 (the virtual meeting)

This session had 14 virtual presentations followed by brief discussions. The HSS session was attended by more than 35 participants in the virtual mode.

- The HSS had planned a session at the 36th IGC, New Delhi 2020. (<http://36igc.org/Second-Circular.pdf>). The session could not be materialised due to Covid 19 resulting in the cancellation of the 36th IGC.

Publications (journals/books)

- Special Issue in Episodes dedicated to heritage stone was prepared in 2020 and has been released in March 2021 as a SI of Episodes (<http://www.episodes.org/main.html>).

- Around 30 new publications on heritage stones have been published in the year 2020 by the HSS correspondents.

2nd book in the series ‘Natural Stone and World Heritage: Delhi-Agra, India’ by Kaur et al., published by CRC press in May 2020 (<https://www.routledge.com/Natural-Stone-and-World-Heritage-Delhi-Agra-India/Kaur-Singh-Ahuja-Singh/p/book/9780367251802>)

INTERNATIONAL GEOSCIENCE PROGRAMME IN 2020

The COVID-19 pandemic, as a global public health crisis, strongly resonated with UNESCO's core missions in 2020. The IGCP, through its projects, and through its partnership with IUGS and cooperation with scientific community throughout the world, is committed to support and enhance scientific and educational cooperation, promoting solidarity-initiatives that help society facing this unprecedented crisis.

IGCP statutory Meeting: In 2020, the IGCP Council was scheduled to physically meet between the 13th and 17th of March 2020, but due as a preventive measure against

COVID-19, the evaluations were held online through videoconferencing between 12th and 16th of March 2020. In this meeting, the progress of the 31 ongoing projects was assessed and 26 new proposals - submitted as of October 2019 according to the guidelines of the Council – were reviewed. The 2020 IGCP Council also adopted a new vision on new special topics for prioritization in the IGCP 2020 call for project proposal. In 2020, the IGCP UNESCO secretariat received 24 new IGCP project proposals, which is aligned with the substantial increase observed since 2015 (Table 1).

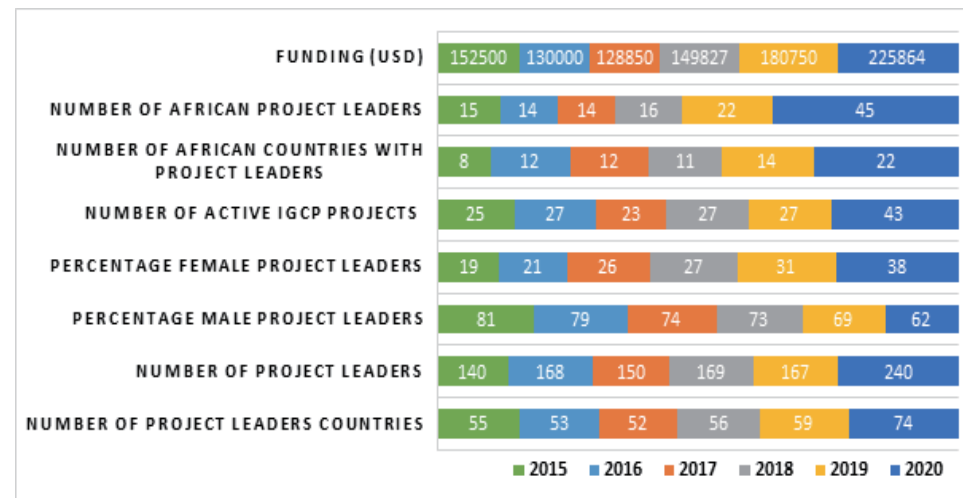


Table 1: IGCP projects and participants details since 2015

IGCP project activities in 2020: During the 5th Council meeting, 18 new projects were approved totaling 43 active projects. Of these, 36 projects were eligible to receive financial support from UNESCO, IUGS, Republic of Korea and China National Commission to UNESCO. However, due to the COVID19 pandemic ma-

jority projects requested to transfer their funding to 2021 and IUGS accepted their requests.

During 2020, 43 IGCP projects were able to reach thousands of people through their online activities. Early in the year, two IGCP leaders delivered in-person meetings in India (IGCP

685) and Myanmar (IGCP 668) and throughout the year several other project leaders delivered animated videos, mini-courses, short webinars, and 35 seminar lectures. The digital material is available online on the IGCP website.

IGCP capacity building activities: In late 2020, UNESCO IGCP Secretariat, in collaboration with IUGS and iCrag, launched a series of Earth sciences lectures designed for a global audience. These are providing diverse perspectives on Earth materials and their role in society and can be found here. More than 5,000 people from 145 countries attended these lectures.

IGCP publications and outreach: In 2020, UNESCO IGCP Secretariat designed and delivered educational videos and impact case studies explaining IGCP's contribution to the UN 2030 Agenda and Sustainable development goals. This booklet demonstrates how UNESCO, the only United Nations organization with a mandate to support research and capacity building in geology and geophysics, and its flagship programme, the International Geoscience Programme, in collaboration with the International Union of Geological Sciences, actively contributes to society and to the implementation of the Sustainable Development Goals.

Appointment of new IGCP Council members and Scientific Board members: According to the Statutes of the International Geoscience and Geoparks Programme (38 C/14, Annex I) and Operational Guidelines for UNESCO Global Geoparks (38 C/14, Annex II) approved by the 38th General Conference half of the Council membership have to be renewed every two years. Between the 7th of February and the 15th of April 2020, the Secretariat of the IGCP opened a call and informed UNESCO Member States. 65 eligible applications were received, 18 of which from female

geoscientists. Keeping in mind the priority gender in UNESCO and ensuring a good geographical distribution of the Council members, while making sure highly qualified members are still present in the Council, the below listed scientists were endorsed by IUGS President and nominated by UNESCO Director General Audrey Azoulay for the new IGCP Council having started their activities in November 2020:

- o Mr Jonathan Craig (United Kingdom and Northern Ireland): Earth resources
- o Ms Hassina Mouri (South Africa): Geodynamics
- o Mr Mohammed Jalludin (Djibouti): Hydrogeology

UNESCO and IUGS would like to thank Ms Brigitte Vlaswinkel (Netherlands), Ms Nellie Muteri (Zimbabwe) and Mr Yongje Kim (Republic of Korea) whose mandate ended in November 2020 for their efforts to promote and support IGCP council members since their initial appointments in December 2016. For more information about the composition and the profile of the Scientific Board, members click here.

<http://www.unesco.org/new/en/natural-sciences/environment/earth-sciences/international-geoscience-programme/igcp-council/>



Figure 1: IGCP 668 project field trip in Myanmar, January 2020, picture credit Nigel Hughes



Hans Thybo, President

INTERNATIONAL LITHOSPHERE PROGRAM (ILP)



International Lithosphere Program (ILP) was formed in 1980 by International Union of Scientific Unions (ICSU - today ISC) 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 and 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, and GFZ-Potsdam complimentary ran the secretariat until end of 2020, when the secretariat will move to University of Missouri and Nanjing University.

ILP is a true bottom-up organisation that is fully dependent on the activities of the members of its Programmes, which are Task Forces (TFs) on specific scientific subjects and regional Coordination Committees (CCs) on integrated geoscientific studies of specific regions and regional topics. The role of ILP is to take initiatives for fostering new Programmes and to bring together individuals and organisations in the TFs and CCs and to ensure collaboration between

complementary Programmes in order to obtain maximum added value. The Programmes are selected solely on the basis of scientific quality and societal needs. Key features are that each Programme is open to participation by any interested scientist as well as their dynamic nature and focus on bringing in new talent. Programmes exist for a limited period of up-to five years, which may be extended for one term after successful review. The task forces are organised in four thematic subjects:

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

ILP has fostered a long list of very successful Programmes, and many of these still continue at high level outside ILP. Some Programmes have come back to the ILP family with new perspectives on their subjects. A few examples from ILP's first 40 years include:

- World Stress Map
- Global Seismic Hazard Map
- Global Impact Studies
- International Continental Drilling Program (ICDP)
- Global Geoscience Transects and regional programmes, such as EGT, EUROPROBE, TOPOEUROPE, TOPOASIA

Activities in 2020 were hampered by the COVID-19 pandemic. ILP had planned a series of events to celebrate its 40 years anniversary at

the International Geological Congress, the annual meeting of European Geosciences Union (EGU) and American Geophysical Union. Only the event at EGU could take place as a virtual, well-attended session. The other events have been postponed until 2021 and 2022. Despite difficulties, there have been intensive activity in all Programmes in 2020.

- the annual business meeting was held virtually in spring 2020 with presentations of projects and awards, open to all interested scientists.
- There were around 15 ILP related virtual symposia at scientific conferences
- Three special issues and books were published by the Programmes
- ILP awarded the Evgueni Burov medal to Dr. Clint Conrad, Oslo, Norway
- The Flinn-Hart award to an early career scientist was awarded to Dr. Attila Balazs, ETH-Zürich
- ILP is a founding member of the Deep-Time Digital Earth (DDE) programme of IUGS.

Most active Programmes terminated by end 2020, of which some will continue with new scopes. ILP approved ten new Programmes at its bureau meeting in 2020 to begin by 2021 and one new task forces has been approved in 2021. The presently active Programmes include:

TF1: Lithosphere Structure and Mineral Resources, I. Artemieva (Germany), R. Ernst (Canada), S. Dong (China)

TF2: Deformation and Magmatic Processes from the Lithosphere to the Surface: Integrated Multi-disciplinary Approaches, A. Tibaldi (Italy), A. Gudmundsson (UK), G. Waite (USA)

TF3: The World Stress Map in 3D, M. Rajabi (Australia), S. von Specht (Taiwan), Oliver Heidebach (Germany)

TF4: Continental Lithosphere: a Broad-scale Investigation (CoLiBrI), G. Hetenyi (Switzerland), H. Zlebcikova (Czech Rep.), M. Bielik (Slovakia), J. Carlos Afonso (Australia)

TF5: LithoMar - Assessing the Relationships Between Lithospheric Processes and Seafloor Topography at Oceanic Hotspots and Divergent Margins, A. Savini (Italy), S. Krastel (Germany), A. Micallef (Malta), P. Nomikou (Greece)

TF6: Sedimentary Basins, L. Matenco, Netherlands and F. H. Nader, France)

TF7: Lithospheric Heat Flow – Global Data Assessment Project, S. Fuchs (Germany), M. Verdoya (Italy), R. I. Negrete-Aranda (Mexico), S. Liu (China), R. Harris (USA), G. Beardmore (Australia)

TF8: Bio-Geodynamics of the Lithosphere, T. Gerya (Switzerland), R. Stern (USA)

CC1: TOPOEUROPE: 4D Topography Evolution in Europe: Uplift, Subsidence and Sea Level Rise, T. Ehlers (Germany), I. Kovacs (Hungary), S. Cloetingh (Netherlands)

CC2: 2020-2024: Lithospheric Seismicity and Tectonics in the Himalaya, M. Karplus (USA), A. Velasco (USA), S. Nath Sapkota (Nepal), D. Drukpa (Bhutan)

CC3: Anatolian Tectonics (ANATEC), O. Göğüs (Turkey), T. Schildgen (Germany), A. Fichtner (Switzerland), D. van Hinsbergen (Netherlands)

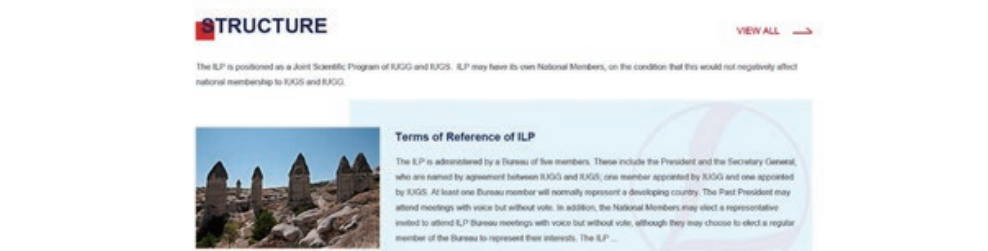
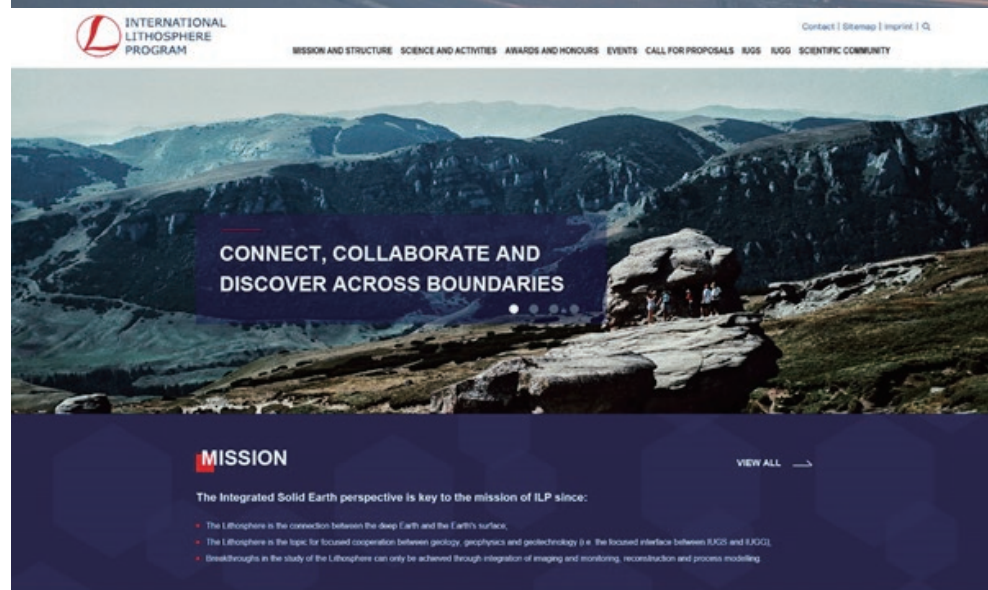
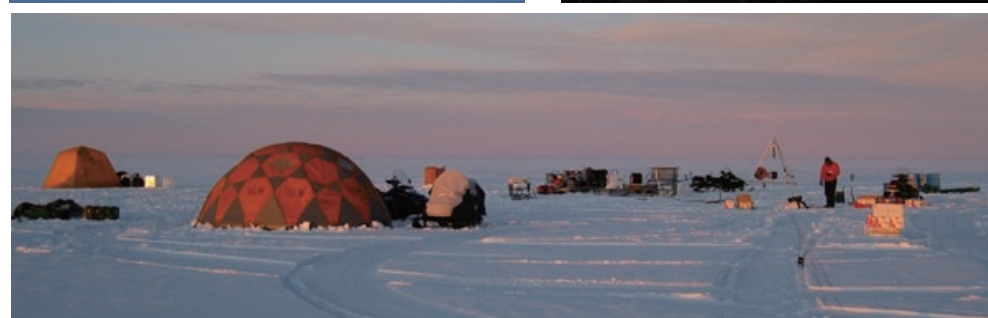
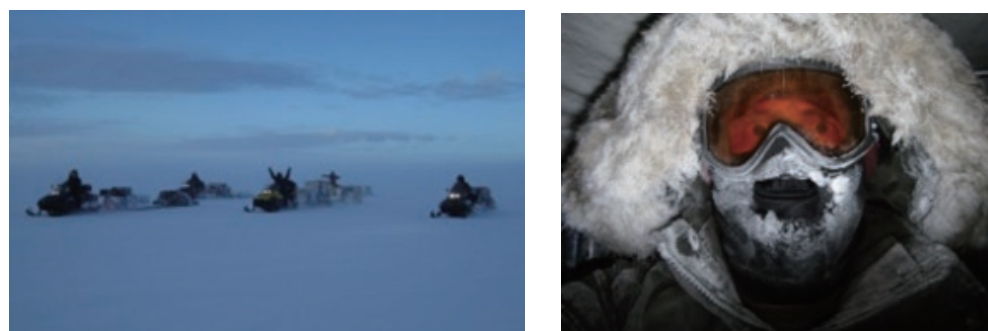
CC4: Global Geo Transects (GGT), S. Dong (China), H. Thybo (Turkey), L. Brown (USA)

CC5: Lithosphere of East Antarctica, A. Reading, K. Selway, M. King (Australia)

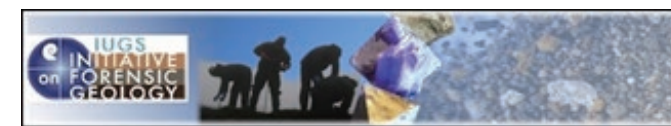
This broad coverage of lithosphere research includes researchers from all continents, and we are pleased that the group of PIs include an increasing number of early career scientists.

<https://www.scl-ilp.org/>

Arctic field work for geophysical data on the ice sheet in Greenland.



Design of the new ILP web-page



INITIATIVE ON FORENSIC GEOLOGY (IFG)

Throughout 2020, IUGS-IFG held between two and four events each month. Whilst the global impact of the COVID-19 resulted in the postponement of some events, others took place virtually, which provided the opportunity to engage with new audiences. Although the 36th IGC was cancelled, forensic geology continued to become established in India. Training was delivered in Poland for undergraduates and MSc students at the University of Warsaw, which included collaboration with the Centralne Laboratorium Kryminalistyczne Policji (Central Forensic Laboratory of the Police). Advice was provided on forensic geology search strategies to locate Nazi death camps associated with the holocaust during the Second World War. Training was also delivered with the International Commission on Missing Persons (ICMP), Universidad Antonio Nariño and Instituto Nacional de Medicina Legal y Ciencias Forense, in Bogota, Colombia. The Abu Dhabi Police approved the establishment a forensic geology branch and laboratory, following on from IUGS-IFG collaboration since 2013. Conferences and workshops included: the 3rd British-Finnish Natural Resources Initiative, hosted by the Geological Survey of Finland (GTK), British Geological Survey and the British Embassy, in Helsinki; preliminary development of forensic geology in Rwanda, Uganda and other Central Africa countries; 1st Undergraduate Geoforensic Research Workshop in South

America; workshop with forensic investigators in Rio de Janeiro; 1st Brazilian Geoforensic virtual workshop; and the Geological Society of London, Forensic Geoscience Group, workshop on Forensic Geophysics and Forensic Geoscience. The IUGS-IFG 'Student Chapter' was established in Brazil, to create an academic network for the development of forensic geology, which includes 10 universities, 155 student members, 14 experts and 11 teachers. IUGS-IFG committee members were invited by the police and law enforcement to provide operational support for casework around the world. UK based members of IUGS-IFG continue to be registered with the UK National Crime Agency as Expert Advisers. IUGS-IFG presented the 'IFG Raymond Murray Award for Recognised and Distinguished International Contributions to Forensic Geology', to Maureen Bottrell, forensic geologist and forensic examiner, upon her retirement from the United States, Federal Bureau of Investigation (FBI) laboratory. IUGS awarded IFG a Special Project called, 'Forensic Geological Analysis of Crimes in International Mining, Minerals and Metals.' The aim of the two years long project is to evaluate the current global scale of crimes that take place in the mining, minerals and metals industry, and assess geological methodologies and strategies, which may aid in the detection, prevention, management and mitigation of these crimes. IUGS-IFG launched a new web site, hosted by Queens

University Belfast, in Northern Ireland. IUGS-IFG supported the FBI soil collection video, available on YouTube and this was translated from English into Mandarin, Spanish and Italian. The book, 'A Guide to Forensic Geology' was completed and is expected to be published by the Geological Society of London during 2021. A second book, 'Forensic Soil Science and Geology' is also expected to be published by the Geological Society of London in 2021-2022. The Journal of the Geological Society of Japan

dedicated an entire edition to Forensic Geology. Proceedings were published for the '4th Iberoamerican Congress on Forensic Geology', held in Puerto Vallarta, Mexico, in 2019. The possibility for a TV documentary on forensic geology was also explored. Throughout 2020, IFG provided widespread visibility and positive exposure to IUGS around the world in; academia, industry, governments, non-government organisations, police, law enforcement, forensic science, the media and public.



DEEP-TIME DIGITAL EARTH: THE IUGS BIG SCIENCE INITIATIVE

This new and ambitious initiative, officially announced at the 73rd session of the IUGS EC session convened in Beijing during 26-28 February 2019, was expected to receive visibility and the broadest range of engagement of the geoscience community during the IUGS/IGC scheduled for March 2020 in New Delhi, India. But, like all such international events planned for what turned to be the "year of the pandemic" in 2020, IUGS/IGC had to be postponed. Hopes for convening that landmark quadrennial, IUGS event in 2021 were abandoned; the earliest possibility for the organization of an event that may resemble IUGS/IGC 36 is in March 2022.

The absence of a formal, international launch event of DDE open to global earth sciences

community, together with restrictions on international travel and face-to-face communications between scientists imposed by COVID-19 during the whole of 2020 impacted the growth and development of DDE to some extent. In particular communications among the 26 Working and Task Groups (WTGs) of DDE, as well as that between WTGs and the DDE Governing organs, i.e., the Governing Council (GC), Executive Committee (EC) and the Science Committee (SC) were sub-optimal. Nevertheless, DDE has made significant progress in fulfilling its vision and mission in 2020, despite the unusual and hitherto inexperienced working modalities and conditions that characterized 2020.

In 2020, the global Secretariat of the DDE was



Flyer for, 'A Guide to Forensic Geology.'

(Left) Selected forensic geology marketing material for forensic geology training in Poland. (Right) Front Cover, Proceedings for 4th Iberoamerican Seminar on Forensic Geology in Mexico.



The Brazilian Sub-Group on Forensic Geology, IUGS-IFG Student Chapter. <https://geoforenses.com/noticias/>

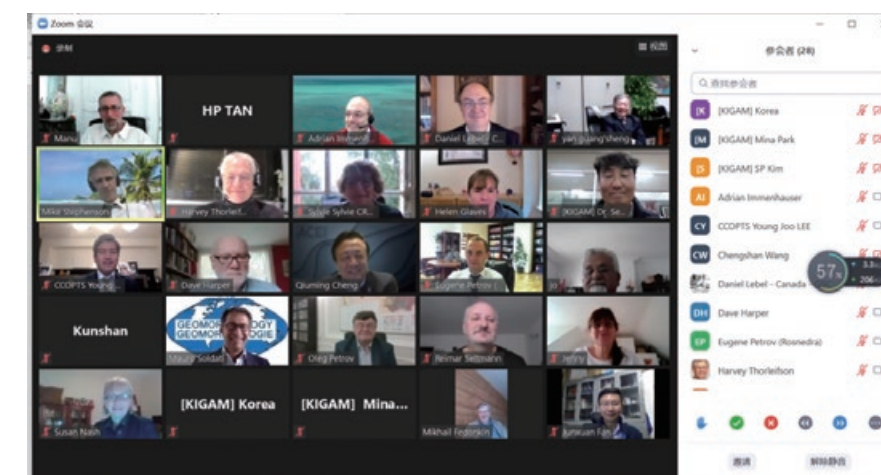


Figure 1: The First Meeting of DDE Governing Council

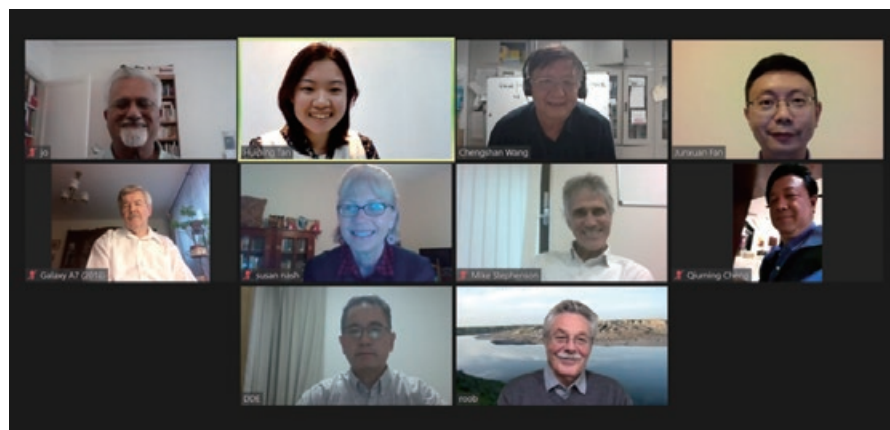


Figure 2: The First Meeting of DDE Executive Committee

established in Suzhou, China; thanks to the generous support of the Mayor of the Kunshan City. An MOU for the establishment and operations of the Secretariat was signed between DDE and the Mayor at the beginning of the first session of the DDE GC held via zoom on 21 October. The Kunshan City Government is also providing significant support for the construction of the first Research Centre of Excellence (RCE) of DDE in the same location as the DDE global Secretariat. DDE RCE in Suzhou is expected to become fully operational in 2021.

DDE EC met for its first session, around 10 days before the GC session, during 9-10 October 2020. The EC reviewed and discussed a number of issues including progress in the development of DDE cyberinfrastructure: leaders of the groups working on DDE data, DDE knowledge, DDE platform and DDE scholar provided reports on progress to-date and plans for the groups' work during 2021.

The number of Founding Members of DDE at the end of 2020 stood at 18. International Lithosphere Program (ILP), Geological Survey of Canada (GSC), Russian Federal Geological

Foundation (FGBU), Korea Institute for Geosciences and Mineral Resources (KIGAM) and Coordinating Committee for Geoscience Program in East and Southeast Asia (CCOP) signed their respective MOUs with DDE during the DDE GC session on 21 October 2020. The number of Founding Members is expected to grow further in 2021.

The five project proposals that were referred to in President Qiuming Cheng's report to the IUGS report of 2019 were finalized and formally submitted to the DDE SC for evaluation and recommendations to the EC for approval. Four of the five projects, i.e., Geological Mapping of the World at 1:5 M scale, Eurasian Marginal Seas, ICS efforts to capture and digitize successions in stratigraphic records and Geoscience Data Standards for DDE, have requested DDE sponsored financing that have been mobilized with the help of the Kunshan City Government. The fifth, the DDE China Country Node project is expected to be fully financed by the Geological Survey of China. DDE SC evaluations of these projects are expected to be completed, and DDE EC decisions finalized on all five projects during the second quarter of 2021.

In addition to the projects referred to above, DDE has also mobilized catalytic funding to support each one of the 26 WTG's efforts to support DDE's vision and mission. Each WTG will receive a sum of US\$ 5000/year in support of their work on DDE relevant activities and initiatives. DDE Secretariat has attempted to improve communications between WTGs; the first meeting (on-line) of the WTGs was convened on 26 October 2020 and ideas and information exchanged. The Secretariat will organize regular meetings of the WTGs and is working on setting up a communications platform to facilitate regular exchange of data, information and research outputs generated by the WTGs.

Work on DDE Statutes and Bylaws has made considerable progress during 2020 and is due to be finalized by the second quarter of 2021. Special attention has been given, based on contributions made by DDE GC Members during their 1st meeting held on 21 October 2020, to clearly define financial management procedures that ensure transparency in budgetary and accounting practices of the DDE Secretariat and Governing Bodies. In addition, efforts are made to introduce provisions that encourage geographical and gender diversity in Membership of DDE Governing bodies, defining a Membership payment structure that will not influence equitable rights of all Members to participate and contribute to DDE decision making processes, DDE/IUGS relationships and the structure and

role of the DDE Governing Board.

The DDE White Paper (2019-2029) has also undergone several revisions and is due to be finalized when the DDE SC meets for its second session in early 2021. A draft, 5-year, Medium Term Plan (MTP) has been prepared and has already been revised three times based on inputs from DDE Steering Committee sessions by the end of 2020. The MTP is expected to be finalized during the first half of 2021 and implementation begin in the second half of 2021. The MTP is built around six objectives, i.e., construction of DDE cyberinfrastructure, designing and developing a DDE Web that serves a range of audiences, developing a network of RCEs with research and training opportunities for young professionals, priority projects under the 4E (evolution of geography, climate, life and minerals) themes defined by the White Paper, priority applied science projects that contribute to UN SDGs and other international agendas and financial security of DDE. Key performance indicators (KPIs) for evaluation of mid-term and end-of-plan performance have been defined. DDE Secretariat has also developed an IP Policy document that is awaiting a legal expert review before its finalization.

More information on specific actions and activities undertaken during 2020 could be obtained from the DDE Report for 2019-2020 accessible at: <https://www.ddeworld.org/read>.

2020 PREPARATION REPORT FOR THE 37TH INTERNATIONAL GEOLOGICAL CONGRESS

IGC 2024 Organizing Committee Launched

The inauguration ceremony of the Organizing Committee for the successful hosting of the IGC 2024 was held in Busan City Hall on November 10, 2020 (Tuesday) at 3 pm. At the ceremony, the chair and key officers of the IGC 2024 Organizing Committee were appointed and the regulations related to the committee were deliberated and resolved. The IGC 2024 Organizing Committee consists of Member Daekyo Cheong (Kangwon National University) as its Chair, Member Young-Seog Kim (Pukyong National University) as its Secretary-General, Member Moon Son (Pusan National University) and Member Weon-Seo Kee (Korea Institute of Geoscience and Mineral Resources) as its auditors, as well as 60 domestic experts recommended by the Geological Society of Korea, Korea Institute of Geoscience and Mineral Resources, and Busan Metropolitan City as its members. The Chair of the IGC 2024 Organizing Committee Daekyo Cheong appointed 19 initial officers to efficiently promote the work of the committee and granted them the authority to represent the Organizing Committee in consultation with the IUGS.



Inauguration ceremony of the IGC 2024 Organizing Committee



Chair Daekyo Cheong and key officers

37th IGC Venue checked by the IUGS EC members during the 74th EC Meeting in Busan

The 74th International Union of Geological Sciences Executive Committee Meeting (IUGS EC Meeting), an annual event of the IUGS, was held at Ibis Ambassador Haeundae in Busan from January 15 to 18, 2020. During the meeting a briefing on the status of preparation for the IGC 2024 was given by the organizing team of 37th IGC. In addition, attendees participated in a tour of the Busan Exhibition and Convention Center (BEXCO), where the IGC 2024 will be held, and Busan National Geopark, as well as a welcome dinner hosted by Busan Metropolitan City.

About 50 people, including executive directors such as IUGS President Qiuming Cheng and scholars from member countries, attended the meeting. Among the attendees from the Geological Society of Korea were President Chang-sik Cheong, Vice President Sung Hi Choi, Member Daekyo Cheong (Chair of the IGC 2024 Organizing Committee), Member Bo-An Jang (Vice President of the International Association for Engineering Geology and the Environment), Member Young Joo Lee (Secretary-General of the Coordinating Committee for Geoscience Programs in East and Southeast Asia), and Member Young-Seog Kim (Secretary-General of the IGC 2024).



BEXCO Convention Center, the main venue of 37th IGC in Busan, Korea



Group photos at the corridor of BEXCO and at a geosite of the Busan National Geopark after the IUGS EC meeting in Jan. 2020 in Busan



A session during the IUGS EC Meeting



Group Photo of participants of IUGS EC Meeting

Next Generation Geologist Conference and IGC 2024 Young Geologist Program

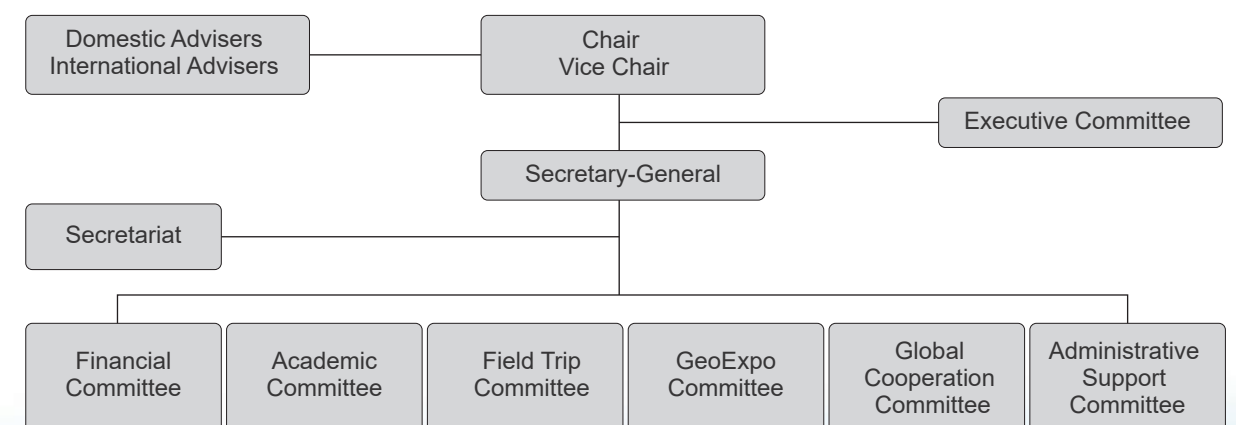
The Next Generation Geologist Conference and IGC 2024 Young Geologist Program were held online by the Geological Society of Korea Conference from October 27 to 29, 2020. While it was the first conference held online in Korea due to the unprecedented COVID-19 pandemic, many students participated and gave their 5-minute e-poster presentations. Seven of the participating students were awarded the Geological Society of Korea President's Award, the Korea Institute of Geoscience and Mineral Resources President's Award, and the Busan Mayor's Award.

IGC 2024 지질꿈나무 프로그램 수상자

대한지질학회장상	한국지질자원연구원장상	부산광역시장상
 민준호 강원대학교 강원도 춘천시 남산면 북 신원리 일대 경사면의 연변계 퇴적층군의 변성암 지형적 연구 - K: Metasomatism, Migmatite, Metamorphism	 이유나 공주대학교 원시적 단층의 구성원리의 단층의 미시적 거동에 미치는 영향 - 광역적과 지역적의 일관성 확보를 위한 지역 연구	 한다은 이화여자대학교 An experimental study on constant water flow for isotopic evolution of meltwater from ice
 고혜나 전북대학교 장기 실험 실험을 통한 수증기 처리 시스템을 이용한 지하수 내 질산염 제거 효율성 평가	 이승보 경상대학교 울진 연방의 불연단층이 대지활동(지진)을 일으키는 메커니즘과 관련된 고압역학 해석	 소진범 부경대학교 지층은 선암의 지리적 분포를 통해 조립된 고압역학의 변화
 하태정 부경대학교 원시적 단층의 구성원리의 단층의 미시적 거동에 미치는 영향 - 광역적과 지역적의 일관성 확보를 위한 지역 연구		

Winners of the IGC 2024 Young Geologist Program

Attachment 1. IGC 2024 Organizing Committee



Attachment 2. Members of IGC 2024 Executive Committee

Role		Name	Position
Chairman		Daekyo Cheong	Kangwon National University
Vice-chairman		Kwang-Eun Kim	Korea Institute of Geoscience and Mineral Resources
Committee	Secretary-General	Young-Seog Kim	Pukyong National University
	General committee	Seung Ryeol Lee	Korea Institute of Geoscience and Mineral Resources
		Weon-Hack Choi	KHNP Central Research Institute
		Tae-Kyung Hong	Yonsei University
		Jong-Sik Ryu	Pukyong National University
	Director of Global Cooperation Committee	Yongje Kim	Korea Institute of Geoscience and Mineral Resources
	Director of Field Trip Committee	Sung-Won Kim	Korea Institute of Geoscience and Mineral Resources
	Director of Financial Committee	Samgyu Park	Korea Institute of Geoscience and Mineral Resources
	Director of Academic Program Committee	Jin-Yong Lee	Kangwon National University
	Director of GeoExpo Committee	Sungkeun Lee	Seoul National University
	Director of Management Committee	Jun-Seung Lee	Busan Metropolitan City
	Vice-director of Global Cooperation Committee	Wonsuck Kim	Yonsei University
	Vice-director of Field Trip Committee	Yoonsup Kim	Chungbuk National University
	Vice-director of Financial Committee	Hyoun Soo Lim	Pusan National University
	Vice-director of Academic Committee	Jinho Ahn	Seoul National University
	Vice-director of GeoExpo Committee	Taejin Choi	Chosun University
	Vice-director of Management Committee	Vacancy	Busan Tourism Organization

Affiliated Organizations

INTERNATIONAL ASSOCIATION FOR PROMOTING GEOETHICS (IAPG):
A GLOBAL PROJECT FOR GEOSCIENCES

The IAPG is a not-for-profit organization, founded in 2012 during the 34th International Geological Congress in Brisbane (Australia), and affiliated to the IUGS since 2013. It is a multidisciplinary, scientific network for widening discussion and creating consciousness regarding problems of ethics applied to the geosciences. It deals with the ethical, social and cultural implications of geoscience knowledge, research, practice, education and communication. The IAPG is an international leading organization working to develop theoretical aspects and practical activities covering a wide range of contents including: philosophy of geosciences and history of geosciences thinking; research integrity and professionalism in geosciences; working climate issues and related aspects; geoethics in georisks and disaster risk reduction; responsible georesources management; ethical and social aspects in geoeducation and geoscience communication; ethical and societal relevance of geoheritage and geodiversity; sociological aspects in geosciences and geoscience-society-policy interface; geosciences for sustainable and responsible development; geoethical implications in global and local changes of social-ecological systems; ethics in geoengineering; ethical issues in climate change and ocean science studies; ethical implications in geosciences data life cycle and big data; ethical and social matters in the international geoscience cooperation; as well as geoethics applied to different geoscience fields including economic geology, palaeontology, forensic geology and medical geology. The IAPG School on Geoethics and Natural Issues

provides videos, publications, and other online resources for teaching and learning geoethics. The IAPG cooperates with numerous international/national associations and institutions. In 2020, the IAPG signed agreements for cooperation with the Geological Society of Africa (GSAf), Geological Society of Chile (SGCh), and Turkish Association of Economic Geologists (MJD). Moreover, the IAPG was invited to become a partner of the Equality, Diversity, and Inclusion in Geoscience (EDIG) project of the Irish Centre for Research in Applied Geosciences (iCRAG), and media partner of the “UNESCO Lecture Series: Earth Materials for a Sustainable and Thriving Society” organized by UNESCO, in collaboration with IUGS and iCRAG.

The IAPG officially supported the “International Declaration of the Significance of Geoscience Expertise to Meet Global Societal Challenges” , promoted by EGU, AGU, AOGS, GSA, JpGU, GSL, and released during the EGU General Assembly 2020, and was a formal signatory of the “Framework for Addressing Racial and Ethnic Equity in Geosciences Professional Societies” by the American Geosciences Institute (AGI). Again in 2020, the IAPG enlarged its structure by establishing the Early Career Scientists Team (ECST) and its thirty-second national section (IAPG-Chile), appointed an IAPG Delegate for Relationships with European Organizations, renewed the Task Group on Responsible Mining, and created the Task Group on Geoethics and Geoheritage.

Moreover, the IAPG developed the proposal for

a White Paper on Forensic Geology in cooperation with the IUGS-IFG through a dedicated Task Group. The IAPG supported also two European projects: GOAL (Geoethics Outcomes and Awareness Learning) on teaching geoethics, as project partner, and INTERMIN (International Network of Raw Materials Training Centres), as member organization of the International Advisory Board of the project. Among its editorial projects, in 2020 the IAPG produced the first book on a sociological approach in mineral exploration within the series Springer-Briefs in Geoethics (fig. 1). Moreover, the association worked to publish a new book entitled “Geoethics: Status and Future Perspectives” , to be printed in April 2021 by the Geological

Society of London (GSL). Another important achievement has been support for the IAPG Cape Town Statement on Geoethics and the Geoethical Promise by new geoscience organizations, now bringing their total number to 27.

During 2020, the IAPG launched an international survey on geoethics, partially funded by the IUGS, and 413 online questionnaires were collected.

Moreover, the IAPG organized the annual session on geoethics at the EGU General Assembly (33 presentations) and cooperated with IAH to organize the first Geoethics & Groundwater Management Congress. Both events were held in May in a virtual format due to the pandemic.

With regards to activities carried out by IAPG national sections, we note the 1st International (Virtual) Symposium on Geoethics organized by IAPG-India and the 6th edition of MinerLi-ma, an international event on geosciences and georesources organized by IAPG-Peru, with a programme comprising short courses, showcase, conferences, geological excursions, guided tours, and workshops.

On the occasion of the 4th International Geoethics Day (15 October), the ECST organized a webinar to celebrate the event in cooperation with AGI (fig. 2), as well as IAPG-India organized a webinar on geoethics in cooperation with the National Institute for Disasters Man-

agement of India and Amity University. The 2020 Geoethics Medal (3rd edition) was awarded to John Geissman (University of Texas at Dallas) in October 2020 (fig. 3).

Finally, during the same year IAPG officers and members were invited to give talks on geoethics in numerous webinars, organized by universities and other organizations, and in November the IAPG contributed to the celebration of World Philosophy Day of UNESCO with a video on “Pandemic and Social Inequalities” . Details about the IAPG activities, products, publications, events can be found in the website: <https://www.geoethics.org>.

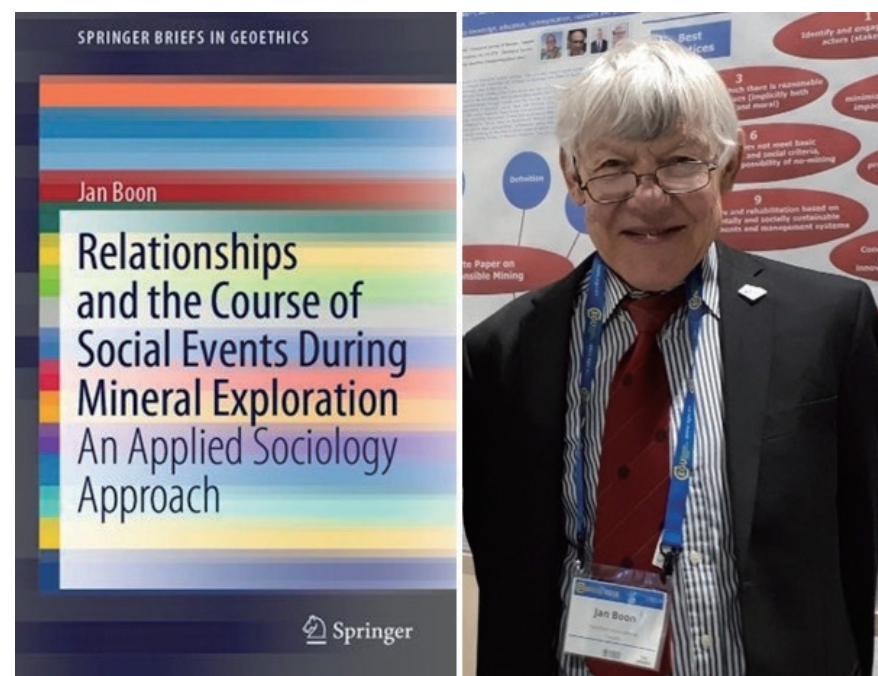


Fig. 1: The first book published in the SpringerBriefs in Geoethics, authored by Jan Boon (deceased in 2020).



Fig. 3: The winner of the 2020 Geoethics Medal, John Geissman, awarded for his dedication to the highest standards of professional conduct, application of the geosciences in service to society, and concern for the long-term stewardship of the Earth.

GEOLOGY FOR GLOBAL DEVELOPMENT (GfGD)

Geology for Global Development (GfGD) is a registered charity and affiliated organisation of the IUGS, based in the United Kingdom and operating internationally. Our purpose is to champion the role of geology in sustainable development, mobilising and reshaping the geology community to help deliver the UN Sustainable Development Goals (SDGs). In 2017, we launched a strategy setting out our priority objectives to support this mission (www.gfgd.org/strategy).

Our work towards these objectives, while responding to the significant challenges of COVID-19, continued through 2020. We are grateful to both the IUGS and UNESCO/IUGS International Geoscience Programme Project 685 - Geoscience for Sustainable Development for their support. Here we report on highlights from 2020, including (i) a set of open-access learning resources for higher education contexts, (ii) initiation of a research programme on geoscience education for sustainable development in the Global South, and (iii) advancing work on a major edited volume on geosciences and the SDGs.

Recognising the increasing demand for the inclusion of sustainability concepts in the training of geoscientists, and the impact of Covid-19 on the means of delivering learning resources, in 2020 we prepared a fully open-access module on 'Geoscience and Sustainable Development' for higher education contexts. This module, available from our website in English and French (www.gfgd.org/education), has eight classes that collectively help

learners to explore sustainability challenges and understand how geoscience knowledge can contribute to understanding and tackling these. The learning resources have been used in teaching at several universities, from Argentina to the United Kingdom. At the University of Hull, for example, our classes have been a starting point for the University to transform its Earth Science programme, and to showcase Earth Science as a facilitator of sustainability.

The fully open-access module on 'Geoscience and Sustainable Development' is available from our website in English and in French (www.gfgd.org/education).

With geoscientists having a key role to play in tackling sustainability challenges, a lack of appropriate geoscience expertise in any given region could hinder the implementation of the SDGs. In 2020, we initiated work to understand geoscience education in eastern Africa. We have developed a database of geoscience higher education courses in eastern and southern Africa, including details of the modules offered. We are now using this research, and partnering with academics in the UK and Kenya, to analyse gaps in geoscience capacity compared to what will be required to achieve the SDGs. Our ambition is to develop a roadmap to strengthen geoscience education for sustainable development in and beyond the region.

At the heart of our vision is the desire for diverse stakeholders to have greater access to, and understanding of, geoscience to support sustainable development. A long-term project,

**make a ...
Geoethical Promise!**

International Geoethics Day 2020

time around
the World

8:00 - 9:30	PDT [UTC-7]
11:00 - 11:30	EDT [UTC-4]
12:00 - 13:30	Brasilia [UTC-3]
16:00 - 17:30	Lagos [UTC+1]
17:00 - 18:30	CEST [UTC+2]
20:30 - 22:00	IST [UTC+5:30]



Speakers:

The IAPG: an international project



Giuseppe di Capua
IAPG Treasurer and Webmaster
Istituto Nazionale di Geofisica e Vulcanologia - INGV
Italy

The ECST group of the IAPG



Cristina Toma
ECST - IAPG
University of Bucharest
Romania

Foundations of Geoethics



Silvia Peppoloni
IAPG Secretary General
Istituto Nazionale di Geofisica e Vulcanologia - INGV
Italy

Geoethics in education and an example of case-based teaching



Alexandra Cardoso
ECST - IAPG
Faculdade de Ciências da Universidade do Porto - FCUP
Portugal

Geoethics in connection with the palaeontological heritage



Daniel DeMiguel
ECST Spokesperson - IAPG
Agencia Aragonesa para la Investigación y el Desarrollo - ARAD
Spain

Aspects of geoethics in water management



Sebastian Handl
ECST - IAPG
Universität für Bodenkultur
Austria

Misleading and fuzzy risk assessments clash with Geoethics principles and hinder public acceptance



Cesar Oboni
ECST - IAPG
Oboni Riskop Associates
Canada

The many dimensions of Geoscience Professionalism



Linda Gundersen
IAPG Medalist 2019
American Geoscience Union - AGU
USA

Moderators:



Jonathan Rizzi
ECST - IAPG
Norwegian Institute of Bioeconomy Research - NIBIO
Italy / Norway



Barbara Zambelli
ECST - IAPG
Comissão Brasileira de Geoética
Brazil

join us at:
bit.ly/IAPGWebinar

Language: English
Subtitles: English, French, Portuguese, Arabic, Italian, German, Spanish

#geoethicsday2020
geoethics.org/geoethics-day





Fig. 2: Leaflet of the webinar organized to celebrate the International Geoethics Day 2020 by the Early Career Scientists Team (ECST) of the IAPG in cooperation with the American Geosciences Institute (AGI).

HIGHER EDUCATION TEACHING MODULE

GEOSCIENCE & SUSTAINABLE
DEVELOPMENT



The fully open-access module on 'Geoscience and Sustainable Development' is available from our website in English and in French (www.gfgd.org/education)

advanced in 2020, is the editing of a book on 'Geosciences and the SDGs' to be published by Springer Nature. Edited by Dr Joel C. Gill and Dr Martin Smith, this joint GfGD and British Geological Survey project involves 42 authors from around the world (www.springer.com/gb/book/9783030388140), profiling a range of IUGS initiatives and affiliated organisations. Our expertise in geoscience and the SDGs also means we are well placed to coordinate input into related consultation processes led by global organisations such as the United Nations and International Science Council.

2020 was a year in which the ongoing injustice of racism rightly received global attention. To achieve our organisational mission, for our science to thrive, and to serve society effectively,

we need a diverse and inclusive geoscience community, free of all forms of discrimination and abuse (including racism). In 2020, we were proud to become supporting partners of the Equality, Diversity and Inclusion in the Geosciences programme – based at the iCRAG centre in Ireland (www.icrag-centre.org/edig/).

Having recently recruited additional volunteers to the GfGD team (www.gfgd.org/our-team), and with work underway on a new strategy, we look forward to growing through 2021 – advancing research, strengthening education, and informing diverse policy processes to secure a better future for all. Find out more about our work online (www.gfgd.org), follow us on Facebook (www.facebook.com/gfgd.org) and Twitter (@Geo_Dev).

ACKNOWLEDGEMENT

The invaluable contributions of the following persons are acknowledged with deep appreciation and gratitude:

Prof. Dr. Stanley FINNEY, the IUGS Secretary-General, for his great efforts in and contributions to compiling the IUGS **2020** Report.

Sincere gratitude are also given to those who have contributed to the **2020** IUGS Annual Report.