



**Strategy for Enhancing Global Geoscience Education
2021**



The International Union of Geological Sciences Commission on Geoscience Education (IUGS-COGE)

Objectives and structure and products and accomplishments of IUGS-COGE

The overall objectives of IUGS-COGE remain the same as in previous reports, as indicated in Appendix 1. The IUGS-COGE objectives relate to the scientific objectives of IUGS, as also recorded in the IUGS-COGE 2016 report and included in Appendix 1. IUGS-COGE focusses particularly on the IUGS objective of: *'strengthen public awareness of geology and advance geological education in the widest sense.'*

The current structure and organisation of IUGS-COGE can be found in Appendix 2.

- The chief products and accomplishments of IUGS-COGE during 2019 are listed in Appendix 3.
- Details of the 2021 expenditure are given in Appendix 6.
- The 2022 budget request, with indicative budget requests until 2023/24 are given in Appendix 7.

Background to the development of this *'Strategy for Enhancing Global Geoscience Education – 2021 update'* document

In the Autumn of 2018, the Chair of IUGS-COGE was appointed as Chair of the European Geosciences Union Committee on Education (EGU CoE). Chris was invited by the EGU hierarchy to devise a new strategy for supporting geoscience education across Europe and beyond. A strategy document was developed as *'Strategy for Enhancing Geoscience Education – 2018'*. This was fully approved and funded by EGU. It was used as the basis of the *'Strategy for enhancing global geoscience education - 2019'* and the *'Strategy for enhancing global geoscience education - 2020'* documents submitted to IUGS Council. Both received partial funding.

The follow up EGU documents, *'Strategy for Enhancing Geoscience Education – 2019 update'* and *'Strategy for Enhancing Geoscience Education – 2020 update'* were both submitted to EGU and were again fully supported and funded. This document builds on last year's IUGS-COGE strategy document and this year's EGU strategy document.

This document also supports of the work of the IUGS-COGE Chair to:

- attend the 76th IUGS Executive Committee meeting in 2022 (assumed to be in Europe for costing purposes) and in future years (**Priority 1**)

COGE decided not to apply to the IUGS Special funding Program for funding for a particular proposal when it was available, since experience of a number of education initiatives has shown that projects funded by time-limited funding often flounder when the funding ceases. Educational initiatives are only effective when they are supported by long-term funding and moral support. This therefore makes the ongoing support of IUGS Council for COGE long term initiatives highly critical.

The global school-level geoscience education scene

The 2017/18 survey of global school-level geoscience education published by UNESCO in 2019 (King, 2019) and analysed in an academic paper (King et al, in press) showed:

- only around two thirds of the countries surveyed have geoscience in their curriculum
- the geoscience teaching guidelines are not closely followed in around a third of countries
- support for geoscience teachers in schools is available in less than half the countries whilst financial support is available in less than a quarter of the countries
- in the majority of the countries the quality of teaching materials is moderate or poor

The conclusion to the analysis (King et al, in press) was:

'The final conclusion to the latest survey has not changed from the 2013 survey: 'There are success stories in school-level geoscience education across the globe, and these successes need to be celebrated, and the lessons learned from them distilled and disseminated worldwide, through active national and global support networks ... The 2017 survey emphasises this view, whilst the demand grows for geoscience understanding and for geoscientists across the world.'

Targeting geoscience educators

Research has shown that the most effective way to improve geoscience education is to target teachers and other educators. Research has also shown that providing good teaching materials is not enough on its own – educators need to be shown how to use the materials most effectively.

Experience indicates that geoscience educators can be sub-divided into five main groups:

1. teachers of geoscience in schools and colleges with strong geoscience backgrounds;
2. teachers of science or geography with some geoscience in their teaching, who have weak geoscience backgrounds;
3. teachers of geoscience in Higher Education;
4. providers of informal geoscience education;
5. researchers into geoscience education.

Much of the remainder of this document has been structured according to these five groups.

1. Teachers of geoscience in schools and colleges who have strong geoscience backgrounds and who may also have received training in geoscience education

Background of this group

These are usually teachers of geoscience in schools and colleges to students of age 16 and older. They usually have first degrees in geoscience and have received training in geoscience education. There may be several thousands of these geoscience teachers across the world. All teachers, including this group, need professional development and support.

Currently available support for this group

- The International Geoscience Education Organisation (IGEO) with its quadrennial GeoSciEd international conference and its support for the education strand of the quadrennial International Geological Congress (IGC) – both of these are supported by IUGS.
- Chapters of the IGEO – the South American and European chapters.
- National organisations in Europe, North America and possibly in other countries.
- Regular GIFT workshops run for teachers by both the EGU and the AGU (American Geophysical Union) (EGU = Geoscience Information for Teachers; AGU = Geophysics Information for Teachers).

Plans for the future in support of this group

- GIFT conferences are being planned in association with the EGU General Assembly (usually in April each year), the IAGA Conference, Hyderabad, India (August 2021), Central America (2020 – 2023) and southern Africa (2021 – 2024), all funded by EGU and supported by IGEO. Some or all of these planned face-to-face workshops will be replaced by virtual or hybrid workshops.
- The IUGS should support these initiatives by continuing to support the work of IGEO financially in publicising these initiatives and by publicising the initiatives on the IUGS website.

2. Teachers of science or geography in schools and colleges who have some geoscience in the curricula they teach but have poor geoscience backgrounds and received no training in geoscience teaching

Background of this group

These are usually secondary (high school) teachers of science or geography or primary (elementary) teachers who have some geoscience in their teaching curriculum, but who have received little or no training in geoscience or in geoscience education. This leads to uninspired teaching and the promulgation

of misconceptions amongst pupils, often exacerbated by the lack of availability or the poor quality and inaccurate Earth science content of many textbooks. There may be many tens of thousands of these teachers across the world.

Currently available support for this group

- The Earthlearningidea website, which was originally developed for the International Year of Planet Earth (IYPE) in 2008, and currently publishes a new geoscience teaching idea every two weeks, now carries more than 380 activities in English and more than 1200 translations into 12 other languages. There have been more than 5.5 million downloads of these activities globally, averaging more than 45,000 per month. During lockdown a series of online workshops supported by videos have been added to the website. So far, the PowerPoint presentations leading the workshops have been downloaded 4,752 times and the individual videos more than 168,000 times globally.
- The international textbook supporting the International Geoscience Syllabus for 16 year olds (<http://www.igeoscienced.org/activities/international-geoscience-syllabus/>) has had a pair of volumes added to it this year: 'Exploring Geoscience – across the globe: activities and questions' and 'Exploring Geoscience – across the globe: activities and questions – some answers'. These international versions of the textbook 'Exploring Geoscience – across the globe' and its companions were produced by voluntary effort, but the re-drawing of the diagrams in the core textbook was supported by IUGS funding. All are available at: <http://www.igeoscienced.org/teaching-resources/geoscience-text-books/>
- The work of the IUGS/IGEU Field Officers in two countries (India and Morocco), the EGU Field Officers in four countries (France, Italy, Portugal and Spain) and of the Earth Science Teachers' Association (ESTA) in the UK continued until the March 2020 lockdown. Between them, they presented workshops to more than 1100 teachers last year.

Plans for the future in support of this group

- The Earthlearningidea website will continue on its voluntary basis – some 40 activities are in the pipeline, augmented by activities written by colleagues from overseas.
- The *Exploring Geoscience* textbook is currently being translated into Japanese and Portuguese and a version for England is being prepared.

The success of the Field Officer initiative

The EGU 'Strategy for enhancing geoscience education – 2020 update' summarised the success of the four EGU Geoscience Education Field Officers and the two IUGS/IGEO Field Officers as:

Country	Indicator					
	Workshops (n)		Workshop participants (n)	Teachers conferences (n)	Published	
	Face to face	Online			Abstracts	Papers
France	2	1	22			
India		1	75			
Italy	4	1	90	1	1	
Portugal	1	3	87			1
Spain	1	7	152			
International		3	129		1	1
Totals	8	16	535	1	2	2

Given the initial success of these initiatives, the EGU Geoscience Education Field Officer initiative was due to be extended to a further four Field Officers in Albania, Germany, Hungary and Turkey who would have been trained in Vienna in May 2020. Funding for their training in Vienna, their workshop equipment and the travelling expenses/registration fees for the national conferences they attend was to be provided by

EGU, as for the four original Field Officers. Sadly, all this had to be postponed due to Coronavirus, but the funding has been rolled over by EGU and the training may take place in Barcelona in May 2022.

IUGS-COGE and IGEO jointly planned to extend the Field Officer initiative (currently involving four existing and four newly-appointed EGU Field Officers and two IUGS/IGEO Field Officers (India and Morocco) by inviting the two current IUGS/IGCE Field Officers to return to Vienna for the planned Field Officer reunion and updating session (a key way of building and supporting the Field Officer community) in April 2020. Thankfully IUGS supported this, and the funding will be rolled over until 2022.

IUGS-COGE and IGEO jointly planned to appoint three more Field Officers from non-European countries where their efforts are most likely to be successful to be trained alongside the EGU Field Officers in Vienna in May 2020. Of the seven people who applied for these posts, three were invited for training, from Chile, Malaysia and Togo, but sadly, their training had to be postponed and may now take place in May 2022 with the rolled over IUGS funding.

The rolled over funding from 2020/21 will allow the Annual Reunion of the existing two Field Officers and the training of the three new Field Officers.

Priority 2 in the accompanying bid is for 2022 for the reunion of the five existing IUGS/IGEO Field Officers in that year.

Priority 3 is to train and appoint four additional Field Officers in 2022, bringing the total number of IUGS/IGEO Field Officers to nine. A copy of the 'call' to be circulated is given in Appendix 5.

Priority 4 is to supply these four additional Field Officers with workshop kits.

Priorities 5 – 10 concern the training and appointment of more Field Officers in future years and supplying them with workshop kits.

When appointed, IUGS/IGEO Geoscience Education Field Officers will also offer training to people involved in informal geoscience education (as outlined in Section 4. below), particularly those in geoparks and aspiring geoparks, in the museum sector and similar institutions. In these circumstances it is anticipated that the training would be funded by the institutions involved.

3. Teachers of geoscience in Higher Education (HE) who have strong geoscience backgrounds and have received generic training in HE teaching, but who have usually received little professional development in geoscience education

Background of this group

These people work in geoscience departments and in some geography and environmental science departments teaching undergraduates. They usually have first and higher degrees in geoscience and have received generic educational training in their institutions but no geoscience-specific training. Some are lecturers and some are developing the skills to become lecturers. There may be thousands of these across the world.

Currently available support for this group

The evidence from a survey (111 responses from 20 countries) carried out amongst university geoscience staff by the EGU indicates that:

- 84% of lecturers teach beyond their expertise often or sometimes
- in 57% of countries there is no geoscience-specific support available
- 96% want more teaching resources
- 84% value discussion with staff of other countries
- 73% would like improved networking opportunities

- 61% would welcome webinars and online seminars

This survey indicates that much more support is needed for geoscience university teachers across the world.

Plans for the future in support of this group

The EGU has advertised Higher Education Teaching Grants, each worth up to €750 for university lecturers to write up their teaching approaches for publication on the EGU website. Fourteen of these were made for 2020 and a further eight are being advertised.

The EGU is also advertising funding to support the running of Higher Education Teaching workshops in 2022.

EGU is advertising two Teaching Fellowships for Earth Career Scientists to trawl through the abstracts submitted to the EGU General Assembly (being held virtually in April 2022) for materials of educational interest, and to set up a system for archiving that and other EGU materials of value to Higher Education.

4. Those providing informal geoscience education

Background of this group

These people offer geoscience outreach, such as through geoparks, outreach in national and regional parks, museum geoscience education, HE outreach, industry/mining outreach, adult geoscience courses and field trips; these have varying backgrounds but most have not been trained in geoscience education.

They fall into two main groups, a) those who have first degrees in geoscience and b) those who have poor geoscience backgrounds. Usually neither group has received training in geoscience education although most have high levels of enthusiasm. There may be tens of thousands of these geoscience outreach educators across the world.

Currently available support for this group

a) Those providing geoscience outreach – who have first degrees in geoscience.

The EGU Outreach Committee convenes sessions on outreach at the EGU General Assembly. The EGU has also recently begun publication of a journal entitled '*Geoscience Communication*'. At its General Assembly, the EGU offers training workshops to General Assembly participants in geoscience communication.

b) Those providing geoscience outreach – who have poor geoscience backgrounds

There appears to be little training available for this group.

Plans for the future in support of this group

The IUGS/IGEO and the EGU Geoscience Education Field Officers, have been trained in offering workshops to those in geoparks and aspiring geoparks. It is anticipated that funding for presenting these training packages will be provided by the geoparks themselves.

5. Researchers into geoscience education

Background of this group

There are strong communities of geoscience educational researchers in some countries such as the USA, Portugal, Brazil and Israel. However, geoscience educational researchers are not common in many other countries.

Currently available support for this group

Sessions in which geoscience educators can present their research form part of the annual Geological Society of America (GSA) conferences in the USA, the quadrennial International Geological Congresses

(IGCs) and the quadrennial IGEO international GeoSciEd conferences. However, there are not strong geoscience educational research sessions at either of the quadrennial international conferences.

The National Association of Geoscience Teachers (NAGT) in the USA publishes a high-profile journal, the '*Journal of Geoscience Education*' which carries mainly US submissions, but also some international papers.

Plans for the future in support of this group

The EGU has promoted the setting up of a LinkedIn group of geoscience educational researchers.

Conclusion

This '*Strategy for Enhancing Global Geoscience Education – 2020update*' document addresses the IUGS objective of to: '*strengthen public awareness of geology and advance geological education in the widest sense.*'

The document has not only identified real weakness areas in geoscience education around the world, but some important pockets of strength and innovation.

The most important ways of providing IUGS support for global geoscience education are by:

- supporting and collaborating with global geoscience educational initiatives already underway – a number of these have been outlined in the document above;
- in particular, by broadening the EGU pilot initiative to appoint and train unpaid Geoscience Education Field Officers in different countries.

If the Geoscience Education Field officer pilot is rolled out to more, then this will involve considerable IUGS investment in future years. However, no other initiatives seem to have the capacity to, '*strengthen public awareness of geology and advance geological education in the widest sense*', given that research has shown that the most effective way to promote geoscience educational reform is to put effective teaching materials in the hands of teachers and educators and to demonstrate how these can be used most effectively.

Thus, the IUGS Executive Committee is urged to support the work of the IUGS Commission on Education in general and the Geoscience Education Field Officer initiative in particular.

References

King, C. (2019) *Earth science education across the globe* in Ed: Martinez, M dl L. (2019) *Geoscience in primary and secondary education, Volume 2*. UNESCO, Montevideo. ISBN: 9789231003486.

King, C., Gorfinkiel, D. & Frick, M. (in press) International comparisons of school-level geoscience education – the UNESCO/IGEO expert opinion survey. *International Journal of Science Education*.

Appendix 1. The overall objectives of IUGS-COGE, as given in the 2016 report to IUGS Council

Overall objectives

The IUGS Commission on Geoscience Education, ~~Training and Technology Transfer~~ (COGE) was established in 2004 to examine and develop programs to assist developed and developing countries to maintain, expand or introduce better Earth Science education, outreach and technology transfer within their countries.

The main objectives defined and approved by the IUGS are:

- Identify gaps in education, training and technology transfer both conceptually and geographically.
- Together with other relevant bodies in or outside the IUGS family, develop strategies for the coordination of existing, and the development of new, programmes in geoscience education, training and technology transfer based on the identified gaps.
- Produce a 5-year Action Plan together with an annual plan of action including budget.
- Organise meetings, conferences and workshops for geoscience educators and to disseminate information on new trends and topics in the field of geosciences.
- Develop specific programmes on the continuation and coordination of training courses, especially through generation of teaching materials and provision of training courses.
- Encourage publication of handbooks or textbooks at an international level to help bridge recognised gaps in the training of, and education for, geoscientists.
- Facilitate the harmonisation of geoscience presentation with different cultures in order to enhance the development of ethics in geoscience education.
- Assist in the distribution of geoscience teaching materials, including books, videos, equipment, etc.

Relate goals to overall IUGS scientific objectives

The IUGS aims to promote development of the Earth sciences through the support of broad-based scientific studies relevant to the entire Earth system; to apply 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; and to strengthen public awareness of geology and advance geological education in the widest sense. The scientific work of the IUGS is carried out primarily by Commissions, Task Groups, Initiatives, and Joint Programs.

The IUGS-Commission on Geoscience Education ~~Training and Technology Transfer~~ (IUGS-COGE) is the key tool of IUGS for developing geoeducational activities. The main goals of the commission follow the IUGS scientific guidelines, in accordance with its main role for fostering geoscience education and developing geoscience education and awareness for the benefit of society.

Appendix 2. The current structure and organisation of IUGS-COGE.

IUGS-COGE Commissioners

- Chris King, *Chair*, Keele University – United Kingdom
- Ian Clark, *Secretary/Treasurer*, University of South Australia – Australia
- Greg McNamara, *Webmaster*, Geological Society of Australia – Australia
- Yamina Bourgeoini, Cadi Ayyad University – Morocco
- Miguel Cano, Bicol University – The Philippines
- Ochir Gerel, *Former IUGS Vice President and IUGS Strategic Planning Committee*, Mongolian University of Science & Technology – Mongolia
- Roberto Greco, University of Campinas – Brazil
- Gary Lewis, *Former Chair and IUGS Strategic Planning Committee* – USA
- Jesús Martínez-Frías, *Former Chair*, Spanish National Research Council, CSIC – Spain
- Young-Shin Park, Chosun University – South Korea
- Rajasekhariah Shankar, Mangalore University – India
- Clara Vasconcelos, University of Porto – Portugal
- Ashvin Wickramasooriya, University of Peradeniya – Sri Lanka

During 2021 3 additional member have been ad to the COGE in order to correct the gender gap:
Sandra Villacorta, Peru
Maria Jesus Bravo, Chile
Kholoud Mohamed, Egypt

Appendix 3. The products, accomplishments and interactions of IUGS-COGE during 2020/2021.

Interactions of IUGS-COGE with international and national organisations

During 2020/21 IUGS-COGE has had fruitful interactions with the following organisations.

1. The maintaining of Field Officers to offer interactive teacher training in India and Morocco and the invitation for training for new Field Officers from Chile, Malaysia and Togo who could not be trained due to coronavirus. The appointments were IUGS/**International Geoscience Education (IGEO)** appointments, and the training was provided by the **European Geosciences Union Committee on Education (EGU-CoE)**.
2. The **UNESCO International Geoscience and Geoparks Programme, Regional Office for Science in Latin America and the Caribbean (UNESCO Montevideo)** in the preparation of an academic paper on the international survey of geoscience education which was published in November 2019.
3. The **European Geosciences Union (EGU)** through providing expertise to its development of its, '*Strategy for Enhancing Geoscience Education – 2021 update*' document.
4. Supporting the work of the **International Geoscience Education Organisation/European Geosciences Union (IGEO/EGU)** in developing a European Chapter of IGEO, involving collaboration between:
 - **Association des Professeurs de Biologie et de Géologie** (French association for Earth Science teachers – APBG) in France
 - **Associação Portuguesa de Professores de Biologia e Geologia** – (Portuguese association for Earth science teachers – APPBG) in Portugal
 - **Asociación Española para la Enseñanza de las Ciencias de la Tierra** (Spanish Association for the Teaching of Earth Sciences - AEPECT) in Spain,
 - **Earth Science Teachers' Association (ESTA)** in the UK and
 - Earth science section of the **Associazione Nazionale Insegnanti di Scienze Naturali** (National Association of Natural Sciences Teachers - ANISN) in Italy.
 - Association of Geography teachers in Flanders (**Vereniging Leraars Aardrijkskunde**)
 - Working group of teacher educators in geography in Belgium (**Werkgroep Didactiek Aardrijkskunde**)

Chief products and accomplishments of IUGS-COGE in 2020/21

1. Support for two **IUGS/IGEO Field Officers** to offer interactive teacher training in India and Morocco.
2. The development of an academic paper based on the international geoscience education survey, completed and published in November 2019 as the **IPGG/UNESCO – IGEO international geoscience education survey** in two volumes, one focussed on Latin America, the other focussed on 35 non-Latin American countries linked with IUGS-COGE and IGEO.
3. Continuing the support for the **IGEO/EGU** strategy in promoting a European Chapter.
4. The **Earthlearningidea** website, which continues to publish a new teaching idea every two weeks. Milestones reached in 2021 were: 380 activities in English; 1200 translations into 12 different languages, more than 5.5 million pdf and video downloads (averaging more than 45,000 per month).

Publications in 2021

1. Errami E., Gerel O. Peppoloni S. (2021). Achieve Gender Equality and Empower All Women and Girls. In: Geosciences and the Sustainable Development Goals. DOI: http://10.1007/978-3-030-38815-7_5
2. Gerel O. Teaching petrology at the Mongolian University of Science and Technology: importance, development and future. *Geology* 36. 24-33 (In Mongolian)
3. Gerel O. Teaching petrology at the Mongolian University of Science and Technology 2021. Petrology and Geodynamics of Geological Processes. XIII All-Russian Petrographic Conference with the participation of foreign scientists, volume III, 265-267.
4. Greco, R; Toledo, C; & Villacorta, SP. (2021). Geoscience education in Peru. In: *Geoethics in Peru. A Pathway for Latin America* (chapter 7). Springer Nature. ISSN 2662-6780
5. Correia G.P., Pereira, H. & King, C. (2021). O Geoscience Education Field Officer, Revista Ciência Elementar, V9(3):056. DOI <http://doi.org/10.24927/rce2021.056>

6. Correia, G.P., Juan, X. (2021). Atividades Low-cost que funcionam sempre. VIII Jornada de História da Ciência e Ensino e II Congresso Internacional de História da Ciência no Ensino, Caderno de resumos (pp. 40-41) (online). <https://revistas.pucsp.br/index.php/hcensino/issue/view/2642/384>
7. Realdon, G., Correia, G.P., Juan, X., Coupechoux, G., Baskar, R., Bourgeoini, Y. & King, C. (2021) Watery world – hands-on experiments from Earthlearningidea. Science in School, 54. ISSN 1818-0361 <https://www.scienceinschool.org/article/2021/watery-world-hands-on-experiments/>
8. Realdon G., Correia G.P., Coupechoux G., Juan X., Baskar R., Bourgeoini Y. & King C. (2021) European Geosciences Union (EGU) Education Field Officer programme: a review after two years of activity. 90th Conference of the Italian Geological Society, Session S27 Geosciences at School (online)
9. Y-S. Park & Green, J. (2021). Self-Study Journey from a Novice to an Expert for Computational Thinking Practices. Journal of Korean Earth Science Society, 42(5), 588-603.
10. Y-S. Park (2021). Enhancing the Role of Science Museums to Promote Community Cooperation-Based Science Culture. Journal of Korean Society of Earth Science Education, 14(2), 95-111.
11. G. Hwang & Y-S. Park (2021). Exploring Teachers' Perceptions of Computational Thinking Embedded in Professional Development Program. Journal of Korean Earth Science Society, 42(3), 344-364.
13. 2021 Natural Disaster STEAM program for Democratic Citizen Literacy: inquiry for Landslides.
Students books: ISBN 979-11-6369-451-9
Teachers' manuals: ISBN 979-11-6369-452-6
12. Y-S. Park (2021). Natural Disaster STEAM program for Democratic Citizen Literacy: inquiry for Earthquake.
Students books: ISBN 979-11-6369-449-6.
Teachers' manuals: ISBN 979-11-6369-450-2

Appendix 4. Reports by IUGS-COGE Commissioners on the current state of geoscience education in their countries

The following reports can be found below:

- Brazil
- India
- Mongolia
- Peru
- Portugal
- The Philippines
- South Korea
- Sri Lanka
- The UK
- The USA

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Brazil annual report for IUGS-COGE, January 2022

- The new Brazilian curricula is in phase of implementation, the earth science contents are still limited and spread in several discipline.
- Earth science education in Brazil is supported by the Brazilian Geological Society. During the COVID-19 pandemic the Brazilian Geological Society was really active in promoting online seminars with wide audiences.
- Brazilian Earth Science Olympiad was held online in 2021.
- The translation of Earth Learning Ideas into Brazilian Portuguese is ongoing. There was a huge increment in 2020 and now it is the language with the greatest number of ELI translations. The ELI Facebook page is updated weekly and almost 6 thousand people follow it. Earth Learning Idea are used regularly in courses for future teachers.
- Translations of the e-book *Exploring Geoscience* in Brazilian Portuguese is completed.
- At least one Brazilian delegate attended the monthly online meeting of the Latin America IGEO (LAIGEO) chapter.
- The 50th Brazilian Geological Congress host a round table about “Geoscience Teaching in Latin America” in collaboration with LAIGEO.

Roberto Greco

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India Annual Report to IUGS-COGE, January 2022

The COVID pandemic necessitated switching to online classes at schools, colleges and universities, profoundly affecting teaching-learning. It is difficult to compile all the geoeducational/outreach activities of a huge nation like India. Hence, only representative ones are listed below:

- The Earth System Project (ESP), one of the four activities of the International Earth Science Olympiad 2021, was conducted online from Bangalore (Dr R Shankar). It lays emphasis on developing scientific skills like data collection & analysis, reasoning, system thinking, communication & collaboration and oral/written presentation. Multinational groups of students research the given topic using and analysing the data they collect from the Internet. About 300 students participated.
- The Geological Survey of India carried out a) 200 training courses in the fundamentals and applications of geosciences for 23,271 participants from State Directorates of Mining and Geology, Academia and GSI’s own officers; b) Fourteen e-training programs for faculty members, research scholars and Master’s and graduate students (total participants=2017); and c) Eighty eight field- and lab-based training/e-lecture sessions for 16,046 participants.

- AICTE funded 100 engineering colleges for students' visit to the Atal Tunnel (Himachal Pradesh) to study the geological/ geotechnical challenges faced and the novel methods adopted during construction of this 9-km long highway tunnel at 3000 m above MSL, and to promote research and innovation. Ten students, like several others, from the Manipal Institute of Technology led by Dr. K. Balakrishna benefited from this program.
- Dr Subrata Ghosh, Geology Department, Durgapur Government College, reports of a Geology Exhibition that drew large crowds, mostly young students. Faculty members and students answered queries from inquisitive visitors. Faculty members delivered invited talks on geology and allied topics at mountaineering clubs, schools, colleges and social organisations.
- Manipal Centre for Natural Sciences organised Short Certificate Courses on the Earth's Landforms & their Evolutionary Mechanisms (Dr M Prithviraj) and Paleo-botanical evidence and evolutionary trends in plants (Dr Vivek Pandi) and other academic activities.
- Dr R Baskar co-ordinated webinars on the Himalayan Ecological Systems, Water in the Classroom and the World, World Biodiversity Day, World Environment Day, World Ocean Day, and World Population Day. He delivered TV talks on Climate change, and International Environmental Policies, Agreements & Treaties.
- Mr Makki conducted workshops for students and the general public at the Makki Park Museum, Pune, that houses specimens of colourful, crystalline minerals and fossils. He showed them zeolites in their natural setting in nearby basalt quarries and offered them complimentary boxes of zeolite specimens as souvenir.
- Dr Prabhas Pande reports on an upcoming Geo-excursion site in the Lesser Himalaya. Work in progress: Identification & placement of display/sign boards at geologically important locations to educate students/common people with an appeal to protect and conserve the area; infrastructure development to facilitate geotourism; capacity-building and awareness drives. All these will benefit four clusters of villages.
- CERG, Pune, organized a) *Geoquest Enlinea* - year-long online monthly quizzes on Earth Science topics to arouse participants' curiosity. Deserving ones were awarded certificates and cash prizes; and b) An activity-packed Geoweek – talks, exhibitions, visual arts, video, photography and creative writing contests. Participants showcased their writings at *Geotales* and their educational posters, arts and photographs at the *Virtual gallery*.
- Dr Ajit Vartak reports on talks and a panel discussion during World Water Week in August 2021.
- Dr A D Ahluwalia gave webinars on Geoheritage, Disaster Management, Water Conservation, Climate Change, and Hygiene & Solid waste management in Chandigarh. He volunteered at the Government Natural History Museum, Chandigarh.
- The Tethys Fossil Museum and Research Centre, Dhangiri (Himachal Pradesh) showcases Dr R Arya's collection of fossils and rocks from the region. It aims to educate children, administrators, policy makers and politicians about evolution and extinction of life, global warming, mineral deposits etc.

Rajasekhariah Shankar

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Mongolia annual report for IUGS-COGE, January 2022

Submit to the university and Geological Society of Mongolia suggestion regarding curriculum that should be developed to educate a new generation of students under this interdisciplinary framework of "Earth System Science"

O. Gerel

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Peru annual report for IUGS-COGE, 2021

The state of Earth science education at school levels in Peru

The issues for teaching Earth science in schools are:

- Earth science is included in the course: "science and technology" to develop the competence: "Explain the world of physics" based on the abilities: "understand and use knowledge about living things, matter, energy, biodiversity, the Earth and the Universe"; as well as "assess the implications of scientific and technological knowledge."
- Field activities are not included as part of K-12 geoscience teaching.
- There is no funding or initiatives for creating courses for the training of teachers.
- There is no Teaching materials on geosciences

National support

- Currently, there is no national support to improve school-based Earth science education in Peru.
- Geoscientific associations are not working to improve children's education in this area of knowledge.
- There are isolated efforts of professional societies such as the Peruvian Geological Society, Geological, Mining and Metallurgical Institute, Geophysical Institute of Peru, Peruvian section of IAPG, Paleontological Association of Peru and others. During the COVID-19 pandemic, they organized online seminars for a wide audience. However, there is no coordinated effort between them.
- It seems that progress is being made in increasing the participation of women in undergraduate programmes in geoscience, thanks to the launching of conferences that promote their attendance. However, their effectiveness should be assessed
- Recent trends in online learning have provided some teachers with new Earth science skills to apply at school. It is also necessary to measure the success of these activities to attract more students to geoscience.

Events carried out and ongoing by the Peruvian delegation of IGEO

- Successfully was carried out MinerLima2021. 7th International Mineral Exhibition of Lima (Peru). This event has been organized by IAPG-Peru since 2015 and is a success for spreading geosciences in Peru, through a rock and mineral exhibition, short courses, conferences and workshops (for children and the general public), geological excursions and more. This year the exhibition was held in Miraflores (Lima, Peru) with the support of public and private entities. It is highlighted the massive participation of students, professionals and citizens, not only in the exhibition but also in the conferences and crash courses organised. Website: <https://minerlima.wixsite.com/minerlima>
- A Peruvian professional was chosen as the IGEO Latin American chapter new general secretary
- A Peruvian member of IGEO is leading the translations of the e-book Exploring Geoscience in Spanish, which is completed and currently under revision.
- 2 Peruvian delegates attended the monthly online meeting of the Latin America IGEO (LAIGEO) chapter.

Upcoming events

- In a Round Table on Geoethics, to be held on December 18, among other topics, the importance of improving geoscience education in Latin America will be discussed. 2 IGEO representatives: Amelia Calonge and Roberto Greco, will participate in the event. Program of the event: <http://iapgeoethics.blogspot.com/2021/10/4th-round-table-on-geoethics-in-peru-18.html>
- The 1st Peruvian Earth Sciences Olympiad will be held for the first time in the year 2022. This event will be organized by IAPG-Peru with the main support of LAIGEO and the Peruvian group of IAEG. The regional phase is scheduled to take place between February and March, and the

national phase, with an online contest, is in April. The selected students who will attend the International Olympiad will then be prepared through virtual workshops. coge

Sandra Villacorta

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Portugal annual report for IUGS-COGE, January 2022

The earth science education scenario in Portugal has not changed except for the compulsory online classes and the increase of virtual field trips.

Clara Vasconcelos

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Philippine annual report for IUGS-COGE, January 2021

With the onset of the pandemic, the Philippines has struggled with the implementation of the science curriculum in which the 7E (or 5E) Science Inquiry approach is prescribed by the Department of Education. Webinars have been created, sponsored by the Department of Education and other stake holders such as teachers' associations and publishing companies, to reach out to teachers, as strict implementation of lockdowns have made it difficult for them to interact as before. However, one advantage of these webinars is that many educators have been reached and usually these online opportunities were gratuitously available (i.e., no registration fees). For instance, the webinar I gave on June 22, 2020 entitled "Preparing Earth Science Lessons in the New Normal: 5E/7E Inquiry Model in Focus" was viewed more than 9,700 times as of the time of this writing.

The Philippines has successfully participated in the International Earth Science Olympiad (IESO) in the past years; more recently in France (2017), Thailand (2018), and South Korea (2019). However, we were not able to organize a team for 2020 due to the pandemic. Interestingly, the two winners of IESO in 2019 (both silver medalists) were selected again to participate in the International Chemistry Olympiad (IChO) in July 2020. They both clinched bronze medals in IChO 2020. I am still in communication with other science Olympiad handlers and students who participated in the virtual Olympiads, especially IChO, so as to help us prepare for the planned virtual IESO in the future.

In December 2020, the Geological Society of the Philippines, in its 75th year, held its first ever virtual convention. The advantage of this platform is that many were able to participate (more than 1000 participants). One of Geological Society of the Philippines' objectives is to promote the science of geology and allied Earth Sciences.

Miguel C. Cano

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South Korean annual report for IUGS-COGE, January 2022

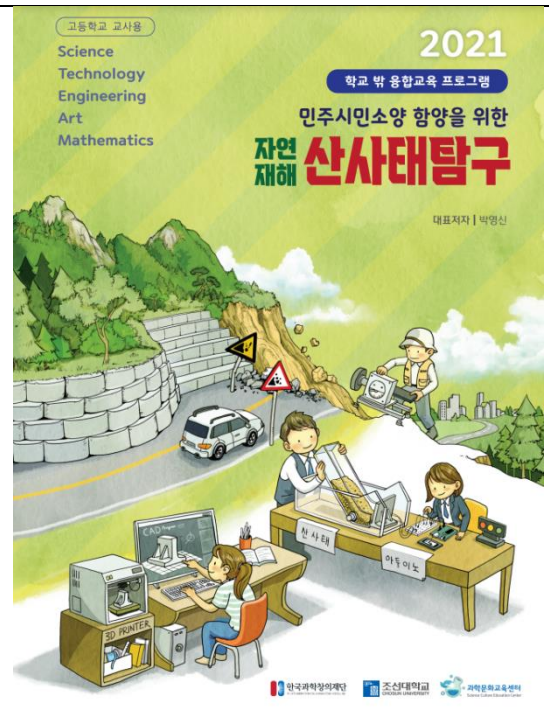
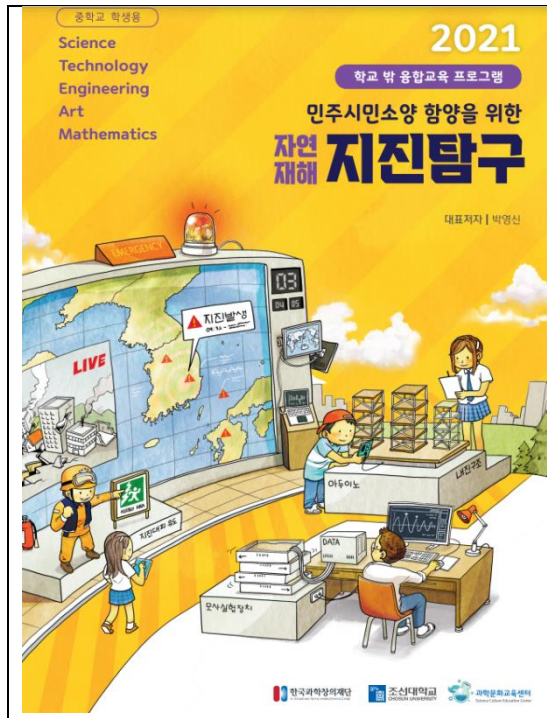
Un-tact (not face to face) classes and virtual conferences have dominated over the in and out schools from K to 16. There has been the following events/news in earth science education in Korea.

1. At the 2021 International Geoscience Olympiad (IESO), South Korea's student delegation ranked fourth overall. The competition was held as an online competition from the 25th to the 30th of last month in consideration of the COVID-19 situation. 206 students from 32 countries participated. The competition was divided into "Data Mining Test (DMT)," a written test using big data, and "National Team Field Investigation (NTFI), an English oral presentation test for outdoor geological exploration. Scientific exploration activities such as poster presentation after data research on global environmental problems, earth system research tasks (ESP) seeking solutions, and Mars exploration missions were also prepared.

In the NTFI field, which formed a group of two representative students from each country, the

delegation received two Berry Good and two Good. This year's competition announced the results of Excellent, Very Good, and Good instead of the existing gold, silver, and bronze medals.

2. Shin Dong-Hee, a professor of science education at Ewha Womans University, became the first president of the Korean Society of Geoscience. Professor Shin Dong-hee was elected the 31st chairman of the Korea Geoscience Association at the 57th regular general meeting of the Korean Geoscience Association held at Haenam-gun Office in Jeollanam-do. Founded in 1965, the Korean Earth Science Society Association is the center of the nation's geoscience researchers and teachers with 1,500 full members. Geology, astronomy, atmospheric science, marine science, and earth science education are all related to geoscience education in Korea. Professor Shin will lead the society as the first president of the women's conference in the 56-year history of the Korean Earth Science Society Association, which has played a pivotal role in academic development and dissemination of academic achievements in the field of earth science. Professor Shin expressed his ambition, saying, "In an era where natural disasters, disasters, and global environmental problems are rapidly increasing, the Earth Science Society will take the lead in developing citizens' knowledge of earth science."
3. The "2021 Marine Academy Introductory Course Teacher Professional Development Program" for earth science teachers had been held in August in 2021. Under the subtitle "Into Marine Data Literacy," Teacher Professional Development Program focuses on emphasizing the need for integrated education that combines marine science, technology, and environment, recognizing that restoring marine capabilities is essential to protect humanity and overcome the climate crisis. In particular, the purpose is to strengthen school marine science education and enhance subject expertise by providing relevant and high-quality content to earth science teachers in front-line education sites, while laying the foundation for social and marine science education through the spread of marine literacy. In fact, the Earth Science Teacher Professional Development Program provide various programs related to marine science education, including marine environment, marine observation theory, data literacy, and marine ecology, as well as opportunities for marine observation practice and experience by the Ministry of Oceans and Fisheries. Through the "Into Marine Data Literacy" training, policy makers in earth science try to find a way for integrated education that combines marine science knowledge, technology, and environment necessary for future generations. Due to climate change and crisis, there are many newly designed PDP (professional development program) for science teachers.
4. There are STEAM programs with the focus on natural disaster. Young-Shin Park, one of earth science educators, developed STEAM program with the content of natural disasters targeting secondary school students. One STEAM program is related to earthquake and the other STEAM is related to landslides. Now we have more earthquakes since 2016 and the citizen as well as students start to have more interests in earthquakes. In addition, every year we have more rainfall which makes landslides in Korea. Every year, Professor Park developed natural disaster STEAM program and science teachers and students welcome those programs since there had not been curriculum with the focus of natural disasters. May science educators develop STEAM program with the purpose of equipping students with competencies of computational thinking and democratic citizen literacy.



5. I will introduce KGU (Korea Geoscience Union). Geoscience, a major discipline in basic science, is divided into geology, oceanography, astronomy, space science, and meteorology, and it has been difficult to timely link and provide necessary knowledge and information to the country and society. In response, 6 societies, including the Korean Geoscience Society, the Korean Society of Meteorology, the Korean Society of Space Science, the Korean Earth Science Society, the Korean Astronomy Society, and the Korean Society of Oceanography, worked together and KGU were founded in 2018 after a long time. KGU (Korea Geoscience Union), which has been established itself as a representative academic organization in the field of earth science, expects to greatly contribute to improving the level of research and education in Korea through dynamic academic interchange and joint research and development in the field of earth science in the future. In addition, through KGU in the future, we had been actively engaged in substantial academic activities to popularize earth science as well as seek new and diverse academic exchanges in the field of earth science and to explore new directions for research and education in the field of earth science. Now, 6 different associations related to KGU take turns in appointing the presidents of KGU for every other years and we have annual conference during summer every year. The 3rd annual conference of KGU will be held in Daejeon city during August 2022 (two times of annual conferences had been cancelled due to COVID-19).

Young-Shin Park

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Sri Lanka annual report for IUGS-COGE, January 2020

- **Undergraduate degree programs**
Admission for the undergraduate geology special degree remains unchanged during 2020 as it is offered only at the University of Peradeniya and its intake is fixed to 50 students per year. However, a few other universities like the University of Motatuwa, Uva Wellassa University, South Eastern University of Sri Lanka, Sabaragamuwa University of Sri Lanka offer degree programs related to geology as well. The University of Moratuwa, Uva Wellassa University, South Eastern University of Sri Lanka, Sabaragamuwa offer a BSc in Earth Resources Engineering, a BSc in Mineral Resources and Technology, a BSc In Earth Science and a BSc in Natural Resources, respectively.
- **Geology teacher training programs**

Annual “Earth Science for schools” school teacher training workshops which are supported by the Geological Society of Sri Lanka (GSSL) and the Department of Geology, University of Peradeniya could not be organized in 2020 because of the Covid-19 pandemic situation.

- **Geology related publications**

The Geography teachers’ supplementary guide book has been revised by the Educational Publication Department Sri Lanka and is in press for publication in early 2021. Two geology related chapters i.e. “Earth’s structure and Composition” and “Mineral resources, Rocks and soil in Sri Lanka” are included.

- **Sri Lanka Earth Science Olympiad and National Geography Olympiad**

Two annual events i.e. Sri Lankan Earth Science Olympiad competition and National Geography Olympiad competition could not be organized as the Government decided to close all schools from end of March, 2020 because of the Covid situation.

Ashvin Wickramasooriya.

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UK annual report for IUGS-COGE, January 2021

- The English national curriculum is unchanged. It has significant Earth science in the primary curriculum, but only the rock cycle in the secondary science curriculum and plate tectonics in the secondary geography curriculum. Most schools do not have to follow the national curriculum and the Earth science is not assessed.
- The Scottish national curriculum is unchanged and contains significant earth science in the primary curriculum, but it is not assessed
- The Welsh national curriculum contains little Earth science.
- The Northern Ireland national curriculum is unchanged and contains some Earth science in the primary curriculum, which is not assessed
- Entry for the optional geology GCSE exam (for 16 year olds) has dropped by half (to 553) since 2014, due to government changes in GCSE weightings in the formula by which schools are judged, but the fall has now stabilised
- Entry for the optional geology A-level exam (for 18 year olds) has fallen by more than half since 2014 (to 1037) due to changes in the government funding for A-levels
- Entry for undergraduate geoscience degrees is falling – the Geological Society of London has run three ‘summits’ to discuss and address this issue
- Earth science education in the UK is supported by the Earth Science Teachers’ Association (ESTA), the education committee of the Geological Society and two Exam Boards.
- The government has not trained any geology teachers since 2016/17; nine geology teachers were trained through a Summer School thanks to industry/charity bursary funding in 2019 but none could be trained in 2020 due to coronavirus.
- Workshops were offered to c800 trainee teachers on the teaching of Earth science, by ESTA in 2019/20 before the advent of coronavirus.
- GeoWeek is a nine-day week in May when members of the public are introduced to Earth science but most activities were cancelled in 2020 due to coronavirus.
- A LinkedIn group of geoscience educational researchers has been set up by colleagues based at Keele University.

Chris King

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USA annual report for IUGS-COGE, December 2020

The state of Earth science education at school levels in the USA has continued to remain static over the last few years. However, the adoption the New Generation Science Standards by many (but not all states) has provided some teachers with a vehicle to teach Earth science. Other teachers will have been

distracted by the inclusion of engineering topics, further reducing the time for pure physical Earth Science topics.

The issues for teaching Earth science in schools remains the same and with no major injection of funding to solve the issues, being:

1. Teachers not trained in the Earth Sciences
2. Teaching materials are still textbook company driven and extremely expensive.
3. Limitations on schools taking students in the field are becoming tighter - and with COVID are becoming non-existent.
4. State testing forces teachers to teach only items on tests – many states not including ES.

For the general public and educators, GEOetc.com continues to provide information and teaching materials to assist teachers. During 2020 GEOetc released its podcast (GEO Podcast) and has had over 10,500 downloads. Other individuals have produced small/short video series, but there is no coordinated effort.

At higher levels, it appears that progress is being made in increasing diversity at undergraduate levels. Programs, such as those presented by the Geological Society of America (On to the Future) support minority students to attend conferences. Some universities/colleges are highly successful in attracting minorities into the geosciences and need to be commended. The flow of these students up into postgrad degrees and beyond will need to be measured.

National support: There is currently no national support for the COGE commissioner for the USA. There are no truly national programs for school-based Earth science education. This is extremely disappointing and a result of professional societies continuing to not appreciate the role of K-12 education to provide a pipeline for the profession.

Gary Lewis

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Appendix 5. The IUGS-COGE 'Call' for national Geoscience Education Field Officers in countries beyond Europe.



Call for IUGS-COGE/IGEO Geoscience Education Field Officer



The International Union of Geological Sciences Commission on Geoscience Education (IUGS-COGE) and the International Geoscience Education Organisation (IGEO) jointly are seeking to appoint IUGS/IGEO Geoscience Education Field Officers in countries beyond Europe with the major role of providing professional development to school teachers, who have elements of geoscience in their teaching curriculum, through interactive workshops. Priority will be given to those countries where the work of such Field Officers is likely to have most effect.

The two-day training programme for successful applicants will take place in Europe combined with the training for European Geosciences Union (EGU) Field Officers.

Previously appointed and trained IUGS/IGEO Field Officers are in place in Chile, India, Malaysia, Morocco and Togo, four additional posts in non-European countries apart from those mentioned, are available this year.

These positions are unpaid, but funding may be available as follows:

- a bid has been submitted to the IUGS to fund the costs of travel and accommodation in Europe for the training of the individuals alongside the training of European Geosciences Union (EGU) Geoscience Education Field Officers;
 - a second bid has been submitted to IUGS for the funding of workshop apparatus and materials;
- If these bids are unsuccessful, Field Officers will receive no funding for training or for providing workshops, but nevertheless, training is a compulsory part of the appointment. If both bids to the IUGS are successful, Field Officers will receive some of the funding available to their EGU counterparts.

Individuals appointed will ideally:

- be willing to represent IUGS and IGEO amongst geoscience teachers and educators in their own country;
- be willing to liaise with a small group of IUGS/IGEO-recognised supporters in their own country;
- be fully available for work, and so are unlikely to have a full-time position;
- hold a university degree containing at least 40% broad geoscience;
- have wide experience of teaching geology, science or geography;
- be willing to respond to new teaching ideas and approaches;
- be willing to seek out and travel to conferences of school teachers of geography, science or primary-age pupils in their country and region in order to present (in their own language) interactive workshops to the conference participants;
- be willing to present training to people working in informal geoscience education, such as in geoparks, aspiring geoparks, the museum sector and other similar institutions, when funded by the institutions;
- be willing to undertake a two-day training programme in presenting interactive workshops; training will be by experienced trainers with expertise in presenting curriculum-focussed interactive professional development workshops in many countries;
- be willing, with guidance, to formulate interactive workshops appropriate for the curriculum in their own countries (with or without translation from English);
- be willing (if funded) to attend an annual meeting of Geoscience Education Field Officers, to provide a brief report on their activities;

- be willing to purchase locally all the apparatus and materials needed to support and maintain the workshops (expenses may be reclaimable);
- be willing to collect evaluation data from each workshop presented and to provide simple analyses of the data;
- be willing to provide information on the background and progress of geoscience education in their own countries, when prompted.

Application is by sending a motivation letter (occupying no more than a single A4 page) and a curriculum vitae (CV) to the Chair of the IUGS Commission on Geoscience Education, Chris King, at: chris@earthlearningidea.com The motivation letter should refer to the motivation of the individual applying, the state of geoscience education in their country, and how the provision of interactive workshops is likely to have impact.

Appendix 6. IUGS-COGE Expenditure 2021

Funds from the IUGS for COGE are administered by the COGE Secretary/Treasurer and are currently held at the University of South Australia in Australia.

- At the time of the last IUGS-COGE report (March 2021), US\$7,720.92 was remaining from previous years – equivalent to A\$11,029.89 at the time
 - IUGS-COGE received A\$11,453.34 from IUGS in April 2021
 - Interest received on account A\$0.0
- Total funds available – A\$22,483.23

Expenditure since previous IUGS-COGE report

- COGE Sec Treasurer – travel to Perth for Australian National Curriculum consultation meeting 26.7.21 – A\$630.00
- Bank fees UA\$12.00
- Website management fee,– A\$158.09

Funds committed for Feb 2022

- Training 4 field officers – Barcelona – US\$6427

Sum remaining at 14.1.22 – A\$21,683.14 = US\$15,178.20

Notes:

1. This sum remaining from last year's budget will cover:
 - a. Travel President to AGM in Paris – US\$ 1052.00
 - b. the training of the four new Field Officers - US\$ 6427.00
 - c. the planned reunion/training of the existing Field Officers - US\$ 8030.00

Appendix 7. IUGS-COGE budget request for 2021, with indicative requests until 2024.

This is taken from a spreadsheet – also submitted. All sums in US\$.

IUGS Commission on Geoscience Education	% inflation	Bid for 2021		Indicative bids + 3% inflation	
Inflation rate	3		2022	2023	2024
Priority 1 2021					
Funding for IUGS-COGE Chair to attend annual IUGS Executive Committee meetings					
Driving to airport		\$ 21			
Flights		\$ 921			
Airport parking		\$ 84			
Travelling at destination		\$ 26			
Total		\$ 1,052	\$ 1,084	\$ 1,116	\$ 1,150
Priority 2 for 2022 budget					
Funding estimation for current IUGS/IGEO Geoscience Education Field Officers to attend regular meeting in Europe x 2	Per person	Five people			
Flights (based on India - USD705, Brazil - USD795, Nigeria - USD980, Phillippines - USD1070; Mexico USD1300) + 3% inflation	\$ 793	\$ 3,965			
Return travel to airport	\$ 77	\$ 385			
Accommodation at venue	\$ 721	\$ 3,605			
Travel around venue	\$ 15	\$ 75			
Total - 5 Field Officers in total			\$ 8,030	\$ 8,271	\$ 8,519
Priority 3 2021					
Funding estimation for future IUGS/IGEO Geoscience Education Field Officers to attend training/regular meeting in Europe x 4	Per person	Four people			
Flights (based on India - USD705, Brazil - USD795, Nigeria - USD980, Phillippines - USD1070; Mexico USD1300) + 3% inflation	\$ 793	\$ 3,172			
Return travel to airport	\$ 77	\$ 309			
Accommodation at venue	\$ 721	\$ 2,884			
Travel around venue	\$ 15	\$ 62			
Total		\$ 6,427	\$ 6,620	\$ 6,818	\$ 7,023
Priority 4 2021					
Workshop kits for IUGS/IGEO Field Officers - apparatus and materials purchased locally	€ 500	\$ 2,000			
9 Field Officers in total					
Priority 5 - for 2022 budget					
Funding estimation for additional IUGS/IGEO Geoscience Education Field Officers to attend training/regular meeting in Vienna x 4			\$ 6,620	\$ 6,818	\$ 7,023
Priority 6 - for 2022 budget					
Workshop kits for four IUGS/IGEO Field Officers - apparatus and materials purchased locally			\$ 2,060	\$ 2,122	\$ 2,185
13 Field Officers in total					

Priority 7 - for 2023 budget					
Funding estimation for additional IUGS/IGEO Geoscience Education Field Officers to attend training/regular meeting in Vienna x 4				\$ 6,818	\$ 6,819
Priority 8 - for 2023 budget					
Workshop kits for IUGS/IGEO Field Officers - apparatus and materials purchased locally				\$ 2,122	\$ 2,186
17 Field Officers in total					
Priority 9 - for 2024 budget					
Funding estimation for additional IUGS/IGEO Geoscience Education Field Officers to attend training/regular meeting in Vienna x 4					\$ 7,023
Priority 10 - for 2024 budget					
Workshop kits for IUGS/IGEO Field Officers - apparatus and materials purchased locally					\$ 2,185
21 Field Officers in total					
Totals - including all priorities		\$ 9,479	\$24,413	\$ 34,086	\$ 44,113
Totals - just maintaining previously trained FOs			\$15,733	\$ 16,205	\$ 16,692
		2021	2022	2023	2024