

International Association of Hydrogeologists
COMMISSION ON GROUNDWATER & CLIMATE CHANGE
IAH-CGCC



ANNUAL REPORT 2020

Chair

Dr. Tibor Stigter, IHE Delft Institute for Water Education (Delft, the Netherlands)

Co-Chairs

Dr. Jodie Miller, IAEA (Vienna, Austria)

Prof. Jianyao Chen, Sun-Yat Sen University (Guangzhou, China)

IAH-CGCC website: <https://gwclimate.iah.org/>

1. IAH-CGCC Aims

The mission of the IAH Commission on Groundwater and Climate Change (IAH-CGCC) is: **to improve understanding of (1) the relationship between groundwater and climate change, and (2) the role of groundwater in adaptation to climate variability and change.**

The IAH-CGCC will seek to fulfil its mission by:

1. promoting related research and development to advance scientific and technical knowledge;
2. fostering inter-disciplinary, international collaborations among universities and research institutions, water resource managers, and water policy makers;
3. fostering linkages with related research and development activities in climate, hydrological, agricultural and health sciences;
4. engaging with key international organisations, agencies and programmes (e.g. UNESCO-IHP, WMO, FAO, UNICEF, WHO, IAEA-WRP, GEWEX, GWSP)
5. working with the International Groundwater Resources Assessment Centre (IGRAC) to promote the development of a programme and facility for the collection, evaluation, archiving and sharing of groundwater data including both ground-based observations and satellite measurements;
6. identifying and evaluating a series of representative case studies illustrating the relationship between groundwater and climate change and the role of groundwater in adaptation to climate variability and change;
7. disseminating research and development outcomes to the global research community including specifically the IPCC, and global development community including governmental and non-governmental organisations and those specifically concerned with enabling adaptation to climate change; and
8. creating awareness of the IAH-CGCC among IAH members, related professions and wider water resources and water supply communities.

2. Progress on IAH-CGCC objectives during 2020 through:

2.1 Knowledge dissemination initiatives – projects and programmes

- Several colleagues from different parts of the world manifested their interest to join the commission, and the list of members has grown, having reached the total number of 50. The website itself has information on the commission, its history (*in preparation*), its current members and their profiles (LinkedIn, ResearchGate) and contacts, links to other networks, commissions and organizations, challenges addressed by the commission, news and events, and relevant publications.
- No annual meeting of IAH-CGCC was held in 2020, due to all the Covid-19 related restrictions and postponement of the IAH conference in Brazil; in addition, we considered that such as meeting works best in a face-to-face format. Notwithstanding, there were communications through the commission's email address, in particular around the jointly organised online IWRA-IAH conference on "Addressing Groundwater Resilience under Climate Change".
- The commission was heavily involved in the organization and implementation of the Online Conference "Addressing Groundwater Resilience under Climate Change" held from 28 to 30 October 2020, co-organised by the International Water Resources Association (IWRA), the UNESCO Intergovernmental Hydrological Programme (IHP) and IAH. The conference ran from 8 am to 8 pm CET each day, to cover the different time zones in the world as much as possible, with a live audience and Q&A platform where more than 500 questions were answered either verbally or in writing by the speakers. The conference had a total of 2662 registrants from over 130 countries, participating in 13 sessions on 5 main themes during three days, with more than 65 speakers and 19 poster presentations. Great keynote talks were given by Jay Famiglietti, Karen Villholth, John Cherry, Bridget Scanlon, Basant Maheshwari, Aditi Mukherji and Eddy Moors. In addition, a high-level panel was organised on the "Science and Policy Interface". The chair of the CGCC, Tibor Stigter, was technical coordinator of the Conference and one of the leading members of the Scientific Committee, also joined by Jodie Miller, Richard Taylor and many others. Tibor Stigter was also co-editor of the final conference report, moderator of Theme 2: Climate change effects on groundwater resilience - Pollution and remediation, and co-author of two presentations. All sessions were recorded and made freely available through the website www.iwraonlineconference.org.
- The International Joint MSc programme on Groundwater and Global Change – Impacts and Adaptation (GroundwatCh, www.groundwatermaster.eu), coordinated by the chair of this commission, Tibor Stigter, entered its sixth edition, with 24 students from across the globe. The programme has received around 4M EUR funding by the EU for an additional four editions. GroundwatCh seeks to offer a distinctive curriculum built on the cornerstones of hydro(geo)logy, climatology, impacts and adaptation, within a framework of human pressures, global change and feedbacks. Jointly implemented by IHE Delft, IST Lisbon and TU Dresden, other academic partners include universities from Colombia, Morocco, Mozambique, South Africa, Tanzania, Uganda, China and Vietnam, and UNESCO and IAEA are also affiliated, in addition to a large number of public and private partners, mostly from the three leading

partner countries. In 2020, because of the COVID-19 situation, students of both the fifth edition (3rd trimester) and sixth edition (1st semester) had mostly online lectures, although fieldwork could be organised in September 2020.

- With financial supports from the National Science foundation of China (NSFC), NSFC-ISF (Israel Science Foundation) joint research grant and INQUA (International Union for Quaternary Research) three major fieldwork campaigns were conducted in Leizhou peninsula between 2014 and 2021. During these campaigns more than 40 monitoring boreholes were sampled for radiocarbon dating and the analysis of ^3H , $^2\text{H}/^{18}\text{O}$, major ions and some other elements. Besides, some of them were selected for the analysis of ^{39}Ar , ^{81}Kr , ^{85}Kr and noble gases. According to the radiocarbon dating results we have got for now a whole picture of the groundwater ages of the middle (30-200m) and deep aquifers (more than 200 m in depth). The University of Science and Technology of China (USTC) has worked on the improvement of ^{81}Kr and ^{39}Kr measurements, which are of great potential in palaeogroundwater, and surface-groundwater interactions.
- One special issue in Quaternary International (547) on groundwater and global palaeoclimate signals was published in June 2020. Dr Jianyao Chen also serves as one member of scientific committee for the 47th IAH conference in Brazil, and is going to present relevant research on palaeogroundwater and climate change in the conference (virtual meeting).

2.2 Contributions to international conferences

2020, May	Conference on Geoethics and Groundwater Management, Porto (Portugal) , https://geoeth-gwm2019.wixsite.com/porto/scientific-committee , Scientific Committee, Session coordinator and Keynote presentation on “The importance of geoethics in groundwater education: an international perspective”.
2020, May	EGU General Assembly (online) , https://www.egu2020.eu/ . Co-convening Special Session “How to assess climate change impacts on groundwater”, co-authoring presentations.
2020, Oct	IWRA-IAH-UNESCO Conference “Addressing Groundwater Resilience under Climate Change” (Online) . Technical coordination, Scientific Committee, co-authoring presentations.

2.3 Publications

- Various authors (2020) Palaeoclimatic signals from large aquifers. Special issue of Quaternary International
- Please visit <https://gwclimate.iah.org/aboutus/cgcc-members> for an updated list of publications by authors who are members of CGCC, by clicking on their ResearchGate links

2.4 Engagement with international programmes and scientific agenda:

Besides looking at climate change impacts on groundwater, the importance of drivers such as population growth, development, urbanisation and changing dietary preferences in large emerging countries, which all lead to increased (ground)water demand, also merit attention within the activities of IAH-CGCC, as does the role of groundwater in adaptation. For this reason, contacts are sought with other relevant commissions within IAH, such as the Commission on Managing Aquifer Recharge, as well as with international programmes (e.g. UNESCO IHP), organizations (e.g. IGRAC) and networks (e.g. IWRA, ECHN). A few examples:

(i) International Water Resources Association (IWRA)

- Joint organisation of online conference on “Addressing Groundwater Resilience under Climate Change”, 28/29 October 2020, see description on page 1.

- Involved in IWRA Groundwater Task Force leading IWRA’s efforts to connect groundwater science, policy, and practice interface (<https://www.iwra.org/groundwater-task-force/>).

(ii) INQUA and IGCP

- IAH-CGCC Co-chair Jianyao Chen serves also as INQUA IFG Palaeogroundwater leader, which enables the close communication between INQUA, IGCP and the IAH and contributes to the Commission with knowledge of global change from large aquifers.

(iii) International Groundwater Resources Assessment Centre (IGRAC)

- IAH-CGCC and IGRAC are involved in joint activities including awareness raising, knowledge dissemination and MSc supervision.

- IGRAC hosts the website for *The Chronicles Consortium* and acts as the portal for a pan-African dataset of multi-decadal groundwater-level records recently compiled under this initiative.

- Close collaboration within the GroundwatCh Joint MSc programme

(iv) IAH Commission on Managed Aquifer Recharge

- Close collaboration within the GroundwatCh Joint MSc programme

- Joint participation in events (e.g. IWRA-IHE-UNESCO online conference)

Tibor Stigter
Chair

Jodie Miller & Jianyao Chen
Co-Chairs