REGIONAL GROUNDWATER FLOW COMMISSION

ANNUAL PROGRESS REPORT

(January – December 2021)

1. Stand-alone Specialist Symposium

The ENeRAG project successfully hosted its most significant scientific event, the International Symposium on Geofluids. The largest and most anticipated event of the project was held virtually between 7-9 July 2021. The main objective of the Symposium was to bring together scientists, professionals, and stakeholders to share and discuss all kinds of topics in geofluids, and especially groundwater, to highlight the interaction among geothermal energy, hydrocarbons, geogenic contamination and hydrothermal mineral resources.

The international Symposium was organized by the ENeRAG H2020 project in collaboration with the Eötvös Loránd University (ELTE), and the József and Erzsébet Tóth Endowed Hydrogeology Chair Foundation. The scientific objectives of the event were supported by the Regional Groundwater Flow and the Managed Aquifer Recharge Commissions, the Hungarian National Chapter of the International Association of Hydrogeologists (IAH), the MOL Group and the Water MDPI Journal.

Teodóra Szőcs, Vice-President of Finance and Membership of the IAH, emphasized the importance of the geofluids systems in sustainable water management and adaptation to climate change as one of the most pressing current issues.

"Due to climate change, climate adaptation strategies are needed more widely, not only in arid or semi-arid regions to facilitate a sustainable (ground)water management."

Judit Mádl-Szőnyi, symposium chair, scientific coordinator of the ENeRAG project, presented the scientific background and aims of the event. She emphasized the focus of the Symposium:

“Fluid geology has been gaining increasing attention compared to traditional solid geology. We need, however, to advance our understanding on fluid-rock-related processes, on different geofluids and their interrelationship. For this reason, emphasis should be put on the dynamics of the fluid flow systems and the geological effects of fluids in the lithosphere.”

The symposium featured 40 live lectures and 28 poster presentations on 5 general themes. The attendees came from 26 different countries who actively participated in the follow-up discussion.

Main Topics and Sessions were:

- Energy flow systems, groundwater flow systems, related fluids and their simulations
- Managed aquifer recharge, adaptation to climate change and ecohydrology
- Geoenergy, thermal water and hydrocarbon systems
- Natural and anthropogenic contamination, vulnerability and hazards of geofluids
- Fluid–rock interactions and hydrogeochemical reactions

The event was highlighted by the presentation of 5 internationally renowned keynote speakers (Inga Berre from Norway, Xiao-Wei Jiang from China, Niels Hartog from the Netherlands, Vincent Post from the Netherlands, Daniele Pedretti from Italy) who shared their forward-looking and high-quality research findings with the participants.

An interactive workshop was organized within the framework of the event, where Judit Mádl- Szőnyi, Brigitta Czauner and Ádám Tóth, members of the hydrogeological research group of ELTE, demonstrated the dynamic systems approach, involving the audience with thought-provoking questions.

The symposium also included social events, where participants were able to obtain insight into the mysteries of Hungarian cuisine with a cooking competition held within the framework of the virtual gala dinner, and were able to visit the streets of Budapest and get acquainted with the diverse architecture of the Hungarian capital during a virtual sightseeing tour.

2. Sessions at Conferences

Due to the continuing pandemic situation, this year the annual EGU General Assembly (vEGU2021 – Gather Online) was held online (just like in 2020). The events of the EGU 2021 conference were scheduled between 19-30 April 2021. vEGU21 included 18,155 scientists from 136 countries, attending 13 643 live presentations in 642 scientific sessions.

At this online event, RGFC-IAH organized a session entitled “The role of groundwater flow systems in solving water management and environmental problems” which was convened by John Molson, Daniela Ducci, Jim LaMoreaux, Manuela Lasagna and Judit Mádl-Szőnyi. The session brought together scientists studying various aspects related to groundwater flow systems, and their role in solving water management and environmental problems. 36 abstracts were submitted to the session, which was held in the form of 2-minute-long vPICO presentations followed by break-out room discussions.

The EGU General Assembly 2021 in the online format was another exciting experience for all attendees. The event gave an excellent chance to meet online and share research and ideas among other researchers. We were happy to try the new platform, thereby also fostering the acquisition of new experience in geofluid and regional groundwater flow research and we could build new liaisons with scientists from all over the world.

The RGFC co-organised session, entitled „Regional groundwater systems and transboundary aquifers”, chaired by Ádám Tóth and Hanneke Verweij, attracted many abstracts and therefore, two oral sessions were run during the annual Congress of IAH, 48th IAH Congress, 6-10 September 2021, Brussels, Belgium.

The contributions focused on new and inspiring practices related to groundwater at a larger (basin to supra-basin) level, in which calculation of regional groundwater flow, advances in GIS methods were some of the sub-topics considered along with raising awareness and better understanding. Transboundary aquifers were also presented from all around the world including cross-border political, socioeconomic and environmental differences. Due to the high importance of the event and to a large number of participants, the 48th IAH Congress was an inspiring and memorable opportunity to engage in networking, broaden our network and exchange research ideas.

The 2021 annual conference of the IAH-CNC was held in Niagara Falls, Ontario, from 26–29 September 2021 and was a great success. Among the many special sessions, these five in particular included a significant number of talks related to the themes of the RGFC: i) Groundwater issues associated with energy development;

ii) Groundwater - Surface Water Interactions; iii) Regional groundwater resources and mapping; (iv) Groundwater and climate change, and v) Groundwater Modeling.

Also, in the province of Quebec, 6 final reports were completed as part of the latest phase of the Regional Hydrogeological Groundwater Characterization Program (PACES). These studies cover regional aquifer characterization and groundwater flow systems, as well as a host of other characteristics including aquifer recharge and vulnerability, and groundwater quality, all at the watershed-scale of major regions of Quebec. All reports (in French), over the past 10 years, can be found here.

Throughout Canada, groundwater protection and understanding the role of regional flow systems, continues to be a priority. Regional groundwater flow systems are indeed attracting attention in Canada!

3. Training workshops, short courses

Short Course on Groundwater Flow Systems, Larbi Tebessi University, Algeria. Online, two hours a week from November 2020 until April 2021 given by José Joel Carrillo-Rivera

4. Dissemination of Knowledge

The ENeRAG H2020 project with the cooperation of the József and Erzsébet Tóth Endowed Hydrogeology Chair and the RGFC-IAH launched a geofluids blog named "Groundwater, Geoenergy, Hydrothermal minerals". This scientific blog intends to inform those who are interested in underground fluids including groundwater, thermal water, hydrothermal mineral resources, geothermal energy, hydrocarbons and their interrelationships. Stay tuned by being a follower of the blog. Our target audiences are colleagues and hydrogeological professionals, but the blog also provides useful information for high school students and their teachers. University students, as well as representatives of related disciplines, such as geography, meteorology, hydrology, water management, ecology, soil science, geothermal energy, hydrocarbon geology and agriculture, are also welcome among our readers!

RGFC launched its LinkedIn page, which is a forum for scientific discussion, in autumn of 2014 and since then the number of members reached 349 (~15 new members during this report period).

Now, the news and activities of RGFC can be followed on another social media platform. We will share conference pictures and updates @rgfc_iah Instagram profile, as well. You can use hashtag #rgfc_iah if you would like to share a photo of regional groundwater related topics or even a memory of your daily hydrogeology practice. We already have 115 followers!

The Commission launched a ResearchGate project entitled *Selection of papers related to Regional Groundwater Flow*. This project was created and is managed by the Regional Groundwater Flow Commission of the International Association of Hydrogeologists (RGFC-IAH) in cooperation with the József & Erzsébet Tóth Endowed Hydrogeology Chair. This project is a selection of international papers related to the research and practical application of regional groundwater flow theory. The project has 79 followers (~10 new ones) and 1071 reads (~200 new ones) at the end of this reporting period.

Around a year ago, we announced the list of teams which qualified for the final round of our Problem Solver Competition. As we all know, due to the developing new health situation, our lives, daily routines, social activities and work habits have all changed. We therefore remained in contact with our contestants to monitor their progress in video-making to give them enough time for preparation. Finally, by the end of 2020, 7 short movies were submitted and now we are happy to announce the final results made by an international jury of 4 experts at the end of this long journey.

1. GroundwatCH: Coordinated management and sustainability of land use and agriculture. How groundwater is affecting and affected? What are the concerns, limits and effects? by Aditya Vikram Jain and Ricardo Leonel Marroquín Paíz, IHE-DELFT, Institute for Water Education, UNESCO, Delft, the Netherlands
2. The Origin: The drinking water – mineral water – thermal water nexus: interrelationship and aligned management. Where are the borders in quality and quantity? by Ji Taotao and Tang Xulin, China University of Geosciences, Beijing, China
3. By Two: Numerical simulation of coupled fluid–heat–matter transport. What are the next-generation application aspects and possibilities? by Ying Tan and Jiaxin Shi, China University of Geosciences, Beijing, China
4. Miyah: Can Managed Aquifer Recharge (MAR) mitigate groundwater depletion? Issues, aspects and possibilities in groundwater quantity augmentation and quality amelioration by Hana Ben Mahrez and Sikandar Hayat, ELTE Eötvös Loránd University, Budapest, Hungary
5. Cug_gw: Overexploitation and groundwater depletion. What are the effects and innovative solution perspectives? by Zhang Yipeng and Wang Qi, China University of Geosciences, Beijing, China
6. WenGer Not Arsene: Interaction of fluids and metals: novel approaches in economically feasible metal production of geothermal systems. Engineering issues and environmental impacts by Valerie Wendo and VictorGerald Nzewuji, University of Miskolc, Hungary
7. Pro-gro: Water, sanitation and hygiene: improved knowledge on water quality. What is the perspective for human development? by Abiodun Olugbenga Ajayi and Arinloye Samuel, Federal University Oye Ekiti, Ekiti State, Nigeria

Congratulations to all teams and we are very grateful for their persistent and hard work! All contestants were awarded full-year memberships for the International Association of Hydrogeologists and the best of the bests can attend the International Symposium on Geofluids and the ENeRAG's workshops free of charge.

5. Awards

It was a great pleasure and a huge success for us that this year Judit Mádl-Szőnyi, RGFC Chair, received one of the most prestigious awards of the International Association of Hydrogeologists, the IAH Presidents' Award in the framework of the Congress. The IAH Presidents' Award was established in 1995 and is determined by the current and past presidents. It is given annually to a member who has made outstanding international contributions to groundwater science and furthering IAH's mission to promote understanding and management of groundwater resources for the benefit of humankind and the environment.

In her acceptance speech, Judit said the following:

"I was pleasantly surprised when I learned that I am being awarded one of the most prestigious awards at IAH in 2021. I have always worked on the subject that I have been passionate about, believing that I can help people better understand groundwater flow systems and their operations."

6. Future plans

- Special Issue "From Groundwater Flow Understanding to Sustainable Water Management"

  Strategic management of water resources is the key to a sustainable environment and future economic development. This requires knowledge of gravitational groundwater flow systems from the local to regional and basin scales. This Special Issue aims to analyze topics connected to physicochemical processes of groundwater flow systems and their economic resources, geogenic and anthropogenic contamination and hazards of fluids, fluid–rock interactions in deep and shallow flow systems, vulnerability and management of aquifer recharge, water-based heat utilization in the light of climate change, and also legislative frameworks toward sustainable development goals.

  Original research articles, theoretical, field, experimental, and numerical studies, and comprehensive review papers in the field of hydrogeology and geochemistry focusing on defining groundwater flow and preventing, controlling, and mitigating negative environmental impacts (quality and quantity) related to groundwater, including those in developing countries, are welcome.

  This Special Issue brings together manuscripts from different fields of groundwater studies with the common aspect of understanding regional groundwater flow systems for improved water management. The Special Issue is initiated by the Regional Groundwater Flow Commission of IAH and the ENeRAG H2020 project and is connected to the International Symposium on Geofluids held in July 2021.

  Guest editors:
  Prof. Dr. Judit Mádl-Szőnyi
  Prof. Dr. Marco Masetti
  Dr. Hanneke Verweij
  Dr. Ádám Tóth
  Dr. Brigitta Czauner
  Prof. Dr. John Molson

- International conference on the „Use of Groundwater Related Terms: Review, Challenges and Opportunities”

  We plan to carry out this conference in Mexico City. The topic comes as a result that many terms in the groundwater-related terminology have undergone subtle and often substantial changes in their use and meaning as manifested within publications from earth sciences, economics, or legal sources. As a result, often related terms are not correct. As the wording is inaccurate, issues do not become evident, making reality, morals and art Comlack flourishing and justice

uncertain. There are many examples of the term aquifer; its erratic use has resulted in uncertainty about the groundwater's nature. Terms such as an aquifer, aquifer system, demand, recharge, resource, scarcity, contamination, overexploitation, or transmissivity are often inconsistently applied or require a clear definition. Therefore, it is necessary to use well-defined terminology and language to describe totally and fully understand groundwater functioning and its physics and chemistry.

Organizing Committee:
Dr. Udo WeyerDr. J Joel Carrillo-Rivera
Dr. MdelCarmen Carmona Lara
Dr. Gonzalo Hatch-Kuri
Dr. Samuel Schmidt

7. Publications

Papers and books

Abesser C, Schincariol R, Raymond J, Gil AG, Drysdale R, Piatek A, Giordano N, Jaziri N, Molson J 2021: Case studies of geothermal system response to perturbations in groundwater flow and thermal regimes. Groundwater, https://doi.org/10.1111/gwat.13086

Ameur M, Aouiti S, Hamzaoui-Azaza F, Cheikha LB, Gueddari M: Vulnerability assessment, transport modeling and simulation of nitrate in groundwater using SI method and modflow-MT3DMS software: case of Sminja aquifer, Tunisia. Environmental Earth Sciences 80(6), pp. 220–236.

Aouiti S, Hamzaoui-Azaza F, El Melki F, Hamdi M, Celico F, Zammouri M: Groundwater quality assessment for different uses using various water quality indices in semi-arid region of central Tunisia. Environmental Science and Pollution Research 28, pp. 46669–46691.

Aouiti S., Hamzaoui Azaza F, Zammouri Z, Hamdi M, Celico F: Water quality assessment of the shallow and deep aquifers of Hajeb Layoun-Jelma basin (Central Tunisia). In: Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition), Springer International Publishing. pp 1663–1669.

Bordeleau G, Rivard C, Lavoie D, Lefebvre R 2021: A systematic multi-isotope approach to unravel methane origin in groundwater: example of an aquifer above a gas field in southern New Brunswick (Canada). J. of Applied Geochem. 134, doi: 10.1016/j.apgeochem.2021.105077.

Hatch-Kuri G, Carrillo-Rivera JJ 2021: Groundwater Flow Systems and Their Importance in the Assessment of Transboundary Groundwater: The Mexico–U.S.A. Case. In: Intensified Land and Water Use, Springer International Publishing, pp. 141–161.

Hayat S, Szabó Zs, Tóth Á, Mádl-Szőnyi J 2021: MAR site suitability mapping for arid–semiarid regions by remote data and combined approach: A case study from Balochistan, Pakistan. Acque Sotterranee – Italian Journal of Groundwater 10, pp. 17–28.

Huizar-Álvarez R, Carrillo-Rivera JJ 2021: Hydrogeochemical Characterization of Groundwater and Its Interaction with Other Components of the Environment in Mexico. In: Intensified Land and Water Use, Springer International Publishing, pp. 115–140.

Ghouili N, Jarraya-Horriche F, Hamzaoui-Azaza F, Zaghrarni MF, Ribeiro L, Zammouri M: Groundwater vulnerability mapping using the Susceptibility Index (SI) method: Case study of Takelsa aquifer, Northeastern Tunisia. African Journal of Earth Science 173, doi.org/10.1016/j.jafrearsci.2020.104035

Markó Á, Mádl-Szőnyi J, Brehme M 2021: Injection related issues of a doublet system in a sandstone aquifer - A generalized concept to understand and avoid problem sources in geothermal systems. Geothermics 97, paper 102234

Szijártó M, Galsa A, Tóth Á, Mádl-Szőnyi J 2021: Numerical analysis of the potential for mixed thermal convection in the Buda Thermal Karst, Hungary. Journal of Hydrology: Regional Studies 34, paper 100783

Troudi N, Hamzaoui-Azaza F, Tzoraki O, Zammouri M 2021: Assessment of potential health hazards of trace elements contamination of groundwater in a shallow aquifer: A case study in Guenniche (Northern Tunisia). In: Recent Advances in Environmental Science from the Euro-Mediterranean and Surrounding Regions (2nd Edition), Publisher: Springer International Publishing, pp. 2349–2358.

Conference Presentations

Arfaoui M, Aouiti S, Hamzaoui-Azaza F, Zammouri M: Assessment of groundwater quality with respect to nitrate in Bouficha aquifer (Northeast of Tunisia). Atlas Georesources International Congress (AGIC), Online, 22–24 March 2021

Colléau E, Huchet F, Vergnaud V, Bordeleau G, Lefebvre R: Geochemical assessment of the contamination risk of water supply wells. IAH-CNC online seminar series, 24 March 2021

Baják P, Csondor K, Pedretti D, Muniruzzaman M, Izsák B, Vargha M, Horváth Á, Pándics T, Erőss A: The controls of radionuclide mobility in a siliciclastic aquifer in Hungary: Hydrogeological investigations and geochemical modeling. EGU General Assembly, Online, 19–30 April 2021

Csondor K, Csobaji L, Czauner B, Győri O, Erőss A: Karst evolution, hydrocarbon and geothermal resources in flow system context (South Hungary). EGU General Assembly, Online, 19–30 April 2021

Szabó Zs, Pedretti D, Masetti M, Ridavits T, Csiszár E, Mádl-Szőnyi J: Experimental rooftop rainwater harvesting by shallow well infiltration – A case study from the Duna-Tisza Interfluve, Hungary. EGU General Assembly, Online, 19–30 April 2021

Tóth Á, Galsa A, Mádl-Szőnyi J: Regional groundwater flow conditions and preliminary geothermal potential in asymmetric basins. EGU General Assembly, Online, 19–30 April 2021

Trásy-Havril T, Simon Sz, Mádl-Szőnyi J: Complex groundwater flow systems in the light of climate change: response of combined fluid driving forces on recharge reduction. EGU General Assembly, Online, 19–30 April 2021

Aouiti S, Troudi N, Hamzaoui-Azaza F, Celico F, Zammouri M: Irrigation Water Quality Index (IWQI) for groundwater suitability in the agricultural domain: case of Hajeb Layoun Jelma Basin (Central Tunisia). 3rd Euro-Mediterranean Conference for Environmental Integration (EMCEI-2021), Online, 10–13 June 2021

Abud-Russell Y, Ouysse S, Carrillo-Rivera JJ: Identification of recharge and discharge zones in a gravity-driven regional groundwater flow. The case of the Yucatan Peninsula, Mexico. International Symposium on Geofluids, Online, 7–9 July 2021

Baják P, Csondor K, Pedretti D, Muniruzzaman M, Izsák B, Vargha M, Horváth Á, Pándics T, Erőss A: Natural Uranium Contamination in Groundwater – Understanding the Mobilization and Transport Processes with the Help of Hydrogeology and Geochemical Modeling. International Symposium on Geofluids, Online, 7–9 July 2021

Balogh VD, Tóth Á, Simon Sz: Complex flow fields due to different fluid driving forces in large sedimentary basins – Pannonian Basin, Hungary. International Symposium on Geofluids, Online, 7–9 July 2021

Csondor K, Baják P, Izsák B, Vargha M, Surbeck H, Horváth Á, Erőss A: Evaluation of a natural uranium contamination of a riverbank filtered drinking water supply system. International Symposium on Geofluids, Online, 7–9 July 2021

Czauner B, Tóth Á, Mádl-Szőnyi J: Abnormal formation pressures: definition, determination and mapping in the Pannonian Basin, Hungary. International Symposium on Geofluids, Online, 7–9 July 2021

De la Fuente Vivanco D, Carrillo-Rivera JJ: Groundwater flow systems in Petorca River Basin, Chile: Their contribution to improve water management and protection. International Symposium on Geofluids, Online, 7–9 July 2021

Djaafri I, Carrillo-Rivera JJ: A hydrogeochemical study of thermal water (Geysers Hammam Debegh & Ouled Ali) using Toth's theory in Eastern Algeria. International Symposium on Geofluids, Online, 7–9 July 2021

Erőss A, Baják P, Csondor K, Izsák B, Vargha M, Horváth Á, Pándics T: Geogenic radionuclide contamination in groundwater –a new challenge in drinking water supply. International Symposium on Geofluids, Online, 7–9 July 2021

Galsa A, Szijártó M, Tóth Á, Pedretti D, Mádl-Szőnyi J: Topohaline and Topothermohaline Convection in Regional Groundwater Flow Systems in Synthetic and Real Hydrogeological Environment. International Symposium on Geofluids, Online, 7–9 July 2021

Kachadourian-Marras A, Carrillo-Rivera JJ: The forgotten facts of the visibility of groundwater. International Symposium on Geofluids, Online, 7–9 July 2021

Mádl-Szőnyi J, Czauner B, Tóth Á, Déri-Takács J: What is the significance of incorporating flow systems in geofluid research? – Exchanging views from scientific basis to practical approach. International Symposium on Geofluids, Online, 7–9 July 2021

Markó Á, Mádl-Szőnyi J, Brehme M: Approach to understand and avoid injection related problems in geothermal systems. International Symposium on Geofluids, Online, 7–9 July 2021

Szabó Zs, Pedretti D, Masetti M, Ridavits T, Csiszár E, Falus Gy, Palcsu L, Sütő V, Mádl-Szőnyi J: The Effectivity and Potential of Rooftop Rainwater Harvesting by Shallow Well Infiltration in Kerekegyháza, Hungary. International Symposium on Geofluids, Online, 7–9 July 2021

Szijártó M, Galsa A, Tóth Á, Mádl-Szőnyi J: Role of coupled fluid flow and heat transfer in synthetic and real groundwater flow systems. International Symposium on Geofluids, Online, 7–9 July 2021

Tóth Á, Mádl-Szőnyi J: Interacting Geofluids Systems in a Shallow Carbonate Basin, Hungary. International Symposium on Geofluids, Online, 7–9 July 2021

Trásy-Havril T, Simon Sz, Mádl-Szőnyi J: Effects of recharge reduction on the dynamics of complex groundwater flow systems driven by multiple driving forces. International Symposium on Geofluids, Online, 7–9 July 2021

Yahyaoui I, Carrillo-Rivera JJ: Groundwater discharge visibility and vertical flow in understanding recharge in western Tunisia. International Symposium on Geofluids, Online, 7–9 July 2021

Tóth Á, Galsa A, Mádl-Szőnyi J: Basin-scale Characterization of Geothermal Resources in Convection Dominated Geothermal Plays. 47th IAH Congress, Sao Paulo, Brazil & Online, 22–27 August 2021. 48th IAH Congress, Brussels, Belgium, 6–10 September 2021

Baják P, Csondor K, Pedretti D, Muniruzzaman M, Kohuth-Ötvös V, Izsák B, Vargha M, Horváth Á, Pándics T, Erőss A: Hydrogeological investigation of the radionuclide content in groundwater in the vicinities of two crystalline outcrops in Hungary. 48th IAH Congress, Brussels, Belgium, 6–10 September 2021

Szabó Zs, Szijártó M, Masetti M, Pedretti D, Visnovitz F, Mádl-Szőnyi J: The Impact Of Topography, Geology And Local Hydrogeology On The Efficiency Of Managed Aquifer Recharge – A Case Study From The Danube - Tisza Interfluve, Hungary. 48th IAH Congress, Brussels, Belgium, 6–10 September 2021

Tóth Á, Galsa A, Mádl-Szőnyi J: Role of basin interplay in geothermal system operations. 48th IAH Congress, Brussels, Belgium, 6–10 September 2021

Diop MN, Molson J, Lemieux J-M: Numerical simulation of water well capture zones under the influence of a dispersed saltwater interface: Île du Cap aux Meules,

Magdalen Islands, Quebec, Canada. GeoNiagara 2021, 74th Canadian Geotechnical Conference and 14 th Joint CGS/IAH-CNC Groundwater Conference, Niagara Falls, ON, Canada, 26–29 September 2021

Labbé M, Molson J, Rosa E: Numerical modelling at the local and catchment scales for assessing the hydrogeological behavior of a tailings site in Abitibi-Témiscamingue, Québec. GeoNiagara 2021, 74th Canadian Geotechnical Conference and 14 th Joint CGS/IAH-CNC Groundwater Conference, Niagara Falls, ON, Canada, 26–29 September 2021.

Mathis R, Lefebvre R, Molson J, Paradis D, Ballard J-M, Raynauld M, Huchet F: Numerical modelling of groundwater flow and residence time in an Appalachian aquifer system, Estrie, Quebec, Canada. GeoNiagara 2021, 74th Canadian Geotechnical Conference and 14 th Joint CGS/IAH-CNC Groundwater Conference, Niagara Falls, ON, Canada, 26–29 September 2021

Hatch-Kuri G, Carrillo-Rivera JJ, Carmona-Lara M del C, Ortega-Guerrero MA: Flow systems and their importance in the Mexico–USA governance of transboundary groundwater. ISARM 2021 - International Conference on Transboundary Aquifers „Challenges and the way forward”, Online, 6–9 December 2021

Pétré MA, Rivera A, Lefebvre R, Folnagy AJB, LaFave J: The hydrogeological assessment of the Milk River Transboundary Aquifer (Alberta, Canada – Montana, USA): a basis towards joint management plans. ISARM 2021 - International Conference on Transboundary Aquifers „Challenges and the way forward”, Online, 6–9 December 2021

Budapest, 20 July 2022

Ádám Tóth, Secretary of RGFC

Judit Mádl-Szőnyi, Chair of RGFC