



REGIONAL GROUNDWATER FLOW COMMISSION

ANNUAL PROGRESS REPORT

January – December 2025

1. Annual meeting of the Commission

In 2025, the Commission Board meetings were held exclusively in an online format. The Board members agreed to continue the Commission's activities through online platforms, primarily via the LinkedIn webpage, where articles related to the topic are presented on a regular basis. As a new initiative to further promote knowledge of the regional groundwater flow system concept, an RGFC lecture series was established under the title: *Understanding groundwater flow systems*. In these new activities, our social media coordinator, Petra Baják, who started to work in 2025, plays a crucial role. We also continue to involve more ECHN members in our activities. The next in-person meeting will take place in Budapest, in September 2026, in the framework of the IAH annual Congress.

2. Sessions at Conferences

In 2025, several conferences were organised under the umbrella of the RGFC. First, the annual **EGU General Assembly** took place in Vienna, where online attendance was also available. The event was held between 27 April and 2 May 2025. In the congress, the RGFC co-organised the session [HS8.2.3](#), entitled: The role of groundwater flow systems in enhancing sustainable water management and solving environmental issues. The session convener was Stefania Stevenazzi, and the co-conveners were Xiao-Wei Jiang, Manuela Lasagna, Szilvia Simon, and Jim LaMoreaux.

“The objective of this session was to gather case studies and scientific contributions connected to sustainable management of groundwater and its protection from degradation and deterioration, e.g., due to over-exploitation, competition for water resources, natural or anthropogenic contamination, and climate change. Contributions were invited, but not limited to, the following subjects: (i) the use of environmental tracers (chemical species and isotopes) for investigating natural processes and human impacts on water resources, (ii) the assessment of hydrogeological budgets for the evaluation of water availability, and (iii) methods for characterizing groundwater flow systems, and preventing, managing and mitigating harmful environmental impacts related to groundwater, as well as (iv) identifying major existing challenges and critical issues.”

The session was a successful event, with a record number of presenters. Thirty-four oral presentations were performed in on-site and virtual formats in the form of short 10-minute presentations. Additionally, fifteen posters were presented during the session. The event again provided a good opportunity to share knowledge and ideas about research and practical applications connected to the regional groundwater flow

system concept. Thanks to the session, several new connections could be established with scientists from all over the world.



Conveners of the session at EGU

Our second event was organised in the frame of the **52nd Congress of the IAH** ([IAH 2025](#)) in Melbourne between 15 and 19 September. The RGFC represented itself by organising the session entitled „*Regional Groundwater Flow Systems (IAH RGFC special session) - Basin-scale groundwater flow – core concept to solve water-related issues of the century.*” The session was dedicated to the memory of Prof Joel Carrillo. The convener was Szilvia Simon, and the co-conveners were Judit Mádl-Szőnyi, Xioawei Jiang, and Samira Ouysee. Six oral presentations and some posters were part of the session, and an active scientific discussion followed the presentations. The session provided a valuable forum for bringing together researchers engaged in the further development of the Tóthian concept, as well as those wishing to acknowledge and honor the scientific contributions of Prof Joel Carrillo in this field. The session concluded with a short commemorative segment dedicated to Prof. Carrillo, highlighting his significant and long-standing contributions to the IAH and to the IAH Regional Groundwater Flow Commission.



Commemoration of Prof Joel Carrillo

3. Dissemination of Knowledge

1. LinkedIn activity

RGFC has been using its former [LinkedIn page](#) as an information platform and a forum for scientific discussion. The number of members is growing continuously, reaching 412 (~ 22 new members during this reporting period).

In 2025, we opened the RGFC community to a broader audience by launching a new open [LinkedIn page](#). Through this platform, we **share recent publications**, research highlights, and insights related to regional groundwater flow systems, as well as announcements of upcoming lectures and conferences. The recordings of previous lectures are also available on the site. Supporters and followers can contribute to the scientific discussion by sending us via direct message on the webpage to our new social media coordinator, Petra Baják and sharing recently published papers or studies relevant to this field. The number of followers has already reached 947. The community is very active in commenting on the papers and studies introduced on the page.

2. Instagram

The **RGFC's Instagram profile** @rgfc_iah is also available, and news and activities can be followed there. You can use the hashtag #rgfc_iah to share a photo on regional groundwater topics or even a memory from your daily hydrogeology practice. We have ~130 followers.

3. IAH–RGFC YouTube Channel Reactivated

In 2025, with active contribution from Petra Baják and Szilvia Simon we also **reactivated the IAH–RGFC YouTube channel**. Recordings of the RGFC Lecture Series and other educational videos on regional groundwater flow systems will be uploaded regularly. Visit and subscribe here: www.youtube.com/@iahrgfc. If supporters have relevant video content to share, we are happy to upload it to the RGFC channel.

4. Events

In the framework of the RGFC, we had two scientific presentations streamed online for the members last year.

The Darcy Lectures of 2025 were performed by the IAH Vice President for North America, **Prof Grant Fergusson** (University of Saskatchewan). Grant Fergusson visited Eötvös Loránd University (Budapest) in May, and his two talks were streamed via MS Teams for the commission members and supporters. The presentations focused on the deep basinal groundwater and its aspects of regional groundwater flow:

„Deep Groundwater and Deep Time”

„Living Fossils: Ancient Groundwaters in the Anthropocene”

The presentations were a great success; these interesting topics were followed by numerous people online and in person, too.



Grant Fergusson's presentation in May

In October 2025, **we successfully launched the online IAH–RGFC Lecture Series**, aiming to introduce the latest scientific results and stimulate discussion on regional groundwater flow systems. The lecture series is planned to continue on a monthly or bi-monthly basis. Our first speaker was Brigitta Czauner (Eötvös Loránd University, Budapest), presenting on: “*Regional Groundwater Flow Systems in the Pannonian Basin, Hungary: Non-renewable groundwater resources at surprisingly shallow depth.*” During the monthly talks, various fields of hydrogeology are presented, where all problems and research are related to the regional groundwater flow system theory or to the practical application of the concept. The lecture series has continued in 2026 with speakers from diverse institutions and research backgrounds. It is popular; the number of online attendees is usually between 40 and 80. Upcoming lectures are announced on our [LinkedIn page](#) and via email. The recordings of the lectures are accessible on our [YouTube channel](#). We encourage everyone to contact us if they have a lecture proposal, whether based on their own research, a colleague’s work, or a student’s project.

5. Future plans

- We plan to continue the IAH–RGFC Lecture Series about the theoretical aspects and application of the regional groundwater flow system concept and its practical aspects. The aim is to represent all fields of hydrogeology where the regional groundwater flow approach is highly relevant.
- We plan to continue the collection and sharing of the new RGF-related papers and books and publish them on the RGFC LinkedIn page. It helps all scientists to follow updates and new results in the given topic. It also generates scientific discussions about the topic.
- RGFC co-organises a session at EGU General Assembly 2026 (3 - 8 May 2026) ([Session HS8.2.12](#)). The session is entitled: Approaches for enhancing sustainable water management and solving environmental issues. Session conveners are Stefania Stevenazzi, Manuela Lasagna, Jim LaMoreaux, Szilvia Simon, Xiao-Wei Jiang.
- RGFC will be represented at the IAH-2026 [IAH 2026 - The 53rd Congress of the International Association of Hydrogeologists](#) in Budapest. We organise a [session 1.4](#). “Evolving from Tóth’s gravitational systems of groundwater flow to integrated basin-scale fluid systems for addressing 21st-century challenges”. We will also have our annual meeting during the congress. Session conveners: Judit Mádl-Szőnyi, Szilvia Simon, John Molson, Hanneke Verweij, Xiao-Wei Jiang
- The RGFC also co-organises a session at the 2026 GSA congress. The GSA (Geological Society of America) meeting will be held in the USA. The submitted session title is: “Advancing the Understanding of Regional Groundwater Flow

Systems and Groundwater Sustainability Through Environmental Tracers”. The conveners are Xiao-Wei Jiang, John Molson, and Yipeng Zhang.

7. Publications

Selected papers and books

Galsa, A., Szijártó, M., Tóth Á. & Mádl-Szőnyi, J., 2025, Topothermohaline convection – from synthetic simulations to reveal processes in a thick geothermal system. *Hydrology and Earth System Sciences* 29(17): 4281-4305. <https://doi.org/10.5194/hess-29-4281-2025>

Houben, G., Batelaan, O., Birk, S. and Kacimov, A., 2025, The force of Forchheimer – the contributions of Philipp Forchheimer to groundwater hydrology. *Hydrological Sciences Journal* 70(3): 436-455. <https://doi.org/10.1080/02626667.2024.2438337>.

Marshall, S.K., Peeters, L.J.M., Batelaan, O., Noorduijn, S. and Velterop, T., 2025, Using expert participation to evaluate the accuracy of hand-drawn water-table maps. *Groundwater* 63(1): 52-67. <https://doi.org/10.1111/gwat.13431>.

Serianz, L., Markelj, A., Rman, N., Brenčič, M. & Mádl-Szőnyi, J., 2025, Hydrogeological analysis of topography-driven groundwater flow in a low temperature geothermal aquifer system in the Julian Alps, Slovenia. *Hydrogeology Journal* 33(1): 237-256. <https://doi.org/10.1007/s10040-024-02866-z>

Sharma, Y.K., Kim, S., Tayerani Charmchi, A.S., Kang, D. and Batelaan, O., 2025, Strategic imputation of groundwater data using machine learning: Insights from diverse aquifers in the Chao-Phraya River Basin. *Groundwater for Sustainable Development* 28: 101394. <https://doi.org/10.1016/j.gsd.2024.101394>.

Simon, Sz., Czauner, B., Balogh, V., Mádl-Szőnyi, J. & Biró M., 2025, Groundwater flow systems as key determinants of groundwater-dependent vegetation distribution. *Ecohydrology*, 18(8): e70147. <https://doi.org/10.1002/eco.70147>

Szijártó M., Galsa, A., Czauner, B., Eröss, A., Tóth, Á. & Mádl-Szőnyi, J., 2025, Numerical investigation of groundwater aging and thermal processes in confined-unconfined basins with asymmetric flow patterns: The Buda Thermal Karst, Hungary. *Hydrogeology Journal* 33(4): 1047-1065. <https://doi.org/10.1007/s10040-025-02908-0>

Tran, Q.-C., Vu, T.-T., Batelaan, O. and Pham, Q.-N., 2024, Factors controlling land subsidence in the Southern Hau River Region, Vietnam. *Groundwater for Sustainable Development* 27: 101383. <https://doi.org/10.1016/j.gsd.2024.101383>

Verweij, H., Oude Essink, G., Hartog, N. & Zaadnoordijk, W-J, 2025., *Hydrogeology*. Chapter 17 In: Ten Veen, J.H., Vis, G.-J., De Jager, J. & Wong, Th.E. (eds): *Geology of the Netherlands*, second edition. Amsterdam University Press: 627-677. DOI: 10.5117/9789463728362_ch17

Zhang, Z.-Y., Jiang, X.-W., Zhou, P.-Y., Batelaan, O., Wang, X.-S., Han, P.-F. and Wan, L., 2025, Stagnation and pseudo-stagnation lines for separating 3D groundwater flow systems in Tóthian Basins. Water Resources Research 61(5): e2024WR038967. <https://doi.org/10.1029/2024WR038967>.

Budapest, 27 April 2026

Szilvia Simon, Secretary of RGFC

Judit Mádl-Szőnyi, Chair of RGFC