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Foreword

This volume is dedicated to Professor József Tóth and his Hungarian research activity at the Eötvös Loránd University (ELTE), Budapest, Hungary. Tóth is one of the best-known representatives of modern hydrogeology in the world. Modern hydrogeology has developed since the 1980s and is based on basin-wide thinking, where the common generator of the processes is groundwater flow.

Tóth is of Hungarian origin, but had to leave his country in 1956. Nevertheless, he has been in contact with Hungarian hydrogeologists since 1994, and resettled here in 2005. He became an honorary professor at Eötvös Loránd University. This volume summarizes the results of the research projects in which he was involved with the staff of the Hydrogeologic Group in the Institute of Geography and Earth Sciences of ELTE until 2008.

The first paper by Mádl-Szőnyi addresses the development of Hungarian hydrogeology from the artesian paradigm to the modern way of thinking (the so-called basin hydraulics), through the contributions of József Tóth.

The next collection of papers focuses on the flow systems of the Danube–Tisza Interfluve, in the Hungarian Great Plain. The first, by Mádl-Szőnyi et al., provides the hydraulic and hydrostratigraphic framework with the help of the "Danube–Tisza Interfluve Hydrogeologic Type Section" for soil and wetland salinization of the area. The paper by Simon et al. focuses on the Lake Kelemenszék area in the Danube valley. Near-surface saline water in the surroundings of the lake was identified with geophysical and chemical measurements. The results fit with the general hydraulic and hydrogeochemical conclusions of the previous general paper. It was found that the saline water of the deep overpressured flow system rises to the near surface and provides the salt supply for the salinization of the local area. Czauner et al. developed a method for mapping of salinization and vegetation phenomena caused by discharging groundwater, in order to evaluate the seasonally variable extent of Lake Kelemenszék. From the surveyed lake-bed morphology and recorded lake water level, the actual lake extent and water amount can be deduced.

The utilization of geothermal energy has a long tradition in Hungary. In their paper Lenkey et al. summarize the thermal and hydrogeologic conditions of the Neogene groundwater reservoir of the Great Hungarian Plain. The authors provide suggestions how to exploit this resource in a more effective and sustainable way.

The paper of Czauner et al. connects the problem of thermal water exploration to petroleum hydrogeology with the help of basin hydraulics. The authors examined a fluid potential anomaly in the flow field near Berekfürdő. The role of a complex tectonic structure in gas entrapment and fluid flow could be interpreted in an overpressured flow field.

Budapest is the city of spas and hydrothermal caves. The publication of Erőss et al. deals with the discharge features of Rose Hill and Gellért Hill in the Buda

Thermal Karst System. The research was based on the analysis of quasi-natural hydrological systems of the area. The flow system geometry and the recharge and discharge features of groundwater flow will correlate if the human influence – mainly water abstraction – is negligible. The observations indicate different discharge characteristics for the two study areas, which has significance for hydrothermal cave development and thermal water utilization and protection.

All of the presented studies were inspired by József Tóth. The source of his marvellous motivation all along his way is best illustrated by a quotation from one of his favorite thinkers, Michael Polanyi: "The love of science, the creative urge, the devotion to scientific standards" (Polányi 1964, p. 64). Here the fruits of this scientific motivation can be seen in a special hydrogeologic research laboratory, the Pannonian Basin.

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