



Introductory Editorial Thematic Issue: “Mineral and thermal waters”

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Water is the source of life on our planet. Freshwater is an essential resource for survival of man. Additionally, water is an extraordinary solvent that dissolves more substances than any other liquid in nature. For this reason, groundwaters through interaction with rocks in the underground environment gradually acquire unique physico-chemical characteristics, mineral content, and temperature: mineral and thermal waters are formed. These waters—depending on the specific chemical features, temperature and place and form of occurrence at the surface—have been used by people for drinking, healing, bathing, therapy or religious rites for thousands of years. That is why mineral and thermal waters have their special place in the development of societies, nations, countries and civilizations.

Mineral and thermal waters from the hydrogeological point of view are groundwaters. Groundwater constitutes only about 1.7% of the world’s total water, which accounts for a volume of around $23.4 \times 10^6 \text{ km}^3$. More than 50% of that volume constitutes groundwater which occurs in strata below 1 km depth where water is mostly saline and hot. The uniqueness of the use of mineral and thermal waters from the

beginning to today is characterized by a firmly established belief in the curative powers of mineral and thermal water springs in the countries in which they occur. Nowadays, this is corroborated by a growing number of balneological healing centers, health resorts, and spas, which are well established in the public healthcare system in many countries of the world.

Use of mineral and thermal waters evolved over time. Nowadays, utilization of such water falls into three main areas which constitute important sectors of the economy, namely: (1) balneology—relates to the most traditional use of mineral and thermal water, to balneotherapy, health and wellness industry, warm baths for healing purposes with natural mineral and thermal waters of different chemical composition or viscosity (pure liquid water or mud), (2) water bottling industry—relates to specially distinguished and regulated water-food market, to consumption of natural mineral waters, spring waters, table waters, etc., packed and sold for consumers, and (3) geothermics—geothermal energy sector connected with exploration and utilization of geothermal heat carried by thermal waters for direct use and electrical power generation.

When the International Association of Hydrogeologists (IAH) was established in 1968 in Prague (the capital of Czechoslovakia in that time) the Commission of Mineral and Thermal Waters (CMTW) was also formed as one of the first working groups of IAH. This fact once more indicates the importance of mineral and thermal waters in hydrogeological research and the groundwater industry. To date, 50 years have passed and the commission is still working to organize annual meetings for its members and hydrogeologists, engineers, scientists, and stakeholders who are involved in the field of mineral and thermal water. Meetings of the CMTW always are directed towards fulfilling three main objectives: (1) exchange of professional knowledge among participants, (2) familiarization with mineral and thermal water properties, occurrence and utilization in the country where the meeting is organized, (3) dissemination and publication of new achievements and research results in the field

This article is a part of the Topical Collection in Environmental Earth Sciences on “Mineral and Thermal Waters” guest edited by Drs. Adam Porowski, Nina Rman and Istvan Forizs, with James LaMoreaux as the Editor-in-Chief.

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of mineral and thermal waters directed at target audiences from academic to industry.

With this special thematic issue of *Environmental Earth Sciences* (EES) dedicated to mineral and thermal waters, we would like to express our gratitude and respect to founders and long-time members of the CMTW who contributed to the activities of the Commission during the last 50 years. The issue is also dedicated to all the tireless and hardworking hydrogeologists and engineers whose professional careers have been engaged in the study of mineral and thermal waters and who have contributed to the development of this very important field of groundwater utilization.

This thematic issue is focused on the key aspects of mineral and thermal waters occurrence and formation in the Earth's hydrosphere, and on their exclusive socio-economic role in modern societies resulting directly from their use and application. Multidisciplinary studies about mineral and/or thermal waters are presented by professionals from almost all five continents. These papers address the current state-of-the-art methods, applications, and hydrological process interpretations using isotopic and advanced geochemical approaches. Contributions in this thematic issue are related to the following subjects: (1) occurrence and formation of mineral and thermal waters in different parts of the world;

(2) REE geochemistry and other specific elements (e.g. Br, I, F); (3) formation, origin and evolution of water chemical composition; (4) properties, application and utilization of mineral and thermal waters in selected countries. We believe that this collection of papers will be of interest to a broad audience of readers of the EES journal.

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