Dear Colleagues,

This special issue of the "Engineering Geology and Hydrogeology" is thematically devoted to the variety of research activities in connection with the water flow in the unsaturated zone.

Unlike the ubiquity of the water flow, circulating freely between the atmosphere and subsurface, the scientific fields of the water related sciences are rather differentiated. Recent decades have raised numerous challenges related to combination of pressure on the natural ecosystems both from the intensive anthropogenic activities and changing climate. Nowadays there is a need for more integrated approach that would encompass contributions from different branches of the scientific knowledge.

It was a pleasure for us to join professionals from different water related branches during the seminar *"Water flow through variably saturated porous media – a link between atmospheric events and groundwater recharge"* held in Sofia on September 14th, 2015. This seminar was organized in the frames of the project DFNI-E 02/4 (2015-2016) *"Application of up-to-date methods and technologies for evaluation of the groundwater recharge related to future climate change in Bulgaria, with emphasis on the vadose zone"* with project leader Assoc. Prof. Tatiana Orehova.

The presentations held during the seminar covered different aspects of water flows in unsaturated zone in Bulgaria and abroad. The topics of the papers in this issue are based on these presentations, and are grouped in three sections: (1) Field studies connected with the vadose zone in Bulgaria; (2) Methodological aspects of the water flow research and modeling in the unsaturated zone; (3) Crop water requirements in relation to changing climate in Bulgaria.

The first section comprises two articles: one from the ongoing project and the second - a review of the past research activities. The first paper by Dr. Dimitar Antonov, Assoc. Prof. Tatiana Orehova, Assist. Prof. Peter Gerginov, PhD student M.Sc. Sava Kolev, Assist. Prof. Tanya Vasileva and Dr. Vanushka Petrova, Geological Institute – BAS, is devoted to the ideas, objective and progress of the project DFNI-E 02/4, including description of the equipment of experimental sites, and initial data from the monitored parameters as soil moisture content and soil water potential at different depths. In the review paper prepared by Prof. Zdravko Diankov, former Institute of Water Problems – BAS, there are presented results from long-term water balance studies in Bulgaria by large lysimeters.

The second section includes articles that treat methodological and theoretical aspects of the unsaturated flow according with related practical examples. They are written by the foreign consultants of our project Prof. Jiri Šimůnek, Environmental Sciences Department, University of California Riverside (USA), and Prof.

Nobuo Toride and Dr. Masaru Sakai, Hydrology and Soil Physics Laboratory, Mie University (Japan). The third article presents groundwater recharge results from both experimental and modeling studies carried in Hydrogeology Division, Moscow State University (Russia) by Prof. Sergey Pozdniakov and coauthors.

The third section encompasses two research papers devoted to changing water balance elements, namely evaporative demand – by Assoc. Prof. Milena Moteva, University of Architecture, Civil Engineering and Geodesy with coauthors Prof. Valentin Kazandjiev and Dr. Veska Georgieva, National Institute Meteorology and Hydrology - BAS, and irrigation needs – by Prof. Zornitsa Popova and Dr. Milena Ivanova, Institute of Soil Science "Nikola Poushkarov", both in respect to climate variability in Bulgaria during last decades. The paper of Prof. Ilia Christov, considers changes in available water from the plant's point of view. Application of the proposed energy index may be a base for a decision support system (DSS) to ensure maximum crop yield at minimum costs.

The research team of the DFNI-E 02/4 Project is grateful to all contributors of this issue. We do hope that the presented articles covering different aspects of water-related studies in the unsaturated zone would be of interest for large audience/community of specialists in Bulgaria and abroad.

Finally, we would like to express our sincere gratitude to the Bulgarian Science Fund - the supporter of the ongoing project DFNI-E 02/4.

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Tatiana Orehova
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