

**Short report on:
Post-congress field trip of the 5th Slovenian Geological Congress, October 6th-8th 2018:
Geology, hydrogeology and geothermy of NE Slovenia and N Croatia**

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The 5th Slovenian Geological Congress was a great opportunity to promote also international exchange of experience. One of the reasons that 21 researchers in the fields of hydrogeology and geothermal energy from nine countries (Slovenia, Belgium, Croatia, Hungary, New Zealand, Poland, Slovakia, Switzerland and USA) spent an interesting prolonged weekend together, visiting sites in Slovenia and Croatia, was also the patronage of the Commission on Mineral and Thermal Water of the International Association of Hydrogeologists (CMTW-IAH).

The Commission on Mineral and Thermal Water is one of the two the oldest commissions of IAH, being established in August 1968 in Prague, Czechoslovakia, during the 23rd session of the International Geological Congress (IGC). The objective of the Commission is to bring together scientists, engineers and other professionals dealing with mineral and thermal waters, and is open also to young beginners. The traditional CMTW-IAH annual meetings are educational, with lots of scientific and technical knowledge exchange regarding also the host country of the meeting. In 2018, the annual meeting was organised during the presented post-congress field trip, however, many commission members contributed already to the scientific sessions of the 5th Slovenian Geological Congress with posters and presentations. The Commission is honoured to have among its members internationally recognized profes-

sionals, we may mention only some: the ambassador professor Jan Dowgiałło, professor Ladislaus Rybach, and dr. Jim LaMoreaux, the actual Chairman. More about the history of the CMTW-IAH can be found in the article of Dowgiałło (2013: *Envir. Earth Sci.* 70: 2923-2928).

On Saturday, we have learned about geology and hydrogeology along the Celje-Lenart highway, visited very promising but now closed geothermal well Be-2 in Benedikt in Slovenske gorice, tasted the mineral water of Ivanjševska slatina, listened to the natural CO₂ seeps at mofette Strmec, visited the bottling company Radenska d.o.o., heard about the shallow and deep geothermal energy use as well as coal and hydrocarbon exploration in NE Slovenia, visited the exhibition on 75 years of hydrocarbon exploitation at Lendava, and visited the geothermal doublet in Lendava. On Sunday, we stared at a natural oil spring in Peklenica, walked on the Quaternary sands "Đurđevački peski" and discussed the local drinking water supply, had a most interesting visit to a brand new nearly-opened geothermal power plant in Velika Ciglana, and listened to the geological evolution of the Croatian Zagorje Region in Stubičke Toplice. On Monday, we have learned about the bathing and heating technology in the AQUAE VIVAE Waterpark in Krapinske Toplice, visited the exhibition in the Krapina Neanderthal Museum, and tasted the natural mineral waters in Rogasška Slatina.



Fig. 1. Mofette Strmec (photo: D. Rajver).



Fig. 2. Natural oil spring in Peklenica (photo: N. Rman).



Fig. 3. Wells in geothermal power plant in Velika Ciglena (photo: L. Serianz).

Evaluation showed that the most interesting topics to the participants were: geothermal power plant in Velika Ciglena, chemistry, isotopic data and hydrogeological information, presentation of Mg rich natural mineral waters and natural oil spring in Peklenica. In future, more information is wanted also on the utilization of geothermal and mineral water in Slovenia in relation to Europe, operation of various geothermal systems for heat production in neighbouring countries, shallow geothermal heating and cooling practice, mitigation of scaling and environmental effects of geothermal fluid production and, of course, strategy and perspective of geothermal energy in the region. The journey was positioned in the pilot area of the project DARLINGe (<http://www.interreg-danube.eu/approved-projects/darlinge>), and we hope that with this international knowledge exchange we will help to support enhanced sustainable use of geothermal energy in this region with really high geothermal potential. As we see it, the interest in further development among experts is promising.

Organization of the field trip was the result of collaboration of several institutions and their representatives, dr. Nina Rman, dr. Tamara Marković and assoc. prof. dr. Mihael Brenčič as representatives from the Slovenian Geological Society,

the Geological Survey of Slovenia, the Faculty of Natural Sciences and Engineering of the University of Ljubljana, the Slovenian Committee of the International Association of Hydrogeologists, the Croatian Geological Society and the Croatian Geological Survey. Beside them, we also thank to sponsors who supported the field trip in various ways: Atlantic Grupa d.d., Dana d.o.o., Krapina Neanderthal museum, Petrol Geoterm d.o.o. and Radenska d.o.o.



Fig. 4. Engine room in Aquae vivae waterpark in Krapinske Toplice (photo: D. Rajver).