1. MOTIVATIONS
The active hypogenic karst area of Buda Thermal Karst (Hungary) is a good natural laboratory to study mineral precipitation processes. Around thermal springs carbonates and biogeochemical precipitates are the most abundant. The goals of the research: study the evolution of thermal water-related precipitates with in situ experiment in time and with changing aquatic chemistry – demonstrate the relationship between the evolved precipitates and the parent fluid flow component.

2. THE IN SITU EXPERIMENT AND METHODS
Two-phase in situ experiment in a controlled environment: 1st phase: 1-day-long experiment along a 400-m-long flow path aquatic chemistry: temperature, pH, specific electrical conductivity (EC), dissolved oxygen content (DO), concentration of Ca⁺ and HCO⁻ parallel reactive transport modelling (PHREEQC) – 2nd phase: 3-months-long experiment along a 130-m-long flow path glass slides in different distances from the outflow, perpendicular to the flow direction aquatic chemistry: temperature, pH, specific electrical conductivity, dissolved oxygen content, concentration of major Ca⁺ and HCO⁻ precipitates: stereo and transmitted light microscopy (TLM), scanning electron microscopy (SEM), X-ray powder diffraction

3. 1ST PHASE – aquatic chemistry and reactive transport model
– continuously decreasing EC – generally decreasing T; increasing between 150 and 250 m
– decreasing Rn activity – degassing – stable Rn activity after 100 m – good agreement between measured and modelled values
– increasing DO – change from reductive to oxidative environment – stable DO after 100 m – good agreement between measured and modelled values

4. CONCLUSIONS OF THE 1ST PHASE:
– significant changes in the first 100 m – continuous CaCO₃ precipitation is expected – degassing and degassing processes are controlled by pure chemical reactions – in the variations in pH and in the concentrations of Ca⁺ and HCO⁻ other processes also take part

5. 2ND PHASE – aquatic chemistry and precipitates
– same variations as in the 1st phase continuously decreasing T, EC, Ca⁺ and HCO⁻ concentrations increasing pH, DO stable pH and DO after 100 m

6. CONCLUSIONS OF THE 2ND PHASE:
– chemical and additional microbiological reactions take part in precipitation, the former dominates close to the outflow, while the latter further away – bacteria attached to the slides in the vicinity of the outflow – CaCO₃ precipitates at SI>0.8 – rhombohedral calcite crystals grow at relatively low supersaturation – dendrite calcite crystals grow at relatively higher supersaturation – bacteria try to inhabit calcite surfaces too, but chemical precipitation suppresses biological one

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