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Model of the thermo-mechanical behavior of the Pravcicka brana sandstone rock arch (Czech Republic) and Perun's rock at Spis Castle (Slovakia).

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Surficial parts of rock masses undergo daily and annual changes of temperature which are of quasi-periodic character. Such periodic heat flow is transmitted into a rock mass according to Fourier's conduction law. Here-in, our attention is focused on the study of surface temperature variations and the distribution of heat flow in the interior of the rock mass at the Pravčická brána rock Arch in Czech Republic. Results from this study confirmed that diurnal thermal cycles are transmitted up to the depth of 150 cm while annual thermal cycles thermally influence the rock body up to the depth of 950 cm.

The research was further focused at the numerical simulation of the thermomechanical behavior and temperature-moisture regime of Pravčická brána Arch and Spis Castle (UNESCO site). Daily temperature changes influence in particular those parts of the rock massif which are close to the surface this was proven by both the sites under study, for deeper parts of the rock mass, long-term temperature variations are crucial. The daily temperature oscillations in sandstone body of Pravčicka brána Arch may induce thermal stresses which nearly reach the strength of the host rock. By the numerical simulation of thermomechanical behavior of Pravčická brána Arch a dilatation of 1.2 mm/year was determined and dilatation of the cliff of Perun's rock at Spis Castle reached 0.074 mm/year.

Relation between moisture and temperature confirmed that daily temperature penetration depth in the days of precipitation rate greater than 1.5 mm/day were about 20 cm deeper than the penetration depth calculated in the days with precipitation rate $\leq$ 1.5 mm/day.