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Monitoring of the temperature – moisture regime of pillars in north and south orientation of the St. Jacobs Church in Levoca

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Historic monuments are subject to degradation due to exposition to surrounding meteorological conditions and groundwater. A significant attention are undertaken to prevent degradation of the cultural heritage throughout the world. Especially monuments built from stones, their porous structure plays a primary role in the deterioration of stone skeleton. Then monitoring of the deterioration of building blocks helps in determining the critical state, when it is necessary to make adjustments to avoid destruction. Moisture diffusion, condensation, etc. attack structural stability of historic structures. Then the moisture diffusion and effects like drying, freezing / thawing belong to the control mechanisms of the degradation. In addition to laboratory experiments concerning the mentioned effects, we simultaneously studied processes by monitoring of the historic monuments. During monitoring we have identified diffusion of moisture associated with cycle day / night and cycle moisture /drying caused by meteorological precipitation. Long term monitoring is performed at the St Jacobs Church in Levoca in exterior. Monitoring is carried out in pillars composed of sandstone blocks in high of 2 m above the ground and at a depth of 10 cm from the pillar surface at two orientations, the north and the south. Appropriate holes are drilled into the stone blocks. The moisture sensor having diameter and height of 20 mm is made of a core drill. The fixing the moisture sensor back into the drilled hole ensures that the pore structure is the same in the cylinder as well as stone block. The moisture content is determined by measuring thermal conductivity of a pore structure. A principle of the hot-ball method is used for measuring thermal conductivity.