Belt. It is also considered that numerous klippen surrounded by the Magura flysch in Orava and Považie region in Slovakia may represent olistoliths. Also possibility of occurrence of olistoliths in the Ukrainian and Austrian sectors of the Pieniny Klippen requires further research.

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Effects of high temperatures in building granites: micro-cracking patterns and ultrasound velocity attenuation

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Fire is one of the most important catastrophic decay agents of building stone because of the severe mineralogical and physical modifications that generates within them. Fire causes decay due to the heat and the solid fraction contained in the fumes produced during fire. The impact of these two components is different depending on the location of stone in relation to fire. However, in low porosity, dense materials the effects of heating can easily override those of the fumes. Accordingly to this, granite will be, during a fire, mostly affected by the quick heating and the high temperatures reached, and experience physical breakdown due to the micro-cracking generated by the differential thermal expansion of minerals. Especially, in granites, cracking will occur if the thermal gradient is higher than 2ºC/minute. The very low initial porosity favours this process due to the dense packing of minerals with different thermal and structural properties in the stone.

The aim of this research is to characterize the micro-cracking patterns of granites, commonly used internationally as building stone, when heated in furnaces to temperatures ranging from 100 to 900ºC, simulating the temperature increase that these materials could undergo during a fire. Thirteen building granites were selected on the basis of their petrophysical characteristics, such as grain size, mineral grain size ratio, mineral anisotropy, mineral composition and porosity. Some of them also showed prior cracking. Non-destructive methods were used to characterize the changes at different temperatures within this range. This allows repeated measurement in the same samples before and after being exposed to high temperatures. This methodology was also selected as it can be used for the on-site characterization in heritage buildings without sampling and allows comparing the laboratory results to real fire damage found in buildings. 3-D topography was used to evaluate surface changes and it was measured by means of a TRACEiT® Portable Optical Surface Analyser and a Leica confocal binocular microscope with stereoscopic software. Variations in roughness parameters evidence damage patterns. In polymineral rocks, such as granites, each mineral behaves in a different way when exposed to weathering agents. Average roughness gives an indication of surface variations, but in this case, peaks or valleys provide more information on the damage processes. Peaks represent minerals pulled out due to the expansion and the internal pressure generated. Valleys correspond to cracks and the measurements before and after the tests show differences in their deepness and quantity. Ultrasound propagation velocity (Vp) as well as ultrasound attenuation was measured with a CNS Electronics Pundit tester with an attached Tektronix oscilloscope. This research also analyzes the advantages and shortfalls of these techniques and parameters to evaluate fire decay.

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