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Approximation of the degree of decay by microscopy and porosimetry of irregular specimens from sculptures: Carboniferous arkosic sandstones case study

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Impossibility to sample larger pieces of material from heritage objects such as sculptures leads to the adoption of alternative approaches for the characterisation of the degree of decay. In the recent study, small irregular specimens from several sculptures carved from Carboniferous arkosic sandstones, the widely used natural stone type from the Variscan molasses in the Bohemian Massif (Czech Republic), are prone to various decay processes despite their favourable composition and rock fabric. In order to understand more deeply the effect of e.g. freezing water, moisture variation or salt crystallization, samples from several sculptures were examined by microscopic techniques (SEM/EDS) and quantitative mercury porosimetry. Namely textural characteristics of the pore space allow for approximation of the degree of decay: in the case of studied rock type this is manifested by substantial shift from the dominance of coarse pores (pores above 7.5 microns) to increased volume of macropores (pores bellow 7.5 microns). This phenomena leads to the increased susceptibility of affected materials to further decay as documented by computed durability indices.