

Spatiotemporal evaluation of weathering-induced depressions in sandstone blocks by terrestrial laser scanning

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For the quantitative evaluation of damages in stone-based cultural heritage by weathering, repeated measurements by terrestrial laser scanning (TLS) are an efficient way to monitor the surficial changes of the stone material. In particular, TLS enables quantifying the spatiotemporal changes in the morphology of rock surface by weathering at a high resolution. We apply TLS measurements to damaged masonry piers of a bridge (Yayoi Bridge at Aoshima, Miyazaki Prefecture, southwestern Japan; constructed in 1951) comprising vulnerable sandstone blocks in a coastal area, for which salt weathering is primarily responsible. The weathering-induced depressions in the sandstone block surface are quantified over six years and the weathering rates are assessed. The spatial distribution of the depression seems to correspond to the effectiveness of weathering conditions in the spray zone. The non-destructive assessment of the weathering conditions by TLS can thus provide basic information for the conservation of cultural heritage.

Keywords: salt weathering, TLS, change detection