



Decay assessment through thermographic analysis in architectural and archaeological heritage

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Any exposed stone-built structure is subject to thermal variations due to daily, seasonal and secular environmental temperature changes. Surface temperature is a function of air temperature (due to convective heat transfer) and of infrared radiation received through insolation. While convective heat transfer homogenizes surface temperature, stone response to insolation is much more complex and the temporal and spatial temperature differences across structures are enhanced.

Surface temperature in stone-built structures will be affected by orientation, sunlight inclination and the complex patterns of light and shadows generated by the often intricate morphology of historical artefacts and structures. Surface temperature will also be affected by different material properties, such as albedo, thermal conductivity, transparency and absorbance to infrared radiation of minerals and rocks. Moisture and the occurrence of salts will also be a factor affecting surface temperatures. Surface temperatures may as well be affected by physical disruptions of rocks due to differences in thermal inertia generated by cracks and other discontinuities.

Thermography is a non-invasive, non-destructive technique that measures temperature variations on the surface of a material. With this technique, surface temperature rates of change and their spatial variations can be analysed. This analysis may be used not only to evaluate the incidence of thermal decay as a factor that generates or enhances stone decay, but also to detect and evaluate other factors that affect the state of conservation of architectural and archaeological heritage, as for example moisture, salts or mechanical disruptions.