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Monitoring colonization dynamics and photosynthetic activity of lichens in the House of the Ancient Hunt, Pompeii (Italy), under the climate change scenario

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ABSTRACT

Strategies to prevent (re-)growths on heritage surfaces are required to improve the management of biodeterioration issues. Nevertheless, (re-)colonization dynamics may be also limited by the divergence of current (micro-) climatic conditions from those of the past which allowed biomass accumulation, as modelized for the Mediterranean area. In this work, lichen communities were re-surveyed after eight years on the vertical walls of the House of the Ancient Hunt in Pompeii (VII,4,48) (S-Italy), displaying shifts in cover values varying for species and the cardinal aspect of walls. In particular, the hygrophytic *Dirina massiliensis* showed a regression on the S-facing wall, while the xerophytic *Verrucaria macrostoma* relatively increased and the mesophytic *Lepraria lobificans* was rather unchanged. To evaluate if these trends reflect a change in the wall microclimatic suitability, the photosynthetic activity of lichens (and of phototrophic biofilms as a comparison) was fluorimetrically monitored across the four seasons, under changing meteorological conditions, at different cardinal aspects and distances from the ground. GLM models indicated a maximum influence of spatial related factors (primary wall aspect) on the variability of basal fluorescence (F_0) and maximum quantum yield (F_v/F_m), higher than that of lithobiont type and the temporal factors (month, interval from sunrise). Relationships between photosynthetic activity and meteorological conditions also showed aspect dependence, with rainfall and consequent wind-driven rain (WDR) having remarkable importance, particularly for S-aspect. On this aspect, the hygrophytic *D. massiliensis* showed prolonged photosynthetic inactivity, even under WDR favourable conditions, suggesting the loss of suitability of its current micro-niche and realizing expectations of climate change models.

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[1] MC, MM and LG shared the same responsibility for the methodology definition, data acquisition and curation of the fluorimetric and meteorological/micro-climatic datasets.

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