

Impact of climate change on the service life of building components. Application to external cement renders in façades in a progressively warmer and drier climate

Summary

Façade claddings are especially relevant in the context of buildings' vulnerability to climate change, considering their direct exposure and importance to overall durability. The effect of climate change on the durability of buildings and external components is considered a relevant subject within adaptation to climate change, which requires research efforts. How can the future degradation and service life of façade claddings be projected, considering the action of climate change? The present research intends to answer this question through a new methodology for evaluating the future degradation and service life of renders in façades, based on the impact of different climate variables under the influence of gradual changes in climate. The proposed methodology is quantitative, leading to numerical results, and rooted in a background methodology, involving visual inspections of case studies in real service conditions.

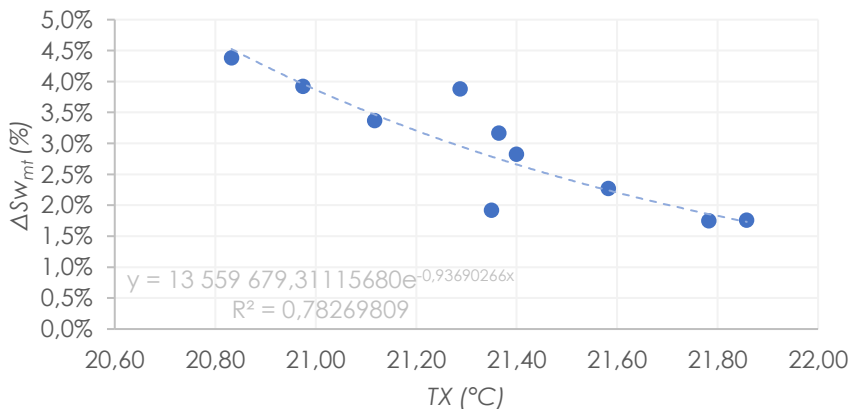
The analysis of the sample, 26 rendered façades in Lisbon, reveals a general decrease in degradation rates between the dates of past and recent inspections. The climate characterising the period 1990- 2020, whose trends of temperature increase and precipitation decrease follow the ones projected for Lisbon by the end of the 21st century, is likely to have contributed to a slowdown of the degradation evolution of the case studies. The results of the new methodology show that the climate change signal for the main temperature variables is likely to yield a positive effect on the future degradation of rendered façades, increasing the service life. Despite the conclusions of the research giving a positive perspective on the future degradation of rendered façades, it is important to bear in mind that climate change in Portugal is expected to have significant consequences, which need to be acknowledged in the context of buildings' durability. Further developments of the proposed methodology might shed light on such a relevant subject.

Keywords

Climate change, rendered façades, climate agents, degradation evolution, future degradation and service life.



Different types of defects observed on rendered façades during visual inspections: stains, cracks and loss of cohesion and adhesion (from left to right).



Distribution of the global mean degradation rate (ΔSw_{mt}) according to the mean of daily maximum temperature (TX), based on the triennial periods between 1990 and 2020 (source of climate data: Instituto Geofísico D. Luís, Lisbon)



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