

THE IMPACT OF AIR POLLUTANTS ON THE DEGRADATION OF TWO HISTORIC BUILDINGS IN BORDEAUX, FRANCE

S. Oliveira, Marcos L.; Neckel, Alcindo; Pinto, Diana; Maculan, Laércio; Dotto, Guilherme Luiz; O. Silva, Luis F.

Abstract

Urban centers concentrate high levels of atmospheric pollutants, sourced by vehicular traffic, public transit systems, industrial emissions and agricultural emissions. This leads to the accumulation of gases and particulate matter (PM) which contribute to the degradation of historic buildings. Considering the importance of preserving historic structures, this manuscript examines the analysis of dangerous elements on the facades of two historic, UNESCO listed sites in Bordeaux, France, Grosse Cloche and Cathédrale St-André, due to the multiple influences of atmospheric pollutants, responsible for the degradation of historic buildings, in addition to causing possible compromises to human health. A total of 48 samples of particulate matter were collected between June 2018 and May 2019 using self-made passive samplers (SMPSs). Sedimented dust samples were collected from the same locations at the same time, one collection during each of the 4 seasons of the year. Analyses of accumulated ultrafine particles (UFPs) and nanoparticles (NPs) were performed on the collected samples. The results detected the presence of more than 800 organic NPs with high levels of toxic elements. Of these, 78% were detected in samples obtained via SMPS and the others in sedimented dust. 60% were shown to have a diameter of less than 50 nm. The authors suggest restoring the sampled historical structures for the benefit of humanity, in addition to increasing the rigor of public policies to control the release of particulate matter.

keywords

Atmospheric pollution; Dangerous elements; Historic buildings; Human health; Nanoparticles