January 15th, 2021.

Dear Dr. Seyed Mojtaba Sadrameli,
Editor of Journal of Architectural Environment & Structural Engineering Research

My name is Kelen Almeida Dornelles, I am Associate Professor from the Institute of Architecture and Urbanism, University of Sao Paulo (USP), in São Carlos, Brazil. My research focus is on thermal comfort and thermal performance of buildings in the built environment. I specifically analyze the potential of improving the thermal and energy performance of buildings with cool roofs, through solar spectral reflectance measurements in laboratory and energy modelling with computer simulations.

Enclosed is a paper entitled "**Effect of aging on solar reflectance of white cool roof coatings: natural weathering and the influence on building energy needs for different climate conditions in Brazil**". It is the result of a post-doc research developed at the Institute of Architecture and Urbanism (IAU-USP), in Brazil.

In this research, I verify the optical-radiative and thermal performance of nine cool white coatings applied as roof membranes. In this study I considered preliminary results of natural aging tests performed on specimens exposed to natural weathering for one year in the city of Sao Carlos, SP, Brazil. Through the literature review, it was possible to verify that the use of cool materials on the building envelope is one of the most cost-effective ways to increase indoor thermal comfort conditions in hot climates and to decrease the cooling energy needs.

Despite the benefit of reducing cooling loads, researches have demonstrated that aging of roof coatings changes the initial SR, which can influences the long term building thermal and energy performance. Studies indicated that most of the solar reflectance degradation of coatings occurred within the first year of application. In this context, spectral and solar reflectances were measured in laboratory to point out the effect of reflectance degradation along the time. A cleaning process was also conducted to identify the ability of the coatings to restore the initial solar reflectance after the period of natural weathering, once literature indicates that the reflectance changes induced by weathering can be reduced by an accurate maintenance procedure.

White roof coatings have been promoted for the benefit of reducing cooling load because of their high solar reflectance. In contrast, from the literature review, it is noted the gap existent in these studies regarding the effect of the cool roof aging on the thermal performance and energy use in buildings. This gap is more evident for studies conducted in hot and tropical climate conditions for low altitude areas between latitudes 15º north and south. Therefore, I also present in this work results from computer simulations with *Energyplus* software to estimate the cooling and energy needs for a residential building located in 4 different outdoor climates in Brazil. New and aged solar reflectances of cool coatings from this work were considered for simulations.

I believe that it can be of interest to readers of Journal of Architectural Environment & Structural Engineering Research because it shows that the aging of roof surfaces may be considered once the effect on the roof solar reflectance over time cannot be neglected. The impact of aging on the thermal performance of building envelope materials is relevant and must be considered in the design of sustainable buildings. The results presented in this paper also confirm that maintenance through cleaning processes can be an effective solution to restore the initial solar reflectance. Therefore, there is a need to develop a new generation of cool coatings, easy to clean and able to retain their initial solar reflectance for as long as possible.

I agree with the contents of the manuscript, and I declare that this is an original manuscript and is not under review at any other publication. I have no conflicts of interest to disclose.

I hope that the editorial board will agree on the interest of this study.

Sincerely yours,

Prof. PhD. Kelen Almeida Dornelles
University of Sao Paulo (USP)
Institute of Architecture and Urbanism
Avenida Trabalhador São-Carlense, nº 400, Centro – São Carlos (Brazil),
CEP: 13566-590
E-mail: kelend@usp.br