

Interactive comment on “A wedge strategy for mitigation of urban warming in future climate scenarios” by Lei Zhao et al.

Anonymous Referee #3

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General comments

In this article, the authors examine by means of online and offline climate simulations the effectiveness of four urban heat island mitigation strategies, namely, cool roofs, street vegetation, green roofs, and reflective pavement for three climate regions in the US and southern Canada under present and future warmer climates. Their main result is that by adopting highly reflective roofs, almost all the cities in the US and southern Canada are transformed into daytime “white oasis” (i.e., the city surface is surrounded by a hotter landscape) for the summer months of 2071-2100. Although all the mitigation strategies decrease daytime temperature, none of them was able to significantly reduce nighttime temperature.

Major concerns First, the impact of cool roofs depends of the roof areal fraction that is

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in average 48.8% for the 57 selected cities. I think this value is typical for European cities but not for US cities, which are much less compact. How the roof areal fraction was estimated?

Second, The impact of reflective pavement was calculated based on the same offline method used for the green roofs. I know that it is not possible to calculate directly the cooling benefit of green roofs because CLM does not have a green roof model implemented. However, the impact of reflective pavements can be easily simulated (online) by incrementing the road albedo. I wonder why the authors did not estimate the cooling benefits of reflective pavements by means of direct simulations.

Third, model outputs at 13:00 and 01:00 LT are used to represent daytime and nighttime conditions, respectively. I wonder why the authors did not include more hours in the analysis of the results.

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