Reviewer’s report

Title: Estimating policy-relevant health effects of ambient heat exposures using spatially contiguous reanalysis data

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Reviewer: Christofer Astrom

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The conducted study aims to assess the necessity to use spatially resolved temperature exposure data in health impact studies to be able to accurately set temperature thresholds for health interventions. Spatially resolved temperature and air pollution data was linked to addresses to get exposure data on an individual level. The health outcomes investigated in the study was emergency department visits due to heat stress, dehydration, acute kidney failure and cardiovascular diseases in New York State.

I believe that the study is well conducted but there are needs for clarification, reformulation and maybe reductions and/or additions in the manuscript. My points are mainly on larger issues and further comments may be added at a later stage.

Main points

* The aim is to prove the usefulness of remote sensing data when refining exposure-response functions for regions where observed data from air-monitors may be sparse. This is also claimed to have been proven in the conclusion part of the abstract. To do this however, I would think that a comparison with an analysis using a fixed weather station as exposure is needed to claim that any additional information is gained by this method. The possibility to use a more individual exposure is, intuitively, a better way to estimate exposure but I do not think that this study shows that. It is also a bit odd to state that the study demonstrated something in the aims section.

* In the methods section it is unclear whether the temperatures at different lags where all included at the same time in the analysis or separately. This should be stated and depending on how temperatures were included in the model more questions might arise.

* The results section needs quite a substantial revision.
  o The use of heat-impacted illness, heat-related illness (mixed up with heat stress on line 190?), heat-stress related, heat-related hospital visits etc makes the results section very hard to follow. This needs to be better structured.
  o In the results section the authors present a comparison between the exposure-response functions between maximum temperatures, the heat index and heat stress
This analysis is only commented briefly in the results section and not in the discussion section. This should either be removed or be revisited at some point.

- The added analysis is based on heat stress, the health outcome that is by far the smallest investigated group with 8000 out of almost 1 million cases. It might be of more interest to present another health outcome that might have larger health impacts.

- The joint effects are only presented for heat stress (table 2) and dehydration (table s1) while cardiovascular disease is not mentioned at all. However, if the associations were estimated they should at least be mentioned in the results section especially as cardiovascular ED visits/hospitalisations where by far the largest group investigated.

- I have a hard time trying to find the actual temperature knots or thresholds, from which the mortality increase is estimated for the different health outcomes. I can't find them, so they are either missing or they are too hard to find.

* On line 263 the authors claim that the effects persist up to 4 days after exposure. It might extend further but as the study have limited the lag times to 4 days the study can only show that the effects persist at least 4 days. The choice to use 4 days as the maximum exposure lag time is not explained or strengthened by any references.

* The public health implications of using the spatial temperatures are not as substantiated as the authors claim. The difference between the proposed threshold and the old one is mainly that new data and evidence is available rather than the difference between spatial and fixed temperature data.

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