General comments:
This study analyzed a major continental scale biomass burning smoke event to evaluate the degree of surface cooling introduced by the smoke plume, and how this affects model bias in near surface air temperature forecasts. The study found that the smoke aerosol induced surface cooling is comparable to model uncertainties, and thus concluded that incorporating a more realistic aerosol field into numerical model will not significantly improve the accuracy of near surface air temperature forecasts. The analysis is detailed, and the presentation is clear. However, the limitations of the study are not fully addressed and thus the conclusion is over-stated. The length of the paper could also be shortened by making the description of the dataset and the event more concise, so that the reader could get to the key points more quickly.

We thank the reviewer for his/her thoughtful suggestions. We have revised the paper accordingly. Also, we have provided lengthy discussions of the event, as this sets up the basis for both this paper and a companion paper that we are currently working on.

Major comments:

The study is only focused on cloud free conditions, thus only aerosol direct effect is considered. However, it is well known that aerosols not only affect climate directly through reflecting or absorbing solar radiation, but also indirectly through affecting cloud microphysics in both stratiform and convective clouds. A summary of these effects could be found in Tao et al. (2012). With this effect omitted from the study, it is not justified to conclude that incorporating a more realistic aerosol field into numerical models will not significantly improve forecast accuracy. The limitations of the study should be addressed.

Thanks for the excellent suggestion. We have added the following discussion to reflect the issue.

"Note that this study is focused on cloud free conditions and only the direct smoke aerosol surface cooling effect is studied. Still, aerosol particles may indirectly affect weather by altering cloud microphysics in both strati-form and convective clouds (e.g. Tao et al., 2012). Such effects warrant further discussions and evaluations."

Minor comments:
(1) Line 86-89: "Upscaling aerosol effects from individual weather phenomenon to climate: : :" The word "upscaling" seems to imply that the result from this study, which focuses on aerosol effect on weather, has implication for studies about aerosol effect on climate. This is misleading since whether the aerosol signal is detectable in weather forecasting does not relate to whether it is detectable in climate simulations. They are based on different time and spacial scales. I suggest to just focus this statement on studies of aerosol effect on weather phenomenon.

We agree with the reviewer that "aerosol signal is detectable in weather forecasting does not relate to whether it is detectable in climate simulations". However, here "Upscaling" is used for

linking weather phenomena to climate in general and is not intented to imply the results of this study.

(2) Line 173: remove "the" after "a)".
Done.

(3) Line 281: remove "at".

Done.

(4) Line 443: "temperate" should be "temperature".

Done.

(5) Line 501: "52-hr" or "54-hr"? Some places are "52-hr", while others are "54-hr" in the manuscript. It is also "54-hr" on the figure caption. This is confusing.

Changed from 52-hr to 54-hr.

(6) Line 509: Why does 30-hr forecast has larger error than 52-hr? From line 503, the largest surface temperature bias comes from 52-hr forecast.

This may relate to model uncertainties. Local-wise, it is not guaranteed that the 30-hr forecast is better than the 54-hr forecast in accuracy.

(7) Line 515: Should be "Figure A1 and A2".

Done.

(8) Line 515: It seems the 0-hr forecast from NCEP has the largest error from Figure A2. This is different from ECMWF and UKMO, why?

Again, we suspect that this may be related to model uncertainties. However, exploring uncertainty sources in each model is beyond the scope of this paper.

(9) Line 541-545: It is not clear how this translates into the importance of radiative warming/ cooling versus thermal advection.

To avoid confusion, we removed this sentence:

"Considering that the near surface air temperature is modulated by radiative warming/cooling and thermal advection, this result may suggest that radiative warming/cooling is more dominant for a colder region, which"

(10) Line 558-559: This sentence need to be re-written.

Done.

Reference: Tao, W.-K., J.-P. Chen, Z. Li, C. Wang, and C. Zhang (2012), Impact of aerosols on convective clouds and precipitation, Rev. Geophys., 50, RG2001, doi:10.1029/2011RG000369.