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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source sector and region contributions to BC and $PM_{2.5}$ in Central Asia" *by* S. Kulkarni et al.

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Response to Anonymous Referee #1

This manuscript describes an effort to quantify concentrations and sources of PM in Central Asia. This region appears to not be specifically target by air quality model applications, so this work seems to be a good contribution in that sense. Regional contributions were obtained using the simple "zero-out" method. Future emissions scenarios were also considered.

I suggest the following items for the authors to consider:

1) How are the winter heating emissions currently quantified? This would be good to

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know since the authors point to this as one of the reasons for underestimations in the PM concentrations.

Authors' Response: Seasonal variations of residential heating/cooking emissions were not included as the base inventory did not have this information for CA.

2) The BC surface mean values was found to be around 0.1 ug/m3. That seems very low. Do you have confidence in your apportionment models at such low values?

Authors' Response: As our estimates are based on chemical transport model, we are confident that we can track concentrations at these levels.

3) It is not clear to me why the authors chose to have different source regions foranthropogenic emissions, biomass burning emissions, and dust emissions instead. Perhaps the value gained in the analysis overcomes the confusion, but it is not clear.

Authors' Response: The CA region is strategically located and aerosols at these sites are shown to reflect impact of varied dust (including CA, Western China, Africa and Middle East), biomass burning (including Europe, Siberia, South Asia and North America) and anthropogenic sources (including Europe, South, East and Central Asia, and Russia) depending on the time period. So we choose different regions for the anthropogenic, dust and biomass burning in order to capture the impact and the associated seasonality of these main regions on the regional distribution of aerosols in this region. We have more anthropogenic regions to better understand how regional changes in emissions may impact CA PM levels.

4) Why were residential and transportation emissions portioned between model layers 1 and 2? 10% seems like a lot to inject higher up. How high was level 2?

Authors' Response: Residential and transportation emissions are considered near surface emissions so we portioned them from surface to $\sim$ 100m (AGL altitude of level 2).

5) How were back (and forward) trajectories calculated? This does not seem to be described in any deal.

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Authors' Response: They were calculated using the three dimensional wind fields simulated by WRF model (that were also used as input to the STEM simulations). Details describing the trajectory calculations have been added in section 2 of the manuscript.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 11343, 2014.

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