

## ***Interactive comment on “Soccer games and record-breaking PM<sub>2.5</sub> pollution events in Santiago, Chile” by Rémy Lapere et al.***

**Anonymous Referee #1**

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The manuscript presents the impact soccer games and their related cultural habits may have on air quality in a large city such as Santiago, Chile. Extreme PM<sub>2.5</sub> events reaching up to 500  $\mu\text{g}/\text{m}^3$  have been studied, with the traffic and meteorology alone not being able to account for those values, based on the derived chemical signature of NO<sub>x</sub>/CO and NO<sub>x</sub>/PM<sub>2.5</sub> ratios. When taking into account cooking as a source and given the estimated emission factors from barbeque cooking from different studies, it occurs that the observed ratios during the extreme events of observed PM<sub>2.5</sub> concentrations indeed correspond to emissions from barbeques. Tracking back specific events to the dates of observed events it occurs that extreme events are associated with international soccer games involving the Chilean national team, with concentrations being observed in higher intensity during evenings before a non-working day. When the as-

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sociated emissions are coupled with a chemistry-transport simulation, observed peaks are highly reproduced, which is not the case without considering the specific emissions. Having reproduced the specific levels, the model then offers the possibility of studying the dispersion of the PM<sub>2.5</sub> plume and pinpoint the areas which could be affected by such extreme events.

The paper is well written and easy to follow, and an important point made is that such analysis can be applied in other cases around the globe in order to estimate the burden on air quality of specific sources.

Nevertheless, there are some issues and more thorough discussion should be made in specific sections. Other than that the paper can be recommended for publication after addressing the issues listed below.

General comments:

- There is no mention on what is considered as “background concentrations” neither for PM<sub>2.5</sub> nor for the species used for the chemical signature (NO<sub>x</sub>, CO). Is it below some threshold value?
- There is a lot of mentioning throughout the text about mitigation, decontamination measures etc. and how Chilean authorities should also take into consideration the specific source from this cultural habit, but what possibly can be done in this case? Don't allow barbeques during international soccer games? I agree that cooking may be a very important source during such events, and possibly the contribution of cooking for those 6 hours may well be even more than traffic, thus I was wondering what could be an effective air pollution mitigation policy (Abstract L13)?
- Is there any report/association of the specific events epidemiologically? In the introduction it is mentioned that increases in respiratory emergency and pneumonia visits may occur within 2 days after such a peak, are there any records for the events reported in this paper?

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Specific comments:

- P9L145 What are the respective ratios for residential heating by domestic combustion? Are these ratios also quite off as the traffic ones?
- P16L217 It would be interesting to see whether the peak event of the 18th of June also followed a similar dispersion scheme or not; this would imply that only specific areas around Santiago could be impacted during such events.

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