Interactive comment on “Characterization of coarse particulate matter in the western United States: a comparison between observation and modeling” by R. Li et al.

Anonymous Referee #1

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This manuscript presents the first comparison of PM10-2.5 between observation and CMAQ model simulation. Previous CMAQ studies focused primarily on PM2.5 or PM10. This study however provides a very interesting result regarding the performance of CMAQ on the PM10-2.5: the CMAQ underestimated the measurements systematically. The paper provides intriguing information for the model community and for the policy maker to rethink the uncertainty on air quality modeling. Several issues needs to be resolved before it can be accepted for publication in ACP:

1. The major issue is what are the uncertainties associated with this indirect measurement method since those PM10-2.5 are taken to be the difference between PM10 and
PM2.5? Are those PM10&2.5 measured with the same instrument or different instruments? The uncertainties might be quite large if they are obtained from two different instruments.

2. What are the major sources for the PM10-2.5? In the abstract, it seems they are more related with natural than human activities. In the text (3.3 weekly patterns), in some cases, they are more associated with human activities.

3. When addressing the causes of the model underestimation compared to observations, several speculations are given including the underestimation of emission inventory, incomplete sources and the limited point measurements vs a large domain etc. Is there any sensitivity study for the above factors or is it too difficult to do the sensitivity tests?

4. Some minor comments: Abstract: p11466, L4, “reporting” should be “reported”; L12-13, delete “To obtain insights for regional PM10-2.5 modeling”; “also” should be deleted; L24, “of the analysis” should be deleted.