

Interactive comment on “Sources of PM_{2.5} carbonaceous aerosol in Riyadh, Saudi Arabia” by Qijing Bian et al.

Anonymous Referee #1

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This manuscript describes comprehensive measurements of particulate organic and elemental carbon and metals in Riyadh, Saudi Arabia. There is detailed trajectory and emission/source analysis. There is investigation of the secondary component of OC with consideration of differing weekend/weekday emissions and the potential different chemical regimes (e.g., different NO_x emissions with potential impact on secondary OC formation). This work is similar to studies and analyses performed for areas of the U.S. and Europe. This dataset is novel for its location, and may provide useful constraints for atmospheric modeling studies applied to this region. My comments are mostly minor and should be considered prior to publication.

Abstract: If most of the OC is secondary and Ca is predominantly primary, how can they have similar sources (line 32)? Is it that the precursor VOC has a similar source

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as Ca? Could it be that the species undergo similar atmospheric processing?

Starting at Line 70: Is atmospheric re-suspended dust due to wind or human activity? If it is due to human activity is it “anthropogenic”?

The chosen cities for comparison in Table 1 see randomly chosen, and this is probably not the case. Are these areas or their air quality similar to Riyadh in some way?

Starting at line 276 “Since OC concentrations had no significant weekday-weekend variation, the increase in OC/EC ratio during the weekend likely indicates the importance of regional photochemical sources of SOC, although decreased NO_x emissions on weekends may promote more efficient photochemical processing of local SOC precursors” This is a curious conclusion to draw from Figures 5 and S2, but maybe not in the context of results discussed later in the manuscript. From these figures, it appears that changes in [EC] are what drive the changes in the OC/EC ratio predominantly. Perhaps the authors are intending to state primary OC emissions follow trends in EC and that the OC on Wednesdays is more primary than say on the weekends when SOC makes a larger contribution? It seems the authors allude to this when discussing figure 6. This needs to be shown first and the authors need to state the findings to support this statement more articulately.

Why not explore the diurnal profiles also separated by weekend/weekday. That would help support the statements the authors make (above) regarding OC/EC findings.

Is it possible that if Calcium carbonate forms, other compounds, for example would potassium carbonate form? It does seem from Figure 8 that there are two regimes for K vs. Ca. Does that inform the OC and Ca correlation analysis further?

Editorial: Sometimes the authors use present tense (e.g., line 80) and sometimes past tense (e.g., line 216, 218) and it is distracting.