

The manuscript by Xu et al. had a comprehensive characterization of aerosol composition, sources, aerosol volatilities, and spatial variability in great London area during winter 2012 based on the simultaneous measurements at a rural site and an urban site. This study is unique, and particularly interesting, the authors found much higher concentration of oxidized organic aerosol at the rural site than the urban site which was attributed to the aged biomass burning aerosol. Another important result of this study is the variable relationship between volatility and O:C ratio, implying that using O:C ratio to estimate volatility needs to be cautious. This manuscript is overall well written. I recommend it for publication after minor revisions.

Comments:

1. Although the authors performed retroplume analysis, inclusion of wind direction would be helpful, at least a wind rose plot showing the prevailing wind during this study.
2. The average wind speed was 5.8 m s^{-1} , and the distance between the two site is 45 km. This means that the transport time from the urban site to the rural site was generally within 2 hours. Could the authors explain how biomass burning aerosol can be rapidly oxidized to OOA in such a short time in winter when photochemical processing is often weak?
3. Page 23816, line 10, no Eq. (4).
4. The OA fraction of the campaign average at the Detling site was the same in Figure 3 and Figure 6. Could it be some mistake since the organics loading and the period for the calculation was different.
5. I am thinking if it is appropriate to connect the three points using straight lines in Figure 9 since the relationship is not linear.
6. Change "(b)" to "(b - e)" in the caption of Figure 12.