***Interactive comment on* "Characterization of the light absorbing properties, chromophores composition and sources of brown carbon aerosol in Xi'an, Northwest China" by Yuan et al.**

Brown carbon (BrC) is a fraction of organic aerosols with effective light absorption, which has significant effects on radiative forcing and climate. In the present study, the light absorbing properties, chromophores composition, and sources of BrC were investigated for aerosols collected in Xi'an, Northwest China. The results showed that AAE and MAE365 both present distinct seasonal differences and were due to the differences in sources and chemical composition of BrC chromophores. Some organic compounds including 12 PAHs, 10 NACs and 3 MOPs were quantified, which contributions to the light absorption of methanol-soluble BrC light absorption at 365 nm ranged from 1.1% to 3.3%, and thereby indicates that the light absorption of BrC is likely determined by an amount of chromophores with strong light absorption ability. Four major sources of methanol-soluble BrC were identified by PMF, which including secondary formation, vehicle emission, coal combustion and biomass burning and a large variation of BrC sources was observed in different seasons. Overall the manuscript is written well, and with some further explanation of collected data and further elaboration on the results it will be ready for publication. Below are specific revision comments for the authors to consider in their next revision:

1) Line 113: Please provide the unit of Absλ.
2) Line 122: Please provide the unit of MAE_{365}.
3) Line 126: "MOSC" should be "MSOC".
4) Lines 139-140: "The concentrations of NACs were analyzed following the method by Al-Naiema and Stone (2017). Briefly……". The details of experiment have some differences to that of reference (Al-Naiema and Stone, 2017). For example, the silylation was conducted by heating at 70 ℃ for 3h in this study, however it was conducted by heating at 100 ℃ for 90 min in the reference (Al-Naiema and Stone, 2017). In addition, according to the reference (Al-Naiema and Stone, 2017), the derivatization method used in the current study is only used for levoglucosan and phthalic acid isomers. Please check this section.
5) However about the uncertainty of organic compounds and PMF analysis?
6) Lines 179-183: As shown in the paper "The higher WSOC fraction in OC during summer may

be related to biomass burning emissions…? Why biomass burning have a large emissions in summer? The seasonal variation of biomass burning should be small.

"The lower WSOC fractions in OC during winter could be attributed to enhanced emissions from coal combustion and motor vehicles": I think the seasonal variation of motor vehicles emissions should be very small.

This explanation of seasonal variations of WSOC/OC should be revised based the experimental results and the supporting references.

7) Lines 212-215: the average MAE365 value (1.18) in fall is more similar to that in spring and summer.
8) Lines 218-220: How about the contribution of the large amount of coal combustion and biomass burning activities in rural region around Xi`an?
9) Line 212-216: The unit of MAE_{365} is $m^2\ gC^{-1}$, however the unit of MAE_{365} is $m^2\ g^{-1}$ in Fig 2 and S2, Table 1. Please correct the errors. This is also important for the calculation of light absorption contribution of various organic compounds.
10) Lines 77-78: Other important references about BrC materials directly emitted from coal combustion should added, such as "Sun et al., ACP, 2017, 17, 4769", "Li et al., EST 2019, 53, 595", "Song et al., EST 2019, 53, 13607", etc.
11) Line 247: The "autumn" should be revised to "fall".
12) The PAHs, NACs and MOPs are important strong light-absorbing organic compounds, however the total contributions of PAHs, NACs and MOPs to the light absorption of methanol soluble BrC at 365 nm are small, only 1.05%- 3.26%. What is the major contribution to the light absorbing BrC?
13) Section 3.3: the sources of BrC were quantified with a PMF model. However I have several concerns: 1) Why the contribution of biomass burning was not identified in spring? In general, the biomass burning activities should happen in every seasons.2) the contribution of SOA is lowest in Fall. Why? Could you give some explaination? 3) the contribution of vehicle emissions are more than 1/3 in spring and fall. Could you give some discussion to interpret the reason for this seasonal variations of source compostions.