

Response to Co-editor Comments

Comments to the Author:

Dear Authors, thank you for your patience. I've heard back from the reviewers and based on their readings and mine my reading of the revised manuscript we feel this study is ready before publication. However, it came up again about IEPOX-derived SOA not being resolved or discussed from this seasonal dataset. Have the authors seen the recent publication by Zhang et al. (2017, GRL, <http://onlinelibrary.wiley.com/doi/10.1002/2016GL072368/abstract>) on the limited formation of IEPOX-derived SOA in eastern China during summer? The reviewer and I were still curious if you tried to determine the presence of IEPOX-derived SOA from your PMF analyses? If you didn't resolve it, is that consistent with this recent paper? You might want to at least mention this point (either way) in the discussion of the results. Once you address this final point, I will gladly accept your revised manuscript.

Most sincerely, Jason Surratt

Response: Dear Dr. Jason Surratt, thank you very much for handling our manuscript and your decision "Reconsider after minor revisions".

About IEPOX-SOA, as we mentioned in the previous responses, we give response as follows.

IEPOX-SOA can contribute substantially to OA concentrations in forested areas under low NO conditions (Hu et al., 2016). However, this study was conducted at a typical urban site, and the concentrations of NO were 10.5, 3.5, 37.5 and 24.4 during four seasons, respectively (Table 1). The IEPOX-SOA factors were resolved by PMF because they

made a significant contribution to OA, and the influence of vegetation was important. For example, Budisulistiorini et al. (2013, 2016) found that IEPOX-SOA accounted for 27-41% of OA, and showed a seasonal difference at a downtown urban site and a rural/forested site. Hu et al. (2015) mapped the IEPOX-SOA fractions of OA at diverse sites across the world, and the resolved IEPOX-SOA accounted for 6–36%. IEPOX-SOA is only identified at the sites where the predicted average IEPOX concentration higher than ~30 ppt. In addition, no IEPOX-SOA factor (i.e., below the PMF detection limit of ~5% of OA) was found in areas strongly influenced by urban emissions where high-NO concentrations suppress the IEPOX pathway, even in the presence of substantial isoprene concentrations (Hu et al., 2015).

Even in summer (modeled data in July 2013), the gas-phase IEPOX concentrations are quite low (close to 0) in North China, so there were no IEPOX-SOA factors resolved at the sites in North China, including Beijing and Changdao Island (Hu et al., 2015). There might be relatively limited IEPOX-SOA contribution to the OA in Beijing, but the IEPOX-SOA factor cannot be resolved in our dataset by free PMF. In recently published papers (Fig. 5; Hu et al., 2016; Sun et al., 2015, 2016a, 2016b; Wang et al., 2015; Xu et al., 2017; Zhang et al., 2016), there were also no IEPOX-SOA factor resolved by PMF analysis in urban Beijing.

Recently, Zhang et al. (2017) reported that the average IEPOX-SOA concentration is $0.33 \pm 0.19 \mu\text{g m}^{-3}$ (3.8% of the total OA) under NO_x -rich environments in mid-Eastern China in summer 2013. The concentration was much smaller than those ($2\text{-}4 \mu\text{g m}^{-3}$) in IEPOX-rich regions in the southeastern US, i.e., the formation of IEPOX-SOA under polluted urban environments is quite limited.

In summary, it is reasonable that IEPOX-SOA factor cannot be resolved in Beijing. In this study, we would like to keep using PMF analysis for OA factorization.

In the revision,

Page 12, Line 10: “*Different from the two sites in southeastern USA, there were no isoprene-epoxydiols-derived SOA and a biogenic influenced factor characterized by distinct m/z 91 resolved in urban Beijing, the same as addressed in Hu et al. (2015).*” was changed to “***Different from the two sites in southeastern USA, there were no isoprene-epoxydiols-derived SOA (IEPOX-SOA) and a biogenic influenced factor characterized by distinct m/z 91 resolved in urban Beijing. No IEPOX-SOA factor (i.e., below the PMF detection limit of ~5% of OA) was found in Beijing because the formation of IEPOX-SOA under IEPOX-poor and polluted urban environments is quite limited (Hu et al., 2015).***”

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