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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Molecular characterization of organic aerosols in the Kathmandu Valley, Nepal: insights into primary and secondary sources" *by* Xin Wan et al.

Anonymous Referee #1

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General comments This article presents a sizable set of field measurements for total suspended particulates in Bode, focusing on major inorganic ions and a wide range of markers to discuss primary and secondary emission sources. This work adopts organic molecular markers established in the published literature with tremendous effort given to chemical speciation which is commendable. In addition to providing data beneficial for control strategies and relevant implications, more clearly specified scientific novelty (new scientific findings that research communities have not known yet, and need to learn) will further enhance the value of this work. The major revision for the manuscript lies in the sampling artifacts and relevant impacts on the reported concentrations as well as discussion. Quartz filters are used for sample collection, which is recognized

to incur positive sampling artifacts by 10–20% for OC and up to 16 % for organic tracers. The positive sampling artifacts on organics are cited based on a published study (Ding et al. 2013) instead of experimental measurements devoted for this manuscript. Authors are encouraged to examine appropriate ways (available in published literature) to assess such positive artifacts and corresponding impacts on reported data, followed by correction accordingly. At least, correction based on make-up experiments or post data analyses need to be considered. Similar correction/discussion should be given to the effects of discounted recovery rates. Quartz filters are also well known to adsorb semi-volatile inorganics (e.g. nitrate, chloride, and ammonium), another type of major positive sampling artifacts. How such effects affect the various correlations and discussion involving inorganic ions mentioned in the manuscript deserve to be examined to revise the discussion accordingly.

Specific comments Lns 118-120: Why would comparing only BC and O3 between Bode and Paknajol be sufficient to conclude that Bode is a representative site for Kathmandu Valley?

Ln 252: Incense burning can also emit levoglucosan. Would such emissions be significant at the study site?

Lns 450-451: Reference is needed for "During the fires, substantial amounts of aerosols and VOCs including isoprene and monoterpenes would generate, . . .". Similar description also appears at other locations.

Lns 452-453: An R2 value of 0.32 does not indicate good linear correlation between Levoglucosan and 3-HGA, even though the p-value is less than 0.001. There are also inconsistent use of "r" vs. "R2" throughout the work. The use of statistical mean deserves more careful consideration and application.

Line 489-490: Typically, atmospheric samples show greatly fluctuated concentrations. Prior to calculating and using the mean values for various comparison, a distribution of concentrations can be examined to evaluate whether a median or mean should be

used to convene corresponding discussion.

Use of Lev/OC ratio among major biomass types deserves re-consideration. This use assumes that atmospheric degradation pattern of levoglucosan and overall OC at any time remains the same. This assumption is questionable, especially under varied temperature, relative humidity, locations, types and abundance of major biomass burnt, dominant burning conditions, varied transport, etc. It is also worth noting that oxidation intermediates of levoglucosan (and other organics) remain part of overall OC, which adds additional questions on the validity of adopting the ratio. The ratio at a given time point is a net results of multiple atmospheric processes on overall OC and levoglucosan therein.

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