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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Polycyclic aromatic hydrocarbons (PAHs) in aerosols over the central Himalayas along two south-north transects" *by* Peng Fei Chen et al.

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Review of acp-2016-71

General comments:

1) Overall, the manuscript is poor in English, making it difficult at several places to understand what is being conveyed. Section on estimation of dry-deposition fluxes of PAHs is irrelevant. It is not clear why it is important to estimate PAHs fluxes at the six sampling sites. The impact on aquatic systems, if any, or human health has not been addressed at all. Simply reporting the fluxes (rough estimates – as claimed by authors themselves on page 14, lines 14-15) do not make any sense. With large uncertainty in the deposition velocity of any atmospheric constituent, it is conceptually wrong to state the deposition fluxes of PAHs up to 1st or 2nd decimal units (25.9 ug/m2/d at Pokhara,

at Nyalam as 6.74 ug/m2/d and so on – Section 3.4, Pages 13-14). The entire concept of using deposition velocity and deposition fluxes is not valid at all for sampling sites located in high altitude regions. The concept may still be applicable for deposition over high altitude lakes.

2) Abstract is still very poorly written: Page 2, lines 1-2: 1) Why it is important to understand transport of PAHs across Himalayas? 2) Why only from the Indo-Gangetic Plain?

3) Page 2, lines 20-24: Isomer ratios are expected to help in identifying the specific source signature, whereas, authors have stated that – quote "isomer ratios suggested that atmospheric PAHs from the Nepal sites were mainly associated with emission of biomass, coal burning and petroleum burning". This is a very qualitative statement.

4) Conclusion: Page 18, lines 10-15: If inferences are drawn only from AMBTs, then it is not of much relevance to measure chemical constituents (example PAHs). Their long-range transport cannot be considered "conservative".

5) Page 18, line 8: What authors mean by "higher deposition efficiency"? How this is built in the concept of using deposition velocity for PAHs? How deposition efficiency is assessed from the data presented in the manuscript.

6) Specific Comments: a) Abstract, Page 2, line 11: What is the concept of logarithmic decreasing pattern of PAHs with increasing elevation? Is this is an empirical relation only applicable to PAHs? b) Page 3, lines 14-15: Why study of PAHs in remote sites is needed for the understanding of the atmospheric mechanisms involved in the long-range transport of these pollutants? Which "atmospheric mechanisms" authors are referring to during long-range transport? c) Page 4, line 8: ABC is not "Asian Brown Cloud". It refers to "Atmospheric Brown Cloud". d) Page 5, lines 5-19: Why these sources are not important for the contribution of PAHs measured at the sis sampling sites? e) Page 9, lines 4-8: Based on TSP and PAHs concentrations, it is conceptually incorrect to conclude impact and transport of pollutants from the IGP in the winter.

What about contribution from intermediate/downwind sources. f) Page 9, lines 3-5: Std. deviation on PAHs cannot be stated as 5.65 ng/m3, 2.97 ng/m3 and so on. Are these significant up to 2nd decimal units. g) Page 10, lines 10-14: It is not clear what authors are trying to infer and convey. It is rather poor discussion on spatial and temporal variability of TSP and PAHs along south-north transects. h) Page 11, lines 7-8: Concentrations of PAHs in soils and variability with altitude is out of context and irrelevant. PAHs in soils cannot be assumed to be derived from atmospheric deposition. i) Page 11, lines 9-10: Which "nearby contaminant sources" authors are referring to? j) Page 11, line 12: "Thus, less local anthropogenic emissions —— ". What is "less"? k) Page 11, lines 12-15: The entire discussion is very qualitative and poorly written. l) Page 11, line 15: "–thus we just gave a rough estimate of the regression analysis in this study". What is the relevance of giving "rough estimate"? m) Page 12, line 8: "——- indicating that biomass combustion is the main source for particulate PAHs in Lumbini". How biomass combustion source can be inferred from particulate PAHs? What are the concentrations and ratio of OC and EC? n) Page 15, lines 16-19: There is no new understanding emerging from this qualitative discussion. o) Page 17, lines 1-2: What is "thermally driven flows through Himalayan alleys and up sides? p) Page 17, lines 3-4: "—— diurnal valley wind system often occurs that blows up valley–". What authors mean by "that blows up valley—- "?

7) There are several confusing & qualitative statements: Page 2, lines 22-24; Page 3, lines 14-15; Page 9, lines 7-10; Page 10, lines 10-15; Page 11, lines 6-7; 10-15; Page 13, lines 3-4; Page 14, lines 12-15; Page 15, lines 16-19

8) English errors: Abstract, Page 2, line 11: "exhibited"; wrong English; Page 3, line 1: "long-range transportation" Page 6, line 17: "pre-burned"; What is pre-burned? It should be "pre-combusted"! Page 8, line 2: "All analytic"; What is analytic? Page 10, lines 14 and 20: "long-range transported pollution"? Wrong English "transported"! Page 10, line 21: "—- concentrations "exhibited"—-. Page 11, line 9: "The low-elevation sites displayed—-"; displayed is not a correct word to use! Page 12, line 15: "PAHs are

present"; not is present. Page 12, line 16: "— PAHs scarcely reenter the atmosphere—-". Very poor English! Page 14, line 21: "—— indicates non-burned petroleum——". Non-burned is incorrect word.

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