For RC1

We appreciate the reviewers' comments, which surely improve our manuscript. According to reviewer's comments, the point-by-point responses to each of the comments are provided below. A 'track change' version of the manuscript is also attached.

Comment 1: Although the authors do a good job at explaining how site specific sampling rates are determined using Depuration Compounds, there is no information on how the effective air sample volumes are calculated. I am specifically wondering about the more volatile compounds like HCB and a-HCH (and perhaps also g-HCH) that will equilibrate or approach equilibrium during the 2-month deployment periods. This approach to equilibrium should result in reduced effective air sample volumes for these compounds relative to the other POPs. This effect may also have a role to play in observed seasonality since the sorptive capacity of the PUF disk is temperature dependent.

Response:
Effective air volume for all the chemicals were calculated using the formula given by Harner et al., (2013),

$$V_{Air} = (K'_{PSM-A}) + (V_{PSM}) \times \left\{1 - \exp\left[\frac{k_A}{K'_{PSM-A}} \times \frac{1}{D_{film}}\right] t\right\} \ldots\ldots\ldots\ldots\ldots(1)$$

Where, V_{Air} Effective air sample volume

$$K'_{PSM} = K_{PSM} \times \delta_{PSM}$$

PUF-air partition coefficient (K_{PSM-A}) was estimated using the equation by (Shoeib and Harner, 2002)

$$logK_{PSM-A} = 0.6366logK_{OA} - 3.1774 \ldots\ldots\ldots\ldots\ldots\ldots..\ldots\ldots(2)$$

V_{PSM} = Vol. of the passive air sampler (m^3)

k_A = air side mass transfer coefficient (m d^{-1})

D_{film} = effective film thickness (m)

t = time (day)

k_A = the sampling rate R (m^3 d^{-1}) divided by the surface area of the PUF disk.

In general, average concentrations, of HCB, α-HCH, γ-HCH, PCB-28, PCB-52, α-endo and o,p´-DDE increased by 46%, 40%, 26%, 25%, 18%, 13% and 11% respectively. There was no significant

variation in the concentrations of less volatile chemicals. Though the concentrations of some of more volatile analytes changed, in overall, there were no changes in "distribution patterns" and the "seasonality" from previous analysis. All the numbers, figures and tables are reformed based on the new calculation (please see Figures 2-4 in the manuscript; Figures SI-3-12 in supplementary materials; Table 1 in the manuscript and Tables SI-5-11 in supplementary materials)

For details about calculation, please see pp. 6-7, lines 159-173 of the manuscript.

References

Harner, T., Su, K., Genualdi, S., Karpowicz, J., Ahrens, L., Mihele, C., Schuster, J., Charland, J. P. and Narayan, J.: Calibration and application of PUF disk passive air samplers for tracking polycyclic aromatic compounds (PACs), Atmos. Environ., 75, 123–128, doi:10.1016/j.atmosenv.2013.04.012, 2013.

Shoeib, M. and Harner, T.: Characterization and Comparison of Three Passive Air Samplers for Persistent Organic Pollutants, Environ. Sci. Technol., 36(19), 4142–4151, doi:10.1021/es020635t, 2002.

Comment 2: There are several places in the paper (e.g. line 164) where results are reported to several significant figures. This should be reduced to 2 or at most 3 significant figures.

Response:

Thank you for your concern, 2 significant figures were chosen for our data. Please see line 34-36, line 205-206, line 220, line 240, line 252-253, line 332, and Table 1 (page 19) in revision. However, data from previous studies, e.g. India, Pakistan, and Vietnam were cited from literatures, we just kept their original values in Table 1.

Comment 3: should read ": : :Global Atmospheric Passive Sampling (GAPS) network: : :"

Response:

We read the suggested research paper and modified the lines 96-99, p. 4, in the introduction section.

Reference

Shunthirasingham, C., Oyiliagu, C. E., Cao, X., Gouin, T., Wania, F., Lee, S.-C., Pozo, K., Harner, T. and Muir, D. C. G.: Spatial and temporal pattern of pesticides in the global atmosphere., J. Environ. Monit., 12(9), 1650–1657, doi:10.1039/c0em00134a, 2010.

Comment 4

line 347, Eq. 1 and related text and SI. Shouldn't these rate constant k-values be lower case?

Response:

Thank you for the suggestion. We have changed all the 'K' in the equation and related text into lower case 'k' as per the reference used. Please see p. 16, lines 405-410 in the manuscript.

Comment 5

Figure 1 – what is the source (reference?) of the climate classification map?

Response:

We now have provided the proper reference to the climate classification map of Nepal. Please see the caption for Figure 1, p. 18, line 461, and p. 24, lines 544-545.

The cited reference is:
Karki, R., Talchabhadel, R., Aalto, J. and Baidya, S. K.: New climatic classification of Nepal, Theor. Appl. Climatol., 125(3–4), 799–808, doi:10.1007/s00704-015-1549-0, 2016.

Comment 6

Figure 2 - please double check y-axis label. Also why does it end at 2640? The spacing seems strange 2600 to 2640 takes up almost a third of the figure (y-axis scale) yet 0 to 40 (the same 40 units) takes up much less space. I realize that this is a broken scale but something seems off with the spacing.

Response:

The Y-axes of all the figures in the manuscript are double checked so that the axis label is correctly given. The Figure 2 has been reconstructed based on the recalculated data. The Y-axis has been provided with a break so that a large variation in concentrations of analytes can be understood clearly. The highest concentrations of the dominant chemicals are presented in the figure. Please see p. 19, Figure 2.

Comment 7

Table 1 – use consistent number of significant figures throughout i.e. either 2 or 3 significant figures.

Response:

Regarding data of the current study, the quantitative values were kept to 2 digital numbers (Please see p. 20, Table 1). While, data from India, Pakistan and Vietnam were obtained from other references, we kept their original values in Table 1.