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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Polycyclic aromatic hydrocarbons in the atmosphere of two French alpine valleys: Temporal trends and examination of sources" *by* N. Marchand et al.

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Temporal evolution and sources examination of Polycyclic Aromatic Hydrocarbons in two French alpines valleys

Marchand et al.

(suggested title: Polycyclic aromatic hydrocarbons (PAHs) in the atmospheres of two French Alpine valleys: sources and temporal patterns.

The authors present this study as part of a larger campaign to investigate the impact of road traffic/road tunnel-use on the air quality of the Chamonix and Maurienne valleys. A number of basic air pollutants were monitored alongside particle-bound PAHs.

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Pollutants were sampled during both summer and winter periods at two locations in each valley. This has lead to an extensive study, which investigates both pollutant relationships and trends, and attempts to tease out sources and seasonal differences in pollutant loading. Undoubtedly this work and the wider scientific programme to which it belongs, will lead to the identification of major pollutant sources and aid the implementation of legislation/management intended to reduce air pollution in these valleys. Interestingly, this study was conducted while the road tunnel ŞTunnel du Mont BlancŤ was closed, thereby providing useful baseline data with which to compare to future data when the tunnel is open.

The use of specific PAHs to infer the impact of source type, particularly at the urban site in Chamonix, is also supported with the use of particle and NOx data. The authors do recognise some of the weaknesses in using the PAH ŞmarkerŤ approach for source apportionment and select only those compounds that are grounded in the literature. The highly time-resolved data presented here, combined with measurements of other air pollutants, will make this paper of interest to atmospheric scientists in general and therefore I recommend publication.

Specific points:

Section 3 (and Table 1) The authors present a short, but useful review on PAH emissions from different sources. However, are the emissions studies cited in the text for particle-bound PAHs only, or both gas+particle, and for which compounds? The footnotes in Table1 give a clear indication of which compounds are included in the emission estimates, but this is not apparent for the studies cited in the text of section 3.

Section 4.1 The authors show that B[a]P (one of the more reactive PAHs) shows the greatest change in ratios (B[a]P/PM10) from winter to summer. The authors state that this confirms the impact of degradation processes (presumably during the summer). However, couldnŠt this simply reflect a greater emission of B[a]P during the winter? The authors should also examine other reactive PAH, such as B[a]A, to further support

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their degradation argument.

P10. Is fig 2 necessary? The authors make very little comment on this and it doesnŠt add anything new to the paper. With respect to this figure, what do the authors mean byĚ.Ťthe PAH profiles were not fundamentally differentŤ? (are they statistically different?)

P11. Para 1. The authors comment on B[b/k]F contributions between winter and summer in Chamonix, and account for a winter decrease in B[b/k]F due to the influence of gasoline vehicles. Likewise a similar increase at the rural site is attributed to wood burning. Examining Table 2 however, I fail to see any decrease/increase in the contributions of B[b/k]F to the sum-PAH at these sites. Possibly this may occur between C1 (18%) and C2 (23%) during the winter, but is this increase statistically different, given the standard deviations around these numbers?

Section 4.2 P12, para1. The authors observed a stronger correlation between sum-PAH and NO than with NO2. This makes sense, as both PAHs and NO are primary pollutants, emitted directly from sources. In the following sentence do the authors mean: ŞThus, the influence of primary sources appears preponderantŤ?

P12, para 2. Could the authors expand on their description of the Saharan dust event? What do they mean by ŞSaharan dust associated by anthropogenic inputŤ?

P12, para 2. ŞWhile the contribution of BF to sum-PAH is higher than those of B[ghi]P and COR, total PAH concentrations are more correlated to the later ratiosŤ What do the authors mean by later ratios?

Section 4.2.2 P14, para 1. What do the authors mean by stating thatĚ..Ť the PAH and PM10 concentrations present low variability, thereby preventing accurate calculation of their ratioŤ? IsnŠt period 2 also included in Fig 5?

Figure 5. Are the correlations statistically significant? Have the authors tried a similar plot using organic carbon (OC) instead of PM10? For OC, there appears to be a similar

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degree of correlation with PAHs for period 1 and even a stronger relationship with this variable in period 2 (for both C1 and C2) according to Table 3.

General: The authors should be consistent with the use of PAH acronyms e.g. B[b]F+B[k]F rather than ŞBFŤ- both are used in this manuscript.

The manuscript needs careful proof reading before publication can proceed. There are plenty of typos and sentence construction and syntax also need to be addressed throughout large parts of the text.

The maps in Figure 1 are not that helpful to the reader, as it is difficult to place these areas in context to the alpine region. The authors should include a map of the wider geographical region.

Interactive comment on Atmos. Chem. Phys. Discuss., 4, 887, 2004.