

## ***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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The authors present data of particle bound atmospheric PAHs in addition to other atmospheric parameters like NO, NO<sub>2</sub>, EC/OC, PM<sub>10</sub>. Several sampling campaigns on 12h to 24h basis took place during summer and winter, one week each. The samples were collected during closure of the Tunnel du Mont-Blanc, a second survey will take place, when the tunnel is opened for traffic. The fundamental data for the total investigation are discussed in correlation to meteorological and emission factors.

Because the atmospheric conditions are changing on a short time-scale, source characterisation by measurements of PAH concentration is very difficult. I highly agree with the authors, that PAH profile analysis alone is not sufficient. The manuscript needs fur-

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ther proof reading, in particular to show the important influence factors and processes taken place during the campaigns in a more clarified way. Above all, due to the general need of time-resolved atmospheric PAH data, I recommend the publication.

Fig. 1: The 3D-View doesn't allow readers, who are not familiar with the Alps, to get an overview. A classical geographical map will be better. Distances between the main sampling sites C1, C2, M1 and M2 and roads/residential areas should be shown in detailed sub views.

Section 2.1: Is wood burning the main heating method used in both valleys? In particular for a more easier understanding of the results shown in Section 4, I was missing a time-table summarising the meteorological situation (wind speed and direction) as well as an estimation of the different local emission sources (wood burning, diesel and gasoline traffic).

Section 3: A useful short overview about PAH sources. Perhaps the partially very high variability of emission data of PAHs (as done on page 894, line 19), should be pointed out even more distinctly.

Section 4.1 Table 2, Fig2: The authors excluded FLU and PY from  $\Sigma$ , this makes sense due to their high gas/particle partition coefficient. Additionally it should be mentioned, that even CHR is only about 25% particle-associated at 20°C and about 90% at 0°C (raw estimation using data from Yamasaki et. al., 1982). Opposed to this data, the relative concentrations of CHR at both sampling sites are only slightly higher in summer than in winter (15%-20% vs. 14%, data of Fig. 2). Even the ratio of  $\Sigma$  to  $\Sigma$  remains nearly constant (about 2). Are there any possible explanations for these findings? Do the relative concentrations of FLU, PY, CHR and BaA correlate with the ambient temperature?

Page 903 line 8: The article of Schnelle-Kreis et al. was published in 2001

Section 4.2.2: The authors pointed out, that during the winter campaigns PAHs are

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generated mainly by local (=internal?) emissions. BaP shows the lowest thermodynamic stability of all analysed PAHs, in particular compared to BeP with a similar physical behaviour. The ratio of BeP/BaP should be calculated and used to underline situations with mainly local emission. Especially period No. 2 at C2 should have had a significantly higher BeP/BaP ratio. Having potential decomposition of BaP during sampling in mind (Schauer et. al., 2003), BeP/Bap may even be used for characterization of the summer campaigns including/excluding the Saharan dust period.

#### References:

Schauer, C., Niessner, R., and Pöschl, U.: Polycyclic Aromatic Hydrocarbons in Urban Air Particulate Matter: Decadal and Seasonal Trends, Chemical Degradation, and Sampling Artifacts, Environ. Sci. Technol., 37, 2861-2668, 2003.

Yamasaki, H., Kuwata, K., Miyamoto, H.: effects of Ambient Temperature on Aspects of Airborne Polycyclic Aromatic Hydrocarbons, Environ. Sci. Technol., 16, 189-194, 1982.

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