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Comment

***Interactive comment on “Factor analytical modeling of C<sub>2</sub>–C<sub>7</sub> hydrocarbon sources at an urban background site in Zurich (Switzerland): changes between 1993–1994 and 2005–2006” by V. A. Lanz et al.***

**Anonymous Referee #2**

Received and published: 14 February 2008

General Comments

This manuscript describes the application of receptor modeling to volatile hydrocarbon data collected over two separate years, one decade apart. Six to eight sources were thereby resolved and their identification was supported through comparison with literature source profiles. The manuscript describes an interesting study that is within the scope of ACP and it is recommended for publication. Novel concepts are included in the analysis and substantial conclusions are reached. There are some issues and questions that need to be addressed. These comments are provided, in part out of

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interest in the authors reply, and in part to guide the revision of the final manuscript.

### Specific Comments

How did the ethane factor for 1993-94 get converted to ppb (Fig 10) since the ethane concentrations were only measured quantitatively in 2005-06 (pg 912)?

Using a modeling uncertainty of 10% is not unusual for PMF analysis (pg 914). However the suggestion that this accounts for the variability in the atmospheric lifetime of the compounds is surprising. Presumably the concentration of OH varies by much more than 10% between days. In addition the lifetime of the species vary by a factor of 10 or more, as pointed out by the authors. If this uncertainty is accounting for the variability in the lifetime, why is a value 10% appropriate?

The use of k-nearest neighbor to impute missing values in PMF (pg 915) is an interesting and, to my knowledge, novel strategy worthy of further discussion. How much difference did this make as compared to using the more common approach of assigning values based upon a fraction of the detection limit?

Were the less than 1% of the values that exceeded the model outlier threshold for the scaled residuals down-weighted (pg 918) or excluded (pg 916)?

What does the  $n=13$  on page 919 represent? Is this the number of components in the profile or the number of reference profiles compared? Assuming it's the former, what type of correlation coefficient is reported? Was this correlation biased by the dominant components in the source profile?

The conversion of ratios of emission factors to concentration ratios on page 920 is not clear. How does a change from 2:1 to 5:2 get equated to a doubling from 1:1 to 2:1?

Is the correlation of the gasoline source with temperature ( $R = 0.45$  and  $R = 0.3$ ) statistically significant? Should the temperatures on figures 7 and 10 correspond with each other? For example the average temperature 10-15°C for January 2006 (Fig 7) does not match with the value of about 4°C on Fig 10. Are the labels for the values in Fig 7

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for January 2006 and October 2005 perhaps reversed?

In Table 5, how were the mean concentrations for the factors (last column) combined to give the mean values for the source groups? The method should be described, as it does not appear to be a simple summation.

The low concentrations of both the ethane and wood burning factors in Dec 1993-94 is curious and perhaps worthy of discussion on page 926. Was there actually much less wood burning in December than November?

#### Technical Corrections

It is recommended that the wording in a few places be revised.

Title &#8220;Factor Analytical modeling&#8221; P908, line 23 &#8220; complex regarding..&#8221; P909, line 4 &#8220;got special..&#8221; P911, line 5 &#8220;located at a ..&#8221; P911, line 23 &#8220; extracted from hydrocarbons..&#8221; P918 line 10 &#8220;first-guess attribution&#8221;

The word factorial in the figure and table captions (e.g 6-factorial PMF solution) may result in misunderstanding due to its mathematical meaning. &#8220;6-factor PMF solution&#8221; might be better.

Table 2 - 4 captions: many of the coefficients are less than 0.7. Should the caption read  $0 < R < 0.8$ ?

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Interactive comment on Atmos. Chem. Phys. Discuss., 8, 907, 2008.

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