

Interactive comment on “Global emissions of non-methane hydrocarbons deduced from SCIAMACHY formaldehyde columns through 2003–2006” by T. Stavrakou et al.

Anonymous Referee #1

Received and published: 13 March 2009

General Comments:

This paper presents top-down emission estimates of non-methane VOCs, which have been deduced from SCIAMACHY HCHO column measurements and the IMAGES global chemistry transport model. The paper is well written and presented, and the scientific content is good. The paper therefore should be published when the issues raised below have been addressed by the authors.

Specific Comments:

Page 4614, Lines 9-10:

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Does the use of monthly-mean model HCHO profiles create any bias in the retrievals?

Page 4615, Lines 12-14:

How accurate is it to use the HCHO diurnal profiles to estimate the HCHO column at the time of the overpass? Surely the diurnal profile varies with season? Also, do the posterior emissions then correspond to the satellite overpass time as well? This last point is not clear in the text.

Page 4616, Lines 2-3:

What do you mean by ‘adapted’? Please clarify.

Page 4617, Lines 9-15:

I had to re-read this paragraph several times. Please rephrase.

Page 4617, Lines 17:

Does the vertical distribution of the pyrogenic emissions vary from region to region in the model? Given the uncertainty in injection heights, is distributing the emissions over the first six model layers a valid approach?

Page 4617, Equation 1:

Where does the 0.52 come from?

Page 4618, Line 10:

Be clear. The ECMWF analyses are used to ‘...drive the isoprene emission model.’

Page 4619, Line 25:

Style. Replace ‘general lines’ with ‘general approach’.

Page 4619, Equation 2:

Be explicit. Clearly state what x , t and f_j are.

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Page 4620, Lines 14-15:

Is the observation matrix E truly diagonal? Could it be possible that HCHO retrievals be biased (i.e. correlated) over certain widespread regions affected by biomass burning and aerosol contamination? Also, I think a model error of only 20% is very optimistic. Where does this value come from?

Page 4621, Equation 4:

Be explicit. Clearly state what all the terms represent.

Page 4622, Lines 1-7:

I'm not sure I understand the structure of the matrix B with regards to the temporal correlation. Is the value of 0.2 assigned to all off diagonal elements, which decreases as time moves forward? Please clarify.

Page 4624, Lines 20-25:

As pointed out by Arneth et al. (2008), the validity of the top-down emissions provided by Shim et al. (2005) are questionable, especially over tropical regions. I therefore think on line 23 'in very good agreement with' should be replaced by 'similar to the'.

Page 4626, Lines 19:

Palmer et al. (2003) and Shim et al. (2005) used the same HCHO data set but different approaches (a linear transfer function versus a Bayesian approach, respectively). Please mention this.

Page 4629, Lines 25-30:

The resolution of the IMAGES model is quite coarse at 5 degrees by 5 degrees. Therefore at the Equator the decorrelation length of 500 km corresponds approximately to only a single grid cell. If the model resolution was higher, would the sensitivity to the decorrelation length be significantly different? Can the authors please comment?

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Page 4630-4633: Please shorten the Conclusions section as it is quite long.

Table 2:

Does the biogenic NMVOC refer to just isoprene or all biogenic emission species? Be clear.

Figure 2:

Please put units on the colour bar.

Typographic errors: Table 1: See 'e emissions'.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 4609, 2009.

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