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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Satellite measurements of formaldehyde from shipping emissions" *by* T. Marbach et al.

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The revised version of the manuscript addresses most of the reviewer comments.

In the Editor's opinion the additional sensitivity studies performed by the authors lend strong support to the fact that the observed HCHO is indeed real. Whether the observed amounts are correct is another question, and the authors have found adecuate language that is softened in this respect. Certainly the quality of the satellite retrievals affects the further discussion, but that does not preclude the fact that the work is of generally of high quality and worthy of publication. The complications of detecting HCHO from space with certainty are reflected in the fact that there is more papers on any other gas than can be measured from space (with the exception of recent discoveries), and any paper on HCHO should be regarded in this respect.

However, the significant change in the Author's argument that CH4 is responsible for the elevated HCHO is not convincing. CH4 oxidation rates are too slow compared to the HCHO lifetime, and sensitivity on OH is partly buffered by the fact that a significant amount of HCHO still reacts with OH, in addition to photolysis. The differences in lifetime are calculated favorably by the authors; a more correct calculation indicates that CH4 oxidation rates can explain rather 100 ppt than few hundred ppt HCHO. The CH4 oxidation rate would hence need to be enhanced by a factor of 10-60 in order to explain the range of HCHO concentrations that is compatible with the uncertainties in satellite retrievals.

In the Editor's opinion it is not necessary, and maybe more prudent, to explain the observations in terms of the established thinking about primary, and secondary HCHO sources. This is a very polluted ocean, and any other factors could be at play that are not even on the scope of the atmospheric chemistry community. In fact any factor that is collocated with the ship tracks and affected by air movements could equally explain the spatial match found by the Author's analysis.

In addition to addressing comments that might originate from a second round of reviews, the Author's might want to reconsider why they choose to narrow their conclusion to an explanation that is likely too low (see above), and leave room for possible other explanations, reconsidering what are the limits and strengths of their own data.

Rainer Volkamer

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 10487, 2009.