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Atmospheric Chemistry and Physics Discussions

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

Anonymous Referee #1

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The manuscript describes an investigation using GOME to examine HCHO from shipping emissions. It includes a detailed description of the HCHO GOME retrieval. A brief comparison is presented with MAX-DOAS observations in Milano. High pass filtering is used to investigate HCHO over the ship corridor. The results are compared with a model. The manuscript would be more appropriate for AMT as it mostly describes a measurement investigation. Several issues need to be addressed before publication in either ACP or AMT.

A high-pass filter is applied to GOME data to look for HCHO from shipping emissions. The technique of Beirle et al. 2004 was valuable at the time, but is less relevant now that high-resolution satellite data are available. Why is OMI not mentioned? The OMI pixel size is much better suited to look for a small feature like a ship track. The OMI

data might eliminate the need for a high-pass filter.

Figure 5. The high-pass filter reduces HCHO VCDs over the ship corridor in EMAC from 5.5x1015 in c) to 4x1014 in d). Why? The change in GOME VCDs from a) to b) is much smaller over the ship corridor. An explanation is needed to justify the conclusion that the modelled HCHO values over the ship corridor are lower than in the GOME high-pass filtered data.

How do aerosols from ship emissions affect the air mass factors? This should be discussed. Could the signal in the SCDs arise from increased aerosol scattering, rather than from HCHO? Do satellite observations of aerosol (such as MODIS) show a signal along the ship corridor?

The authors speculate in the abstract and conclusion about reasons that the modelled HCHO values over the ship corridor are lower than in the GOME data. The reasons stated are that the emission inventories are too low and/or that there is in-plume chemistry not represented at the model resolution. Two other possibilities that should be noted are the effect of the high-pass filter, and errors in the GOME retrieval.

The phrase good agreement in the validation needs to be better justified. Statistics such as correlation or RMS difference are needed. The statement about clouds is not very convincing. The difference on 21 August is about a factor of two. The cloud fraction on that day is 0.15 which is smaller than the threshold referred to elsewhere as cloud-free.

The last paragraph of section 3 speculates on the difference between NO2 and HCHO. One proposed explanation is the difference in grid sizes. This effect should be checked.

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