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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Isoprene emissions modelling for West Africa using MEGAN" *by* J. Ferreira et al.

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This is an interesting paper on the important topic of biogenic VOC emissions, in a poorly-understood region of the world. It is especially interesting to see how well the MEGAN algorithms stand up to comparison against measured fluxes in an area that has very different environmental conditions from the studies that led to the development of the model.

Regarding the differences that you report in Section 3.3 between the high and low resolution MEGAN model runs, the issue of using input data of different temporal resolution is one that we have studied (although our input data were all at the same spatial resolution). Our results are presented in our recent paper:

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Discussion Paper

Ashworth et al (2010), Sensitivity of isoprene emissions estimated using MEGAN to the time resolution of the input climate data, Atmospheric Chemistry and Physics, 10, 1193-1201

To summarise, we found that in terms of total global annual isoprene emissions, estimated emissions were highest for the highest resolution of data (hourly) and decreased as the resolution was reduced, ie to 3-hourly, then daily average and monthly average data (even with diurnal cycles applied to the latter two to reproduce hourly climate data). It is interesting to note that you have encountered this effect when using different data sets (our input data were all taken from the same data set) which provides further evidence of the importance of using the highest possible temporal resolution of input climate data to drive the MEGAN model.

We also found that instantaneous (hourly or 3-hourly) fluxes of isoprene showed greater variability in both the magnitude and sign of the differences than is suggested by daily, monthly or annual totals. We would be interested to know if you encountered similar variability or whether the hourly emissions were always higher than the 3-hourly emissions.

I include (Fig 1. below) a figure showing the differences in isoprene emissions that my study showed for the region of your campaign (apologies for the rather boxy nature of the shading – a result of the low spatial resolution of the global meteorological data). Both panels show the percentage differences in emissions using 3-hourly data against those using hourly data. For the total estimated annual emissions, the entire region shows a decrease of up to about 10% when 3-hourly data are used; for the total emissions estimated for August (one of the months of your campaign), most of the region shows a decrease, although some areas increase slightly.

Your paper clearly demonstrates that further work is needed to validate the emissions estimated using MEGAN against observed fluxes in regions with different types of vegetation and different meteorological conditions; it also highlights again the issues that

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arise when using meteorological input data at different temporal resolutions. Your results indicate, as do ours, that model users must ensure that they use the highest resolution data that is available when assessing model performance against measurements to avoid introducing an unwanted bias into their evaluation.

Interactive comment on Atmos. Chem. Phys. Discuss., 10, 6923, 2010.

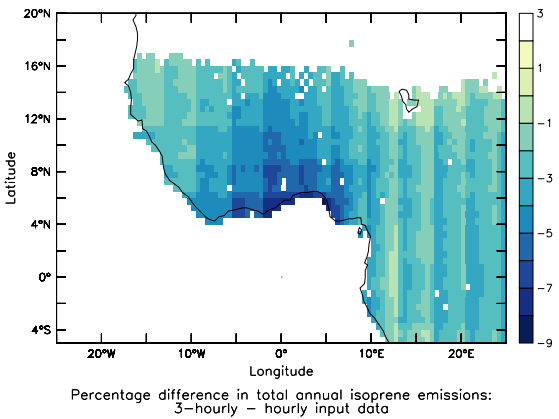

Fig. 1. Percentage differences in total isoprene emissions over West Africa

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Interactive Comment