Atmos. Chem. Phys. Discuss., 11, C7877–C7879, 2011
www.atmos-chem-phys-discuss.net/11/C7877/2011/
© Author(s) 2011. This work is distributed under
the Creative Commons Attribute 3.0 License.

Atmospheric Chemistry and Physics Discussions

Interactive comment on "Source attribution of Bornean air masses by back trajectory analysis during the OP3 project" *by* N. H. Robinson et al.

N. H. Robinson et al.

niall.robinson@postgrad.manchester.ac.uk

Received and published: 17 August 2011

We thank the reviewer for reading our manuscript and providing us with comments. Specific responses to each of these comments in included below.

1. Line 25, Page 15164. "Such a set of trajectories was calculated originating at four pressure altitudes ... Little qualitative change in trajectory was observed for sets from different pressure altitudes and all analysis presented was performed with the 950 hPa set." It is obscure to argue like this that the trajectories at different pressure altitudes had identical paths. How the difference would inïňĆuence the subsequent analysis should be evaluated with more details here

- As implied by point three of the reviewer, the trajectories released from higher al-

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

titudes are not directly applicable to the analysis presented here, which uses surface measurements. We did not mean to convey that trajectories from different pressure altitudes are identical, merely that the conclusions reached when they are used are similar to those reached using low altitude trajectories, hence the use of the word “qualitative”. Comparison of higher altitude trajectories to the 950 hPa trajectory set gives Pearsons’ r values (as defined in the manuscript) of 0.44 for 850 hPa, 0.28 for 750 hPa and 0.1 for 500 hPa. We accept that the indicated statement may be misleading, as the higher altitude trajectories are of little relevance to the surface measurements. This is especially true given the discussion of trajectory altitudes highlighted in the response to point three of the reviewer. As such, we will remove any reference to either calculating or analysing the higher altitude trajectories, specifically the sentence starting “Such a set. . .” on line 25, p 15164, and the sentence starting “Little qualitative change. . .” on line 27, p 15164.

2. Line 7, page 15166. “all grids presented here used a cell size of 0.1 ËŽ $\times$ 0.1ËŽ”. Compared to the resolution of ECMWF wind ïňĄelds (1.125 ËŽ $\times$1.125 ËŽ), the deïňĄnition of a cell, which is used as a unit for the subsequent statistics, seems to be too small. Would the accuracy of the back trajectories modelled meet the requirement of statistics based on such ïňĄne cells?

- While the cell size is slightly smaller than the resolution of the trajectories, we consider that this does not adversely affect the statistics of the mean value maps as they are only being used as a qualitative indicator and any effect would be negligibly small.

3. About “Residence time analysis” (Section 2.2.1). The residence time is calculated by counting the number of trajectory data points in each cell. However, if a trajectory data point is at a high altitude beyond the boundary layer, the surface source emissions in this area cannot contribute signiïňĄcantly to the air mass concerned. How did the authors treat this issue in their residence time calculation?

- This effect, whilst certainly relevant, was not treated explicitly in the mean value map

ACPD
11, C7877–C7879, 2011

analysis. While some kind of parameterisation could be applied to attempt to account for this effect, we took the decision that it would be better to keep the analysis as transparent as possible, discussing any implications of descending trajectories in the text. We hope that by presenting the trajectory average altitude plot (Fig. 8b) and the cluster altitude plot (Fig. 5) that we have been clear in expressing any systematic differences in trajectory altitude. We then address the relevance these small systematic differences may have on the mean value maps in the text e.g. p15181, line 27 to p15182, line 3.

4. Figure 1. There is no unit with the color bar

- This plot expresses the trajectory residence time in physically meaningless units. However, the magnitude will be added to the colour scale and expressed as arbitrary units. 5. Figure

6. Since PMF was based on high-resolution AMS measurements, it is more suitable to provide factor spectra with high resolution MS data. Like Figure 3 in Aiken et al. (2009) (Atmos. Chem. Phys., 9, 6633–6653).

- This PMF analysis was performed with the unit mass resolution data from the high resolution AMS instrument. We will make the clearer by changing p.15163, line 1 to "The unit mass resolution organic aerosol data. . ." This data has been previously published and a reader can find a detailed discussion of the PMF analysis in the supplementary material of Robinson et al. 2010.

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 15157, 2011.