

Interactive comment on “Rapid transport of East Asian pollution to the deep tropics” by M. J. Ashfold et al.

Anonymous Referee #1

Received and published: 13 January 2015

This manuscript presents a time series of observations of perchloroethene at a south-east Asian site and connects weekly-scale variations in these observations to variations in air mass source distributions related to cold surges. The authors then provide evidence for subsequent transport of polluted air masses to the tropical upper troposphere. The data and methodology are well-constructed and clearly described. The presentation is concise and generally quite tight, although I feel the authors have erred on the side of brevity in a few instances (see suggestions below for p.30711 and 30713). The text is well-written and the core arguments are easy to follow. I recommend that this manuscript be accepted subject to a handful of mainly editorial corrections.

p.30707, l.1: I think this sentence would work better as two sentences, split between
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"recent decades" and "under the prevailing". In either case, I recommend changing the order of the "under the prevailing..." and "these increases have..." phrases.

p.30709, l.17: suggest moving "to date" from the beginning to the end of the sentence

p.30709, l.24: it would be useful to specify the beginning and ending dates of the time series shown in Fig. 1

p.30709, l.25: "clear week-scale variations in the data" -> "clear variations in the data at weekly scales"?

p.30709, l.26: comma after "Fig. 1b)" is not necessary and disrupts the flow of the sentence

p.30709, l.27: recommend changing format of clarifications from ", of ~1.0–1.5 ppt," to "(~1.0–1.5 ppt)" for easier reading

p.30710, l.4: "...shows there..." -> "...shows that there..."?

p.30710, l.6: "but Robinson et al. (2014) do discuss" is a little awkward, maybe ", although Robinson et al. have raised"?

p.30711, l.1: causation seems backwards here (the change in mixing ratios is caused by the change in parcel source regions, but this sentence reads as though it causes the change in parcel source regions); the sentence should be revised for clarity

p.30711, l.12: replace "does" with "increases" for clarity

p.30711, l.17: "focussed" – typo or British spelling?

p.30711, l.25: It would be useful to add a sentence or two briefly describing what contributes to the MACC estimates of CO and O₃ in this region. Given that the interpretation is qualitative rather than quantitative, this description need not be especially detailed, but it should be enough to convince the average reader that MACC is a suitable tool for this analysis.

p.30712, l.9-11: awkward phrasing, could change to something like "In Fig. 4 we contrast daily mean maps of CO and O3 from the MACC reanalysis (again at 925 hPa) for the two days shaded in Fig. 3: 15 January 2009, when concentrations of C2Cl4 were relatively high, and 20 January 2009, when concentrations of C2Cl4 were relatively low."

p.30712, l.19: recommend splitting this sentence into two between "ppb" and "our"

p.30712, l.20-23: awkward phrasing, could change to something like "By contrast, simulated levels of CO and O3 and measured levels of C2Cl4 are more representative of the local background (approximately half of the polluted levels) on days when the winds blow from the Pacific, such as 20 January (bottom row of Fig. 4)"

p.30713: I question the decision not to show the corresponding plot for 200 hPa and/or the corresponding tracer density plots for 20 January. The presentation is already quite concise, so I think that there is room to include these. Leaving them out inspires questions (how strong is the agreement at 200 hPa? how much weaker is the evidence for this type of vertical transport?) that could very easily be addressed by including them.

p.30714, l.28: "In order to quantify better" -> "In order to better quantify"?

p.30715, l.14-15: awkward phrasing, could change to something like "Further long-term measurements will also facilitate more detailed investigation of the influences of the climatic variations discussed above."

p.30725: the first sentence in the caption to Fig. 4 is difficult to follow, suggest changing to something like "Daily mean maps of air history calculated using NAME (left), CO at 925 hPa from the MACC reanalysis (center) and O3 at 925 hPa from the MACC reanalysis (right) for 15 January 2009 (top) and 20 January 2009 (bottom)."

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 30705, 2014.

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