

Interactive comment on “Ship-borne FTIR measurements of CO and O₃ in the Western Pacific from 43° N to 35° S: an evaluation of the sources” by T. Ridder et al.

Anonymous Referee #3

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General comments:

This paper presents a series of new measurements of O₃ and CO in the Western Pacific, one of the most remote areas on the planet thought to have the cleanest air. This area has impact on stratospheric composition because it lies below the preferred location for troposphere-to-stratosphere transport and hence has a global environmental impact. The measurements reveal the presence of pollution originated in sources far away from the location of the measurements. The authors use a series of modeling tools both Eulerian (GEOS-CHEM) and Lagrangian (HYSPLIT) to analyse the data and reveal the most likely origin of the pollution events. Agreement between models and

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measurements is fairly good and the interpretations are consistent.

Although relevant for being among the first measurements in this regions, the writing suggests perhaps too much generality. It may be adequate to underline the point-wise, episodic nature of the measurements and recommend actions for more robust statistical studies, maybe suggesting measures to improve the measurements (location, season, techniques, etc.)

The paper would be more self contained if some additional phrases containing key information (both for specialists and non-specialists) would be added. Specific comments point out some examples.

The study is sound and interesting and therefore I recommend it for publication in ACP after the authors have addressed a few mostly minor remarks.

Specific comments:

P 22952 L 24~25. Abstract: ARE significant, IS important?

P 22954 L 1. 'In the Southern. . . . is analyzed.' This sentence is a bit awkward. It could be rewritten.

P 22956 L 2~6. Not clear, radiosondes where launch and used together with NCEP winds as priors? The parenthesis is too long.

P 22956 L 20. A brief sentence explaining the meaning of 3 or 5 DOF would be useful for a self contained explanation.

P 22957 L 18. These where the radiosonde data where used as priors?

P 22958 L 19. Does the word 'results' indicate model output?

P 22959 L 26. 'General' means 'standard' or a new general method is being proposed to handle the problem?

P 22959 L 27. It would be clarifying to explicit the definition of the tropopause used

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both with model and measurements (i.e. WMO?), also for the following references to tropopause.

P 22960 L 19 and Figure: Right hand CO side appears remarkably accurate. A comment here on the cause of the disagreement on the left hand side would be useful for the reader.

P 22961 L 5. Is the Townsville underestimation problem related to the problem describing P1? What is the reason of overestimation of P1 by GEOS-CHEM?

P 22961 L 14. It is not clear from the picture that PE3 reaches higher than 16 km.

P 22961 L 18. PE4 seems to have a TTL component as well, not just near surface.

Figure 5, Panel (a). is GEOSCHEM green line column average?

P 22962 L16. Wording: maybe "hypothesize" would be better than "assume".

P 22963 L 16. fix citation Jaegle/Bay

P 22962 L 18. Do PBL O3 measurements suggest clear PBL air consistent with low CO? It the only problem that model excessively mixes FT and PBL air? Nothing related to emissions/ emission inventories?

P 22963 L 17. wheras? -> whereas?

P 22963 L 18. suggests a problem?

P 22963 L 24 is the peak of VOC seen in Geos-CHEM relevant to PE2?

P 22963 27 origins -> originates?

P 22964 L 10. Some more information about the parameters used for trajectory calculations would be helpful. Does "single" mean one trajectory per event, i.e. 4 trajectories in total? Accuracy of single trajectories over 315 hours is hardly robust. Ensembles are better. What is the size of the ensemble? What are the distribution of the initial locations in space (i.e. column releases?) and time (interval or single instant release?)

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Which winds and resolutions are the trajectories running on?

Section 5.3: Is the main conclusion from this sections that HCN supports the hypothesis that PF3 is mainly fossil fuel and PF 1,2 and 3 are biomass burning originated?

22966 L 18. only originates from oceanian emissions or from Indonesia emissions?

Interactive comment on Atmos. Chem. Phys. Discuss., 11, 22951, 2011.

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