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Discussions

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Interactive comment on "Simultaneous shipborne measurements of CO$_2$, CH$_4$ and CO and their application to improving greenhouse gas flux estimates in Australia" *by* Beata Bukosa et al.

Anonymous Referee #1

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This paper discusses analysis of CO2, CH4 and CO measurements around the continent of Australia. They have employed the GEOS-Chem atmospheric chemistry-transport model for simulating the species concentrations, and also different sectors leading up to the total molecular abandances. The manuscript is pretty well writen although a bit descriptive. At times that made it difficult to identify the highligh of a section or a figure. I recommend the authors to find ways to make smaller figures and reduce the length of the text for better communicating the outcomes of this research. For example you could show only the important new results in the figures. Otherwise I only have minor suggestions and comments on the content of the manuscript. The manuscript can be published in Atmos Chem and Phys after the revisions by the au-

thors.

Minor comments: 1. The introduction section discusses at a great length on the importance of Australian natural CO2, but lees is discued in the resuts and discussions, which is mostly about CH4 and CO. A possible place to concretise your text. Similar the Abstract can be shortened.

Figure 3: May be you do not need the Column titled "Model 201x" for both the 2012 and 2013. This would improve clarify and brevity.

Page 11, line 31-32: Can you not use the biomass burning data for the time of your cruises to more accurately attribute the observed enhancements?

Page 11, line 7-8: Can you not put the emissions resulting from the fire pixels in your model, e.g., from GFED, GFAS, FINN etc.?

Figure 5 and associated discussions: I have doubt whether you can treat the Tasman sea as a background region. We see a lot of pollution events at the Cape Grim site when continuous measurements are analysed using global model.

However, the definition to background region may hold good if you employ a high resolution transport model, say at resolution of 10 km!

FIgure 6: Nice plot but difficult to follow, may be consider merging a few sectors in to bigger categories, eg., for CO2 ship and aircraft and chemical sources grouped in to one. Similarly, I see 3 small sources for CO.

The lines in the upper panels can be made more prominent

Page 14, line 8ff: Is this the global scenario? it would interesting know the australian case here! Of if you have discussed the australian case elsewhere, you may not need this here.

Page 14, line 18-19 : Is this because you have wider data coverage or something else, any speculation would be useful here.

Figure 7: Could move the legend to the same row and increase clarity of the data presentation.

page 18, line 1-6: The North America is a bit out of context, this paragraph is not so much needed, except for the fact that your data agree well with the emission inventory of coal mining! I also have a feeling that the ERs are difficult to define "precisely" from atmospheric measurements of atmospheric species of different lifetimes. At least many more events at a specific location is needed for statistically significantly determine the ERs.