

## ***Interactive comment on “Increasing synoptic scale variability in atmospheric CO<sub>2</sub> at Hateruma Island associated with increasing East Asian emissions” by Y. Tohjima et al.***

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Responses to Anonymous Reviewer #1

Thank you very much for your comments and suggestions on our paper, which are very useful for revising the manuscript.

Reply to General Comments and Questions

Q1: We will check the model results with constant fossil fuel CO<sub>2</sub> emissions and will compare the variability with the observations. Since the back trajectory analysis has been shown here, we don't believe any extra information can be extracted by tagging

C4949

tracer method.

Q2: In near future, we have a plan to do high-frequency sampling for <sup>14</sup>C/CO<sub>2</sub> analysis to isolate fossil fuel contribution to the CO<sub>2</sub> synoptic scale variability. But, now we don't have sufficient data to do such analysis.

Reply to Specific Comments P15726 Abstract: Line 13: We will use full name of “CDIAC” in the abstract, and the proper citation for the CDIAC inventory, Marland et al. [2007], is given in Introduction.

Introduction Line 22: “Although there are international efforts to reduce ...” will be changed to “Although there are international discussions to reduce ...”

P15727 Introduction Line 3: “Increasing fossil fuel CO<sub>2</sub> emissions elevate ...” will be changed to “Increasing fossil fuel CO<sub>2</sub> emission in East Asia elevate ...”.

Line 12: Emission patterns of CO<sub>2</sub> and methane in East Asia are not identical each other, but there is some similarity between them. To clarify this, we will add a figure showing the wintertime emission patterns of CO<sub>2</sub> and methane for East Asia as suggested by you. Here, we are referring to “instantaneous” methane lifetime at transport model grids, which is much faster than the average lifetime of about 10 year (see Fig. 14 of Patra et al., (2009), JMSJ, 87, 635-663, which showing latitude-pressure distribution of instantaneous CH<sub>4</sub> life time). We will modify the text here to reflect this.

Line 22-23: To state clearly that we look at winter time data only, we will changed “CO<sub>2</sub> SSVs observed at HAT during 1996-2007...” to “CO<sub>2</sub> SSVs observed at HAT in wintertime (November-April) during 1996-2007...”.

P15729 Data and Methods We use the biomass burning emissions based on EDGAR 3.2 for CO<sub>2</sub> and Fung et al. (1991) for methane. Both emissions have no interannual variations. We will add a figure showing a map of wintertime emissions of CO<sub>2</sub> and methane for East Asia.

Line 15: We will add a proper citation (Ohara et al., Atmos. Chem. Phys., 7, 4419-4444,

C4950

2007) and web reference (<http://www.jamstec.go.jp/frcgc/research/p3/emission.htm>) for the REAS inventory.

Technical comments We should like to thank the reviewer for his/her technical comments.

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Interactive comment on Atmos. Chem. Phys. Discuss., 9, 15725, 2009.