

## ***Interactive comment on “On the wintertime low bias of Northern Hemisphere carbon monoxide in global model studies” by O. Stein et al.***

### **Anonymous Referee #2**

Received and published: 14 March 2014

The authors presented results from several scenarios using the MOZART model. On the basis of model simulations they tried to assess and explain uncertainties in the global budget of CO.

General comments:

The title of the manuscript is misleading. It should reflect the fact that only one model was used to run several scenarios. Thus, the part “. . . in global model studies” should be replaced by “. . . in a global model simulations” or “. . . in simulations using the MOZART model”.

The paper is too long and repetitive. It looks like a part of a project report.

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Specifically, the last sentence in the Abstract needs to be re-written; the first 6 pages of the Introduction should be synthesised to a single page; the actual introduction starts on page 253. Section 2.3 does not fit under the general title of “Model description”; sections 3 and 4 are not logically organised; the first paragraph of Conclusions would better fit in the Abstract; conclusions are presented in the last two paragraphs of the paper on page 272. All these sections should be reduced and reorganized.

Also, the authors should better explain the concept of the “Optimized approach” (section 4.1.3). As it stands, the reader does not know what was done. Optimization would suggest an analytical or numerical approach to minimize errors (or a cost function) for a given range of parameter space (or scenarios). What I can see, a set of arbitrary scenarios was developed and some scenarios were selected to be ‘optimal’.

I recommend the paper should be reduced and reorganized. It could be published after the presented comments and corrections are addressed.

Specific comments:

In all places the authors should change the noun “concentration” with the term “mixing ratio” or use proper units for concentrations (i.e. mass per unit volume).

247-5: there is something missing in this sentence

247-27: limited – lower

248-7: caused – contribute

249-1: MEGAN is not an inventory

249-4: production of CO from . . .

250-5: the lower values – lower values, pls. remove ‘the’

252-8: missing emissions – underestimation of emission fluxes?

253-9: how far – to what extent

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253-21: Inspired by the MACC – Following the MACC?  
254-8: model version presented – model version used?  
254-13: accomplish a horizontal resolution – run at horizontal resolution  
255-17: the finally published – pls. remove “finally”  
255-21: distributed quickly – diffused rapidly?  
256-18: conducted several – pls. state how many  
256-27: determined – controlled?  
258-2: In total – pls. remove  
258-7: delivered – provided?  
258-9: erratic or locally determined . . . - what does it mean?  
258-9: we built – we calculated  
259-4: acronym MOPIIT was already explained  
259-4: flying on board – pls. remove flying  
267-2: GAV – never explained  
267-3: December to May – should it be January?  
271-3: rough sensitivity – what does it mean?  
271-7: Nevertheless – pls. remove

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Interactive comment on Atmos. Chem. Phys. Discuss., 14, 245, 2014.