



## ***Interactive comment on “Modeling the sensitivity of soil mercury storage to climate-induced changes in soil carbon pools” by O. Hararuk et al.***

**Anonymous Referee #2**

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i did one of the initial quick reviews and get reminders ever since that i shall post my comments. here they are. i hope this of any help.

Interested in the impact of warming climate on Hg i accepted the review this manuscript after some hesitation. Being not a modeler and mainly focusing on aquatic environments i may therefore only judge accordingly and perhaps give another point of view. The manuscript is very well written and structured, and i had great pleasure reading it. The idea of linking TM cycles, especially Hg to changing climate is relatively new and the authors propose a novel approach. General comments: Their model is based on the assumption the Hg/C stable and accesses the impact of changes of 3 variables: temperature, precipitation and CO<sub>2</sub> on the soil carbon budget (which is already well described in the literature) and finally Hg. The authors explain in detail their approach on

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which assumption their findings are based on. I have however 3 point to rise: 1-Even though Hg has been almost only been addressed as a global contaminant in the past century of research and this climate link is novel, the former should not be out-casted completely. The authors should also consider that surface soil has (surely) received anthropogenic Hg, which might result in elevated Hg/C ratios, e.g. archives of atmospheric deposition, such as ombrothrophic peat bogs, are commonly used to trace this. 2-A major flaw is that their major findings are backed-up by a single reference (Natali et al., 2008) and this is not a benchmark piece (3 citations). Better arguments are needed. 3-The manuscript diverges a bit from the figures. The model is thoroughly explained, but the spatial heterogeneity of the results is not addressed in details. References are still in Endnote style (I guess) and need to be checked.

Specific comments: Abstract P1I19: GEOS-Chem model uses the top 15cm, why the difference? Introduction A bit too long to my taste. P2I13: Hg is not a pollutant because of its atmospheric residence time P2I19: put in order of magnitude P2I20: add/check Streets et al., 2012 P2I23: top predators and humans P3I14: bound to P3I20: positive correlation P4I2: remove stores P4I12: remove highly P5I11: remove across the contiguous U.S. Methods P10I9-14: needs to be shortened Results and discussions P14I15: duplicate P15I5: replace continent by U.S. P16I5: address anthropogenic Hg here P16I17-21: better shown in a table P17I1-9: too long and complicated to read, shorten P17I13: end phrase with simulations. P17I17: end phrase with precipitation. P17I22: end paragraph here. P18I4-9: this is a figure caption not a text P20I1-16: address oxidation-reduction briefly P21I9: results of... P23I23: CO<sub>2</sub>, CO<sub>2</sub>.... Conclusions P26I22: go beyond and describe in detail the implication for the studies sub-areas. Fig 2: poor linear correlation, explain

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