

## ***Interactive comment on “Mercury Methylation in paddy soil: Source and distribution of mercury species at a Hg mining area, Guizhou Province, China” by L. Zhao et al.***

### **Anonymous Referee #2**

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#### GENERAL COMMENTS

The study by Zhao et al. addresses Hg contamination and methylation in paddy fields in the province of Guizhou, China. This is a topic of high importance for human and ecosystem health in paddy field areas. The study is relevant for Biogeosciences and falls within the Aims and scope.

The methods are well explained. The results are well presented, although the clarity of the Tables should be improved. The discussion is generally good, but could benefit from more links to existing literature. I have two major comments that should be addressed to improve the paper:

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1/ the Hg balance model (eq. 3 and 4). I don't really see the added value of this model. Moreover, some assumptions are very strong (eg rice transpiration amount extremely low), and the authors compare the input of 'fresh' Hg (irrigation and deposition) of 1 year, to the 'old' Hg pool accumulated over the years. Therefore the Hg balance results entirely depend on the number of years during which Hg has accumulated in the surface layer (X years of paddy field irrigation, etc.). I recommend to completely revise the model or simply drop it (unless you can clearly demonstrate what it brings to the discussion and how it supports your conclusions)

2/ the authors should pay more attention and discuss in more details to the biochemical processes affecting Hg methylation. What if the Wukeng soil had had a low pH more favorable to methylation? Would the conclusions of historical vs. artisanal Hg mining still hold? The important pH difference between the two sites prevents any conclusion regarding the impact on methylation of the "type" of Hg available (old at Wukeng vs fresh at Gouxu). If the redox and pH conditions are not good for methylation, it will not occur (whatever the 'type' of Hg present in the soil). I strongly recommend to discuss this (with additional literature references), and reformulate the conclusions taking this into account.

#### SPECIFIC COMMENTS and TECHNICAL COMMENTS

See attached pdf.

Please also note the supplement to this comment:

<http://www.biogeosciences-discuss.net/bg-2015-638/bg-2015-638-RC2-supplement.pdf>

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