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RC1: 'Comment on essd-2022-346', Yuanzhi Yao, 13 Nov 2022

The manuscript entitled " GRiMeDB: The global river database of methane concentrations and fluxes" proposes an a comprehensive database for riverine CH4 and the associate drivers. The proposed databased is based on the earlier work by Stanley et al. (2016). The authors present the flow chart for generating the database, and also the data analysis.

The topic of the manuscript is interesting and relevant to the earth system science community, as methane emission is a potent source of greenhouse gas. Overall, this is a well written manuscript without any apparent flaws. I can recommend the publication of this manuscript with minor revisions.

- We very much appreciate these positive remarks.

I also have a minor remark about the 'first database' stated in the abstract. I must confess, though, that I did not quite understand the difference between this database and the previous one (MethDB). I think MethDB is the first comprehensive database for river CH4. This work is an extension with significant efforts.

- We changed the wording in the abstract to simply say 'we present a comprehensive database…'

Figs. 5 and 6: Can you differentiate the sites for ebullitive and diffusive flux, respectively. It is very important for modelers.

- We created new versions of Figs. 5 and 6 for the different flux measurements and included it in the Supplement (Fig. S1 and S2).

The figures are very nice and useful. Not all of them need to be in color, though. I also struggled a little bit with the legends: I think Figures 11, 12 and 13 should have legends to show the meaning of the colors.

- For clarity, we used the orange-green color scheme throughout the manuscript (with the exception of Fig. 12 (which is now Fig. 13 in the revised ms) and Fig. 13b (now Fig. 14b) to denote concentration (orange) and flux (green) data. Similarly, brown is used for figures dealing with sites with both concentration and flux data. We would like to retain this color scheme for all plots for consistency. For Fig. 11 (now Fig. 12), because there is just one point type per plot and the y-axis and figure caption also define the contents of each plot, we have not added a legend to this figure. For Fig. 12 (now 13), we added legends, and for consistency, the flux plots were converted to a density plot format. For. Fig. 13b (now Fig. 14b), the colors in this figure have no specific significance- only that they are different- to represent different sites, as is explained in the figure caption. We believe that adding a legend would add confusion rather than clarity, so it was not added.