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Interactive comment on "Effect of sporadic destratification, seasonal overturn and artificial mixing on CH_4 emissions at the surface of a subtropical hydroelectric reservoir (Nam Theun 2 Reservoir, Lao PDR)" *by* F. Guérin et al.

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The authors thank the reviewer for its review

Reviewer comment : R#2 : Due to the great variability in time, the authors remark in the conclusion that temporal sampling might be at least monthly. This reviewer, however, recommend to the authors to avoid taking data only under the light of nonparametric analysis due to non-normal distribution.

ANSWER: Parametric tests are based on the normal distribution and cannot be used

when the dataset follow other distributions

R#2 : Instead, authors should better explore the intrinsic nonlinearities in the underlying CH4 dynamics in hydroelectric reservoirs. Are these distributions power laws, Pareto, log-normal?

ANSWER: As now mentioned in the manuscript (section 3.5) and show in the supplementary material (Figure S3), the dataset (both surface concentrations and calculated diffusive fluxes) follows a loglogistic distribution.

R#2 : If so, what kind of process would lead this sort of distribution outcomes in space and time? Are there literature considering these other kinds of distributions?

ANSWER: Fitting a distribution is only possible with large datasets which are unfortunately rare. Only a few studies consider the statistical distribution of their data and all distributions are heavy-tailed (lognormal or Generalized Pareto Disstribution), indicating that high episodic fluxes are very common for CH4. It confirms that CH4 emissions occur through hotspots and hot moments but it cannot provide any information on the importance of these rare and intense fluxes on the global CH4 budget of the studied ecosystems

R#2 : I do not presume that only intensifying the sampling monitoring would bring novel information, as the distributions maybe the same, nonGaussians. I recommend to the authors to go further on dynamical analysis (complexity) in order to find differential equations or statistical models that come out with those distributions, and might be applicable to any water body. That would be a great advance in CH4 studies and application to hydroelectric reservoirs.

ANSWER: As explained in the section 4.4 and in the answer to the previous comment, defining the type of distribution of a dataset for a given ecosystem requires intense monitoring for at least a year in order to have a dataset with a sufficient number of data encompassing hot moments and the hotspots of emissions to be able to find a

statistical distribution. The rare but significant events “shape” the distribution and make them differ from the Gaussian distribution. Even if we find a general distribution fitting the data of most inland, the parameters of the distribution are unlikely to be constant over all sites and climatic region. Therefore, it will not exclude intense monitoring for adjusting the parameters of the distribution. For reservoir, it is even more complicated since distribution (and their parameters) might change significantly over time with the decrease of emissions with age of the reservoirs since these systems are not at steady state.

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