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Interactive comment on "Evaluating stream CO_2 outgassing via Drifting and Anchored flux chambers in a controlled flume experiment" *by* Filippo Vingiani et al.

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We thank the anonymous Reviewer for her/his considerations/comments. We will be happy to improve the manuscript based on the suggestions and comments provided by the referee. A more detailed answer to each specific comment follows.

Comment: Dissipation rates of turbulent kinetic energy were estimated using a bulk approach (from channel slope and flow depth), as well as from local measurements of turbulent velocity fluctuations. I suggest adding and to discuss a comparison of both dissipation rate estimates, as the bulk approach can be more easily applied to field conditions. Answer: Thank you. We will add a brief discussion about this issue.

Comment: I suggest mentioning the range and variability of measured CO_2 fluxes in addition to dissolved concentration and gas exchange velocity. Answer: We will insert the range of CO_2 fluxes in the text.

Comment: Fig. 2: why not using a scaled x-axis (instead of a categorical axis), where significant regressions could be added to the graph. Answer: We initially used a scaled x-axis for velocity and discharge but then we decided it was better to use a categorical one to have a clear visual comparison of the mean values obtained with the different designs and deployments. Linear regressions for slope and discharge were computed and discussed in the text but not shown in the plot (see L266-282).

Comment: Comparison of the scaling coefficient (alpha) in the equation relating k_{600} to dissipation rates to other studies: energy dissipation rates depend on the depth at which measurements were taken (see e.g. Esters et al. 2017, doi: 10.1002/2016JC012088 for wind-driven systems). In streams, turbulence is driven by bed friction, leading to a different depth-dependence of dissipation rates (and values of the "constant" alpha). Dissipation rates from bulk scaling (see above), in contrast, assume uniform distributions. This issue could be discussed further when comparing the results to other studies. Answer: We agree, we will add a more complete discussion about this issue in the revised text.

Comment: line 452: I assume that the ADV velocities were rotated into a vertically oriented coordinate system before all subsequent analyses? Answer: Yes, we agree. We will add a sentence to explain the rotation, e.g. "We rotated the velocities to an earth coordinate system with an along-flow (u), cross-flow (v) and two duplicate up-down (w1, w2) components following standard transformations provided by Nortek (2020)."

Comment: line 483: lower bound of the wave number for spectral fitting: the lower bound should not be defined by water depth, but by the distance of the ADV sampling volume from the water surface (as this defined the larges isotropic eddy). Answer: Thank you very much for pointing this out. We agree on this point and we will correct the Ms accordingly.

Comment: line 501: estimates of energy dissipation rates are typically log-normally distributed (see e.g., Baker et al. 1987, https://doi.org/10.1175/1520-0485(1987)017<1817:STITSO>2.0.CO;2). Arithmetic averaging may therefore be not appropriate. Answer: Thank you very much for pointing this out. We have verified that our data was log-normally distributed.

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