

Interactive comment on “Soil CO₂ efflux errors are log normally distributed – Implications and guidance” by Thomas Wutzler et al.

Anonymous Referee #2

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This manuscript uses a year of data from four continuous (30 minute) soil CO₂ efflux chambers to examine how different distributional assumptions—in particular, whether one assumes that random errors are normally or lognormally distributed—affects inferred error structures, confidence intervals, and annual sums. This is an interesting topic and appropriate for GIMDS. The ms is reasonably well written, concise but insightful, and provides useful guidance and a convincing argument for researchers in this area.

There are a few problems. It would be useful to discuss negative fluxes in a bit more detail, because they do occur, and not just because of error (see below). Several of the figures should be rethought. Finally, no data and code availability is specified. The latter seems to me particularly important. . .ah, I see the footnotes at the bottom of p.

13. It would be good to feature this more prominently, as the authors 'lognorm' package might be of broad interest.

In summary, this is a short, technical, and very interesting look at the statistical assumptions researchers make when gap-filling and otherwise handling soil respiration data. It needs minor to moderate revisions.

Specific comments

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1. Bottom of p. 2 and top of p. 3: this is an interesting question. In fact, soil CO₂ efflux (the soil-to-atmosphere) flux can definitely be negative at times due to pressure effects for example, or soil drainage. The actual process of soil respiration can probably be negative in certain cases as well (for all these see e.g. <https://www.sciencedirect.com/science/article/pii/S004896971531144X>). Obviously *usually* soil respiration is a positive number, but I think a bit more nuanced discussion would be useful here

2. I share R1's concern about Figure 1, which seems to be pooled data from all four chambers. Is this appropriate? It seems better to show one line per chamber

3. It's difficult to see what's going on in Figure 2—things are jumbled and overplotted. Faceting by method (x) versus chamber (y) would separate the chambers' data individually and be clearer

4. Top of p. 8, "panel" not "penal"

5. Seems like Figure 6 would be more effective as a table, or removed entirely and simply reported in the text

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Discussion paper

