

Interactive comment on “Can current moisture responses predict soil CO₂ efflux under altered precipitation regimes? A synthesis of manipulation experiments” by S. Vicca et al.

Anonymous Referee #1

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Soil CO₂ efflux is the second largest CO₂ flux and slight changes in the factors influencing soil CO₂ efflux are likely to have strong impacts on the global carbon budget. The authors were using the results from rainfall manipulation experiments to test if current responses to soil temperature and soil moisture can be used to predict CO₂ efflux under modified precipitations regimes. The analyses and conclusions are based on 31 experiments (with the majority of experiments conducted in the temperate zone). The used approach provides new insights and fits within the scope of the special issue. The paper is well done on the whole. Yet, I would like to ask the authors to address the following issues.

Please state more clearly how many experiments were used to test the hypothesis

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(24 or 31, see Figure 4). Overall it is difficult to follow how many experiments were excluded for which reason.

Out of these 31? experiments, 14 are conducted in close vicinity (ThuringerSchiefer). Are the findings influenced by such a strong bias towards one area?

The hypothesis was rejected for the seven experiments which had the most reliable data set (i.e. those providing high-frequency measurements of SCE). In contrast, the authors highlight the importance of high-frequency measurements. Please clarify.

The authors tested the “hypothesis (H1) that the relationship between SCE and temperature and volumetric soil water content (SWC) observed over time in the control plots can be predicted to . . .”. However, temperature was only taken into consideration while testing model 1-4.

The authors tested for artefacts related to SWC measurements. What about the effect of the set-up, scale and duration of the different precipitation manipulations experiments on SWC and soil CO₂ efflux. How much of the variability is “experiment” dependent? Please elaborate on the statement made in line 2-5 on page 867.

All experiments (except one) are located in the temperate zone. Please re-phrase your statement given in line 25-26 page 866.

The discussion section is mainly addressing site-specific aspects but an answer to the question “can current moisture responses predict soil CO₂ efflux under altered precipitation regimes” is largely missing.

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