Biogeosciences Discuss.,
https://doi.org/10.5194/bg-2019-232-RC1, 2019

Biogeosciences Discussions

Interactive comment on "Using Respiration Quotients to Track Changing Sources of Soil Respiration Seasonally and with Experimental Warming" *by* Caitlin Hicks Pries et al.

Anonymous Referee #1

Received and published: 5 July 2019

General comments

This manuscript describes an analysis of field-measured apparent respiration quotient (ARQ), along with d13CO2 data, from a soil warming experiment. The promise of such data, as is well explained in the introduction, is the insight it offers into changing sources of soil respiration at a much finer resolution than simply heterotrophic vs. autotrophic. Whether ARQ will live up to this promise is uncertain, but this ms is a significant step in that direction. The authors' results, which documented changes in ARQ with temperature, moisture, and most dominantly season, are intriguing and mostly consistent with theoretical expectations. One could imagine extensions to the experiment–most obvi-

ously to me, it's too bad no measurements were made on root-free (trenched) plots–but this is a really nice study, well written, and compelling.

There are some problems. The introduction needs to be careful about ARQ versus RQ usage; I have some concerns about the statistics, which seem a bit ad hoc at times; there's currently no code or data availability, which I view as unacceptable; and some of the figures and tables need minor clarifications. See comments below for more detail.

Overall, however, this is a strong and interesting study and will pique the interest of a large group of soil researchers interested in discriminating soil respiration sources.

Specific comments

1. Line 33: kind of true but not exactly; typically defined as the surface-to-atmosphere CO2 flux (yes, dominated in most systems by RH+RA). Worth clarifying I'd suggest

2. L. 43: might cite e.g. Subke et al. (2006, http://dx.doi.org/10.1111/j.1365-2486.2006.01117.x) or Bond-Lamberty et al. (2004, http://dx.doi.org/10.1111/j.1365-2486.2004.00816.x) here?

3. L. 48: 1/RQ or 1/ARQ? Is there a difference between ARQ and RQ? Also not sure why OR is defined here as it doesn't seem to be used again

4. L. 49-50: is this (carbohydrate=1) defined as a standard, or does it follow from elemental structure?

5. L. 55: ah. So here define ARQ; line 48 should solely reference RQ, then

6. L. 82: "same soils"

7. L. 84: probably start new paragraph

8. L. 167-169: I know this is standard but it's also unclear and hard to replicate; in the future consider using something like the MASS::stepAIC() function, which automates this term-selection process in a transparent and reproducible way

9. L. 170: start new paragraph

10. L. 180: hmm, consider something like piecewiseSEM::rsquared() which will do this more robustly and statistically appropriately

11. Data AND code availability? I generally expect both to be available (attached as SI or deposited) for transparency and reproducibility, at least for the main results . . .line 339 is nice but not sufficient

12. Table 2: define ARQ in caption and explain difference from RQ in table 1

13. Figure A1: what are the circles?

14. L. 238-: nicely written

15. L. 260: “climate, among other factors.”

16. L. 296-: hmm

17. L. 312: SOC losses?

18. L. 331-332: this probably deserves a bit more discussion, in the discussion or introduction

19. L. 336-337: good close!

Interactive comment on Biogeosciences Discuss., https://doi.org/10.5194/bg-2019-232, 2019.