Biogeosciences Discuss.,
doi:10.5194/bg-2016-397-SC4, 2016

Biogeosciences Discussions

Interactive comment on "Technical Note: Differences in the diurnal pattern of soil respiration under adjacent *Miscanthus x giganteus* and barley crops reveal potential flaws in accepted sampling strategies" *by* J. Ben Keane and Phil Ineson

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Received and published: 13 November 2016

The paper is a nice work for guiding soil respiration measurement design.

Since the temperature response of soil respiration is so important to your topic, I assume the widely reported soil respiration-temperature hysteresis should be addressed. And you did discuss a little in 3.2 Environmental control of Rs, however, I think this section could be discussed even better by incorporating the knowledge from a few previous

efforts. Please see follows.

For the diurnal scale soil respiration-temperature hysteresis, there are a few representative works, including the classic Phillips et al. (2011) paper that applies mathematical models answering a few fundamental questions, like how soil temperature measurement depth selection, heat flow influence the respiration-temperature relation, etc; Afterwards, Zhang et al. (2015) combined both model exercise and field experiments to give a more comprehensive explanation of the occurrence and mechanism of the hysteresis. To exclude the possible effect of temperature depth selection by plotting respiration and temperature colocated at the same depth, this work demonstrated how heat flow, gas diffusion, photosynthesis contribute to the hysteresis, and also explained how soil moisture modulates hysteresis magnitude. Actually, the hysteresis may be more widely reported than the authors realized, see the literature list that reported field measured soil respiration-temperature hysteresis in Zhang et al. (2015).

As a useful knowledge to this manuscript, the argument that "Even the CO2 flux (F(z)) and the environmental conditions at the same depth can be out of phase, since the flux integrates sources from other depths, causing hysteretic loops" (Zhang et al., 2015) would help explain why the temperature-depth selection cannot avoid hysteresis.

Another useful information for this manuscript is related to photosynthesis control on soil respiration. As photosynthesis has long been suggested as the determinant of soil respiration by providing respiration substrate (e.g., Kuzykov and Cheng, 2001; Kuzyakov and Gavrichkova, 2010), Zhang et al. (2015) suggested the time-delayed photosynthesis impact on soil respiration contribute to the '8' shaped soil respiration-temperature hysteresis, and altered the hysteresis direction (clockwise cycle, or counterclockwise cycle) under different time lag levels of transferring photosynthate from leaves to roots. But these are numerical modeling representations, Zhang et al. (2015) also acknowledge more field validation are still required. The authors can think a little about this.

A third representative and nice work is by Oikawa et al. (2014) as you cited.

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Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2016-397, 2016.