

Interactive comment on “Measurements of soil respiration and simple models dependent on moisture and temperature for an Amazonian southwest tropical forest” by F. B. Zanchi et al.

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I have noticed relatively few non-referee contributors to BGD, and would like to take this opportunity to make a very brief and I hope helpful contribution to this work as a short comment.

Assuming no instrumental biases (concern expressed by referee 1) exist, it would be valuable to consider whether the concerns of Kirschbaum (2004) may apply to this work, particularly the efforts to assess the appropriateness of models taking the moisture content of soil into account. Briefly, the concern Kirschbaum (2004) expresses is that heterotrophic respiration may reflect temporal changes in the size of a labile

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soil organic matter pool, that in turn reflect seasonal variation in supply superimposed onto the decomposition dynamics. The result is potentially biased parameters for temperature sensitivity (and possibly moisture sensitivity also). Where heterotrophic and autotrophic respiration are considered in total soil respiration, seasonal dynamics in the autotrophic supply of photosynthate to soil respiration (Hogberg et al., 2001) may also correlate with soil temperature and moisture, and cause further biases if not considered. In a worse case, these differences could lead to the conclusions that C dynamics respond in fundamentally different ways in different ecosystems, even when the same underlying relationships hold.

An alternative approach that may be more robust (by avoiding correlation of substrate supply with temperature and moisture) is to assess soil respiration responses to moisture and temperature using controlled experiments (presumably in the laboratory), and then to impose the laboratory relationships onto the field data. I have been involved in a recent study (Brown et al., 2009), which undertook such an approach, and believe that consideration of the modified Lloyd and Taylor relationship and parameters obtained may be of some use here, despite the differences in ecosystems studied.

Brown M, Whitehead D, Hunt JE, Clough TJ, Arnold GC, Baisden WT, Sherlock RR. 2009. Regulation of soil surface respiration in a grazed pasture in New Zealand. *Agricultural and Forest Meteorology* 149(2):205-213.

Hogberg P, Nordgren A, Buchmann N, Taylor AFS, Ekblad A, Hogberg MN, Nyberg G, Ottosson-Lofvenius M, Read DJ. 2001. Large-scale forest girdling shows that current photosynthesis drives soil respiration. *Nature* 411(6839):789-792.

Kirschbaum MUF. 2004. Soil respiration under prolonged soil warming: are rate reductions caused by acclimation or substrate loss? *Global Change Biology* 10(11):1870-1877.

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