

Interactive comment on “Soil moisture influenced the interannual variation in temperature sensitivity of soil organic carbon mineralization in the Loess Plateau” by Y. Zhang et al.

Anonymous Referee #2

Received and published: 17 February 2015

This study interestingly showed year-to-year variations in Q10 determined from long-term SOC mineralization measurements in Loess Plateau and showed moisture difference due to inter-annual variability of rainfall is the key for Q10 variations. I agree the information is very important for understanding of potential impacts of global warming on local C cycles. MS is mostly well organized, and methodology is good enough. I did not find any significant errors. On the other hand, most of the previous studies cited in the MS were the studies showing Q10 determined from soil respiration measurements including both root and microbial activities, although your study did not include root physiological processes. I think the root effects can be potentially included in the difference of your and previous studies, which also play important roles in Q10 of soil

C231

CO₂ effluxes (ex. Booe et al 1998 Nature, Janssens et al. 2004 GCB). Thus, please be careful about this aspect.

Specific comments

P1454 L11: Please define WFPS in this part.

P1455 L1-5: In the sentences, some previous works reported Q10 of soil respiration including root respiration, which have different processes from SOC mineralization treated in your study.

P1456 L7: “agricultural ecosystems” → “vegetation ecosystems”? , as the references included works in forests.

P1458 L10: Please recheck the equation of WFPS, and the 2.65 is the particle density?

P1459 L7-9: How about estimating annual cumulative SOC using Eq4? Also, the annual cumulative SOC mineralization rate estimated by the linear interpolation should be compared with average of the measurements in each year, to discuss the potential errors due to the estimation methods.

P1459 L19: Table 1 should be referred before Table 2?

P1459 L20: Again, please add the mean annual SOC mineralization rate using the unit of cCm⁻²yr⁻¹ for readers' reference.

L146 L4: Please clearly define when the dry and wet season occurs? Every year same? Otherwise, there are some inter-annual variations?

P1460 L20: I think Raich and Schlesinger (1992) is the review paper for Q10 determined from soil respiration rates, which differ from that of SOC mineralization. Note that root respiration Q10 can be higher than that of microbial respiration in response to the seasonal variations in root increments (ex. Booe et al 1998 Nature, Janssens et al. 2004 GCB).

C232

P1461 L12: It seems the rainfall “distribution” was not examined in the current MS.

P1461 L13: I cannot understand the definition of the “annual precipitation events” in the Figure 5b. Does this mean “rainfall days”? For the rainfall characteristics, you can use rainfall intensity, rainfall days, and rainfall frequency in addition to the rainfall amount (ex, D’Odorice et al 2000 Water Resource Res, Kao et al. 2013 Hydrological Processes).

P1461 L21: Please remove “However”.

P1463 L5: I am not sure if the inter-annul variations in Q10 in your site were large or not. Please compare your results with previous studies if possible. Some previous studies reported inter-annul variations in soil respiration (ex. Savege and Davidson 2001 Global Biochem Cycle, Epron et al 2004 Ann For Sci, Irvine et al. 2008 GCB, Kume et al. Ecohydrol).

Interactive comment on Biogeosciences Discuss., 12, 1453, 2015.