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Interactive comment on "An inversion approach for determining production depth and temperature sensitivity of soil respiration" *by* R. N. C. Latimer and D. A. Risk

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I understand this as a well written paper that is of high interest for inverse modelling and also for understanding how we can potentially understand empirical data by using some of the reliable soil physical principels as a filter.

The only major problem I have with the paper is the authors way to discuss the 2 basic parameters that they can estimate as a try property of high general interest. In my view the 2 parameters are dynamics variables of all ecosystems and none may be of direct interest for the long-term response of environmental changes.

The Q10 as a lumped aggregated sensitivty of temperature is in fact also including

many other components - especially the mositure response control of CO2 production is a problem. In most natural ecosystem the moisture is regulating CO2 production both in the dry and the wet range since microbial processes are regulated strongly by moisture and oxygen. Another issues is the microbial activity and the substrate quality. None of those can be assumed be lumped into a Q10-value.

So I think the value of being able to estimate Q10 from simultaneous measued CO2 conc and surface flux data are limited for understanding CO2 issues especially on the global scale.

On top of this I also think that the production depth that here is assumed to follow an exponential decay function can be totally misunderstood. Production depth is not only the decomposition from a substrate with a certain distribution it also originates from autotrofic respiration that can not be assued to follow such simple depth distibutions.

The high accuracy in the suggested method is of high theoretical interest but it should be balanced by the very high uncertainty in some of the asumptions in the conceptual model. However, assuming the conceptual model is valid I understand the suggested inverse model is useful.

My suggestion for revision is that the authors make such a discussion. They need to clarify the assumption both in the introduction and also follow this up in the conclusions.

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