

## ***Interactive comment on “Soil respiration at mean annual temperature predicts annual total across vegetation types and biomes” by M. Bahn et al.***

**Anonymous Referee #1**

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With this work, the authors demonstrate that annual soil respiration can be estimated by measuring soil respiration at mean annual temperature at sites which are not water limited. At seasonally arid sites, a correction factor based on the ratio between precipitation and potential evapotranspiration needs to be used. This work is, thus, extremely useful in that it proposes a feasible method to obtain reliable global estimates of soil respiration, and their space and annual variability. The approach is sound and the work well performed. Conclusions are well supported by the data. However, despite the high scientific relevance and the good quality of the study, the ms is poorly structured and in many instances suffers from lack of clarity, to the point that it needs substantial rewriting. In fact, it is only in the Results and Discussion section that the study is presented in its logic order and the reader starts understanding the work performed. Both the Introduction and the Method sections are too short and, in particular for the latter, lack

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details and clarity. I suggest that the approach used (1. Tds, 2. Monte Carlo, 3. Test with the dataset) is first explained in the Introduction, and the same order is used to present the Methods. These should also be given in much more details. Also, Results should be presented more extensively (see specific comments below). Specific points: P04L17 \_ Table 1: Number of sites and site-years. First of all there is an inconsistency between the 57 total sites presented in table 1 and the number of sites mentioned in the text (58). I suspect that the table lacks 1 tropical site. This needs to be checked and the mistake corrected. With regards to the site-years, data referring to this category are not clearly reported and they are firstly and only presented (as little triangles) in fig. 4. To which year do data in Table 1 refer to, for the sites where more years are available? I would suggest to report in Table 1 which are the sites where data for more than one year are available and give, for them, also the inter-annual variation of SR. P04L21: Here but also elsewhere in the text, the authors use the expression “season when mean annual temperature occurs”. This, to me, makes no sense and I suggest rephrasing to something like “season when daily temperature is frequently close to the mean annual temperature value”. Methods: I suggest restructuring in: 2.1 Standard Deviation of global daily temperatures (in this paragraph the Q10 classes concept should also be clearly reported); 2.2. Monte Carlo Analysis; 2.3: Database. Each session should be presented with much more details than it currently is. P05L11: Add “for” before all sites. P05L13: Initialize Tsd P05L27: Initialize GPCC P06L20/Fig.1: The results in this figure should be presented in much more details. Data points do not seem to match with the theoretic lines given, but this is not reported at all. Also, the Q10 classes are very poorly explained throughout the ms, and need to be reported with clarity. P08L9: I may be wrong, but to my understanding SRannual is lower than SRmat only when the dry season is also warmer than the wet, and not simply out of the mean annual value. This, in fact, should not be the case if it was colder.