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Interactive comment on "Global spatiotemporal distribution of soil respiration modeled using a global database" *by* S. Hashimoto et al.

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General comments

This manuscript describes a new data-driven, bottom-up estimate of the global soil respiration (RS) flux based on a database of observations and MCMC-parameterized empirical models. The authors do a nice job of describing why this is important in the introduction, and the ms is well written and interesting, with clear figures and appropriate references. There's nothing here fundamentally new, but it's an interesting synthesis/analysis combining a number of previous approaches that significantly improves our best estimate regarding global RS, its spatial and temporal distribution and variability, sources, and changes with climate shifts.

There are a few points that could be improved: some points in the methods and results need to be clarified, particularly with regard to code and data (especially gridded RS outputs, which will be critical for any future model benchmarking exercise) availability; I was surprised the authors didn't mention the possibility of using NDVI/MODIS to drive soil respiration models (e.g. Huang et al. 2013 10.1016/j.ecolind.2012.10.027); a few points in the discussion could be deepened. See specific comments below. It would also be good to know how the authors treated multi-year estimates in the database (e.g. were they weighted?).

Overall, this is a very solid study that will, as the authors say, provide a valuable benchmark and constraint for future efforts to model and understand the global carbon cycle.

Minor comments

1. Page 4336, line 24: "availability is limited"

2. P. 4337: it might be worth noting explicitly that while you're fitting a single global response model, because the model allows for variable response with changes in T and P, it gives a lot of flexibility (I think), i.e. Fig. 6

3. P. 4338, l. 1-: code availability? Did you use pre-written MCMC software, or write your own? Clarify

4. P. 4341, l. 12-14: this seems to be the opposite of what Figures 7 and 8 show? Check carefully

5. P. 4341, l. 20-: It would be straightforward to calculate the CMIP5 Q10s (i.e. how global RH responds to air temperature anomaly) and compare it to your calculated values. That would be interesting (though not required here-just a thought)

6. P. 4343, l. 8-11: might put this in abstract

7. P. 4343, l. 22: "temperature of a CRU"?

8. P. 4345, l. 22-: I agree this is really interesting – why do nonlinear processes at small scales seem to produce linearity at large scales?

9. P. 4346, l. 16-18: not considered, but it *is* included implicitly, right? The SRDB includes observations (though not as many as we would like) on degrading permafrost

10. Table S4: include estimate errors, if available

Interactive comment on Biogeosciences Discuss., 12, 4331, 2015.