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Interactive comment on "A call for international soil experiment networks for studying, predicting, and managing global change impacts" *by* M. S. Torn et al.

Anonymous Referee #2

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The authors have presented a call for the international soil research community to consider a global network of soil manipulation experiments. These would be designed to explore some of the impacts of global climate and environmental change on the ecosystem services provided by soils. The authors particularly stress the importance of possible future changes in soil carbon stocks, but consider also nutrients such as N and P.

It is difficult to disagree with the authors' implied suggestion that it is important that we understand more about how global changes might be manifested in soil carbon stocks and carbon cycling. However, I did not feel that the authors were successful in

making their case for a network of experimental sites where soil conditions would be manipulated. For instance, in section 1 the authors refer to the possibility that, under altered environmental conditions, plants might change their below ground carbon accumulation. But there are many possible effects of altered temperature, carbon dioxide concentrations, and moisture availability on plant growth. These include altered leaf area, for instance, and changed vulnerability to various kinds of disease and predation, as well as to the effects of frost or prolonged moisture shortage. The authors do not set out, or appear to consider, how these various possible effects might be monitored and untangled. The lack of any real detail of the experimental design seemed to me to be an area where the paper needs additional work in order to set out the authors' vision in sufficient detail that the proposal can be more widely considered. It is not clear whether the authors had in mind the manipulation of soil temperature alone, or in combination with other relevant factors.

I was also concerned that the authors' proposal seems to be directed at the soil research community in relative isolation, and certainly without explicit links to biological and ecosystem research programs more generally. For instance, how should soil researchers decide on the most informative level of soil manipulation? Would this be guided by modelled climate scenarios? Would soil biologists and microbiologists form an important component of the proposed network? What other disciplinary perspectives might be important, and how would interdisciplinary linkages be formed and supported?

I would like to see additional detail of what the authors envisage: what soil conditions would be manipulated? How might the effects of unmonitored factors be detected? How much replication would be needed? How would the local site history (e.g. of cultivation or erosion) be documented and included in the proposed program? How would the monitoring program cope with possible disturbance by drought, fire, or other disturbances? Would it be important to build in some level of redundancy, using multiple sites? If so, how might this affect the viability of the proposed global network?

The paper could be better referenced in places. Section 1 makes claims about the turnover time of soil organic carbon in the tropics and the Arctic (lines 3-5). This needs to be referenced. Likewise, the claim that experimental manipulations are often too short (section 2, line 24) would benefit from supporting references. Again, the claim that heat waves often coincide with drought (section 2) should be referenced.

I did not feel that it was appropriate to refer to "PIs" in the paper - the authors could simply refer to collaboration among the proposed network sites. In any case, the correct form for multiple principal investigators is simply "PIs", not "PI's". This needs correcting at several places in section 4.

In section 7 the authors refer to 'principle investigator' but this should be 'principal investigator'.

Interactive comment on SOIL Discuss., 2, 133, 2015.