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Interactive comment on "Passive soil heating using an inexpensive infrared mirror design – a proof of concept" *by* C. Rasmussen et al.

T. Caldwell (Referee)

todd.caldwell@beg.utexas.edu

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The note, Passive soil heating using an inexpensive infrared mirror design, uses glass panels and solar reflection to passively heat the adjacent soil for climate change experimentation. I agree with the authors that a less expensive and complicated method is needed. However, their method alone does may adequately resolve this need universally. For one, the mirror not only shades certain regions, but it likely focuses solar radiation unevenly across the experimental area. Second, it can only warm the soil when and where there is sunlight present. Third, it may or may not be scalable.

As the authors note, the system itself results in shading of the soil surface at certain times of the day. They did produce a significant heating effect but this was only moni-

tored in a 1-D soil profile. Would the in situ temperature sensors randomly instrumented within the 0.91m plots? I'm curious how spatially variable the T-increase is. Between the shading and focusing, there is a lot of potential to induce thermal gradients in many directions. How analogous to global warming would this be? Future direction might include thermal imaging to capture the spatial representativeness of the passive heating.

The authors do show significant heating, but it is somewhat uncontrollable both in its extremes and its duration. Figure 3 shows the majority of heating only happens around noon when the sun is highest. Unfortunately, global warming doesn't necessarily operate as such. For arid locations, as is here, it will increase mean daily soil T, but primarily during peak sun hours. Is that sufficient for climate change studies? I'm not sure. And what limitation are there in more humid or northern regions where clouds limit the effectiveness of passive heating? As for the mirror, it must absorb some spectra of incoming radiation and reflect others. Or does incoming equal outgoing? Lastly, the study focuses on 2 bare soils and relatively small plots. To upscale, do you simply need a bigger mirror? And would it effect vegetation? You might burn vegetation in highly focused areas. The authors could investigate or advise the reader on the appropriate placement and size of the mirror. Is there a particular angle we should consider given our particular latitude?

Generally, the manuscript is well-written and its tables and figures are excellent. In particular, the temperature contour plots are really nice. The conclusions and discussion are somewhat lacking. Obviously, a reflective mirror in the desert will increase the soil where that reflected radiation is sent. But they could expand their recommendation of the mirror placement, size and orientation. They should also discuss the limitations of their study and the mirror system in general. Ultimately some addition modeling or optimization of its design would really help but for this note it's not necessary. Figure 3c and 3d: the precipitation bars are missing units. I'm not sure if they'll fit – it's a very busy figure.