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Interactive comment on "Arable soil formation and erosion: a hillslope-based cosmogenicnuclide study in the United Kingdom" *by* Daniel L. Evans et al.

Anonymous Referee #1

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This manuscript presents a novel and compelling investigation of soil production rates on hillslopes supporting arable agriculture. The authors pair two hillslopes with well-documented land use histories: one is under active tillage and the other, while currently forested, was open field as recently as the early 20th century. The authors carefully surveyed each slope, documenting both topography and soil morphology, and they collected a suite of samples from each hillslope for measurements of Be-10 in saprolite underlying the slopes' soil mantle. The Be-10 derived soil production rates for these sites are reasonable given their climatic and tectonic setting, and the authors do an excellent job of contextualizing their results within a global compilation of similar rates. The authors utilize previously published hillslope erosion rates derived from Cs-137 to

conduct what they refer to as a "lifespan analysis" for soils at their sites. They find a potential for complete loss of the A horizon in just over a century and the possibility for bedrock exposure in just over two centuries. In addition to being some of the first soil production rates quantified for soils supporting arable agriculture, the implications of these results are very important for future consideration of sustainable use of global soil resources.

I have now read this manuscript several times over, and I must say that I am at a loss to find any significant issues with this work. The science is sound - well-planned, well-executed, clearly/concisely described, and cleanly communicated. This paper is a pleasure to read. Each moment I found myself anticipating something they may have overlooked, the next sentence or paragraph cleared up that point. The figures are clear and adequate. The authors don't simply present their results and leave it to the reader to seek context - Figure 4 contextualizes their results simply and effectively.

If there is one place that the manuscript could be taken to the next level, it would be a more sophisticated mass and isotope balance approach to modeling hillslope soil production and transport. However, the authors are 100% transparent about the variables in their lifespan analyses, and their approach is adequate. Demanding a more detailed modeling approach does not seem an appropriate "ask" for this manuscript. I think the soil sciences and geomorphology communities will benefit most by getting these results formally published and disseminated quickly. Additional modeling can follow, if need be.

A final question that I would pose to the authors since I don't think they address it in the manuscript is this: Given that RFF has been actively farmed for over a century and a half, how do you reconcile a still extant A horizon? Do you think that tens of centimeters of soil have been lost in that time? The authors allude to the potential importance of incorporating colluvial processes at toe slopes to their work, and I would agree. Stratigraphic evidence or isotopic (Cs-137) evidence could yield some insight into the effect of the past 1.5 centuries of tillage.

In summary, it was a pleasure to review this manuscript. It is one of only a couple manuscripts that I've received for review that seem ready for publication "as is." I highly recommend this manuscript for publication in SOIL.

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