SOIL Discuss., referee comment RC3
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Comment on soil-2021-2

Anonymous Referee #3

Referee comment on "Deforestation effects on soil erosion rates and soil physicochemicalproperties in Iran: a case study of using fallout radionuclides ina Chernobyl contaminated area" by Maral Khodadadi et al., SOIL Discuss., https://doi.org/10.5194/soil-2021-2-RC3, 2021

The paper shows evidence of an increase in soil erosion rates following a change in land use. More specifically, the authors documented erosion rates in areas covered by forests and in areas where the same forests were replaced by vineyards. The erosion rates for the vineyards were approximately five times those documented for the forests.

The work is based on measurements made in two adjacent and similar hillslopes located in the Zarivar Lake watershed, Kurdestan Province, Iran. The authors selected these sites because this area, like many others in the country, was affected by this land-use conversion several years ago.

The sampling campaigns consisted of collecting a number of soil samples for Cs-137, excess Pb-210 and Pu-239,240 analyses. The area was affected by the Chernobyl accident. In this respect, the authors calculated the Cs-137 Chernobyl component using the ratio Cs-137/Pu-239,240 assuming that for bomb fallout this ratio is 38.4 (as suggested by Hodge, 1996). The proportion of the Chernobyl component was estimated to be ca. 50% of the total fallout (including the bomb-derived).

In general, the manuscript is acceptable and can be considered for publication. However, I have some comments about the methods and about some of the statements provided by the authors. These are as follows.

Lines 76-77 - The authors indicated that the global-derived 137Cs fallout ranges between

160 and 3200 Bqm-2 depending on latitude (UNSCEAR, 1969; Garcia Agudo, 1998). Here the authors should say that these two boundary values are referred to 1996 otherwise they need to be decay corrected. Please add some comments.

However, there are many exceptions to the map published by Garcia Agudo because 137Cs fallout is very sensitive to precipitation amount as well. See examples in Canada (Mabit et al., 2002), Spain (Navas et al., 2007; 2017), USA (Arnalds et al., 1989), India (Mishra and Sadasivan, 1972), Italy (Porto et al., 2009) etc. where the fallout basic line was correlated with the rainfall amount. Please consider to add some comments and citations about it.

I found interesting the approach used here to investigate the proportion of the Cs-137 Chernobyl fallout. This is already documented in previous papers but it appears to be an effective, independent, method to identify this component in the absence of direct measurements of Cs-134. In fact, the value of 50% is in line with what is documented in previous papers related to another Iranian province located not far from the study site (see Gharibreza et al., 2021; Vahabi-Moghaddam and Khoshbinfar, 2012). The authors may want to have a look at these papers.

Lines 243-244

The authors mentioned a 137Cs profile obtained in a lake in the vicinity of the study area. They reported the figure in the additional material but the source is not mentioned. Please add a citation for this study

Lines 307-309

The values of K-factor need units. Please add it

Lines 384-393

The authors emphasized that the three different FRNs account for diverse time spans. This is correct. They explained that 137Cs, because of the Chernobyl input, is more indicative of what happened after 1986 in terms of soil erosion. Similarly, 210Pb is more sensitive to the erosion rates occurred during the last 2-3 decades. On the contrary, the time frame captured by 239+240Pu has been recorded from mid-1960s onward. Based on these assumptions, the results obtained from 137Cs and 210Pb should be more correlated than the results obtained from 137Cs and 239+240Pu. The information provided in Fig. 7 for the forested hillslopes indicates the opposite i.e. the correlation between 137Cs and 239+240Pu is higher. Can they explain why?

Lines 507-508

The authors said that DMM was applied for vineyard. I think it is a mistake because the MBM2 was applied in cultivated areas. Is that correct?

Lines 511-515

The authors indicated that the change in land use from forest to vineyard resulted in a significant deterioration in soil quality as it was indicated by a significant decline in OM etc. This is in line with what was found by other authors for forest soils subjected to thinning (see Romeo et al., 2020; 2021). In those cases, 137Cs was correlated to the OM in different soil layers. The authors may want to have a look at these papers.

In Table 3 correct units of K are t ha hr Mj-1 ha-1 mm-1 (the exponent -1 is missing for ha). Please correct it

In Fig. 3b is reported Pu, not Pb as indicated in the caption (see page 35) – Please correct it

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