Reviewer comment	**Author's response**
Page 5: The model represented by ArcGIS modelbuilder in Figure 1 is necessary. Sure, the users can run the tool of Li (2018) in this way in modelbuilder, but the simplest way to run the analysis is by double clicking the tool and specify the inputs in the GUI of this tool. In this figure, I suggest the author to show a screen shot of the GUI (panel A on the left) and then the screen shot of the attribute table of the point file (panel B on the right) to show how the optional parameters, such as dip, slope, and height, are organized. In addition, this tool accepts both shapefile and feature class as the input of the sample sites. The author may just use a GIS point file of the sampling sites (vector) here.	The figure was modified accordingly (Fig. A1). Panel (a) shows a screenshot of the graphical user interface. Panel (b) shows the attribute table of a point file for shielding factor calculations.
Page 17: Figure 6: May be better to also show the correlations between the shielding factors derived from 1 m DEM and resampled 12m and 30 m DEMs to see if there are major changes on the shielding factors because of the changes in DEM resolutions.	The figure (Fig. 4) was revised accordingly. Correlations between the shielding factors derived from the 1 m-DEM and those derived from the resampled versions are shown in panel (c) and (d)
Page 18: Figure 7: Why the number reduced to 23 in this figure? The number is 37 in the previous figures. If the reason is because only having 23 CRE ages, the author can just report the panel (c) because the previous figures already show strong correlations between GIS and field-derived values.	CRE ages are only available for 23 moraine boulders. As suggested by the reviewer, panel (a) and (b) were removed. Histograms of CRE differences are shown in one figure (Fig. 8a). For clarity, the following phrases were added in the methods section: "Note that CRE ages were not available for 14 boulders in the southern Black Forest that have been selected for this study. Therefore, only 23 CRE ages were recomputed"
Page 20: Figure 9 and the texts: It will be great to discuss the correlations after removing the "outlier" (STEI-7)? I guess the field measurement for this sample site may be problematic.	R^2 rose to 0.91after removing the outlier. This information was added in Sect. 4.1.3: "After the exclusion of the potentially problematic shielding factors for the STEI-7 boulder, R^2 rose to 0.91 in both cases ($p < 0.05$)" In the discussion (Sect. 5.1), the author states that "After the exclusion of the potentially problematic shielding factors for the STEI-7 boulder, SRTM DSM-based and TanDEM-X DSM-based shielding factors were equally consistent with field data-based shielding factors. The similar fit suggests that TanDEM-X data do not have an advantage over SRTM data"
Pages 21-25: Section 4.2: Sensitivity tests. The three sensitivity experiments reported in this section are the results from the three study sites. They are apparently different from	The sensitivity tests do not differ from the sensitivity tests described in the methods section. The term 'sensitivity experiment' was removed from the whole manuscript for

the three sensitivity tests described in the method section (Page 13). Based on the descriptions in the method section, the first test is to assess the effect of the different methods for calculating topographic shielding factors on CRE ages of boulders in mountains with an intermediate elevation that have been exposed to cosmic radiation since the Late Pleistocene. The second test is to determine whether the choice of topographic shielding factors has a significant impact on the CRE ages of surfaces that have been exposed for the last few millennia. The third test is to assess the impact of topographic shielding factors on the young CRE ages of LIA or younger. Although the three tests are related to the three sites, respectively. They have different focuses. I hope the author can check the consistency of the three sensitivity tests described in the method and results sections.	clarification. Sect. 4.2 was shortened to make the manuscript more concise.
Tables 2, 3, and 4 are likely not necessary for the main text. Maybe can put these tables as the supplementary. The author can create the histograms of the CRE age difference for the three sites and put them in one figure. In this way, the main text can be shortened.	The Tables 2, 3 & 4 were moved to the appendices (Tables B1, B2 & B3). Histograms of CRE differences are shown in one figure (Fig. 8).
Pages 26-29: Section 5.1: The discussion about the vegetation-corrected or not corrected should belong to Section 5.3. There are some repeated parts in these sections. The author needs to re-organize the writing to avoid the repeated sentences and paragraphs.	The discussion section was restructured and shortened to make the text more concise. The discussion was subdivided in the following sub-sections: 5.1 Impact of the spatial resolution and quality of elevation data on shielding factors, 5.2 The role of vegetation, 5.3 Correcting for the boulder height – does it matter? 5.4 Impact on CRE ages, 5.5 Practical guidelines
It is interesting that the vegetation seems have different impacts on SRTM DEM and TanDEM-X. This can be a good point. SRTM data is collected in February 2000 (leaf off season), so that the impact of vegetation cover on topography may be not very high. When the TanDEM-X data were collected? if it was during the grown season, it may have a bigger impact. I suggest the author to check the data sources of different DEM sources and explain the vegetation impact on topography more.	Thank you for the hint that the time of the acquisition of elevation data might have an impact on the results. TanDEM-X data were obtained in the 2010-2015 period and multiple acquisitions were averaged. This could partly explain the relatively poor performance of TanDEM-X data in forested areas. The following phrases were added: “It should be mentioned that SRTM data were acquired in February 2000, i.e. during the leaf-off period in the northern hemisphere, whereas TanDEM-X data were obtained by averaging data from multiple acquisitions. Data collection during the leaf-off period could be one explanation for the better performance of SRTM data“

In the discussion and conclusions, the author argues that a relatively low-resolution DEM is better for determining the topographic shielding factors. I suggest the author using medium resolution instead. A low-resolution DEM, such as SRTM 90-m DEM, is not very accurate for the topographic shielding factors as illustrated in Figure 2 (Page 7).	The author considered a DEM with a spatial resolution of 30 m a low-resolution DEM. This is indeed confusing, as SRTM with a *xy*-resolution of 90 m is also available. Therefore, 'low-resolution' was replaced by "intermediate" in the revised version of the manuscript.
The manuscript is relatively long and there are some repeated sentences and paragraphs or meanings in different sections. I suggest the authors to re-organize the writing to make the manuscript more concise.	The manuscript was shortened to make the text more concise. Repetitions in the discussion section were removed and unnecessary phrases were deleted.
p. 5, line 98: Can be a feature class. Maybe just say a GIS point file of the sampling sites (vector)	The manuscript was revised accordingly ("point file of the sampling sites (vector)")
p. 5, line 100: the point file	"shapefile" was replaced by "point file"
p. 6, line 118, measurements	The sentences were rephrased as follows: "In practice, the number of measurements is usually much lower than in the GIS-based approach. If elevation data is correct, GIS-based shielding factors should theoretically be more accurate than field data-based shielding factors"