Reply to the comments of Anonymous Referee #2 to the manuscript entitled ‘Local Beryllium-10 production rate for the mid-elevation mountainous regions in Central Europe, deduced from a multi-method study of moraines and lake sediments in the Black Forest’

Dear reviewer,

We thank you for your thoughtful and critical comments that resulted in considerable improvements to the manuscript. We thoroughly considered all comments and revised the manuscript accordingly. For responses to the comments, see the table below. We hope that the manuscript will be accepted for publication in its revised form.

Thank you very much for your kind consideration.

On the behalf of all co-authors,

Felix Martin Hofmann

Line, Figure, or Table	Reviewer comment	Authors' reply
General comment	Tables often include incomplete citations. For example, please properly cite the scaling methods, etc. in column headings of Table 7.	The references have been included in the updated table.
Line 12	Instead of "understanding" maybe "determination" would be better?	The manuscript has accordingly been revised.
Line 13	Until now might be added before "For the midelevation (Variscan)..."	The manuscript has accordingly been revised. We have reformulated the sentence as follows: "Until now, no calibration site has been available for the mid-elevation mountain ranges of central Europe."
Line 16	specify that the study uses IRSL, and define its acronym, instead of luminescence dating.	The manuscript has accordingly been revised.
Line 18	...rate in quartz. (Add "in quartz".)	The manuscript has accordingly been revised.
Line 20	study site, instead of stud site.	This was a typo.
Line 21	Seems broadly outside the scope of this manuscript and to the best of my knowledge isn't really addressed in the text. Please reword or remove this line from the abstract.	We have removed this line from the abstract.
Line 27	Worth citing the CReP calculator Martin et al., 2017 here, too, particularly because it is used later in calculations.	The manuscript has accordingly been revised: "CRE age calculators, such as the cosmic-ray exposure program (CREp; Martin et al., 2017) utilise physical models, such as the Lifton-Sato-Dunai (LSD) scaling scheme (Lifton et al., 2014), to extrapolate 10Be production rates at calibration sites to sampling sites."
Line 29 and throughout text	Please consider using production-rate calibration site, or calibration site, instead of reference site	"production rate reference site" has been replaced by "calibration site" throughout the manuscript.
Line 30	"At independently dated reference sites..." and yet only one (Claude et al., 2014) is cited. Please consider adding more references and associated citations	The manuscript has accordingly been revised.
Line 31	Determination of the rate.	We have accordingly revised the manuscript.
Line 31	Cosmogenic nuclide production-rate calibration instead of Geological calibration.	"geological calibration" has been replaced by "geological 10Be production-rate-calibration"

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 33	several authors, yet only one is cited. Please add appropriate references/citations.	We have inserted the following references: Small and Fabel, 2016a, b; Lowe et al., 2019.
Line 35	involving multiple, independent dating methods.	The manuscript has accordingly been revised.
Line 36	the resulting cosmogenic nuclide production rate might be…	The manuscript has accordingly been revised.
Line 39	such as the CRONUS-Earth and CRONUS-EU projects (Cosmic-Ray prOduced NUclide Systematics)	The manuscript has accordingly been revised.
Lines 39-54	global canonical Be-10 production rate is mentioned in the abstract, but the value and associated scaling method are neither provide in the abstract nor in this paragraph, which seems to be introducing the background to Be-10 production rates. Ranges of rates produced at European calibration sites could be added and all associated references with citations could be included, rather than directing the reader to read the references in Martin et al. (2017).	We have included the range of European production rates and the global mean production rate. We also added the production rates to the abstract.
Line 46	more strongly, rather than stronger	The manuscript has accordingly been revised.
Line 48	may also differ from those (rates) at production-rate calibration sites	The manuscript has accordingly been revised.
Lines 59 – 62	run-on sentence. Please break into shorter sentences.	We have reformulated the sentence as follows: "As previously discussed (e.g., Hofmann et al., 2020, 2023; Hofmann, 2023), there is an urgent need for dating the onset of retreat from their Late Pleistocene maximum positions. Clarifying this issue would help to evaluate the hypothesis that the Alps shielded the ice caps and glaciers from humid air masses from the Mediterranean Sea during the last major advance of piedmont lobe glaciers in the forelands of the Alps (at around 25 ka; e.g., Gaar et al., 2019)."

Line, Figure, or Table	Reviewer comment	Authors' reply
Lines 69 and 70	Obtaining… this sentence reads out of scope, out of place in this paper.	As mentioned in the manuscript, Be-10 cosmic-ray exposure dating is the key method for age determination of moraines in the mid-elevation mountains of central Europe. Therefore, the choice of the production rate has a strong influence on the ages and on the palaeoclimatic interpretation of the age datasets.
Line 73	Because instead of since.	The manuscript has accordingly been revised.
Line 74	two well-preserved moraines	The manuscript has accordingly been revised.
Line 76	accumulated, in situ cosmogenic…	The manuscript has accordingly been revised.
Line 76	in quartz from moraine-boulder surfaces	The manuscript has accordingly been revised.
Line 77	Radiocarbon and IRSL dating techniques were used to date layers in sediment cores.	We have reformulated the sentence as follows: "Obtaining sediment cores from the FSM coring site ("FSM" stands for Feldseemoor, the German name of the bog) on a buried moraine, radiocarbon dating of macrofossils, IRSL dating, and establishing an age-depth model with the 14C ages, the IRSL ages, and the age of a cryptotephra allowed us to derive a minimum age for ice-free conditions at the bog."
Line 77	Reading through the paper, I thought dating was only used on the FSM borehole.	This is correct: "Obtaining sediment cores from the FSM coring site ("FSM" stands for Feldseemoor, the German name of the bog) on a buried moraine…"
Line 78	a minimum radiocarbon(?) age	We obtained a **modelled age** by interrogating 14C ages, IRSL ages, and the age of a cryptotephra in a Bayesian approach, i.e., an age-depth model in Oxcal.

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 78-79	IRSL dating was used as a separate dating technique which independently verifies the sequence of radiocarbon ages in the FSM core. (Or something similar).	We undertook IRSL dating as an additional line of evidence for establishing the age-depth model: "Obtaining sediment cores from the FSM coring site ("FSM" stands for Feldseemoor, the German name of the bog) on a buried moraine, radiocarbon dating of macrofossils, **IRSL dating**, and establishing an age-depth model with the 14C ages, the IRSL ages, and the age of a cryptotephra allowed us to derive a minimum age for ice-free conditions at the bog."
Line 81	We propose that calibrating the regional production rate finally offers...	The manuscript has accordingly been revised.
Line 82	I'm not sure this is accurate, the evaluation of other authors' correction factors. The case to do this with a minimum radiocarbon age (for calibration) and the BF sites own set of vegetation, forestation, snow cover, and weathering/erosion issues seems weak at best.	We have removed this sentence from the introduction.
Line 85	Paragraph needs a topic sentence to introduce the details that are coming. Figure 1 should also be mentioned in the first few lines.	The manuscript has accordingly been revised: "The study site, the Feldsee Cirque, is located in the southern part of the Black Forest in SW Germany (Fig. 1). The Feldsee Cirque is situated about 2 km ESE of Feldberg (1493 m a.s.l.), the highest summit of the Black Forest. Due to the high abundance of glacial landforms (cf., Liehl, 1982; Metz and Saurer, 2012; Hofmann and Konold, 2023), it is a key site for Pleistocene glaciations of the Black Forest. The cirque has attracted glacio-geomorphological and geological research for almost two centuries (Walchner, 1846; Ramsay 1862; Lang et al., 1984; Schreiner, 1990; Hofmann and Konold, 2023)."
Line 86	specify what "it" is in the sentence that begins "It is situated east..."	The manuscript has accordingly been revised: "The Feldsee Cirque is situated about 2 km ESE of Feldberg (1493 m a.s.l.), the highest summit of the Black Forest."
Line 87	Feldsee, a moraine-dammed lake up to 33 m deep	The manuscript has accordingly been revised.
Line 93	The dominant(?) lithology in the study area is a quartz-bearing basement rock of the...	See the reply to the next comment.

Line, Figure, or Table	Reviewer comment	Authors' reply
Lines 94-97	Starting with "With the denudation..." and ending with "Mezozoic sedimentary rock." Is this information relevant to this study? The reader only needs to know what rocks are present that could have been incorporated into glacial and/or lake/bog deposits.	We have reformulated the paragraph on the pre-Quaternary geological/geomorphological evolution of the study site as follows: "Quartz-bearing rock of the Variscan basement (age: 380—290 Ma; Geyer et al., 2011), i.e., flaser gneiss, migmatite, porphyry, and paragneiss dominates the study area (LGRB, 2013). In addition, quartz-rich porphyry outcrops on the cirque's western headwall (LGRB, 2023). Since denudation from about 50 Ma onwards (Eberle et al., 2023) has led to the complete removal of the Permian, Triassic, and Jurassic sedimentary rock on the Variscan basement (Wimmenauer et al., 1990), glacial sediments at the study site (mainly till) only originate from quartz-rich rock of Variscan age (Schreiner, 1990)."
Figure 1	Include a citation/reference in the figure for the assumed late Pleistocene maximum ice extent. Location of the study area in the southern Black Forest, DE...	We have reformulated the figure caption as follows: "Figure 1: Topographical map of the southern Black Forest showing the assumed maximum ice extent during the Late Pleistocene (Hemmerle et al., 2016), ice divides (Hemmerle et al., 2016), and outlet glacier names according to the nomenclature of Hofmann et al. (2020). See NASA Jet Propulsion Laboratory (2013) for information on the digital elevation model (DEM) in the background. The inset map shows the location of the Black Forest in Germany."
Line 104	"...was repeatedly glaciated." Citations or References?	We have inserted appropriate references: Liehl, 1982; Metz and Saurer, 2012; Hemmerle et al., 2016
Line 106	refer to Figure 1.	We have accordingly revised the manuscript.
Lines 109 to 111	there are three ranges of ages presented and only two valleys mentioned. What does "respectively" refer to in this sentence?	We agree that "respectively" is not needed.

Line, Figure, or Table	Reviewer comment	Authors' reply
Figure 2	Oblique aerial photograph of the study area (study sites?)...Shown are the headwall of the Feld see Cirque...Label the prominent moraine in the figure.The semicircular moraine is also represented by a dotted line (as is the prominent moraine). Use a different symbol?	We have revised the figure caption and labeled the moraines in the figure.
Line 119	This needs a topic sentence that moves the reader from Pleistocene glacial times into the present day and leading them to the connection you're trying to make.	Thanks for this remark. We have added the following sentence: "Although the Feldsee cirque glacier at study site area has long since disappeared, snow cover still plays an important role today."
Lines 119 – 121	Run-on sentence. Please break into shorter sentences.	We have shortened the sentence.
Line 120	Why is this specific 30-yr period used? Why not a longer period of time? Why not a period of time that goes farther back in time?	Data on mean temperature, average precipitation,..., in Germany should be given for a 30-yr period following the recommendations of the World Meteorological Organization (https://library.wmo.int/viewer/55797?medianame=1203_en_#page=1&viewer=picture&o=bookmark&n=0&q=). Following the guidelines of the World Meteorological Organization, this period (1961-1990 CE) is usually selected, as the climate during this period is only partly affected by ongoing climate change.
Line 121 and 122	I read the sentence that starts with "Snowfall..." and found myself asking "And...?" after reading it. Why is this important? What does it indicate relative to your study?	We have added the following sentence to the study site section: "As it will be discussed below, the Feldsee Cirque thus is a challenging site where seasonal snow cover might have considerably slowed down the accumulation of in situ produced 10Be in moraine-boulder surfaces."
Line 126	refer to Figure 3?	The manuscript has accordingly been revised.
Figure 3	Don't abbreviate position to pos. What does FSM stand for? It should also be in the legend.	The figure and the caption have accordingly been revised.
Line 155	Why is only coring site 5 mentioned? Isn't there the same sequence in each core?	Lang et al. (1984) only identified the apparent tephra at their coring site 5. We removed all other cores from the manuscript, as palyonological data is only available for the coring site 5.

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 159	Make it clear to the reader that this ash in this core was not dated. It has been hypothesized to correlate with the Laacher See Tephra which has a reported age of...	We have reformulated the sentence as follows "At one coring site (coring site "5" in Lang, 2005), these authors observed a distinct greyish layer at a depth of about 8.1 m below the ground surface (Fig. 4b). Lang et al. (1984) speculated that this layer is the Laacher See Tephra, having a reported age of 13006±9 cal. a BP (Reinig et al., 2021)."
Line 168	Specify the FSM core in this section?	We refer to the FSM coring site at the beginning of Sect. 3: "To the best knowledge of the authors, the cores obtained by Lang et al. (1984) do, unfortunately, not exist anymore. We thus obtained sediment cores at the FSM coring site during fieldwork in 2021 CE."
Line 174	...content of organic matter in layers?	We have reformulated the sentence as follows: "Sediment samples were obtained from the cores, dried, and loss-on-ignition (LOI) analyses (cf., Heiri et al., 2001) were undertaken."
Figure 4	Sedimentary successions at 13 coring sites of Lang (2005). Instead of redrawn from, write Modified after Lang (2005).	We have removed the figure, since we only comment on the sediment cores obtained from the coring site "5". The Lateglacial part of the cores is shown in Fig. 4b.
Line 182	describe method used to determine water content.	We have added the following sentence: "Weighing the samples prior to drying and before the LOI analyses allowed for the determination of the sediments' water content. "

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 184	Individual conversion factors should be listed (in a table?) for each of the 1 m core lengths. Percent adjustment should be specified (values?). Brief explanation of decompacted depths is needed.	We have included the conversion factors in the results section: "Vibracoring at the FSM coring site allowed for obtaining sediment cores with a total length of 8 m. Borehole FSM recovered the sedimentary succession of the Feldsee Bog and the uppermost 0.32 m of the partly buried moraine at position FS-02 (Fig. 5). The percentage of sediment recovery increased from 67% between a depth of 4 and 5 m to 81% between a depth of 5 and 6 m. Decompaction was thus undertaken with correction factors of 1.49 (4-5 m) and 1.23 (5-6 m). Beryllium-10 concentrations in a total of 10 moraine-boulder surfaces were successfully determined, allowing for production rate calibration." We have included further information on the decompaction procedure in the methods section: "During opening of the cores in the lab, we noted that all sediment cores were shorter than the penetrated depth and, thus, core shortening must have occurred during vibracoring. Generally, core shortening is one of the main limitations of this technique (cf., Glew et al., 2001). As mentioned by Glew et al (2001), sediments with a higher water content are generally more prone to compaction. We assumed that only the clayey and silty lake sediments in the cores (water content: 18-85%) were affected by shortening and not the stratigraphically older diamicts (water content: 15-17%). Following Glew et al. (2001), we assumed that the sediments in the cores were progressively thinned down-core, i.e., equally affected by compaction. Individual conversion factors were computed for every one-metre-long sediment core which then allowed for adjusting the thickness of the lithostratigraphic units to the penetrated depth."
Line 187	This paragraph/section needs a topic sentence.	We have added a topic sentence: "To numerically date the sediments at the coring site, radiocarbon dating of macrofossils was undertaken."

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 187	Samples of macrofossils were hand picked... "See Supplement for photos of macrofossil samples (Figures x - y)." should be its own sentence.	The manuscript has accordingly been revised.
Line 195	It is unclear what "were assumed to be in correct stratigraphical order" means.	We have reformulated the sentence as follows: "The *P_Sequence* function was selected in Oxcal, as the 14C ages of the macrofossils and the IRSL ages of sediment samples were expected to increase with depth"
Table 1	Consider combining tables 1 and 3. There is redundancy between them.	Tables 1 and 3 have been combined.
Sect. 3.3	should be IRSL dating.	We have renamed the section: **3.3 IRSL dating**
Line 202	This section needs a topic sentence.	We have added the following topic sentence: "To cross-check the radiocarbon ages, seven sediment samples from two of the cores (depth: 4-6 m below the ground surface) were sampled for luminescence dating under subdued red-light, with two further samples taken to account for potential dose-rate inhomogeneity due to the complex stratigraphy (FSM-D1 and FSM-D2; Table 2)."
Line 202	Seven samples were obtained from the core... Specify which core and the depth at which each sample was collected. List sample names or refer reader to a table with them listed.	We have moved the table with the results of IRSL dating to Sect. 3.3.
Line 212	For all samples, a standard IRSL protocol was used. Please add a reference/citation.	We have inserted the appropriate reference: "For all samples, a standard IRSL protocol (modified from Preusser, 2003) was applied."

Line, Figure, or Table	Reviewer comment	Authors' reply
Lines 214-215	the word latter is used twice, making the second latter unclear. What does it refer to?	We have reformulated the sentences as follows: "This protocol comprised a preheat to 250 °C for 60 s and IRSL stimulation at 50 °C for 100 s (IR-50). For fine grains, a post-IR (pIR) IRSL protocol was additionally tested to potentially overcome the need for fading correction. This protocol involved a preheat to 250 °C for 60 s, IRSL stimulation at 50 °C for 100 s, and a second stimulation at 225 °C for 100 s (pIR)."
Line 217	first mention of OSL. Should that also be in the section title?	No, that is not neccessary. Optically stimulated luminescence measurements on quartz revealed no suitable signal: "Optically stimulated luminescence measurements on quartz revealed no suitable signal, similar to reports on other directly bedrock derived samples (e.g., Preusser et al., 2006) and experience from the nearby Upper Rhine Graben (Preusser et al., 2016, 2021). Therefore, potassium feldspar was selected as dosimeter."
Line 234	"uranium" is not capitalized. This small error occurs several times in this section.	The manuscript has accordingly been revised.
Line 242	Edit to: We collected surface-rock samples…	The manuscript has accordingly been revised.
Line 244	We also sampled the surface of one boulder	The manuscript has accordingly been revised.
Table 2	Add a column indicating which moraine or site from which each of the samples was collected. Column for measured sample density? Column for dip angle and azimuth for each sloping surface? Significant figures in the topographic shielding factor?	The ice-marginal positions have been added to the table. Strike and dip of the sampling surfaces are given in the detailed sample documentation in the supplement. We have added the following sentence to the section: "See the detailed sample documentation for strike and dip of the sampling surfaces, measured with a geological compass.".
Line 254	Indicate that the angle and azimuth of sloping surfaces was collected and used to add to the total shielding correction.	We have reformulated the sentence as follows: "Therefore, the ArcGIS toolbox of Li (2018) was chosen for shielding factor calculations, considering both self-shielding of dipping surfaces and shielding by topographical obstructions around the sampling sites."

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 261	mention that you account for deep-forest shielding in your total shielding.	We did not account for deep-forest shielding to be able to compute the "baseline" production rate.
Lines 271 and 273	These concentrations of acid are very strong. Are these not typically diluted for treatment of mineral separates?	The acids were not diluted during the preparation of the samples.
Line 290	local, unscaled production rates? SLHL production rates? Please be specific.	We have reformulated the sentence as follows: "The calibration of the spallogenic 10Be SLHL Black Forest production rate followed the workflow of Martin et al. (2017, their Fig. 3)."
Line 293	mean latitude, longitude, and elevation? Why not use sample specific latitude, longitude, and elevation?	This is the standard workflow of CREp described in Martin et al. (2017).
Line 294	Peirce. Incomplete citation?	We have reformulated the sentence as follows: "Following the guidelines of Ross (2003), the 10Be concentrations were subsequently evaluated with Peirce's criterion (Peirce, 1852), and a weighted 10Be concentration was computed after the exclusion of outliers."
Line 297	uncertainties are 1-sigma? 2-sigma?	We have reformulated the sentence as follows: "As recommended by Martin et al. (2017), the standard error of the weighted mean 10Be concentration (calculated with 1σ uncertainties of the 10Be concentrations) was multiplied with $\sqrt{}$MSWD to obtain the uncertainty of the average 10Be concentration."
Line 300	Give the actual age and uncertainty of the modeled radiocarbon age against which production rates are calibrated.	We have included the modelled basal age.

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 302	It appears only two scaling methods were applied, rather than "all scaling schemes and..." Please be specific in language. Lm and LSD were applied, if I understand correctly.	We have reformulated the sentence as follows: "The spallogenic SLHL 10Be BFPR in quartz was computed for the scaling schemes in CREp, i.e., time-dependent Lal/Stone (Nishiizumi et al., 1989; Lal, 1991; Stone, 2000; Balco et al., 2008) and LSD (Lifton et al., 2014) scaling, and all geomagnetic databases in CREp, i.e., the atmospheric 10Be-based virtual dipole moment (VDP; Muscheler et al., 2005, and references therein), the LSD framework (Lifton et al., 2014), and the Lifton 2016 VDM (Lifton, 2016, and references therein)."
Line 354	Hofmann et al. (2022) recently recalculated CRE ages...Why is this important here? It feels out of place in this manuscript. Is there additional text you could add to explain to the reader why this is relevant?	We have reformulated the beginning of the section as follows: "To assess the impact of the newly calibrated BFPR on CRE ages, CRE ages, internal (analytical) uncertainties, and external uncertainties (i.e., analytical uncertainties plus the error of the 10Be production rate added in quadrature) for the sampled moraine-boulder surfaces were calculated with the Chironico landslide spallogenic SLHL production rate and the BFPR." We have also renamed the whole section: **3.6 Assessment of the impact of the new production rate**
Line 356	To assess the effect of the choice of production rate... Do you refer to the choice of production rate in this study? The study of Hofmann et al. (2022)? It's not clear why this is relevant to this calibration study.	See the reply to the previous comment.
Line 359	Were the production rates not also scaled using LSD?	The spallogenic SLHL Black Forest production rate was also scaled with LSD. See Table 5 for further details.
Lines 365 – 378	It seems like circular reasoning to me to calibration a production rate from moraine boulder Be-10 concentrations and then use that same production rate to calculate exposure ages	The idea here was to perform a sensitivity test. How much do the ages shift if they are calculated with the new production rate. If we had chosen another age dataset from the southern Black Forest, the age difference would have been the same.

Line, Figure, or Table	Reviewer comment	Authors' reply
Line 381	This section needs a topic sentence. Does this section give descriptions for each core collected? Is it just for the FSM core? If the latter, why only the FSM and not the others?	We only refer to the cores obtained from the FSM coring site. We have included the following paragraph at the beginning of Sect. 5: "Vibracoring at the FSM coring site allowed for obtaining sediment cores with a total length of 8 m. Borehole FSM recovered the sedimentary succession of the Feldsee Bog and the uppermost 0.32 m of the partly buried moraine at position FS-02 (Fig. 5). The percentage of sediment recovery increased from 67% between a depth of 4 and 5 m to 81% between a depth of 5 and 6 m. Decompaction was thus undertaken with correction factors of 1.49 (4-5 m) and 1.23 (5-6 m). A total of 11 moraine-boulder surfaces was sampled to determine 10Be concentrations for production rate calibration."
Lines 381 – 384	This paragraph is very unclear and confusing. Context?	See the reply to the previous comment.
Line 396	Maybe move this paragraph to the beginning of this section?	In Sect. 5.1 we first describe the results of logging and LOI analyses. In the subsequent paragraph (starting with "The succession of FSM (Fig. 5) reflects the glacial-postglacial transition of the study area. The FSM borehole...") we interpret the results. We argue that the results and the interpretation should be discussed in two separate paragraphs.
Figure 6	Caption mention cores. Is this figure only for the FSM core? The * and ** should be a complete sentence or two in the caption. Do you mean dark read lines instead of curves? List sample numbers for IRSL ages. Hard to tell triangles(?) from circles(?). I was unable to see any symbol/line that is light blue.	We have revised the figure caption as follows: "Sediment sequence at the FSM coring site, calibrated ages (95% ranges of calibration), IRSL ages, the age-depth model, and LOI. Photos of the sediment cores from the Feldsee Bog were acquired with the methodology of Gegg and Gegg (2023). 95% ranges of the modelled ages are marked with dashed lines. The solid line represents the mean modelled age. Agreement indices (A) for individual ages are given in parentheses."
Line 416	Needs a topic sentence. Also, specify if the radiocarbon ages are from the FSM core.	We have added the following topic sentence: "A total of nine macrofossils in sediment cores from the FSM coring site was radiocarbon dated."

Line, Figure, or Table	Reviewer comment	Authors' reply
Table 4	is this related to the FSM borehole? Please specify.	We have reformulated the phrase as follows: "Table 4 summarises the luminescence data for the FSM coring site."
Line 468	Paragraph needs topic sentence.	We have added the following topic sentence: "Calibrating the spallogenic BFPR with the 10Be concentrations in the FS-02a, FS-02b, FS-02c, FS-03a, FS-03c, FS-03d, FS-03e and FS-03f moraine-boulder surfaces resulted in SLHL production rates between 3.61±0.11 and 3.65±0.11 10Be g-1 quartz a-1 for the different scaling schemes and geomagnetic databases in CREp (Table 5)."
Line 470	Consider using "samples were scaled" rather than "normalized". Also, table 6 doesn't exemplify this. The scaling factors are listed in the table as are the scaled Be-10 concentrations.	We have corrected the concentrations for topographic shielding and the sample thickness and adjusted the concentrations to SLHL. See Table 4.
Table 6	Please consider adding a column with LSD scaling factors. Specify the other column is the "Lm" scaling factors.	We have included the scaling factors for both scaling schemes in Table 4.
Table 7	Are these global, arithmetical means? Error-weighted means? SLHL values? How many samples contribute to these? Please specify. Consider combining tables 6 and 7.	At the beginning of Sect. 5.6, we state that "Calibrating the spallogenic BFPR in CREp (Martin et al., 2017) with the 10Be concentrations in the FS-02a, FS-02b, FS-02c, FS-03a, FS-03c, FS-03d, FS-03e and FS-03f moraine-boulder surfaces resulted in SLHL production rates between 3.61±0.11 and 3.95±0.12 10Be g-1 quartz a-1 (Table 5) for the different scaling schemes and geomagnetic databases in CREp (Martin et al., 2017)."

Line, Figure, or Table	Reviewer comment	Authors' reply
Sections 6.2 and 6.3	**Sections 6.2 and 6.3 don't seem relevant, in my opinion, to the scope of this calibration paper.**	We argue that these sections are highly relevant for our calibration cover. In Sect. 6.2, we invalidate a previous approach to correct for snow cover and post-depositional weathering in the mid-elevation mountain ranges of central Europe. We therefore propose that the newly calibrated production rate should be utilised for age determination rather than production rates at calibration sites outside this region. In Sect. 6.3, we discuss the newly calibrated production rate in the European context. We argue that it should be mandatory to compare a new production rate with previously established production rates.
Section 6.4	The title of section 6.4 would be better posed more like a statement rather than as a question.	We have accordingly revised the title of the section: "Explanations for the anomalously low BFPR"