Answer to Anonymous Referee #2, summary comments: Thanks for the detailed review. We would like to highlight that in this paper we do not only "*review and compare the procedures that are typically used to correct AMS 9Be/10Be measurement for laboratory blanks contributions*". This is, indeed, only one part of the paper, but the real focus of our work is the description of a statistical method that defines a lower threshold useful for the interpretation of low-concentration samples. This method is known in analytical chemistry but has never been applied to cosmogenic studies, and the contribution of our work to the community is to present how to apply this standardized method and use it to interpret cosmogenic data. The method is designed to be used by the final user and wants to help the cosmogenic nuclide community users defining the geomorphic meaning of samples with low nuclide concentration. Our comments follow the Referee's comments, which are left in black ink.

Anonymous Referee #2: In this manuscript, Savi and colleagues review and compare the procedures that are typically used to correct AMS 9Be/10Be measurement for laboratory blanks contributions. The paper discusses the effects of considering i) long-term, inter-operator lab blanks, ii) long-term single-operator lab blanks and iii) the blanks that are processed during a single sample batch on low 10Be concentration samples. This discussion is based on a large blank data-set produced by the GFZ Potsdam group over the past years.

The paper is very clear, well written and the number of blanks upon which the discussion is based is significant enough to support the discussion. The statistical approach, albeit simple, seems robust and well discussed. Overall the merits of this paper lays in the fact that it is the first paper to my knowledge that specifically discusses blank corrections in the 10Be community. That said, I have some concerns with respect to the publication of this paper in ESurf: even though it is a useful contribution, I believe that all procedures described here are pretty standard for any analytical measurement made in the geosciences and one would hope that such a reasoned blank correction approach is already widely applied across 10Be labs. I therefore question the novelty and impact of this contribution for a broader community outside of the cosmogenic nuclide people, who should in principle already be aware of these issues in the case of low 10Be concentration samples. In my opinion the paper could be improved and made more significant by having a more systematic evaluation of the sources of blank contamination and the methods to deal with it throughout the entire Be preparation and measurement procedure, from lab to the AMS measurement.

As already mentioned above and in the *Answer to the Referee #1*, the aim of this paper is to highlight the issues that one encounters with low concentration samples (i.e., < 10^5) and to provide a standardized method for the interpretation of the results. The paper is designed for the cosmogenic nuclide final users, including all the people that use the cosmogenic nuclide technique for studying earth-surface processes, but who are not necessarily familiar with the technicality of the Be-extraction/measurement procedure. We agree with the Referee that "*all* (chemical) *procedures described here are pretty standard for any analytical measurement made in the geosciences and one would hope that such a reasoned blank correction approach is already widely applied across 10Be labs*". However, as pointed out by the Referee, this approach is not normally reported, or explained in detail, within standard cosmogenic papers (i.e., non-technical papers). This is one reason for which we report such a detailed description, describing three different possible methods for blank corrections and describing their implication for the results. However, this does not represent the "*novelty and impact of this contribution*", rather, the contribution made by this paper lies in the description of a procedure that is commonly used in analytical chemistry to define a statistically significant threshold for low-concentration samples. In this paper we propose to apply this standardized method for cosmogenic nuclide studies, seeing that such a procedure is so far missing in this community. This aspect is very relevant, especially considering that always more researchers will have to deal with low concentration samples (see Corbett et al., 2016) and such a standardized procedure could help having a common reference for the interpretation of the results. For these reasons, we believe that this paper is timely and valuable in its content and that can be of interest for a broader audience, also within the cosmogenic nuclide community. Indeed, the paper focuses on a statistical procedure that can be used by the final user who may only have basic technical information about the Be-extraction/measurement procedure, but who still has to evaluate the geomorphic meaning of the AMS measured samples. Specifically, the method provides a threshold to evaluate whether the nuclide concentration can be used to quantify an exposure age or erosion rate versus only limit the age or rate; in the latter case, the data is not rejected; on the contrary, a limiting value can still be very helpful and meaningful.

Also, an "*evaluation of the sources of blank contamination and the methods to deal with it throughout the entire Be preparation and measurement procedure, from lab to the AMS measurement*" is already provided in the supplementary material document associated to the main manuscript.

A few things that could be included or need to be better discussed:

- First, I am also a bit puzzled by the different levels of confidence that you are mixing in the manuscript: you consider the limit of detection basically at a 3-sigma level (99.7%) but then compare that to a sample 10Be/9Be measurement that is given at a 1-sigma level (68.3 %). Wouldn't it be preferable to be consistent for all types of measurements you are considering?

Thanks for this comments. This choice has been made with a specific reasoning: 1) The analytical procedure used in analytical chemistry mostly discusses the LOD and LOQ as corresponding to 3- and 10-sigma. These are the confidence levels normally attributed to these detection limits. To be consistent in the definition of "detection limits", we describe the procedure with the same confidence levels. However, we also wrote in the paper that "when such high confidence is not required, the users may alternatively use a 2σ confidence interval". 2) The 1-sigma level, instead, it refers to the cosmogenic measurements. Most of the AMS results are reported and provided to the final user with an uncertainty that corresponds to 1-sigma; therefore we used the same confidence level in our examples. We will state this differences more clearly in the text.

- I would like to see the equations that are used to do the actual blank correction (do you directly consider 9/10 ratios or the number of 10Be atoms as this may yield slightly different results if the amount of carrier that was used is not constant across all measurements).

We have reported in the text that "To perform a blank correction, the number of 10Be atoms contained in the blank is subtracted from the number of 10Be atoms contained in the sample". This implies that we have first calculated the number of 10Be atoms in samples and blanks and then done the subtraction. We will add the subtraction equations if this can help the reader understand the procedure we followed. Also, following a comment of Referee #1, we will slightly change this sentence explaining that this is one possible approach to follow (exactly because the amount of carrier added to the samples, although very similar, is not always the exact same number for all the blanks and samples), but that other approaches (i.e., a direct subtraction of the ratios) are also sometimes used. We will explain the differences and consequences.

- There is no discussion about the low uncertainty that are associated with blank measurements and how that affects the correction. Also, how 10B isobaric interferences are corrected for in the case of low count blank determinations is something that should be mentioned and discussed.

This is not exactly correct. We have explained in section 3.3 how we treat the uncertainties associated with AMS measurements of blanks and samples. These are used for error propagation in case of the single blank correction method, whereas we used the standard errors of the mean and of the median when we used an average blank value (see equations in section 3.3). This approach allows us to include the effect of the uncertainties directly into the blank correction procedure. In addition to this, we have discussed the effects of the different uncertainties on the results in section 4.3.

For the aim and the target audience of our paper, we have designed it to not be overly technical. We want the focus of the paper to be on the statistical method, rather than on the chemical procedure necessary for Be-extraction (for which many technical and excellent papers already exist). However, we understand that such discussion on B-interference can be an important point when dealing with low concentration samples. We already have a full paragraph in the supplementary material that deals with Be contamination (Section S5). We will implement the discussion about B interference within this section, giving some references that can be useful for the readers that want to deepen their knowledge on the topic.

- A broader discussion that includes the whole preparation and measurement procedure would for instance investigate: o the impact of reducing carrier to quartz ratios in terms of overall uncertainty and blank assessment as this increases 10/9 ratios but decreases measurement time or 9Be currents … o the influence of isobaric interferences (10B) on the low ratio measurements … o the relative contribution of the blank correction method to the overall uncertainty and reproducibility of low

10Be concentration measurements (for instance comparing it to CRONUS or internal standard measurements) o What is the impact of very low 10/9 Be ratio carriers on the final measurement (i.e. if the variability is still as high as for commercial, higher ratio carriers).

We agree with the Referee, and indeed we reported some of this information in the supplementary material. However, because this is not the focus of the paper, we prefer to leave this information in the supplementary file and not within the main manuscript, where we believe it would distract from the focus of the paper, which is the statistical method proposed for establishing a lower threshold for interpretation of the data.

I hope this helps to further improve the manuscript.

Thanks for the comments, we hope to have clarified the aim and goal of our work and why we believe it will be important to have it published in a broad journal such as ESurf.