Answer to Anonymous Referee #1, summary comments: Thanks for the detailed review. We understand the perspective of Referee #1 with respect to the technicality of the paper and its broader interest for the surface processes community. However we don't agree completely with his/her assertions.

We would like to highlight that in this paper we describe 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. The method is designed to be used by the final user, after the chemical procedure and the AMS measurements of the samples, and it is not simply an "*exercise done to understand the potential limits of one laboratory*". Rather it is designed to help the cosmogenic nuclide community users defining the geomorphic meaning of samples with low nuclide concentration. In no way we suggest that the results which do not lie significantly above the blank threshold cannot be used, but rather we use this threshold to determine whether or not a rate or age can be quantified or when we can only interpret the data in terms of a maximum age or minimum erosion rate.

In the following lines we will proceed with commenting the main concerns of Referee #1 (in black ink), especially considering the aim of our work and our targeted audience, which define the structure and meaning of our paper. A more detailed answer on the line-by-line comments and changes to the manuscript will follow in the next weeks.

Anonymous Referee #1: Summary: This ms applies what are considered standard approaches in analytical chemistry to determining detection limits for the analysis of cosmogenic 10Be. The ms uses a long term set of blanks and sample measurements from one lab but multiple operators to make calculations and determine several statistical parameters for the detection of 10Be at levels confidently above the blank.

The manuscript does not break new ground; it is an exercise done to understand the potential limits of one laboratory much more than a significant advance in cosmogenic nuclide science and therefore, not the type or style of paper for publication in a broad readership journal such as Esurf. Overall, this paper presents a data set that most cosmogenic labs have and have likely analyzed internally but the ms does little to advance cosmogenic nuclide science more broadly. As a referee and as a user of this literature, I consider the ms to be much more appropriate for an AMS-specific journal such as NIMs and as such suggest it be shortened and submitted for publication there rather than eSurf. It just does not fit well nor will be it be of interest to most of the surface process community. It is technical in nature and does not have any significant geomorphic impact.

Significance and Readership: First of all, we would like to highlight that 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. In the last decades, the rapid expansion in the use of this technique has created a growing community of users that apply cosmogenic studies without the detailed technical knowledge typical of the people that work in an institute where it is possible to perform Be-extraction and/or AMS measurements (e.g., the LLNL facility) and who may have only a basic knowledge of the technical aspects of these procedures. This paper aims also at this broader community and, as such, it is specifically designed not to be technical, since we want it to be suitable for non-technical users. Some technical information on the chemical procedure for quartz extraction, Be-isolation, and the possible sources of blank contamination are, however, additionally provided in the supplementary material. Other detailed information on very specific technical aspects, such Boron interference, background AMS beam current, and blank counts, are already central topics of existing and excellent technical papers that the readers can access separately, if interested (we provide some recent summary papers as examples, e.g., Balco, 2011; Granger et al., 2013; and some technical papers that can be of interest for the more curious users, e.g., Schaefer et al., 2009; Rood et al., 2010; Merchel et al., 2013; Portenga et al., 2015; Corbett et al., 2016). Most of this technical information, indeed, is available for internal usage of specific laboratories (e.g., to define the precision of the AMS machine and/or cleanliness of the laboratory) but are normally not included in the final AMS measurement report that is delivered to the users.

For the above mentioned reasons, our paper does not deal with technical aspects of the AMS measurements (for which, we believe, already exists more suitable end technical papers), but rather proposes a statistical procedure (not chemical nor isotopic) based on clear definitions of detection limits which can be used as standard reference in the interpretation of the cosmogenic measurements. As such, the paper targets a broad audience and it describes a method that can be applied by all the cosmogenic nuclide users. Specifically, the method provides a statistical 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 (nor there is the risk to *reject data that are likely real*); on the contrary, a limiting value can still be very helpful. This proposed method, additionally, can be used also in cases where low-concentration samples are not expected. In such cases the user may not be aware of the precautions necessary to be taken during the chemical procedure, but he/she will still need to define how the results should be interpreted. For this goal, the paper describes a procedure that is commonly used in analytical chemistry to define a statistically significant threshold for low-concentration samples and provides a method for its application in the field of cosmogenic nuclide studies. Consequently, it does not describe a "new procedure", but rather we propose to apply this standardized method for cosmogenic nuclide studies, seeing as such a procedure is so far missing in the 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). We believe that a common and standardized approach that defines a general rule for the interpretation of these data is timely and valuable and that can be of interest for a broad audience and not only for the readers of a technical journal such as NIMs. For these reasons, we strongly believe that the paper will fit well a journal such as ESurf.

Furthermore, the ms is proscriptive and narrow in its approach, which makes it less likely to be accepted by the community. The manuscript does not set the presented data in context because it does not include a critical evaluation of how previous workers have done blank corrections nor does it demonstrate how different blank corrections would change geomorphic outcomes of extant studies. There are several examples in the recent literature where workers have applied several different approaches to blank correction and tested the sensitivity of results to varying approaches; see for example Corbett et al., GRL (2017) on 10/26 ratios. These are not cited nor are they considered critically. The ms reviewed here is under-referenced, omitting numerous important citations both classical and recent that are germane.

With respect to the blank subtraction methods, we have presented here three different approaches and discussed how their application would change the final interpretation of the results. So we do not agree with Referee #1 when he/she said that we did not consider different blank subtraction methods or that we did not "*demonstrate how different blank corrections would change geomorphic outcomes of extant studies*". Nevertheless, in the revised version of the manuscript, we will add more information on how other people have dealt with this topic (e.g., Corbett et al., as suggested by Referee #1) and discuss their approach. We would also like to highlight that very few papers discussed and reported in detail how the blank correction has been performed, and even fewer papers additionally dealt with low concentration samples (i.e., < 10^5 ^{10}Be atoms). As such, this information is not so easy to find within the existing literature.

This point raised from Referee #1 demonstrates how a common procedure for these important steps in the calculation of the cosmogenic results is still missing within the community. The way people normally deal with blank corrections is often not reported in the papers, but this could lead to slightly different results and to a lack of comparability between different publications. This highlights once more why our paper will represent an important contribution for the cosmogenic nuclide community.

Also, we have already provided, as examples, some of the most recent summary papers (e.g., Balco, 2011; Granger et al., 2013) that provide an exhaustive explanation of the cosmogenic nuclide technique and its last advances. The interested readers can go into the details of the references mentioned within these papers, based on their own specific interests. In the revised version of the manuscript, we will had more references to not leave out some of the very recent papers (e.g., Corbett et al., 2017), as suggested by Referee #1. However, we would also like to point out that we have provided here the reference to some of the most important and classical papers, but that it is possible that we have missed some of the very recent works (e.g., Corbett et al., 2017) that have been published only few months before the submission of this paper.

Critically, the paper does not consider type 1 vs type 2 errors, that is in striving to be certain that 10Be is confidently detected, such as using 99.9% confidence, samples containing real 10Be are almost certainly being rejected. This will lead to errant science and must be considered head on in any revision before publication. It is a critical flaw and must be addressed before publication in any journal.

As already mentioned above, for the aim of our work and the targeted readership, the paper is specifically designed not to be overly technical. For the same reasons, we did not go into the details of the Type 1 and Type 2 statistical errors: these are basic statistical notions that can be found in any book of statistics and we do not believe that a discussion about these types of errors will bring any benefit for the readers nor it will change the procedure/discussion presented in the paper. Additionally, we highlight once more that in no way "*samples containing real 10Be are going to be rejected*", rather we suggest that they can be interpreted as limiting values for exposure ages or erosion rates, a still very helpful and meaningful result.

Lastly, boron, an isobaric interference is neglected. It varies sample to sample and the means by which it is rejected varies between AMS facilities. It can be a very real component of the blank measurements. At minimum, it needs to be presented and discussed in the context of the ms and the measurements within – better yet would be to consider it broadly across the community. Again, this is narrow, technical information of interest to a small section of the community but critical to the issues here.

We agree that this is a "narrow, technical information of interest to a small section of the community" and for the reasons already mentioned above, we did not go into the detail of this discussion. Additionally, as pointed out by the Referee, this is an aspect that changes from AMS to AMS laboratories and its discussion goes far outside the aim of our paper and our targeted audience. Nevertheless, we have reported a full paragraph in the supplementary material where we have discussed the issue of the Be contamination (Section S5). We will had there some more information about Boron interference giving some more reference as examples for the interested users.

In summary, the ms is not appropriate for Esurf, is too narrowly focused on one approach to blank subtraction, ignores Type 1 vs Type 2 errors, does not consider 10B interference, and has little critical evaluation of the literature in which the current data need be considered in context. As is, it is a formulaic approach to analyzing an isotopic rather than geomorphic data set and not a significant advance of geomorphic science.

We have presented here three types of blank subtraction, an aspect that is not normally discussed in cosmogenic papers. We will provide additional information using the work of Corbett et al. to include other possible approaches. We have explained why our paper does not want to be too technical (still, many technical information can be found in the supplementary material), considering the aim and the target audience for this work, and we have provided two examples of how our proposed approach can be applied to geomorphic studies, discussing its consequences for the geomorphic interpretation of the samples (section 5.4). In the revised version of the paper we will include more examples, as suggested by Referee #1, so that the readers can have a broader idea of the impact of the proposed method on geomorphic studies.

For all these reasons, we believe that the paper is of broad interest and that it presents timely and necessary information for the cosmogenic nuclide community and for a correct interpretation of low-concentration samples. Its publication in a broad journal such as ESurf, rather than in a technical journal, will surely be of benefit for many researchers within and outside the cosmogenic nuclide community.