Earth Surface
Dynamics
Discussions

Interactive comment on "Determination limits for cosmogenic ^{10}Be and their importance for geomorphic applications" *by* Sara Savi et al.

Anonymous Referee #2

Received and published: 21 June 2017

Earth Surface Dynamics Discussion: Determination limits for cosmogenic 10Be and their importance for geomorphic applications

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: eventhough 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.

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?

- 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).

- 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.

- 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).

I hope this helps to further improve the manuscript.

C3