Earth Surf. Dynam. Discuss.,
https://doi.org/10.5194/esurf-2018-96-RC2, 2019
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Earth Surface Dynamics Discussions
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Interactive comment on "Determining the Optimal Grid Resolution for Topographic Analysis on an Airborne Lidar Dataset" *by* Taylor Smith et al.

Anonymous Referee #2

Received and published: 18 February 2019

The manuscript "Determining the optimal grid resolution..." presents an analysis of two types of errors that affect DEMS and offers a method for finding the DEM resolution that will minimize these errors for real data. I think that this is a very nice study. The analysis is thorough (23 supplemental figures!), and the combination of theoretical derivations, synthetic data, and application to a real dataset makes for a convincing combination. It is definitely something that will be of interest to people working with airborne lidar data, and since you offer a readily applicable method, I think that people will find this quite useful. I find the paper just about ready to publish, so I have only a few minor comments.

I am curious about the impact of irregular topography on the choice of resolution - if you have a stepped landscape (such as terraced hillslopes), would that change the

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consideration of the optimal resolution?

You show at the end that resampling gridded data to the optimal resolution is not sufficient to achieve the same quality as creating the DEM at that resolution, but it does seem to improve the slope distributions for the 1m data (it is interesting that resampling the 2 m data appears to move the distribution away from the ideal distribution). Assuming that you have the standard deviations and could calculate the optimal resolution, it seems that resampling could still be helpful if you don't have access to the ungridded point data?

Fig. 7: It's interesting that the optimal aspect spacing for the two highest noise levels is the same. Does this mean that the optimal spacing maxes out at this point?

Fig. 11: I find it hard to see much of anything with the color scale in panel C. Maybe one with more contrast would be better?

Watch your use of grid spacing vs. grid resolution - because higher resolution = smaller grid spacing, it can be a little confusing if you suddenly switch between them, as you do in the caption to Fig. 13.

It would also be nice to keep the figures consistent with slope and aspect shown in the same order (ie. slope always on the left/top and aspect on the right/below) - i.e. in fig. 5 it is reversed from fig. 3.

pg. 22 line 16: I guess you mean <3 meters

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