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Interactive comment on “GrainSizeTools: a Python script for estimating the dynamically recrystallized grain size from grain sectional areas” by M. A. Lopez-Sanchez and S. Llana-Fúnez

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Dear editor,

The present article deals with the important and interesting aspect of the quantification of grain sizes in microstructures. The authors implemented the Gaussian Kernel Density Estimator into a Python script to allow in future the automated calculation of mean grain sizes. To demonstrate the different aspects in grain sectioning and the application of the Python script, hypothetical grain size distributions were calculated, however, without showing the related structures. This is problematic as explained below. Using quartz microfabrics, the application of the new approach is demonstrated and com-

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pared with results from other approaches for grain size estimation (area weighting, Strip Star, CSD corrections). It is shown, that the new approach delivers similar results but can have additional advantages in comparison to the other approaches. In the following some major points are listed that should be improved during revision of the manuscript.

Selling point The application of the GkD estimator could be better sold to the audience. At the current stage, it seems that the primary goal of the authors want is to give a better defined value for a mean grain size. At the end, however, they show that the obtained results are very similar to those of other approaches. Why inventing then the new approach? In my opinion the authors are selling their invention under value. With the present tool they have a great opportunity to quantitatively characterize the entire grain size population including the distribution of the grain sizes! This has to be clearly stated and also sold to the audience! The future in this grain size business is to incorporate distributions in the rheological interpretations because they allow the investigation of the interplay of grain size sensitive and grain size insensitive deformation mechanisms (e.g. Herwegh et al. 2005, Herwegh et al. 2014 and others). I would like to strongly encourage the authors to argument in their revised form along these lines. In this sense, sentences like 'The GrainSizeTools script provides a robust method to obtain a representative single numeric value of dynamically recrystallized grain size in dynamically recrystallized deformed rocks based on the estimation of grain sectional areas (2-D data)' should be avoided and replaced.

Monodisperse distributions I have substantial problems with the grain size distributions in the case of the shown monodisperse distributions. Over the years, I have analysed hundreds of natural microstructures, some of them with nice equiaxed grains, i.e. monodisperse, and none of them showed a grain size distribution as presented by the authors in Figs 2, 5, and 6. Since the authors do not graphically show, how the grains aggregates look like in a 2D microstructural view, I can only guess what is wrong. In a grain aggregate, grains do not only have a grain diameter but they are

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also spatially distributed. The way how this distribution occurs, depends on the nearest neighbor relationships. Hence the grain 'packing' is the important issue. This 'packing' directly affects the sectioning and therefore the number of peripheral or more central cuts through a grain. In the present version, the authors generate some hypothetical distributions of spherical grains but do not spend a single word on the neighbor relationship between the grains. There is a fundamental lack of knowledge for a reader like me! I guess that the grain size distributions shown in Figs. 2, 5 and 6 result from grains totally isolated from each other (like garnet porphyroblasts in a matrix) and therefore the distributions rather reflect the probability of cutting through individual spheres than the sectioning effect in a grain aggregate. Here clarification and verification is mandatory. This would be done best by showing also the fabrics and not only grain size histograms. In fact this statement is valid for all parts of the manuscript.

Text The writing needs a round of severe reworking. Besides problems with the English writing, the authors often use interlaced subsets, which make the sentences long and very difficult to read. If a reader has to start over and over to read long sentences, he will loose the interest in the article. The authors should stay short, be clear and precise. Terms are loosely used, assuming that any reader is familiar with them. Even worse, synonyms appear through the entire text, making it for non-experts very difficult to follow. I strongly encourage the authors to properly define the terms they use at the beginning and then stay with these terms throughout the entire text. In the main text body critical terms are marked.

Moreover, the writing style is too colloquial. The personalized use of 'we', 'us' and 'our' should be avoided and only be used in rare cases to highlight a specific aspect. Expressions like 'as expected' are used in large numbers and should be avoided completely. Why saying something if everybody knows it already? Also the expectations of the authors may not fit with the background of the reader, giving the latter a negative feeling during the reading. I spent some time to make suggestions for improvements but before resubmission, the text definitely needs to be read by a native English speaker.

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Other colloquial terms are 'something similar occurs with...'. 'Consequently we think the best way to'

More details are marked in the PDF document attached and the comment summary file.

In sum, the article contains interesting scientific aspects and is worth to be published. Before acceptance, however, major revisions along the given lines are mandatory.

With kind regards, Marco Herwegh

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/6/C1471/2014/sed-6-C1471-2014-supplement.pdf>

Interactive comment on Solid Earth Discuss., 6, 3141, 2014.

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