Solid Earth
Discussions

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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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Consideration of the paper "GrainSizeTools: a Python script for estimating the dynamic recrystallized grain-size from grain sectional areas" by M. A. Lopez-Sanchez and S. Llana-Fúnez. In the present manuscript the authors describe a new Python script for characterization of the grain size population of dynamically recrystallized materials. Although technically speaking the method is fine, it is a single and rather simple script based on the kernel-density estimate using Gaussian kernel implemented in SciPy Python library or using well-known equation to calculate weighted mean, which appears to be the fundamental approach for the presented grain size estimate. Simi-

lar python scripts can be commonly downloaded from various web sites without being advertised in the form of scientific article published in a standard scientific journal. As for the scientific content I am not convinced that the present manuscript represents fundamental contribution to the evaluation of the grain size of recrystallized materials. And because the script is already accessible via sourceforge website (http://sourceforge.net/projects/grainsizetools/) and therefore can be located and used by the community I do not see the justification of publishing/advertising the description of the script in a scientific journal. I could understand a presentation of more robust scientific software packages covering many aspects/techniques of data processing but the presented script is just not enough.

I see two main troubles with scientific justification of the present manuscript 1) The belief that we need to know the single number to characterize and describe sometimes rather complex populations of grain sizes is to me obscure and definitely not step forward. 2) The mentioned simplicity of the procedure and advantages of the presented grain size determination technique in comparison with the other existing techniques (StripStar and CSDcorrections) are not so obvious.

ad1. As mentioned several times in the present manuscript a grain size population of dynamically recrystallized materials is typically characterized by the lognormal distribution. Therefore the characterization of the entire population by just one number clearly represents a simplification. The one number characterization of grain size populations led to discussions on which of the statistically relevant numbers should be used for such description (mean, modus, median, geomean see e.g. Ranalli 1984). On the other hand the question is how we want to use the number. If for example the number is used to characterize strain rates via including stresses derived from piezometric equations, in many cases we discover that the hunt for the precise estimate of the grain size is irrational and disappears in the uncertainty of flow laws. Furthermore, we all understand that the process of dynamic recrystallization can be rather complex covering various grain scale mechanisms. Thus the question emerges as whether the simpli-

fication used in the contemporary statistical treatment of the grain size populations is not counterproductive. DO we want/need the simplification if the complexity and more numbers characterizing the population may correspond to various mechanisms of the recrystallization process. The single number approach has been used since seventies so isn't already a time to move on?

ad2. The mentioned simple procedure of obtaining the grain size number via the presented technique is apparently not that simple because it is actually the list of numbers corresponding to areas of individual grains that needs to be imported into the script. However, it is usually the production of these numbers that is time consuming and demands several steps in the procedure. The subsequent statistical treatment of the grain areas in many cases is not demanding at all (matlab, python etc.). The development of this new technique of grain size determination is also not a step forward when compared to the existing techniques (such as StripStar and CSDcorrections) as demonstrated by the table 3. The table 3 presents the best estimation on grain size numbers obtained by the three techniques but basically the numbers range between 33.5 to 34.3 microns. Moreover the theory used to explain the technique is already well known and described elsewhere.