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Interactive comment on “A database of plagioclase crystal preferred orientations (CPO) and microstructures – implications for CPO origin, strength, symmetry and seismic anisotropy” by T. Satsukawa et al.

d. prior (Referee)

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This is an excellent paper. It provides a robust data set of the plagioclase fabrics (magmatic and solid state) in gabbroic rocks and a framework for cataloguing and interpreting those fabrics. It calculates and discusses the implications of these fabrics for elastic/ seismic anisotropy. I have two changes that I think are necessary and a few other suggestions. I also attach an annotated version of the manuscript with comments and questions.

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Required Changes:

Title. The title should make clear that this relates to plagioclase fabrics in gabbroic rocks. There are many other plagioclase bearing rocks that are not part of this study. Just add "in gabbroic rocks" or "in gabbros" before the hyphen in the title.

Plagioclase compositions. Unless I am being blind I cannot find any data on the plagioclase compositions. As Marshall and McLaren (1977 * 2) point out the shortest burgers vector changes as a function of space group (order-disorder) and therefore composition is a primary control upon plastic deformation. The data must exist for plagioclase composition(s) for all of these samples and should be included in table 2. Where plag is zoned that should be recorded and where there are porphyroclasts and recrystallised grains the compositions should be reported separately.

Other suggestions

Temperatures: If there are constraints on T of deformation in plastically deformed samples why not include these in one of the tables.

Reference frames. You can do more to make the reference frames of pole figures clearer. Add a pictogram to each one that distinguishes whether the sample is one with a foliation/lineation ref frame and shows the orientations of these or a drill core ref frame. I would rotate all core ref frame sample images so that core axis is vertical.

J and pfJ values are a function of sample size. For comparison why not normalise all data sets to the same number of grains (choose a random set of n grains: e.g see Holness et al 2012).

It is not clear to me whether the elastic properties calculated for each sample relate just to the plagioclase component or to all phases (or more confusingly to just plag in old manual data and all phases in newer auto data?). Also - I think ipg is a good way of comparing lots of data and helps in defining fabric types, but is not the ideal input data for calculating elastic properties- particularly if recrystallized grains and porphyroclasts

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have very different sizes.

Hope that these comments are useful. Other minor comments and questions in the attached annotated pdf

Dave Prior

Please also note the supplement to this comment:

<http://www.solid-earth-discuss.net/5/C592/2013/sed-5-C592-2013-supplement.pdf>

Interactive comment on Solid Earth Discuss., 5, 1191, 2013.

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5, C592–C595, 2013

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C594



This discussion paper is/has been under review for the journal Solid Earth (SE).
Please refer to the corresponding final paper in SE if available.

A database of plagioclase crystal preferred orientations (CPO) and microstructures – implications for CPO origin, strength, symmetry and seismic anisotropy

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1191

Fig. 1. In error can't work out how to delete this

Discussion Paper | Discussion Paper | Discussion Paper | Discussion Paper | Discussion Paper

SED
5, 1191–1257, 2013

A database of plagioclase CPO and microstructures

T. Satsukawa et al.

Title Page

Abstract Introduction

Conclusions References

Tables Figures

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Back Close

Full Screen / Esc

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SED

5, C592–C595, 2013

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Full Screen / Esc

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