

Interactive comment on “Ice crystal c-axis orientation and mean grain size measurements from the Dome Summit South ice core, Law Dome, East Antarctica” by A. Treverrow et al.

Anonymous Referee #2

Received and published: 27 March 2016

This manuscript presents microstructural parameters of thin sections of the ice core recovered from the Law Ice Dome, Antarctica, in the 1990s. The data have been derived with state of the art methods of that time. To my knowledge these data have not been published before. Mean grain size of one thin section per recovered core meter are presented. The crystal fabric orientation was measured for about 100 grains per prepared thin section. The data are unique as the archived ice from the core is prioritized for chemical analysis, thus it is not possible to derive microstructural parameters with current methods, which allow for more detailed grain statistics. The authors give a detailed introduction to the data and its background, the location and the drilling campaign. They also describe in detail how the data could contribute to improve the

C1

understanding of the rheological properties of ice, which is essential to improve flow modeling. The manuscript is very well structured and a pleasure to read. The data itself is easily accessible and for convenience provided in two different data formats. The pdf-files with the visualization of the fabric data, showing the stereographic plots and histograms, are a very useful addition, as they provide an immediate access to the information enclosed in the data. It is great that finally this valuable data set will be accessible for the glaciological community. It will surely be of use to many and should be published.

I would like to make two minor comments that the authors might want to consider before final publication.

1. In the discussion of the role of ice fabric in flow modeling the authors state that anisotropic flow models are currently not applied to the large scale. There are however some application of these models on the intermediate scale, which highlight the importance of anisotropy to the flow of ice (e.g. Zwinger et al. 2014) and the stratigraphy of ice divides (Martin et al., 2012). Maybe it would be appropriate to mention one of these here.

2. Grain sizes: Is there any information about the grain size distribution within the samples? Mean grain size is of course a valuable parameter but it would be great to have some idea about the shape and/or variation of size. Do the original polaroids still exist and could be digitized? Or could you maybe include some of them as figures in the paper?

References: Zwinger, et al., 2014, *The Cryosphere*, 8, 607–621, 2014, doi:10.5194/tc-8-607-2014 Martin and Gudmundsson, 2012, *The Cryosphere*, 6, 1221–1229, 2012, doi:10.5194/tc-6-1221-2012

Interactive comment on Earth Syst. Sci. Data Discuss., doi:10.5194/essd-2015-45, 2016.

C2