

## ***Interactive comment on “The WAIS Divide deep ice core WD2014 chronology – Part 2: Annual-layer counting (0–31 ka BP)” by M. Sigl et al.***

### **Anonymous Referee #1**

Received and published: 18 August 2015

This manuscript presents a new chronology for the WAIS divide ice core for the last 31 kyr based on annual layer counting. This is an updated chronology with respect to WDC06A-7, based on new datasets (e.g., black carbon, chemistry in the brittle zone, dust in some bottom section) and on new methods (e.g. the automated layer counting algorithms, different manual counting). In section 1, the work is briefly introduced (ice cores in general, WAIS divide, the WDC06A-7 chronology). In section 2, the measurements used are described, as well as the counting methods and the time scale uncertainty. In section 3, WD2014 is compared to other time scales and its accuracy is evaluated. Finally, section 4 concludes the manuscript.

This is a technical manuscript describing an age scale. There is no climatic results in the manuscript. The manuscript does not present new concepts, ideas, tools but use

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new data and new tools. The paper is well written, in a clear and efficient way, although in my opinion some explanations are sometimes missing (see below). This is clearly a step forward with respect to WDC06A-7, judging by the closer agreement to other time scale (e.g., INTCAL13, Hulu).

The manuscript needs major revisions in the following areas: - The various parameters used in the automated methods (StratiCounter and the selection curves algorithm) are not described, leading to un-reproducible dating experiments. - It is not clearly explained why in some section a method is used (e.g., StratiCounter in the 2020-2300 section) and in some other section another method is used (e.g., the selection curve algorithm in the 2300-2711 section). - The manuscript does not quantitatively evaluate the uncertainty of the time scale. There is only a qualitative discussion in section 2.4, but no numbers are given. The accuracy of the time scale is discussed in section 3.3 but this is not an independent error estimate! - This is also due to the fact that there is no counting of uncertain layers, as was done in GICC05. For me, this is a clear step backward with respect to GICC05. The tentative explanation of why this has not been done in pp. 3439-3440 is not convincing at all! For me, it appears that the authors just did not take the time to do it. - The manuscript could include some discussion on the accumulation reconstruction, after a correction for the vertical thinning: 1) comparison to other climatic proxies such as deuterium, 2) distributions of annual layer thickness at different time periods. That would give a small climatic aspect to the manuscript.

Minors comments: - Figures are numbered from their order of appearance in the text (e.g., Fig. 8 appears right after Fig. 5) - Section 3.4 (comparison to GICC05) should appear before section 3.3 (age accuracy) - In Figure 9, the 0.5% confidence interval does not seem to be linear at  $\sim 2.5$  ka. Why?

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