

Interactive comment on “A sixty year ice-core record of regional climate from Adélie Land, coastal Antarctica” by S. Goursaud et al.

E. Isaksson (Referee)

elisabeth.isaksson@npolar.no

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The paper present and discuss the data from a 22 m deep ice core covering 60 years drilled from a coastal site in Adelie Land, an area well known for the strong katabatic winds. The ice core data are discussed in relation to outputs from a high resolution atmospheric general circulation model including water isotopes. Because of the specific meteorological conditions with strong winds the dating of this ice core has been a big challenge- and that is one reason for the lack of such data from this particular region. However, because of the proximity to Dumont d'Urville, various other glaciological and meteorology data has been collected here for several decades. Thus, there are some valuable scientific background data that are helpful for both dating and interpretation of this ice core. A major part of the paper focuses on the dating of the core- something that is important for this particular site for the reasons just mentioned. The authors do

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a thorough job describing the procedure in great details, and verifying the traditional dating with model output. I find this to be an important scientific contribution because dating is something that is usually regarded as a method and thus do not receive too much attention. The main conclusion in the paper is that one core can indeed accurately capture major annual anomalies and multi-decadal variations. During recent years there has been lots more focus on ice core data from coastal regions in Antarctica and therefore the results from the drill site presented here is highly interesting. It is important to collect field data also from “difficult” areas for validation of models so I feel that this paper is a very important contribution, and also an inspiration for such work. Although the paper is presenting valuable data there are a few issues to consider before it is accepted.

1. It is very important to have field data for validation of models but it is also crucial that the field data are of good quality. There are a number of pieces of information missing in the manuscript in order for the reader to make this judgement. Not much data on the general glaciology and meteorology are provided- and the available information is not collected in one place which makes it harder for the reader. It could be good to collect the information that exists in a separate chapter - “area description”-in the beginning of the paper. For instance, the wind direction and wind speed information (chapter 5.3.1.) should be appearing in the general introduction because this is such fundamental information for all interpretation.

2. Information about spatial distribution of accumulation is missing in the paper. A single ice core and its regional representativeness is always an issue for discussion. A first step is to look at the snow layers using GPR (see recommendations in Eisen et al. 2008). In chapter 2.1 GPR measurements are briefly mentioned, and seem to have been collected at the time of the core drilling. Then one might wonder why that is not included here? When this core in addition comes from an areas so affected by katabatic winds this definitely has to be paid more attention to. Also, I think it is necessary to include some more information about the stake data for the same reason. As a reader

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I am not entirely convinced that the good agreement with major annual anomalies and multi-decadal variations is not pure coincidence.

3. There is no information about ice layers and potential effect of melting.

4. The paper is generally heavy to read and it looks like the text is based on a thesis with different chapters. I suggest the authors try to re-organize- and maybe also shorten it a bit. Dating is a main aspect of this paper as it is written now so maybe that should be reflected in the title?

Tables and figures

Table. 2. Specify % for r and p

Table 3. Use capital letters for READER and ECHAM as in other tables.

Specify % for r and p, unit for slope

Figure 2. Spelling of DMS is not English

Figure 3. Different colors are needed- hard to distinguish between the ones chosen.

Figure 7. Poor color choice also for this figure. Add labels and units for y-axes. Very difficult to distinguish the different information from one another in the lower panel.

Figure 8. This figure would benefit from being re-drawn. Labels should be better placed. Legends need to be bigger. All the “d18O” in the Figure caption should be changed to the right format.

Minor issues

There are a number of language problems, typos etc. for the authors to take care of. Here is a small selection- but there are many more.

p. 5 line 23. A slight rewrite to remove at least one of the three “cleaned”

p. 5 line 27. Remove a single “e”

p. 9 line 4-9. There are many very long sentences in the paper that makes it hard to read. Here is one of many examples.

p. 10 line 5. long term. . . ? Uncomplete sentence

p. 11 line 5. Should be “links”

p. 11 line 32. Should be “the period”

p. 12 line 8. Should be cha

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