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Climate of the Past Discussions

Interactive comment on "A brief history of ice core science over the last 50 yr" *by* J. Jouzel

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This has been a somewhat different paper to review compared to most scientific papers, particularly because the author right at the beginning (Page 2, 2nd paragraph at top) states, that this is a personal and not un-biased account. For this type of review paper I think this is indeed fair. I have therefore restricted myself to mainly checking of facts. I have suggested some additions to make also Australian and Canadian activities visible, because these nations were also active early on. Jean Jouzel has chosen to stick to his guns (isotopes and gases), and he is clearly the expert in these matters. It is a wise decision, because if chemistry, dust, ice physics etc. enters the story, it will become unbearably long. The ice core, isotope and gas story is laid out in a really god fashion and all the major breakthroughs in the overall climate interpretation of ice cores is included. The paper is well written, and I enjoyed reading it. I believe the paper will serve as a reference for many future students in the ice core community. I am humbled

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by the knowledge displayed by Jean Jouzel.

Before I get to specific points of the text I would like Jean Jouzel to consider these two points for inclusion in the paper:

1. Bo Vinther has recently in a very neat fashion managed to reconstruct past ice sheet elevations in Greenland by using stable isotopes and total gas content and using Canadian and Renland ice cores as isotopical references. A good case on how isotopes and gases and isotope thermometry can be combined.

2. The disturbed NEEM ice core record of the Eemian (NEEM members, 2013) could never have been reconstructed without the whole toolbox for both water- and gas isotopes and bi-polar synchronization that Jean so neatly has presented in this paper. I think the NEEM case wraps many of the elements Jean Jouzel has made up in a nice way.

Comments to the text and figures:

Page 1, abstract line 2: Change to Greenland, Antarctica and other glacier covered regions.

Page 2, figure 1 caption: Please explain red dots as logistic bases and black dots as drill sites. Also, what do the red areas indicate?

Page 4, line 3: Typo. "...Byrd drillings..."

Page 5, line 2: "...Vostok ice core was..."

Page 5 2nd paragraph: The author might want to consider mentioning the extensive Australian program at Law Dome. They drilled to 382 m in 1969, to 477 m in 1977 and to bedrock at some 1200 m in 1990, also they drilled to 430 m at BHQ in 1977 and to 300 m at BHC-1 to 350 m at BHC-1 in 1982. (refs. Hamley, T.C., Morgan, V.I., Thwaites, R.J. and Gao X.A. ANARE Research Notes 37, 1986 and a Law Dome paper by Morgan, V.I. et al sometimes in the mid-90'ies).

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If possible, maybe the author could also mention the Canadian activity at Devon ice cap, Agassiz and Ellesmere, where they found Laurentide ice at the base of at least two cores. The Canadian cores are important for the reconstructions of past thickness of Greenland (work by Bo Vinther). And maybe the Canadians particularly should be mentioned now that the Canadian government shamefully has decided to close down ice core activities. I guess only David Fisher is around – and only as emeritus. . ...

Page 5, section 2.1 lines1-3: Comment: Camp Century was drilled as part of the Camp Century cold war "city under the ice" experiment so in fact it was drilled at a base. Dye-3 was an American cold war Distant Early Warning radar base on the ice sheet, so the site was chosen because the base and infrastructure was already there. The name of the airport in Greenland was "Sondrestrom A.B." (A.B. for Air Base) until 1992. Then it became Søndre Strømfjord or Kangerlussuaq.

Page 5 bottom line and Page 6 top line: The "science trench" concept was used at Dye-3, but at GRIP it was used and expanded, because it felt natural for the people in Copenhagen to do it again.

Page 6 2nd paragraph line 7 from top: "..under the leadership of first Claus Hammer and later Dorthe Dahl-Jensen. . ." and two lines below: A comment: NGRIP core was drilled with a new drill, an expanded version of the Hans Tausen drill (HT drill) that was developed by Sigfus Johnsen and Steffen Bo Hansen and tested at Hans Tausen glacier in 1995 with French participation (Laurent Augustin and Paul Journet).

Figure 3 caption: this is the drilling trench at NEEM.

Page 8, 2nd paragraph, line 2: Typo: "parallel"

Page 8, 5 lines from bottom: An EPICA drill was developed based on the Danish NGRIP – Hans Tausen design. I think that Jean Jouzel remembers that the Copenhagen group feared that ISTUK would not operate in the cold of Dome C, also there was fear that productivity would not be high enough.

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Page 9 line 7 from top: For completeness it should be mentioned that the drilling at Kohnen was done with the NGRIP drill. In these years, this drill spent most of its time en-route between Greenland and Kohnen.

Page 9, 2nd paragraph: comment: the Japanese used their own JARE drill design for this drilling.

Further down: Siple Dome was drilled with the GISP-2 drill and WAIS has been drilled with a new ICDS DISC drill. Law Dome was drilled with a modified ISTUK, Berkner Island and Talos Dome with a HT drill type. This is just to complete the trivia section.

Page 15, 2nd line: What is Figure "x" ?

Page 20, 2nd paragraph: After discussing Masson-Delmotte 2005 it could be mentioned that all D/O cycles in Greenland appear to be bracketed by abrupt shifts in d-excess, and that the Steffensen et al. paper on the abrupt termination in 2008 made use of this in their interpretation. D-excess therefore, is also a very important parameter in ice core stratigraphy.

Page 26: 4th paragraph: I suggest : ".. an undisturbed record covering the last 1.5 Ma in Antarctica and the last 150 ka in Greenland. High resolution. . .", and in the same paragraph: The mentioning of rapid drill and probe could include U.S.ideas along the same lines and Jakob Schwander has been working on this for years. – Since early 80'ies this has been tried many times, e.g. B. Lyle Hansens tests of the Philbert probe at GRIP and CRRELs test of the wire-line drill in Antarctica in the early 70'ies, so far without luck. . . but still it should be tried. I just feel that just mentioning only a French initiative here is a bit too biased.

General comments: The graphical quality of several figures needs to be improved. In my version, several appear fuzzy.

Interactive comment on Clim. Past Discuss., 9, 3711, 2013.