

REVIEWER'S COMMENTS

A comprehensive interpretation of the NEEM basal ice build-up using a multi parametric approach

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Principal criteria

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| <p>Originality (novelty): Within the scope of The Cryosphere, does the manuscript represent substantial progress beyond current scientific understanding (new insight, concepts, methods, or data)?</p> | <p>Excellent (1) YES</p> |
| <p>Scientific quality (rigour):</p> <ul style="list-style-type: none"> • Is the purpose of the work clearly articulated, reflected in an adequate methodology, and its achievement compellingly underpinned by the evidence presented? • Are the applied methods and techniques valid and suitable? • Are the results discussed in an appropriate and balanced way (consideration of related work, including appropriate references)? | <p>Excellent (1) YES YES YES</p> |
| <p>Significance (impact): Does the manuscript contribute to changing our scientific understanding of a subject substantially or to introducing new practical applications of broad relevance?</p> | <p>Excellent (1) YES</p> |
| <p>Presentation quality: Are the scientific results and conclusions presented in a clear, concise, and well-structured way (number and quality of figures/tables, appropriate use of English language)?</p> | <p>Excellent (1) YES, but a final proof-read might identify some further refinements in clarity of English in a few locations.</p> |

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| Does the paper address relevant scientific questions within the scope of TC? | YES |
| Does the paper present novel concepts, ideas, tools, or data? | YES |
| Are substantial conclusions reached? | YES |
| Are the scientific methods and assumptions valid and clearly outlined? | YES |

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| Are the results sufficient to support the interpretations and conclusions? | YES |
| Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? | YES |
| Do the authors give proper credit to related work and clearly indicate their own new/original contribution? | YES |
| Does the title clearly reflect the contents of the paper? | YES |
| Does the abstract provide a concise and complete summary? | YES |
| Is the overall presentation well structured and clear? | YES |
| Is the language fluent and precise? | YES, on the whole |
| Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? | YES |
| Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? | NO |
| Are the number and quality of references appropriate? | YES |
| Is the amount and quality of supplementary material appropriate? | YES |

Additional comments

This is an important and impressive contribution that will be of widespread interest to several different sections of the cryosphere community, including ice-core studies, environmental reconstruction, ice-sheet mechanics, etc. The paper is well set into its scientific context and provides clear explanations of key analytical techniques such as co-isotopic analysis used in the interpretation. I found the paper very worthwhile in a number of different respects.

There were just a few points of small detail where I thought some readers might appreciate clarification, as follows:

P5556 line 9: somewhere here it would be useful to clarify whether this core reaches what might be considered to be the bed. I know this is tricky since the glacier-substrate interface is not clearcut in this environment, but it would be nice for the authors to be clear about whether they think there is any more "glacier" below the level reached by the drill, or if this really was the bottom.

P5556 line 21-23: This sentence will confuse some readers as to whether the signature was open or closed or both at once or both but in different locations. Could be re-written for clarity.

P5557 line 23: Could be re-written for clarity. Unclear whether there were 58 deep ice cores along the DEW line.

P5558 line 23: Spelling of traditionally.

P5559 line 12: readers might appreciate clarification as to why the top of the basal ice is defined in these different ways by the authors and the NEEM community.

P5559 line 12: events (plural)?

P5570: This is one of several pages where the problem arises that there are so many abbreviation initials that readers might sometimes struggle to keep track. Here we have BIL, EPICA, EDC, PMP, CIS, NEEM, TGC... sometimes a reminder of the full label for some of those created for this paper would help the reader.

P5578 line 27-29: here, or earlier, it would be interesting to see the authors identify explicitly the exact tests that could be applied to test the different aspects of the model that they have presented. They mention some test techniques here; it would be interesting to hear exactly what the authors imagine these tests could exactly demonstrate.

Overall I found this a really useful paper, and my comments only point out some very minor areas where I would have enjoyed even more information!

Thank you for inviting me to review this.

PGK.