

Reply to the editor

We thank the editor for careful review of our manuscript and thoughtful comments to improve it. In the following, we describe our responses (in blue) point-by-point to each of editor's comment (in black).

In the marked-up manuscript, the modified (added) and removed words are highlighted in yellow and blue colors, respectively.

Line 16: change "... the present work investigated..." to "... the work presented here investigates..."

We modified.

Line 17: remove "depth within the 3035 m long"; remove "drilled at one of the dome summits"

We removed.

Line 19: it's not clear what the phrase "at which the ice cover has an age of approximately 300 kyrs BP." Perhaps you mean that the top 80% of the Dome Fuji ice core studied is ice from the last 300 kyr BP? I think you can remove that phrase and change the comma here to a period.

We removed.

Line 20: change "...moving in the depth direction" to "...with depth"

We modified.

Line 26: change "...together with..." to "...and..."

We modified.

Line 48: change "As an..." to "For..."

We modified.

Line 64: change "...and so..." to ", therefore"; change "efforts" to "effort"

We modified.

Lines 99-100: change to "At present, under the Holocene climate,..."

We modified.

Line 106: change to "The DF1 and DF2 boreholes are only 48 m apart."

We modified.

Lines 108-109: change to “from the depths of 100 to 2400 m.”

The sentence was remodified by professional as follows:

“between the depths of 100 and 2400 m”

Line 109: change to “At each sampling depth,…”

We modified.

Line 160: change to “Error bars…”

We modified.

Line 164: change “(plot a)” to “(Fig. 4a)”; change “(plot b)” to “(Fig. 4b)”

We modified.

Line 165: add “Fig. 4c” to the parentheses here

We added.

Line 166: change “(plot d)” to “(Fig. 4d)”

We modified.

Line 171: change “Plot (a)” to “Figure 4a”; remove “is to”

We modified.

Lines 174-175: change “plot (a)” to “Fig. 4a”

We modified.

Line 175: double-check that “MIS7abc” is correct. Do you need commas between a, b, and c?

We don't need commas between abc. (checked by professionals)

Line 177: change “Plot (a)” to “Figure 4a”

We modified.

Line 181: change “plot (c)” to “Fig. 4c”

We modified.

Line 189: change to “Error bars...”

We modified.

Line 191: change “panel a” to “panel (a)”

We modified.

Line 208: change “... our present newly developed method.” to “... our newly developed method that we present here.”

We modified.

Line 211: change “panel (a)” to “Fig. 5a”

We modified.

Line 212: change “Panel (b)” to “Figure 5b”

We modified.

Line 286: add “transitions” after “interglacial to glacial”

We modified.

Line 291: change “discussions” to “discussion”

We modified.

Line 327: add “(Sect. 1)” after “Introduction”

We added.

Line 334: add “a” before “complex”

We added.

Line 337: remove “as to” after “(v)”; add “our” after “apply”

We modified.

Line 349: change “y-scale” to “y-axis”

We modified.

Line 370: capitalize the ‘t’ so that it is defined as “Type A”

Line 373: capitalize the ‘t’ so that it is defined as “Type B”

Line 377: capitalize the 't' in "Type"

Line 405: capitalize the 't' in "Type"

Line 409: capitalize the 't' in "Type"

Line 413: capitalize the 't' in "Type"

Line 417: capitalize the 't' in "Type"

Line 434: capitalize the 't' in "Type"

Line 451: capitalize the 't' in "Type"

Line 479: capitalize the 't' in "Type"

Line 495: capitalize the 't' in "Type" in both places here

We modified all.

Line 385: add "the" before "plots"

We added.

Line 390: change "so that" to "therefore"

We modified.

Line 419: add "is" before "slightly"

We added.

Line 420: change "reason for" to "cause of"

We modified.

Line 436: add "Type" before "B"

We added.

Line 444: change the period (.) to a colon (:) here; change "These are" to (i)

We modified.

Line 445: add "(ii)" before "the various..."

We modified.

Line 446: change to "In the first case, if the deformation..."

We modified.

Line 450: change to "In the second case, deformation..."

We modified.

Line 500: change “and so” to “, which is”

We modified.

Line 504: change to “near this bubble close-off horizon”

We modified.

Line 507: clarify where this phenomena was observed (in your samples for this study? Or in DF samples from Fujita et al?); change “and/or” to “as well as”

We added “Fujita et al., 2016” and modified.

Line 510: change to “metamorphism and deformation”

We modified.

Line 526: change to “the positive and negative...”

We modified.

Line 544: add “of the DF ice core” after “80%”; the phrase “which will be continuous to the deeper 20%” doesn’t make sense. Consider removing that phrase.

We added and removed.

Line 546: change “contrasts” to “fluctuations”

We modified.

Line 547: change “stresses/strain” to “stress/strain”

We modified.

Line 549: change “contrasts” to “fluctuations”

We modified.

Line 552: change to “ice sheets”

We modified.

Line 570: change to “the presence of layers with heterogeneous thickness could...”

We modified.

Lines 571-574: it's not clear what you mean in these sentences. Please revise so that the reader can understand the point you are making here.

We modified the sentences as follows:

“Finally, we suggest an important implication obtained from this study. Layered sequences of ice core signals resulting from Cf and dust particles are commonly obtained from inland ice core sites over the entire widths of the Antarctic ice sheet with minor local variations. Because both Cf and dust particles are primary factors controlling the development of COF (as demonstrated by this study), the COF layering profiles established by these factors should be similar in many ice core sites located in inland of the Antarctic ice sheet. Profiles of COF layering should be similar not only at ice core sites but also over much wider areas of the ice sheet having common sequences of both Cf and dust particles.”

Line 574: add “a” after “discovered”

Line 575: add “the” before “EDC”; change to “The two sites are approximately 2,000 km apart in East Antarctica.”

Line 576: change “for” to “of”

Line 577: change to “Since we can use radars...”; add “now” after “should”

The sentences including these points were remodified by professionals as follows:

“Indeed, in Figure 8, the variations in $a_3^{(2)}$ eigenvalues over time in the DF2 ice core (this study) and the EDC ice core are seen to be similar even though these two sites are approximately 2000 km apart in East Antarctica. This is the first example of common features of COF variations within two very remote ice cores and is thus an important finding. Because radar data can be used to detect COF layering, it should be possible to compare deep COF layers across very wide areas of ice sheets, and such analyses should be performed at other locations.”

Lines 580-581: change to “... we assessed the potential of using the dielectric anisotropy...”

We modified.

Line 584: add a comma here so that it is “Examining thick, 1-m long ice core specimens...”

We modified.

Line 589: change to “...values increased with increasing depth...”

The sentence was remodified by professionals as follows:

“values was to increase with increasing depth”

Line 590: add commas so that it is “The overall trend, in which the values increased, is...”

The sentence was remodified by professionals as follows:

“This general pattern in which the values increase~”

Lines 598-599: add commas so that it is “...Cl⁻ ions, along with a negative correlation with the amount of dust particles in the ice core, were ...”; consider changing “amount” to “concentration”

We added and modified.

Line 607: add comma after “sheets”

We added.

Lines 610-611: the phrase “...in layered manner were apparently present...” doesn’t make sense. Please revise.

We removed “layered manner were apparently present”

Lines 612-615: this long sentence is also hard to understand; please revise. Remove both instances of “basically” in this sentence.

We modified this sentence as follows:

“It should be emphasized that layered sequences of ice core signals related to Cl⁻ and dust particles were common at inland ice core sites within the wide Antarctic ice sheet. Because both Cl⁻ and dust particles are among the major factors determining the development of COF, profiles of COF layering established by these factors toward very deep depths should be similar within many ice core sites located in the inland regions of the Antarctic ice sheet and even in wider areas of the ice sheet having similar sequences of both Cl⁻ and dust particles.”

Line 617: add “the” after “within”

We added.

Line 618: add “the” before “future”

We added.

Line 619: change to “layers with heterogeneous thickness”

We modified.

Figure 5b: consider changing colors for the black markers (or to more visible markers), because it’s very hard to tell the difference between the two black lines.

We modified to grey color

Figure 9 caption: include definitions for both the red and blue lines in the caption here.

We added definitions:

Figure 9. Comparison of the S.D. values of $\Delta\varepsilon$ data determined at intervals of approximately 0.5 m along the core sample, using approximately 23 data points for each interval (blue line) and detrended $\Delta\varepsilon$ data defined as deviations from the third-order-fitting to the data in Fig. 4a (redlines) (smoothed over 10 m intervals). Note that the y-axis for the detrended $\Delta\varepsilon$ has been inverted.

Figure 10 caption: define what the grey and tan shaded bars represent somewhere in the figure caption. Define what “A1”, “AII”, “B1”, “A7”, “B2”, “AIII”, and “B3” mean in the figure caption. Additionally, define what “A1”, “AII”, “B1”, “A7”, “B2”, “AIII”, and “B3” mean somewhere in the discussion section.

We added definitions of shaded bars and A1 ~ B3 in the caption and body text (L371 and 375).

Figure 10 caption: “Grey shading indicates correlations between the large depressions in the detrended $\Delta\varepsilon$ values and lower concentrations of soluble impurities (defined as Type A). These regions correspond to the termination-I/MIS1 (A1), termination-II/MIS5e (AII) and termination-III/MIS7e (AIII) transition periods and to MIS7abc (A7). Note that the labels indicate the termination or MIS stage in each case. Brown shading indicates correlations between the depressions in detrended $\Delta\varepsilon$ values and higher concentrations of dust (defined as Type B, numbered in order according increasing depth).”

Non-public comments to the Author:

Many of the technical corrections listed above are due to grammar and sentence structure issues. The new portions of text you've added due to the reviewer comments have great grammar. Perhaps you could ask the same person to review the whole manuscript, as there might be more grammatical errors than the ones I found in the list above.

Thank you for careful review. The revised manuscript was checked by a native speaker.