

Interactive comment on “Climate variability and long-term expansion of peat lands in Arctic Norway during the late Pliocene (ODP Site 642, Norwegian Sea)” by S. Panitz et al.

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Panitz et al. present a pollen analysis of the late Pliocene interval, Piacenzian, from ODP site 642 collected off northern Norway. The results are original and the resolution of the analysis is high, up to 800 years between 3.29 and 3.16 Ma, approaching the temporal resolution performed in Pleistocene records. In contrast with previous low resolution studies, they show for the first time that Piacenzian warmth was not as stable as previously thought but punctuated by cooler episodes. These cooler episodes, allowing the development of tundra and peat lands, could contribute to an increase in albedo and atmospheric CO₂ capture, both feedback mechanisms contributing to ice

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build-up leading to the major Pleistocene glaciations. This manuscript deserves publication in *Climate of the Past* after moderate revision. My main concerns are manuscript length and descriptions of the pollen results. I suggest to the authors delete section 4.2 (description of the raw pollen data) and 4.3 (description of the quantitative climate reconstructions) and draw a new table synthesizing these raw data. *Climate of the Past* is not a palynological journal. Moreover, section 5 nicely describes the pollen results already along with their interpretation in terms of vegetation and climate. Now, there are many repetitions between sections 4.2 and 4.3 and sections 5.2 to 5.6 and 5.7.

Below I have listed the points that the authors should also modify or further discuss:

Page 5757, Line 11: Please clarify what you mean by “As the mPWP exceeds orbital timescales...”.

Page 5762, Line 5762: Why did the authors sieve the samples with a sieve at 63 μm ? I guess that the reason is because this sieving is the common procedure used by paleoceanographers to collect the foraminifera. However, the size of *Picea* pollen is commonly bigger than 63 μm reaching nearly 100 μm (e.g. Lindbladh et al., 2002, *American Journal of Botany*). Please argue that the potential bias in the pollen data related with the underrepresentation of *Picea* would not affect the interpretation and conclusion of the manuscript.

Page 5763, lines 25-26: “. . ., following the same preparation protocol.” The same protocol in comparison with what other protocol?

Page 5763, lines 9-10: How many pollen grains do you count per sample excluding *Pinus* pollen and how many taxa?

Page 5763, lines 14-19: Please cite the reference of the paper that validates the criteria used to identify the reworked pollen (dark orange to brown colour, high degree of compression. . .).

Page 5763, lines 20-25: Add how the percentages of *Pinus* pollen have been calcu-

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lated.

Page 5765, lines 13-14: How can the authors discriminate Cupressaceae from Juniperus-type pollen? In Quaternary sediments, this discrimination is not possible. We use Cupressaceae pollen morphotype as synonym of Juniperus-type morphotype.

I suggest to the authors to replace “Modern surface samples” by “Modern and mid-Holocene samples” throughout the manuscript.

Page 5770, lines 5-22: could the authors please further discuss the type of transport by wind or rivers that brought the pollen to the ODP site. If the pollen grains from deciduous trees are transported by rivers, they would not necessarily be deposited closer to the source area. I guess that the model of Mudie and McCarthy is valid for pollen transported by winds. Is this correct?

May I suggest including in Figure 6 the $\delta^{18}\text{O}$ curve of Lisiecki and Raymo for the Piacenzian interval in order to better follow the Discussion section?

Minor comments

Please write the names of species and genus in italics.

Page 5760, line 11: replace “is” with “are”.

Page 5762, line 23: add a coma after “Norway”.

Page 5764, line 15: replace “analyse” with “document”.

Page 5771, line 24: add “s” to “zone”.

Page 5764, lines 25-27: delete the meaning of MAT, CMT, WMT and MAP. This is already mentioned in section 2.2.

Page 5767, line 22: replace “is” with “are”.

Page 5775, lines 8-9: This sentence is not clear.

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Page 5779, line 2: add “northern” before “Norway”.

Figure 2: Could you add the latitudes?

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