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Climate of the Past Discussions

Interactive comment on "Qualitative and quantitative reconstruction of surface water characteristics and recent hydrographic changes in the Trondheimsfjord, central Norway" *by* G. Milzer et al.

Anonymous Referee #2

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This paper presents a study on palynomorphs from three cores that covered between the last 25 to 50 years, from a Norwegian fjord and an aim to reconstruct past sea surface conditions, from a qualitative and quantitative perspective. The chronology is based on radionuclide measurements, namely 137Cs and 210Pb concentrations. The paper is mainly focused on the dinocyst assemblages, as they are the dominating palynomorphs. A qualitative appreciation of the downcore assemblages is given based on the known recent distribution of the species occurring in these samples and their ecological affinities. Multivariate analyses were performed on the three sets of assem-

blages to determine controlling factors on the cyst distributions. Finally, a quantitative estimation of temperature, salinity and productivity is given, derived from the transfer function methodology, the Modern Analogue Technique. The fluctuations of the reconstructed environmental factors are related to NAO variability although local conditions may have influenced changes in the assemblages, and little human influence has been detected.

Overall, this paper has sound data that show some changes in the fjord environment over the timeframe studied here, but it would benefit from a reconsideration of the multivariate analysis approach. The results of the NMDS would be more significant and less biased if concentrations (or even fluxes as the authors have a sound age model) were used, as it is normally the case when analysing marine communities (see paper from Clarke (1993)). More information should be given about transformation of the data for the NMDS (log-transformed? Square-root?). Furthermore, you could include your modern database from the fjord in the NMDS to assess the environmental gradients that are affecting the downcore assemblages.

My second point is the data presentation. I find figure 4 to be redundant as the entire information can been found in the following figures, which are more explicit. Furthermore, there are some interesting changes in the concentration curves between the three cores that can not been seen in figure 4. Please delete figure 4 and modify your text accordingly, it will make the text easier to read.

With regards to figures 6 to 8, you mentioned the NMDS to support the group making. I think you need to be clearer here, did you run the NMDS on the samples as variables or species as variables? I do not see the point of using the NMDS results to order the taxa. Why not using the ecological affinities that you have described in your text?

It is correct that as a convention, 5 analogues are used as an option for the MAT but did you try with 10? Was there a significant difference with the estimations? You have indeed a strong influence of P. dalei and more accurate reconstructions would be

difficult to obtain without a bigger database.

Other points to consider: In page 4562, you mentioned that Selenopemphix species were grouped together according to Marret and Zonneveld (2003) and Milzer et al. 2013. So, you grouped S. nephroides and S. quanta together which I think is a mistake as they have not quite the same ecological affinities. S. quanta and S. nudum are indeed grouped together. Please, do check your grouping. In page 4563, L. machaerophorum may also be a signal of lower salinity, as it can tolerate salinity as low as 7. Same with S. bentorii, which is present in brackish environments. Check the taxonomy for P. schwartzii with regards to Matsuoka et al. (2009). This species is related to nutrients in general. In page 4569, data are being explained according to a sedimentological context, would it be possible to add grainsize data as well as TOC? That would support the interpretation over the changes in assemblages. Other minor points were annotated on the ms.

References: Clarke K.R., 1993. Non-parametric multivariate analyses of changes in community structure. Australian journal of Ecology, 18, 117-143.

Matsuoka, K., Kawami, H., Nagai, S., Iwataki, M. Takayama, H. 2009. Re-examination of cyst-motile relationships of Polykrikos kofoidii Chatton and Polykrikos schwartzii Butschli (Gymnodiniales, Dinophyceae). Review of Palaeobotany and Palynology, 154(1-4), 79-90.

Please also note the supplement to this comment:
http://www.clim-past-discuss.net/9/C1969/2013/cpd-9-C1969-2013-supplement.pdf

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Interactive comment on Clim. Past Discuss., 9, 4553, 2013.