

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.

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We gratefully appreciate the remarks and suggestions by referee #2 concerning the grouping of the dinocyst species, the structuring and formatting of the manuscript and the statistical method used for the qualitative analysis of the samples. The comments will certainly improve the manuscript in terms of species characteristics and preferences as well as the understandability of the document. There are three issues, however, we would like to explain in more detail:

C2119

1. Data treatment prior to the NMDS and the approach of the multivariate analysis

The referee suggests that we should reconsider the approach of the NMDS with regard to the general data treatment procedure and the purpose of our work. The grouping of the samples by NMDS as proposed in our manuscript, with the species as variables, is supposed to serve as a statistical test for observed similarities and/or differences between the samples. In the present work we performed the NMDS on the relative cyst abundances without any previous data treatment. In a second step we tried to explain the statistically-based grouping with regard to the ecological affinities of the species. We tested the results of the NMDS for changes in the grouping by excluding the dominant species (*P.dalei* and *O. centrocarpum*) but the results were poor. Still, in consideration also of previous comments we will run the NMDS (or alternatively the CA) on dinocyst concentrations, and further examine the NMDS results with the different data treatment procedures (log-ratio, square-root transformed) before submitting the revised version of the manuscript. Nevertheless, we must stress that our first decision to work on species relative abundances rather than on species concentrations bore on the fact that concentration values in coastal environments are to a high extent affected by dilution from terrigenous sediment rather than reflecting production rates in the surface waters. Dilution by terrigenous sediment is particularly important to consider in this fjord environment where sediment delivery occurs essentially via rivers (Howe et al., 2010). Running the NMDS on dinocyst fluxes, in turn, is unfortunately not possible since dry bulk density measurement were only conducted on one (MC 99) out of the three investigated cores.

2. Choice of 5 analogues for the MAT reconstruction of the sea-surface parameters

As mentioned in the replies to L. Durantou (Referee comment #1) and R. Telford (short comment) we used 5 analogues for the estimation of the sea-surface parameters based on the standard procedure of the MAT for dinocyst based reconstructions. In the present manuscript we only present the very initial “first tries” of the dinocyst based reconstructions in a Norwegian fjord according to e.g. de Vernal et al., (2001), Guiot

C2120

and de Vernal, (2007). Our future objective will be to modify several parameters e.g. the number of analogues and the number of sites used for the reconstructions to examine the impact on the quality of the reconstructions and the RMSEP. At this stage, however, we can only present and discuss our results obtained following the standard procedure.

3. The identification and the nomenclature of the dinocyst species

The referee is gratefully thanked for his advice on that matter. We will consider his/her suggestions concerning the species ecological affinities in order to better discriminate environmental changes. Anyhow, (luckily) we can exclude any confusion with *S. nephroides* and *S. quanta* in spite of the wrong grouping since we only identified the latter species in the Trondheimsfjord. We are furthermore aware of the usefulness of information on downcore grain size or TOC, etc.. Unfortunately, these datasets are not available yet but will soon be submitted for publication as part of a Norway-based PhD research project.

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C2121

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C2122