This manuscript provides valuable phytoplankton taxonomy and pigment data for a region of the Pacific Arctic during summer of 2008. The comparison of microscopy and HPLC data is particularly interesting, since it reveals discrepancies that may be overlooked in other studies in wich only HPLC is used. However, several aspects of the work should be improved. Some comments follow.

The microscopy and HPLC data for the different regions are described in detail but a general framework is lacking. There should be an effort to integrate the findings into an overall picture of what is known of the seasonal and spatial variability of the phytoplankton in the area.

Comparison with previous work has been integrated in the section discussion. While over the Chukchi shelf, the comparison is supported by several previous field studies, available pigments data are inexistent over the deep Canadian basins at the time of the CHINARE 2008 cruise and the only taxonomic cruise in our areas consist in the AOS in 1994. Efforts were made in the discussion section to compare our data with these previous observations (section 4.2) and a general framework was added between line 299 and 334.

Similarly, the comparison with previous cruises should also consider what could be the role of differences in timing and of spatial heterogeneity in accounting for the encountered differences (in this context, there should be more information on the dates and position of the stations of the other cruises). Potential discrepancies due to variations in the methodology should be discussed more deeply.

Because of the lack of phytoplankton data in the Pacific Arctic and difference in timing, geography and techniques between cruises as noted by the referee 2, the comparison is not straightforward. A particular effort has been made to underline these different methodological approaches and especially between the 1994 and 2008 cruises on which our discussion is focused. See between lines 339 and 349 for explanation on the differences between the sampling strategies and between lines 376 and 385 for the differences in the phytoplankton counting methods.

In general, the conclusions of the work are plausible, but some statements need better justification. For example, "microplankton and picoplankton declined in surface waters as compared to 1994 . ." but "nanoplankton does not show significant changes between 2008 and 1994, seemingly because of better adaptation to ice retreat" (lines 27-30 of page 2074 and 1-3 of page 2075). The authors could dicsuss why should nanoplankton show better adaptation than pico- and microplankton and if there could be other explanations (see comments above).

In the aim to better support our statement we choose to use statistical analysis (Student's test and Pearson's test). The Student t-test presented in table 3 provides a more significant interpretation concerning the comparison of the environmental parameters between 1994 and 2008. Statistical analyses were also used to statistically compare the 2008 pigments and phytoplankton distributions between surface/SCM and shelf/basins (Table 1 in suppl. mat.) but also to compare the output of HPLC and optical microsopy concerning the phytoplankton interpretation (Table 2 and Figure 1 in suppl. mat.).
Moreover, we observed large dominance of nanoplankton in the ice-free areas but the physiological reasons for their better adaptation are not investigated here and need a deeper consideration.

In the same way, the question of whether ice retreat would result in increased PP or in reduced phytoplankton growth (lines 25-30, page 2076) is quite interesting, but would need a deeper coonsideration of the physical data than that presented in the manuscript.

The description of the hydrography has been removed from the methods to be used in the discussion as explanation of the phytoplankton distributions observed in 2008 and 1994. Pearson test of the correlation between environmental, chemical and biological parameters are considered (Table 3). Thus the impact of ice retreat is developed through several environmental parameters influenced by ice

melting as freshening, stratification, light or temperature. We focus on the physical parameters describing the environmental conditions susceptible to influence phytoplankton (see section 4.3.).

Other comments In general, the manuscript is well written, but the amount of detail makes it difficult to follow some sections of the results and discussion. Given that the data can be found in Table 1 and the figures, perhaps the text could be streamlined to highlight the main findings, instead of repeating too many numbers.

Most of the numbers have been removed from the discussion because they are already given in Table 2 as suggested by the referee 2. These modifications greatly reduce the amount of details and better highlight the main findings. Overall, the results and discussion have been deeply restructured in order to clarify the scientific message and to facilitate the reading.

Table 1. Explain what are the numbers given within parentheses in the first column.

This information has been added in the text below the Table 2 (old Table 1).

Line 19 of page 2066 mentions 930 cells ml-1 in the SCM and 640 cells ml-1 in surface waters, but these precise numbers are not found in the table.

The amount of numbers used in the results and discussion have been reduced by using superlative instead. For the several numbers used in the text we have take care to have a good consistency with the numbers found in the Table 2.

There should be a brief account, in the main text, of the assignment of determined pigments to the eight phytoplankton classes and of procedure followed to distinguish phytoplankton size classes based on pigment data. The assignment of size classes to pigments given in the supplementary table 1 needs deeper discussion. Pyramimonas, for example is a frequent chlorophyll b-containing prasinophyte but does not fit into the picoplankton size class.

Information on the assignment of pigments to phytoplankton groups and size classes has been indicated in the main document **(line 135 to 147)**. We focused on the "Phytoplankton pigments in oceanography: guidelines to modern methods" by Wright and Jeffrey, 1997 to justify the assignment of pigments to phytoplankton groups. However, the assignment of a size classes to each group induce some degree of incertitude because of species belonging to the same groups can be size variable. Here we consider a mean size of the species included in each phytoplankton groups. Deeper studies about the size structure of Arctic species should be made. We also suggest here the importance of the conversion ratio used for the CHEMTAX interpretation of pigments.