Fatty Acid Composition and Diatoms in Sediments from the Northern Antarctic Peninsula and Larsen A and B Bays.

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INTRODUCTION

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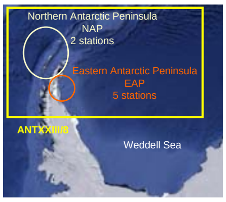
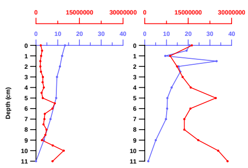
Larsen A ice shelf retreated 1400, 2100 y 3800 yr BP (Brachfield et al., 2003). 4200 km^2 of Larsen A ice shelf collapsed in January 1995 (Rott et al., 1996). 3200 km^2 of **Larsen B** ice shelf collapsed in March 2002.



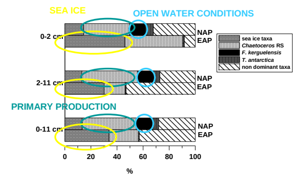
During ANTXXIII/8 in 2006, sediment was sampled with a Multiple Corer (Barnett et al., 1984) from five stations in the Eastern Antarctic Peninsula (EAP), were Larsen A and B ice shelf collapses occurred, and from two stations in the Northern Antarctic Peninsula (NAP), free of ice shelves for more than 1000 yr (Ingolfsson et al., 1998; Anderson et al., 2002).

Sediment FA composition analysis and microscopical counts of diatom valves have been carried out in the sedimentary record to identify relationships with the oceanographic conditions at Larsen A and B embayments and off the Northern Antarctic Peninsula seafloor.

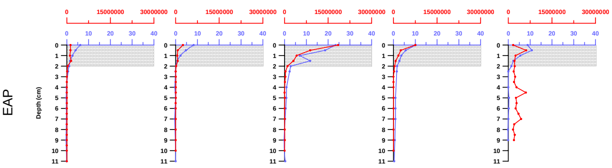
RESULTS and DISCUSSION

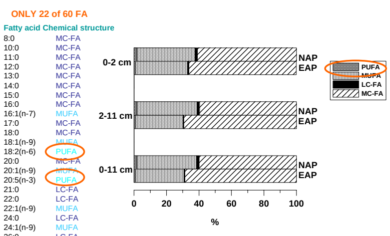


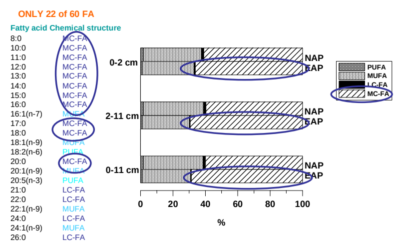
Evident decrease in EAP in the number of diatom valves below 2 cm depth, whereas the valves distribution in NAP showed an increasing trend towards the base of the cores.
The comparison between diatom valves abundance and excess ^{210}Pb activity profiles suggests that the top 2 cm layer in EAP cores represents the material deposited after the ice shelf collapses.



The higher abundances in NAP than in EAP below 2 cm depth of *Chaetoceros* RS and *T. antarctica* are related to NAP open water conditions (Armand et al., 2005; Buffen et al., 2007), which are corroborated with the presence only in NAP samples of the cold open water species *F. kerguelensis* (Crosta et al., 2005; Roberts et al., 2007).



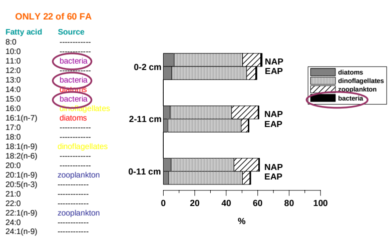




Refractory material in the Eastern Antarctic Peninsula at all depths.

PUFA are rapidly degraded in the water column and after deposition onto the seabed (Smith et al., 1983; Wakeham et al., 1997; Budge and Parrish, 1998; Hu et al., 2006); thus, the low proportion of PUFA and the absence of PUFA diatom indicators, such as 16:2(n-4), 16:3(n-4) and 16:4(n-l) (Volkman et al., 1989; Wakeham, 1995) in the study area may reflect a rapid FA degradation even in this polar environment.

The higher MC-FA average concentration in EAP than in NAP cannot be attributed only to a recent deposition of OM after ice shelf collapses because higher MC-FA concentrations have been found in the EAP sediment column at all depths and not only in the upper sediment column which chronologically corresponds to Larsen A and B ice shelf collapses. Therefore, the high MC-FA concentrations in EAP sediment column may be the result of the accumulation of refractory material that had been laterally advected.



Few BACTERIA indicators and with low concentrations.

FA composition in the study area was diverse and showed no evident patterns to clearly differentiate single OM sources or a stronger contribution from any group to a particular region.
The contributions of bacterial FA were relatively small in the sediments of the study area suggesting a low microbial remineralization of the detrital material.

CONCLUSIONS

The distribution of diatom valves showed an exponential decreasing pattern in EAP in contrast to the more constant distribution in NAP. This distribution was interpreted as the change after ice shelf collapses of the conditions which hampered in EAP the diatom valves supply to the seabed. Further, the proportion of diatom taxa related to open water conditions (e.g., Antarctic Circumpolar Current) such as *T. antarctica* and *F. kerguelensis* were higher in NAP or in the case of the latter just absent in EAP demonstrating oceanographic conditions imposed by the ice shelves.
The presence of FA with refractory characteristics throughout the sediment cores in EAP seems to be the result of the lateral input of refractory OM (MC-FA). These patterns in parallel to the distribution of diatom valves also showed that unsaturated FA degrade rapidly in the study area and cannot be used as indicators of phytoplankton debris or fresh OM.

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