

The Labrador Sea during the Last Glacial Maximum: Calcite dissolution or low biogenic carbonate fluxes?

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Low concentrations of biogenic carbonate characterize the sediments deposited in the Labrador Sea during the last glaciation. This may reflect poor calcite preservation and/or low biogenic carbonate productivity and fluxes. Regional bottom water ventilation was reduced during the Last Glacial Maximum (LGM), so the calcite lysocline might have been shallower than at present in the deep Labrador Sea making dissolution of calcite shells in the deep Labrador Sea possible. To address the issue, a multi-proxy approach based on micropaleontological counts (coccoliths, foraminifers, palynomorphs) and biogeochemical analyses (alkenones) was applied in the investigation of core HU2008-029-004-PC recovered in the northwestern Labrador Sea. Calcite dissolution indices based on the relative abundance benthic foraminifera shells to their organic linings as well as on fragmentation of planktonic foraminifera shells were used to evaluate changes in calcite dissolution/ preservation since the LGM. In addition, the ratio of the concentrations of coccoliths, specifically of the alkenone-producer *Emiliana huxleyi*, and alkenones (*Emiliana huxleyi*: alkenones) was explored as a potential new proxy of calcite dissolution. A sharp increase in coccoliths, foraminifers and organic linings from nearly none to substantial concentrations at ~ 12 ka, reflect a jump to significantly greater biogenic fluxes at the glacial-interglacial transition. Furthermore, conventional dissolution indices (shells/linings of benthic foraminifera and fragmentation of planktic foraminifers) reveal that dissolution is not likely responsible for the lower glacial abundances of coccoliths and foraminifers. Only the low *Emiliana huxleyi*: alkenones ratios in glacial sediments could be interpreted as evidence of increased dissolution during the LGM. Given the evidence of allochthonous alkenone input into the glacial Labrador Sea, the latter observations must be treated with caution. Overall, the records indicate that low biogenic fluxes during the LGM were the most likely cause of the decreased biogenic carbonate concentrations.