Appendix E

If variation in *G. bulloides* $\delta^{13}C$ records the variation in $\delta^{13}C$ of seawater DIC experienced by coccolithophores during calcification, then the difference of $\delta^{13}C$ of coccoliths and *G. bulloides* indicates the magnitude of isotopic fractionation in coccoliths ($\varepsilon_{coccolith}$). $\varepsilon_{coccolith}$ increases towards glacial periods and is particularly lower during the interglacial MIS 7 (Figure E1). The temporal variation is not an artifact of changing assemblage composition of the coccolith fraction as it is observed in a range of assemblage compositions. The magnitude of $\varepsilon_{coccolith}$ may be sensitive to changes in dissolved CO_2 concentrations, a function of water temperature and atmospheric CO_2, as well as algal growth rate. The difference in magnitude of vital effects in MIS 5 relative to MIS 7 may in part be due to the higher coccolithophore productivity recorded during early MIS 5, which may have offset the effect of increased interglacial CO_2 availability during MIS 5.

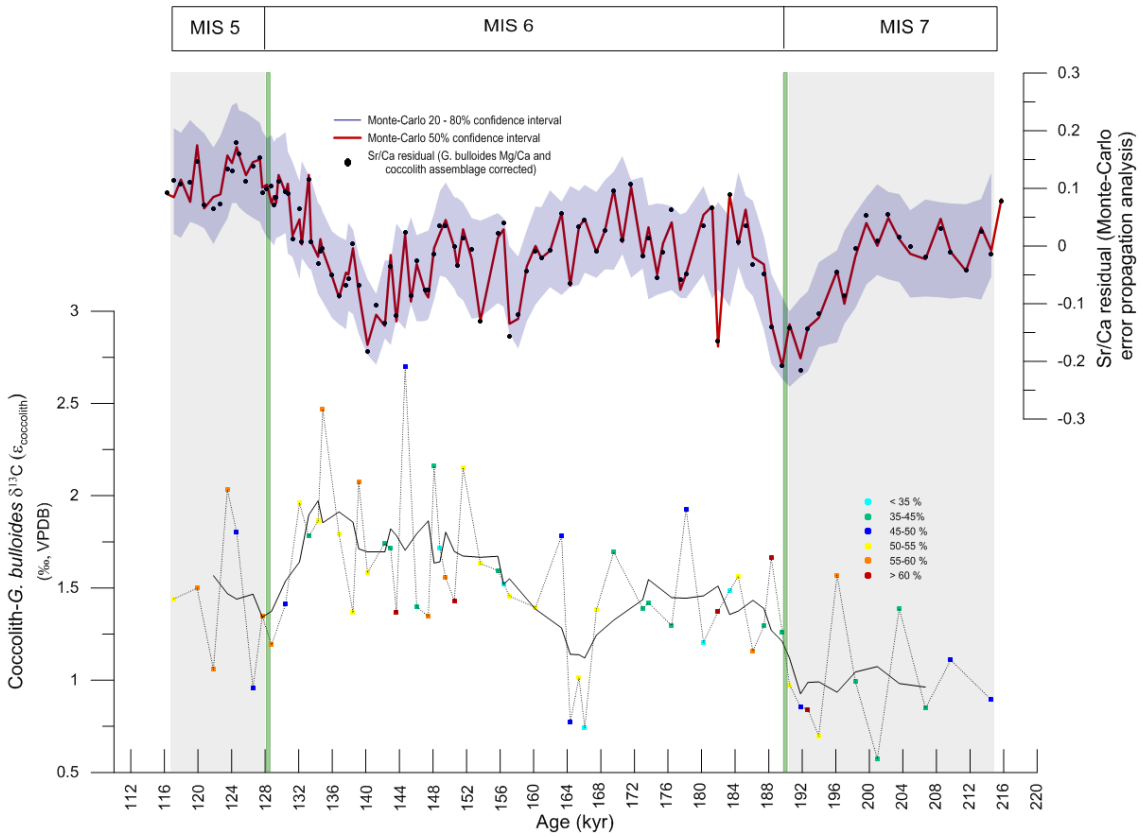

Figure E1. a) Coccolith Sr/Ca productivity record from core MD96-2080, as illustrated in Figure 3*f*. b) Difference of $\delta^{13}C$ of the coccolith fraction and *G. bulloides* ($\varepsilon_{coccolith}$) in core MD96-2080 during the period of study showing increasing differences towards cold glacial periods and decreasing values during interglacials. 5 point running average is shown. Grey-shaded areas and green vertical lines as in Figure A1. Color coding of the sample points corresponds to the % carbonate contribution from larger coccoliths *C. leptoporus* and *H. carteri*.