

# Productivity and North Atlantic subpolar dynamics at orbital-to-millennial scales during middle Pleistocene Marine Isotope Stages 19-11

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Quantitative coccolithophore analyses were performed on sediments from IODP Site U1314, located in the subpolar North Atlantic, in order to reconstruct sea surface water conditions throughout Marine Isotope Stages (MIS) 19c to 11c. The data were compared to available paleoenvironmental proxies from the same site, as well as other nearby North Atlantic records that support the coccolithophore signature at glacial-interglacial and millennial scales. Total coccolithophore absolute abundance increased during interglacials and interstadials but abruptly dropped during the colder glacial and stadial phases, indicating clear changes in productivity.

Coccolithophore interglacial assemblages indicated low productivity during early MIS 11, late MIS 13a, MIS 15b, and some intervals in MIS 17. We attributed these

intervals of lower productivity to a reduced influence of the Irminger Current over the study area.

At MIS 18, 16, 12b and 12a, the coccolithophore absolute abundances were close to zero, and the distinctive increase in cold-water proxies from other studies marked the presence of polar waters in the area at a time when iceberg melting was significantly enhanced.

Millennial-scale abrupt changes in productivity are related to ice-rafting events and the subsequent interstadials. During the stadial phase, productivity values were low, which is concomitant with increases in the polar foraminifera, indicating the presence of cold and low salinity water in the region. In contrast during the interstadial, productivity rose rapidly following the sea surface temperature shift.