

Calcareous plankton fluxes in the upwelling area off NW Africa (Cape Blanc): Dynamics and trends from selected sediment trap series over the past 25 years

Karl-Heinz Baumann

University of Bremen, Department of Geosciences, 28359 Bremen, Germany; baumann@uni-bremen.de

Barbara Donner

University of Bremen, MARUM - Center for Marine Environmental Sciences, 28359 Bremen, Germany; donner@uni-bremen.de

Meral I. Köbrich, Gerhard Fischer

University of Bremen, Department of Geosciences, as above; koebrich@uni-bremen.de, Gerhard.fischer@uni-bremen.de

Coccolithophore-derived carbonate fluxes were determined from four time intervals (1989/90, 1998/99, 2002/03 and 2008/09) off Cape Blanc (21°15'N, 20°45'W) in the filamentous mixing area of one of the prominent eastern boundary upwelling systems. The sediment-trap data, collected at 3600 m water depth, revealed seasonal and interannual changes in species fluxes and assemblage composition, as well as long-term trends in total carbonate fluxes (also including planktonic foraminifera and pteropods).

The study and comparison of the selected time intervals, which were not influenced by any major climatic oscillations, such as the North Atlantic Oscillation, the El Niño-Southern Oscillation or the Atlantic Meridional Overturning, revealed variable flux patterns that reflect the prevailing hydrographic conditions of this dynamic, offshore, upwelling region. Seasonal variations, both in species fluxes and assemblage compositions, occurred in the most prominent calcareous groups, whereas interannual fluctuations were less obvious and, in this case, all groups showed a surprisingly constant flux pattern, with only small variations. The coccolithophore assemblages were dominated by *Emiliana huxleyi*, lower-photoc-zone species (mainly *Florisphaera profunda*) and geophycocapsids. The coccolith flux was generally the highest during the winter/spring and early fall (up to $500 \times 10^7 \text{ m}^{-2} \text{ d}^{-1}$), whereas it was reduced during the summer and late fall. The highest fluxes of planktonic foraminifera (up to $50 \text{ mg m}^{-2} \text{ d}^{-1}$) were observed during the summer (predominantly species preferring cooler water conditions) and winter (warm-water species). The pteropod flux showed the most constant pattern over the years, with distinct maxima (up to $180 \text{ mg m}^{-2} \text{ d}^{-1}$, <1 mm fraction) in the late summer and minima in the winter. No long-term trend of any carbonate producer was observed. The organism fluxes, as well as the general compositions of the assemblages, have not changed, and the calculated carbonate fluxes of the major plankton groups (even aragonitic pteropods were observed in quite constant numbers) gave no evidence of an increasing influence of ocean acidification or any ecosystem change.