Calcareous plankton fluxes in the upwelling area off NW Africa (Cape Blanc) – dynamics and trends from selected sediment trap series in the past 28 years

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Carbonate fluxes of coccolithophores, planktic foraminifers, and pteropods were determined from four annual 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 were collected at a 3600m water depth and were used to reveal seasonal and inter-annual changes in species fluxes and assemblage composition, as well as long-term trends in carbonate fluxes.

The study and comparison of the selected time intervals, which were not influenced by any major climatic oscillation such as North Atlantic Oscillation, El Niño–Southern Oscillation, or Atlantic Multidecadal Oscillation, 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 all the calcareous groups, whereas inter-annual fluctuations were less obvious, and all groups showed only minor variations in a surprisingly constant flux pattern. The coccolithophore assemblages were dominated by *Emiliania huxleyi*, a lower photic zone species, and gephyrocapsids. Coccolith flux was generally highest during winter/spring and early fall (up to $500 \times 10^7 m^{-2} d^{-1}$) and was reduced during summer and late fall. Highest fluxes of planktic foraminifers (up to $50 mg\, m^{-2} d^{-1}$) were observed during the summer (predominantly species preferring cooler water conditions) and the winter (warm water species). Pteropod flux showed the most constant pattern over the years with a distinct maximum (up to $180 mg\, m^{-2} d^{-1}$, fraction $< 1mm$) in late summer and a minimum in winter. No long-term trend of any carbonate producer was observed. The organism fluxes, as well as the general composition of the assemblages, have not changed, and the calculated carbonate fluxes of the major plankton groups (including the aragonitic pteropods) give no evidence of an increasing influence of ocean acidification or any ecosystem change.