

Seasonality of nearshore marine snow in the southern North Sea

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The suspended particulate matter (SPM) concentration in the high turbidity zones of the southern North Sea is inversely correlated with chlorophyll (Chl) concentration. During winter SPM concentration is high and Chl concentration low and vice versa during summer. This seasonality has often been associated with seasonal pattern in wind forcing. However, the decrease in SPM concentration corresponds well with the spring algae bloom. Does the decrease of SPM concentration caused by changing wind conditions, cause the start of algae bloom, or does the algae bloom decrease SPM concentration through enhanced flocculation and deposition? In order to answer the question, measurements from 2011 of particle size distribution (PSD), SPM and Chl concentration from the southern North Sea have been analysed. The results indicate that the frequency of occurrence of macroflocs has a seasonal signal and not its size. The data from a highly turbid coastal zone suggest that the maximum size of the macroflocs is controlled by turbulence and the available flocculation time during a tidal cycle, but the strength of the macroflocs is by the availability of sticky organic substances associated with enhanced primary production during spring and summer. The results highlight the shift of mainly microflocs and flocculi in winter towards more muddy marine snow with larger amounts of macroflocs in spring and summer. The macroflocs will reduce the SPM concentrations in the turbidity maximum area as they settle faster. Consequently, the SPM concentration decreases and the light condition increases in the surface layer enhancing further algae growth.