

Factors controlling phytoplankton distribution in coastal waters of the German Bight (North Sea)

Karl-J. Hesse¹, Urban Tillmann¹, Stefan Nehring² & Uwe Brockmann³

1. *Research & Technology Center, Kiel University, D-25761 Büsum, FRG*

2. *Institute of Marine Research, Kiel University, D-24105 Kiel, FRG*

3. *Institute for Biogeochemistry and Marine Chemistry, D-20146 Hamburg, FRG*

Abstract

The specific abiotic conditions of the Wadden Sea favour the growth of a distinct phytoplankton population which is characterized by the dominance of diatoms with a high proportion of tychopelagic forms all the year round. In contrast, dinoflagellates usually prevail in the summer-stratified offshore areas, whereas the intermediate coastal water is subject to a strong variability involving the coexistence of dinoflagellate and diatom blooms in summer as well as the local formation of exceptional mass occurrences of specific phytoplankton and protozooplankton forms, being concentrated at frontal gradients. The predominance of dinoflagellates in the stratified regions of the German Bight is reflected by the quantitative occurrence of resting stages in recent sediments. These show a general increase in abundance from shallow sites to deeper areas. Sandy mud stations exhibited the highest cyst abundance and diversity. About 15% of the locally recorded dinoflagellate species contribute cysts to bottom sediments. It is concluded that benthic cysts are of minor importance for the initiation of dinoflagellate blooms in the area. The degree of turbulence rather than nutrient availability seems to be a fundamental factor controlling the predominance of dinoflagellates and diatoms in the inner German Bight. It is suggested that the diatom communities in the mixed nearshore waters are constrained by a frontal circulation cell. This ensures the maintenance of the species in their shallow habitat, which may be of essential importance for tychopelagic forms.

Keywords: phytoplankton, blooms, stratification, fronts, dinoflagellate resting cysts, German Bight, Wadden Sea.