

Nohe Anja (Reinoud de Blok)

University of Ghent, Department of Biology, Laboratory of Protistology & Aquatic Ecology

Author(s): Anja Nohe¹, Ruth Lagring², Karien De Cauwer², Annelies Goffin³, Lennert Tyberghein³, Klaas Deneudt³, Xavier Desmit², Wim Vyverman¹ and Koen Sabbe¹

Affiliation(s) :

¹ Protistology & Aquatic Ecology Laboratory, Biology Department, Ghent University, Ghent, Belgium; ² Royal Belgian Institute of Natural Sciences (RBINS), Operational Directorate Natural Environment, Brussels, Belgium; ³ Flanders Marine Institute (VLIZ), Oostende, Belgium

Long-term phytoplankton monitoring data (1970-2010) from the Belgian North Sea reveal shifts in seasonal dynamics and community composition

Marine monitoring programs are useful to detect spatial patterns and long-term trends in marine phytoplankton biomass and composition. While in Belgium's neighbouring countries (the Netherlands, Germany and France) phytoplankton monitoring programs have existed for several decades, Belgium lacked a coordinated program until the 2000's. In the framework of the 4DEMON BRAIN-be project (www.4demon.be), we have compiled and intercalibrated historic and recent datasets on phytoplankton species composition and biomass from the Belgian North Sea (BNS) from the 1970s onwards. In this analysis we focus on diatom and dinoflagellate abundance, which are two important phytoplankton groups in the BNS. Because of a data gap in the 1980s until the mid of the 1990s, we separately analysed diatom and total dinoflagellate abundance in the 1970s and 1990s/2000s. The first analysis shows that both diatom and dinoflagellate abundances have increased during the last decades. In addition, modelling approaches show that the seasonal pattern of diatom abundance varies between different areas of the BNS. While diatoms in the coastal zone usually exhibited two distinct blooms in the 1970s, a larger peak in the spring and a smaller peak in the late summer, from the 1990s onwards the coastal diatoms tend to develop only one pronounced spring bloom. Offshore, however, the seasonal diatom abundance has two peaks and can locally also reach relatively high winter abundances. Dinoflagellate abundance shows two peaks, typically a small peak in late spring and a second bigger peak in late summer/early autumn. Furthermore, our data show a shift in community composition and an increase in several phytoplankton genera (e.g. Pseudo-nitzschia, Guinardia and Thalassionema).

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