

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

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The 4DEMON project (www.4demon.be) funded by BELSPO recovers datasets generated over a period of 40 years in the Belgian part of the North Sea. A huge amount of data was compiled e.g. phytoplankton composition data, chlorophyll a, nutrients, temperature, salinity etc. Below, some preliminary analyses of phytoplankton abundance and chlorophyll a data is presented.

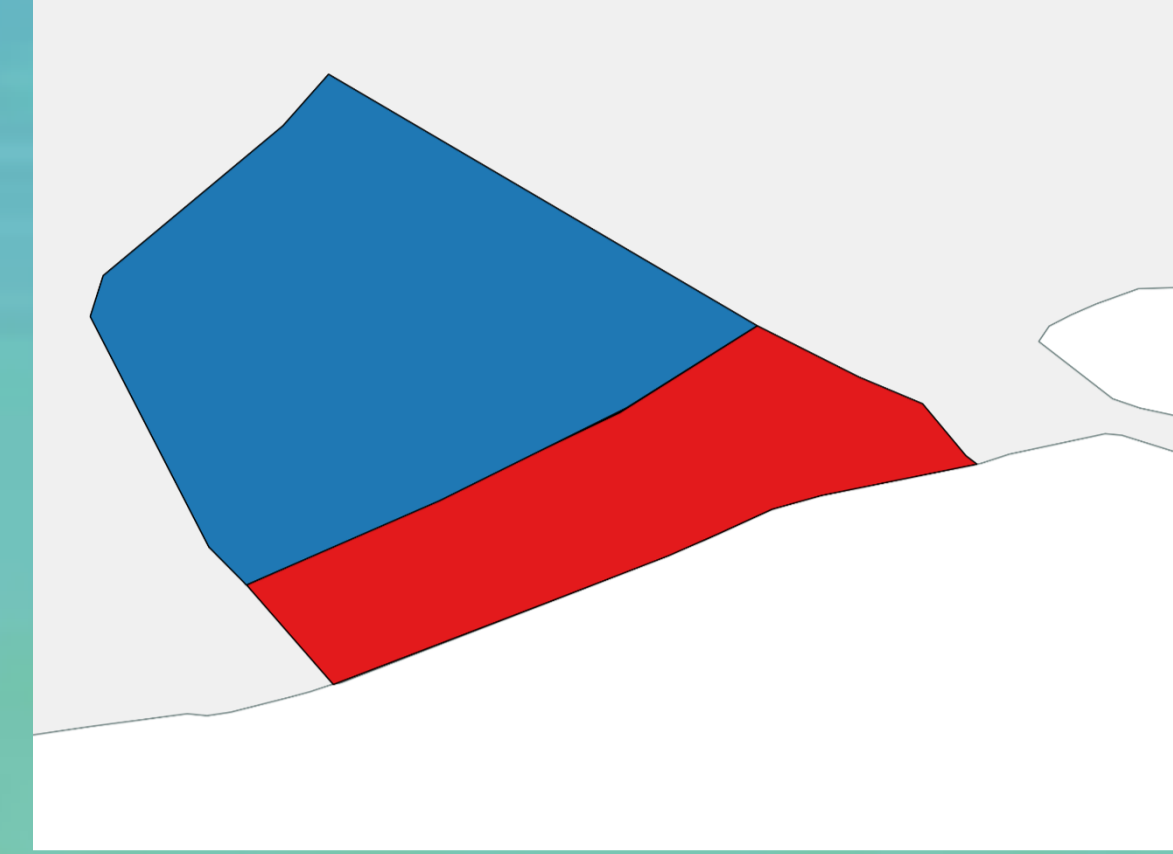


Fig. 1 Map of the Belgian part of the North Sea. The coastal zone is indicated in red, the offshore zone in blue.



Diatom abundance

Diatom abundance data suggest an upward trend in total abundance from 1970 to 2010. In general, coastal abundances are higher than abundances in offshore zones.

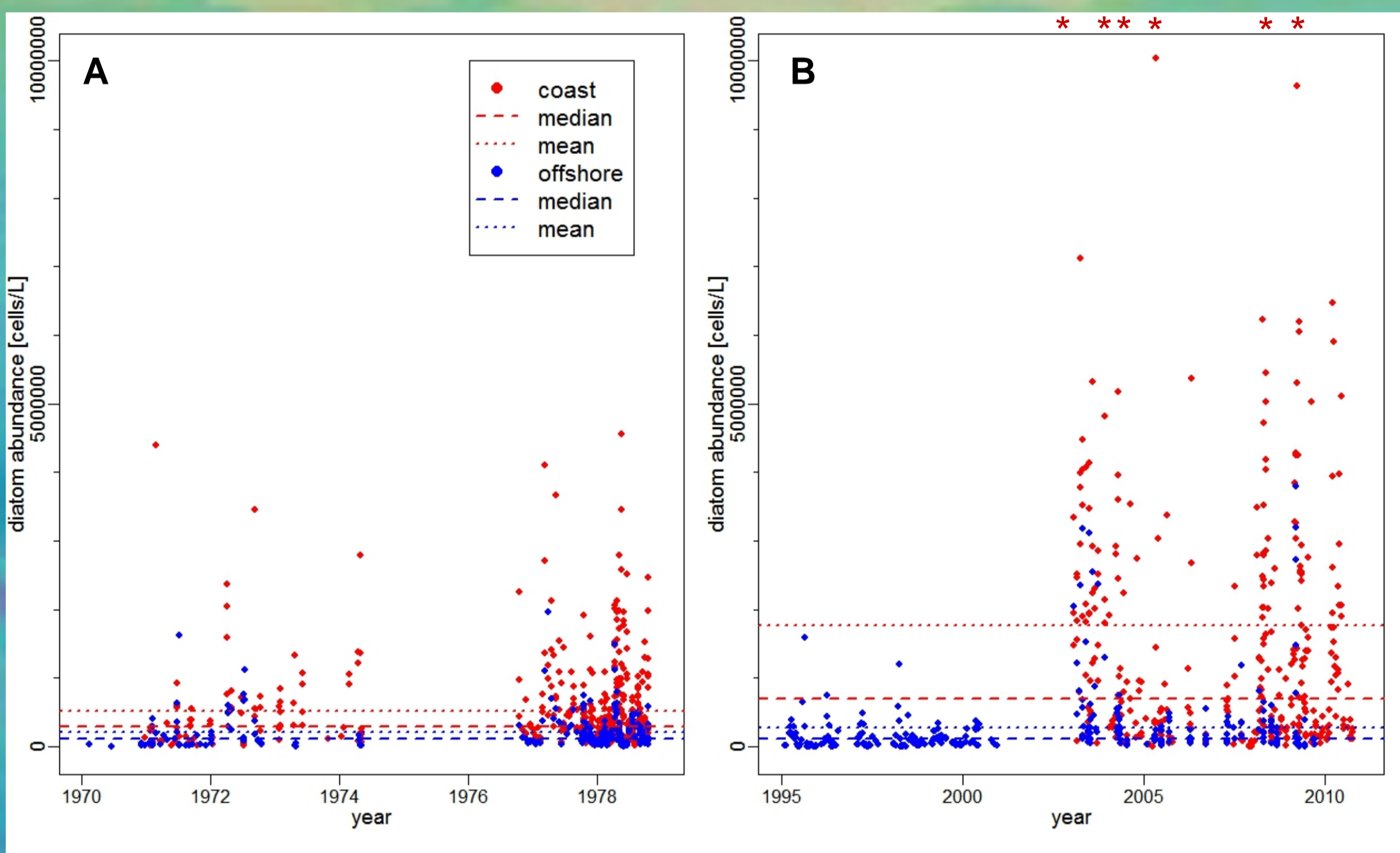


Fig. 2 Total diatom abundance in coastal areas (red) and offshore (blue). **A** Period 1970-1978, **B** 1995-2010.



Dinoflagellate abundance

Total dinoflagellate abundances in the coastal zones suggest an increase in the last decades.

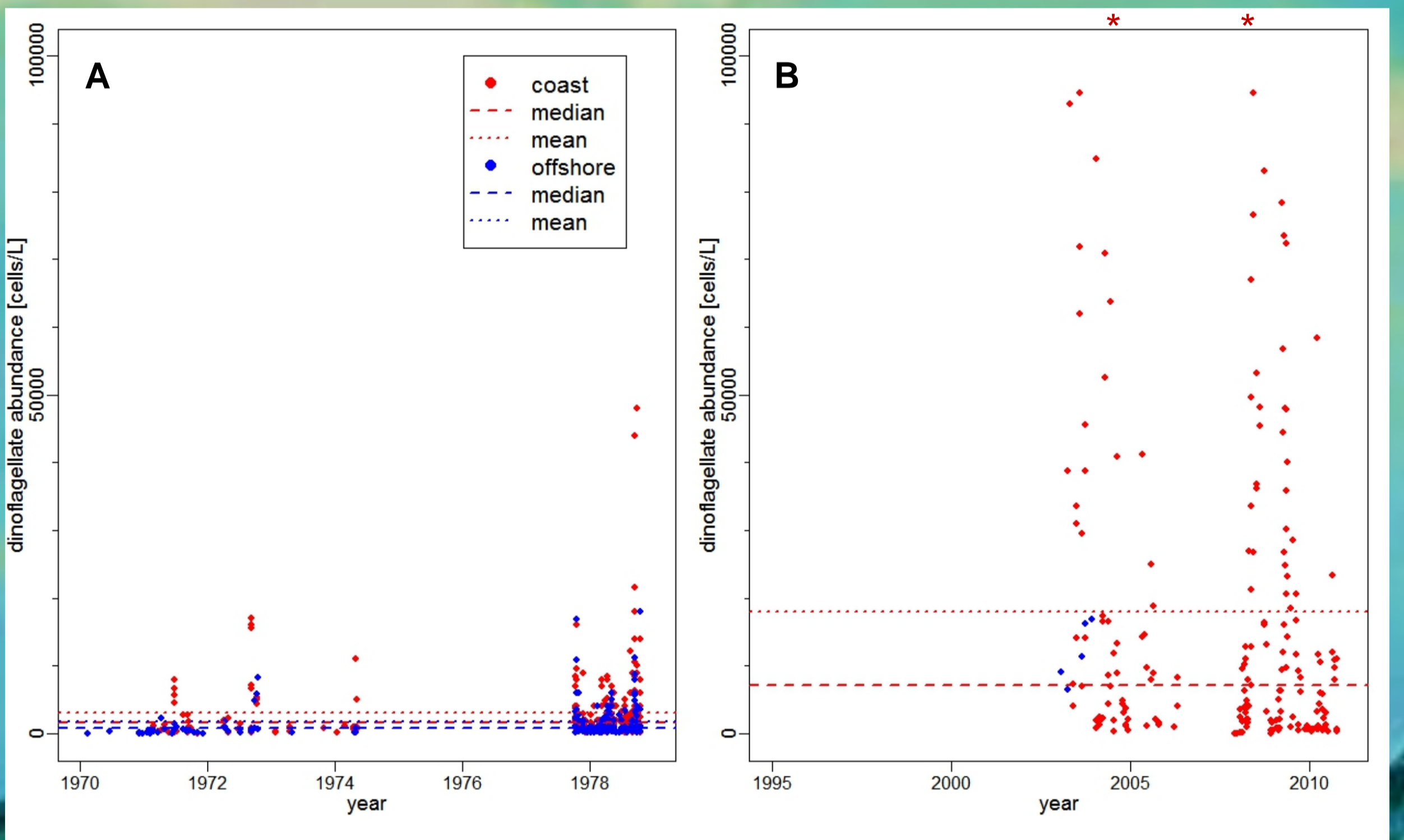


Fig. 3 Total dinoflagellate abundance in coastal zones (red) and further offshore (blue). **A** Sampling between 1970 and 1978, **B** Period from 1995 to 2010.

Dinoflagellate/diatom abundance ratio

The dinoflagellate to diatom abundance ratio suggests an upward trend during the last decades. The seasonality is described by higher ratios in the summer months.

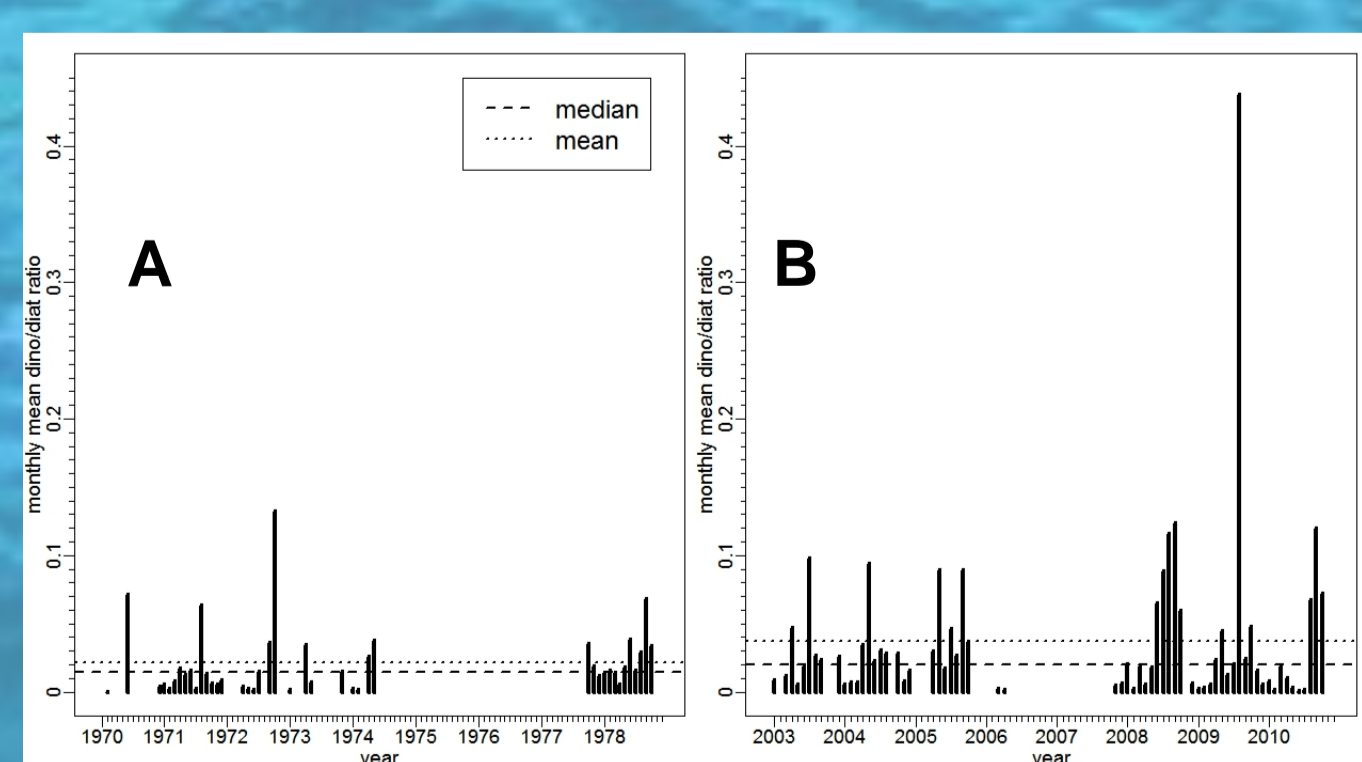


Fig. 4 Dinoflagellate to diatom abundance ratio. **A** 1970-1978, **B** 2003-2010.

Genera composition

By partial PCA analysis the genera composition can be separated clearly between the 1970s and 2000s e.g. the species of the diatom genus *Pseudo-nitzschia* increased in the second period.

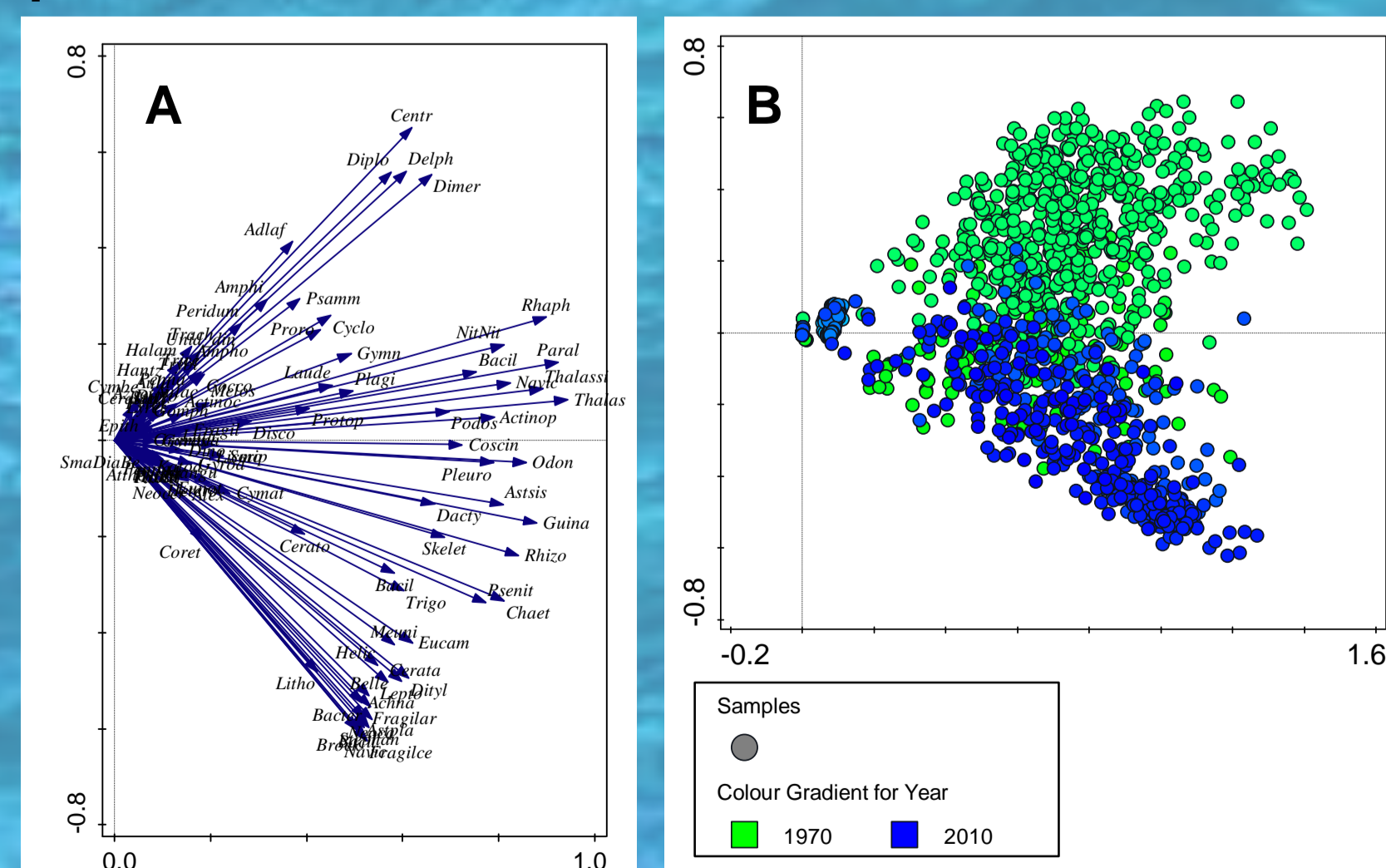


Fig. 5 Partial ordination analysis of genera abundance data with 'month' defined as a covariable. **A** Genera ordination plot, **B** samples in the ordination space colored by sampling period.

Chlorophyll a

Different chlorophyll a measurement methods were used during the last decades. They will need to be intercalibrated.

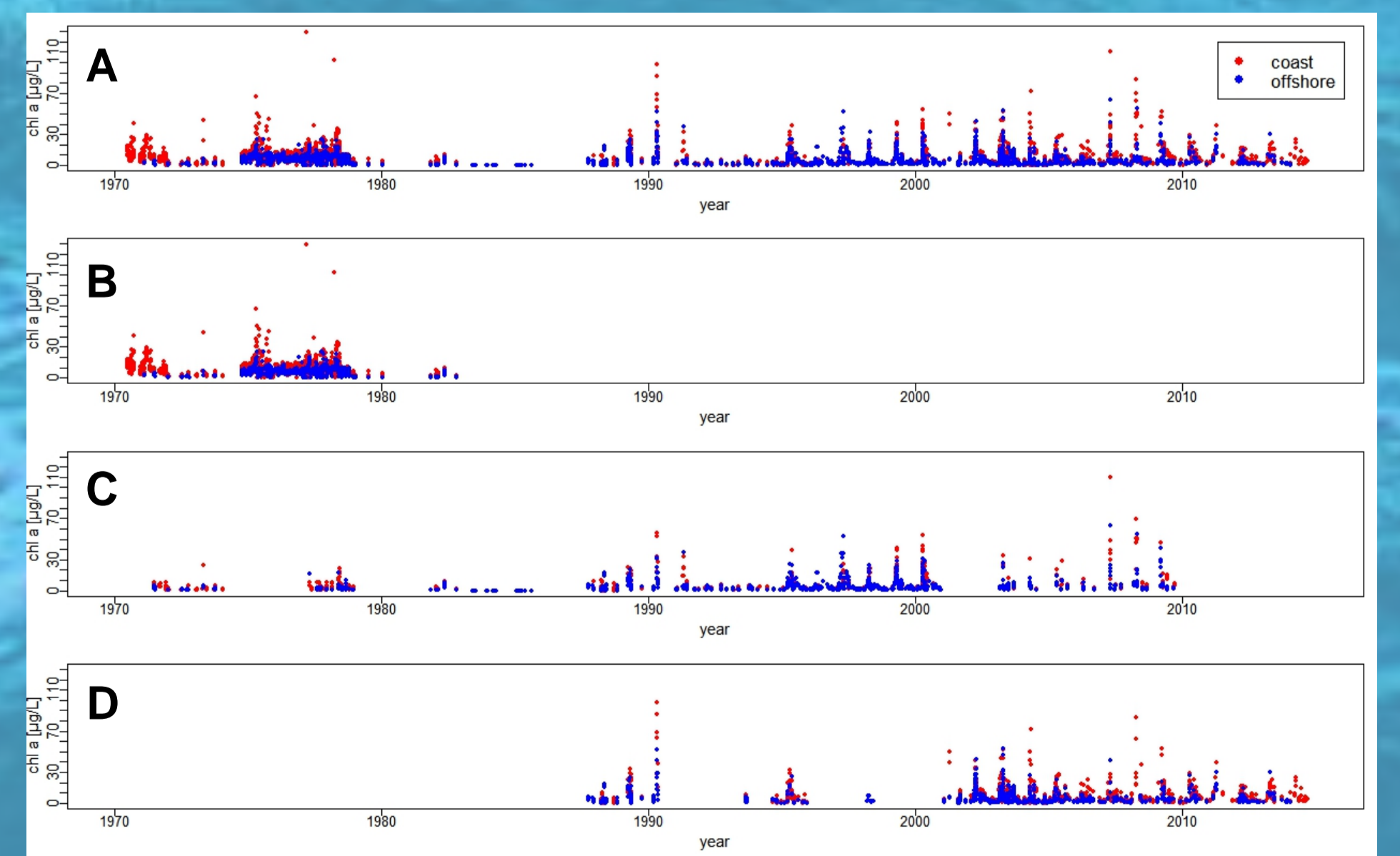


Fig. 6 Comparison of chlorophyll a time-series measured with different methods. **A** Time-series of all available methods including spectrophotometry, fluorometry and HPLC, **B** Trichromatic Spectrophotometry, **C** Monochromatic Lorenzen method, **D** HPLC analyses.