

Tracing nitrogen cycling microorganisms in the North Sea using their intact membrane lipids.

Nitrogen is a key nutrient in marine waters and can be a limiting factor for primary production. The marine nitrogen cycle involves many complex and interrelated processes driven by microbial activity. As part of the NICYCLE project we have been analysing Intact Polar Lipids (IPLs) from cell membranes in order to examine the abundance, distribution and activity of these microorganisms. A principle focus of this study was to examine their spatial and temporal variability and with this aim we have collected suspended particulate matter and sediments from different Dutch Coastal environments, both from the North Sea and Wadden Sea.

These different sampling locations include the fixed station in the Marsdiep Tidal inlet, the microbial mats from the beaches of a Wadden Sea/North Sea barrier island and four seasonal research cruises, carried out along a 235 km transect in the North Sea.

We have used two analytical approaches in the study of the microbial IPLs. Firstly we looked at the 'fingerprint' of IPLs in the samples and examined how it changes over the period studied. The second approach concentrated on changes in specific 'target' IPLs, for example the IPLs of crenarchaeol (for ammonia-oxidizing archaea), heterocyst glycolipids (for nitrogen-fixing cyanobacteria) and ladderanes (for anaerobic ammonia-oxidizing bacteria).