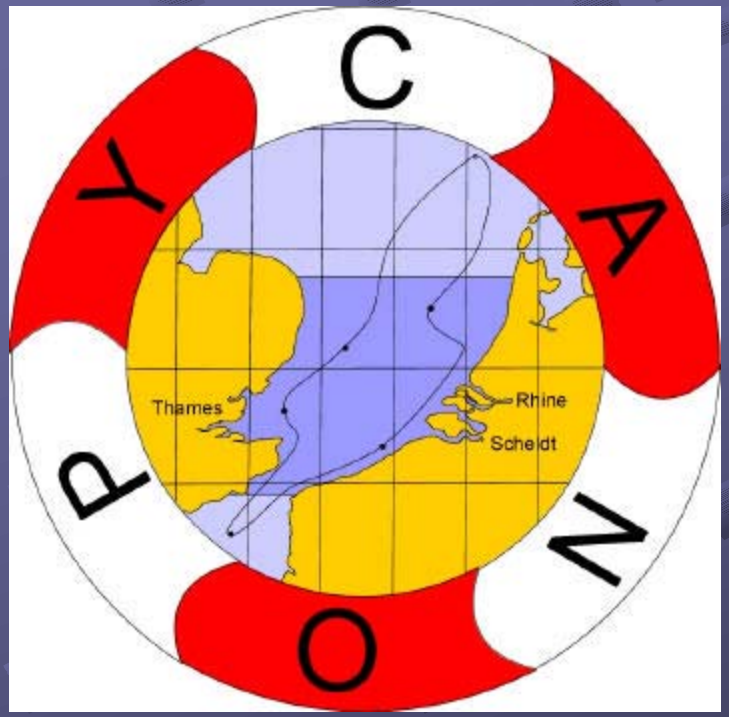
CANOPY

Biogeochemical carbon, nitrogen and phosphorus fluxes in the North Sea



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Context of the project

- The Southern Bight of the North Sea receives carbon and nutrients from wastewater discharges, river inputs and atmospheric deposition. Sources are mostly linked to anthropogenic activities.
- The nutrient enrichment of aquatic systems, also called eutrophication, results in an increased productivity.
- These nutrients and carbon are subject to internal fluxes and processes within the North Sea ecosystem,

BUT recent average data for the North Sea dealing with these internal N, P and C recycling processes are rather scarce.

General Objectives

1. Determine the importance of **uptake** and **regeneration** fluxes of carbon, nitrogen and phosphorus in the Southern Bight of the North Sea.

2. Compare these fluxes with the input and output fluxes of C-N-P in order to visualise the global functioning of the considered ecosystem.

Specific Objectives

Uptake - Regeneration - Pools - Exchange at borders

- **<u>UPTAKE:</u>** Determination of transformation rates between the dissolved (N-P-C) and the particulate (N-P-C) pools
  - NH_4^+ , NO_3^- and Urea uptake rates
  - DIP and DOP assimilation rates in various fractions (phytoplankton, bacteria, inorganic adsorption)
  - DIC assimilation rates

Specific Objectives (continued)

- **REGENERATION**: Determination of transformation rates between the organic (N-P-C) and the inorganic (N-P-C) pools
  - Ammonification and nitrification rates
  - DIP-regeneration rates: alkaline phosphatase activity and 5'-nucleotidase activity.
  - DIC regeneration rates and sea-atmosphere CO_2 exchange rates

Specific Objectives (continued)

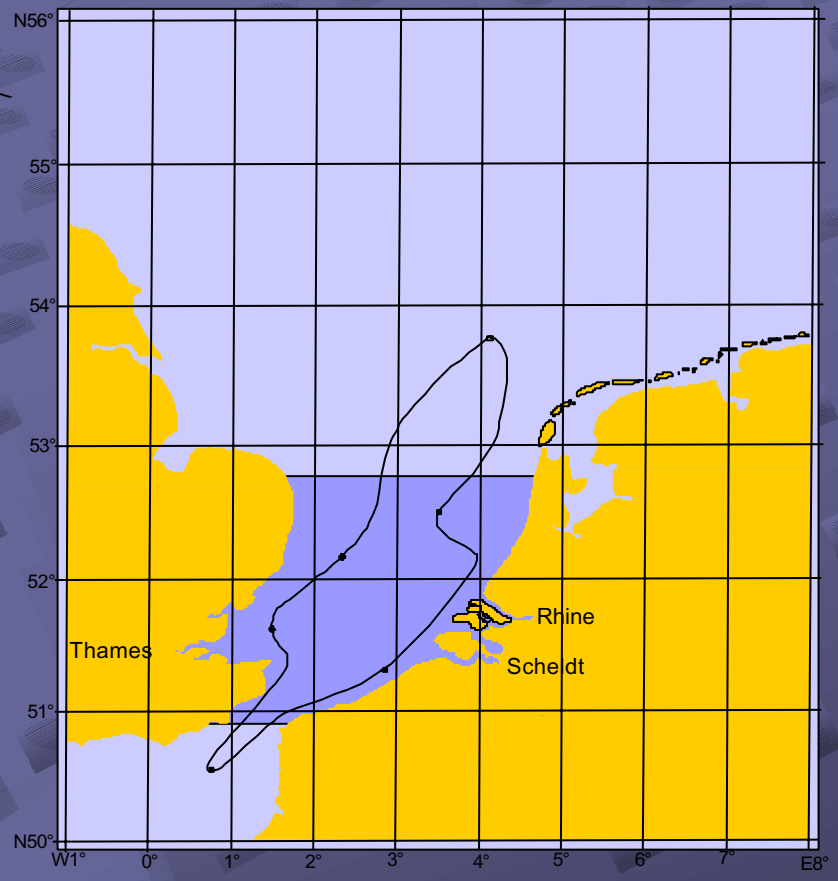
- **POOLS:** Determination of N-P and C pools in the Southern Bight of the North Sea
  - DIN, DON and PON
  - DIP, DOP, PIP and POP
  - DIC, pCO_2, DOC, POC

- **EXCHANGE:** Determination of C-N-P exchange fluxes between the waters of the Southern Bight of the North Sea and adjacent areas (Central North Sea, Channel, Rivers, Sediments)

Work Programme

- Method optimisation (extraction techniques for NH_4^+ and NO_3^-, regeneration techniques for P, ...)
- Collection of new data in the Southern Bight of the North Sea: sept 2003 - july 2004.
  - 6 cruises over a 1 year period starting in early September 2003 (RV Belgica), every 2 months
  - continuous measurements of pCO_2 and NO_3^- + process measurements at a limited number of stations (5).
- Collecting of recent data (1995-Now) from
  - literature
  - existing data bases

Work Programme (continued)



- Stations to be sampled
  - 1 in the Scheldt river plume
  - 1 in the open sea area (no river influence)
  - 1 in the far plume and 1 in the close plume of the Thames river
  - 1 in the Channel with water characteristics of North Atlantic water
- Specified ship track

Expected results

- **Answers to** some fundamental questions about the functioning of a highly men-influenced marine ecosystem:
  - How does the productivity of the Southern Bight of the North Sea reacts to the huge inputs of nutrients?
  - What is the fate of the synthesised biomass?
  - What is the net CO_2 flux in the area?
  - What would be the possible result of a reduction of the nutrient supply?

Valorisation of the results

- Publications in international journals devoted to biogeochemistry and oceanography
- Scientific presentations at national and international conferences on regional, strategic and thematic interest
- Dissemination of results to various international organisations