

A novel approach to model 4 decades of marine chemical data

De Witte Bavo¹, Le Hong Minh², Lagring Ruth², Ruttens Ann³, Waegeneers Nadia³, Ampe Bart⁴ and Bekaert Karen⁴

- ¹ Aquatic Environment and Quality, Animal Science Unit, Flanders Research Institute for Agricultural, Fisheries and Food (ILVO), Ankerstraat 1, 8400 Oostende, Belgium
E-mail: bavo.dewitte@ilvo.vlaanderen.be
- ² Belgian Marine Data Centre, Royal Belgian Institute of Natural Sciences (OD Nature), Gulledele 100, 1200 Brussels, Belgium
- ³ Trace Element Service, Veterinary and Agrichemical Research Center (CODA-CERVA), Leuvensesteenweg 17, 3080 Tervuren, Belgium
- ⁴ Animal Science Unit, Flanders Research Institute for Agricultural, Fisheries and Food (ILVO), Scheldeweg 68, 9090 Melle, Belgium

The awareness of the negative effects of chemical pollution in the sixties has led to an increased concern on the chemical status of the marine environment in the following decades. International regulation in Western Europe started with the Oslo and Paris convention in the seventies, later on leading to the OSPAR commission. In Belgium, at national level, extended research on chemical pollutants in marine sediments and marine biota was done within the "Project Mer/Projekt Zee" from 1970 to 1976. Since then, a long series of research and monitoring projects was conducted, reporting on the chemical status of the Belgian Part of the North Sea.

Within the '4Demon' project (4 Decades of Marine Monitoring), a major work package focusses on the collection, quality control and intercalibration of more than 40 years of data on heavy metals and polychlorinated biphenyls in the marine environment. In this presentation, the modelling approach and results on sediment data will be presented.

Within current OSPAR and MSFD monitoring programs on chemical pollution, variability in location, seasonality, grain size, etc. is reduced thanks to OSPAR guidelines. This facilitates comparability of data within and between regions and assessments based on 5-to-15-year time trends are frequently made. When trying to cover a period of 40 years of pollution data, variability is much larger, and multiple issues have to be tackled to intercalibrate the data: changes in sampling locations and analyses methods over time, missing essential metadata, sample analysis on different grain size fractions, ... Therefore, existing time trend modelling approaches could not be applied within the 4Demon project. An alternative approach was proposed, focussing on cluster analysis and using different granulometric and geochemical normalization procedures. A parametric linear mixed effect model was used to integrate all data into consistent long term time lines which give a view on PCB and heavy metal pollution on a large time frame.

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