

In situ measurements of SPM concentration to evaluate the impact of the disposal of fine grained sediments from maintenance dredging

Fettweis Michael¹, Matthias Baeye¹, Thomas Van Hoesteberghe², Luc Van Poucke², Arvid Dujardin^{2,3} and Chantal Martens⁴

¹ Operational Directorate Natural Environment, Royal Belgian Institute of Natural Sciences, Gulledele 100, B-1200 Brussels, Belgium
E-mail: m.fettweis@mumm.ac.be

² Antea Group, Buchtenstraat 9, B-9051 Gent, Belgium

³ Flanders Hydraulics Research, Department of Mobility and Public Works, Flemish Government, Berchemlei 115, B-2140 Antwerp, Belgium

⁴ Maritime Access Division, Department of Mobility and Public Works, Flemish Government, Tavernierkaai 3, B-2000 Antwerp, Belgium

The aim of this study is to present and discuss the impact of disposal of fine-grained sediments on the SPM concentration and on the fluid mud dynamics in the turbid Belgian nearshore area (southern North Sea). Measurements show that the SPM concentration reaches more than 3g/l near the bed and up to 0.3g/l at the surface; lower values (<0.01g/l) occur more offshore (Fettweis *et al.*, 2010). The high SPM concentration results in high deposition of cohesive sediments that accumulate in man-made areas such as the ports and navigation channels. About 5 million tons (dry matter) per year of mainly fine-grained sediments is dredged in the port of Zeebrugge and is disposed on a nearby disposal site (Lauwaert *et al.*, 2008). The disposed sediments are quickly resuspended and transported away from the site. The results of a numerical study showed that a significant part recirculates back to the dredging places and that a relocation of the disposal site to another location at equal distance to the dredging area reduces this recirculation (Van den Eynde and Fettweis, 2014). In order to validate the model results a one year field study was set up in 2013-2014. During one month the dredged material was disposed at a new site and the efficiency of the new location was evaluated. Measurements inside and outside the port of Zeebrugge of various oceanographic and sediment parameters (SPM concentration, current velocity, waves, salinity, temperature, tides, wind, bathymetry, density of mud layers) were conducted during the experiment.

The measurements inside the port are presented in Dujardin *et al.* (this volume). The monitoring outside the port was carried out at two locations near the entrance of the port using instrumented tripods. Variations in SPM concentration were related to tides, storms, seasonal changes and human impacts. In order to evaluate the impact of the relocation of the disposal operations a statistical approach was used (Baeye *et al.*, 2011; Fettweis *et al.*, 2011). The measured SPM concentration time series during the relocation experiment were statistically compared against the population data. Both experiment samples and population are characterized by statistical properties, such as median, geometrical mean, standard deviation and probability density distribution. The analysis method is based on the concept of statistical populations and provides a tool to account for the complexities associated with natural dynamics and the need to evaluate quantitatively human impact. SPM concentration can be used as an indicator of environmental changes if sufficiently long time series are available that are representative of the natural variability.

References

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