Marine aggregate mining in the Hinder Banks: on-board sampling of the turbid dredging overflow

Baeye Matthias[1], Francken Frederic[1], Van Lancker Vera[1] and Van den Eynde Dries[1]

[1]Royal Belgian Institute of Natural Sciences, Operational Directorate Natural Environment, Suspended Matter and Seabed Monitoring and Modelling Group, Gulledelle 100, 1200 Brussels, Belgium

Monitoring of the effects of marine aggregate mining is needed to reach good environmental status of the marine environment (EU Marine Strategy Framework Directive). For example, changes in seafloor integrity or hydrographic conditions could adversely impact on benthic ecosystems. In the region of the Hinder Banks, the dredging overflow plumes associated with mining activity within aggregate sector 4c potentially reach ecologically valuable gravel areas in a Habitat Directive Area just south of it. Part of the effort in the monitoring programme intends to examine the characteristics of these overflow particles, such as concentration and size distribution. On-board of a trailing suction hopper dredger, 1 l sampling of the sediment-laden overflow was executed in intervals of about 10 minutes for a total overflow duration of 54 minutes. The collected overflow water was analysed with a turbidimeter and laser diffraction instrument. These revealed an overflow concentration of up to 1 g/l and a size distribution centred around 21 µm. These fine-grained overflow plumes likely remain in suspension for many hours and are systematically transported southward, due to the consistently low tide conditions of these extractions. These plumes are being observed in satellite imagery with deriving sea surface plume concentrations of 0.01 g/l. In the period February to April 2017, intensive sand mining took place within sector 4c with a frequency of up to 4 trips per day as two hopper dredgers were simultaneously in operation, just before low tide. Importantly and for the first time, both ships were commissioned to combine both sand mining and harbour maintenance operations. As a result, dredged matter having much higher silt-clay content is likely to remain inside the hopper enriching the fine particles in the overflow plumes during sand mining.