

Towards a more sustainable exploitation of human activities, Belgian part of the North Sea

Van Lancker V.¹, Baeye M.², Du Four I.², Janssens R.^{1,2}, Degraer S.¹, Fettweis M.¹, Francken F.¹, Houziaux J.S.¹, Luyten P.¹, Van den Eynde D.¹, Devolder M.¹, De Cauwer K.¹, Monbaliu J.³, Toorman E.³, Portilla J.³, Ullman A.³, Liste Muñoz M.³, Fernandez L.³, Komijani H.³, Verwaest T.⁴, Delgado R.⁴, De Schutter J.⁴, Janssens J.⁴, Levy Y.⁴, Vanlede J.⁴, Vincx M.⁵, Rabaut M.⁵, Vandenberghe H.⁵, Zeelmaekers E.⁵, Goffin A.⁵

→ Vera.vanlancker@mumm.ac.be

- 1 Royal Belgian Institute of Natural Sciences. Management Unit of the North Sea Mathematical Models, Belgium
- 2 Ghent University, Renard Centre of Marine Geology, Belgium
- 3 KULeuven, Hydraulics Laboratory, Belgium
- 4 Flanders Hydraulics, Belgium
- 5 Ghent University, Marine Biology Section, Krijgslaan 281, S-8, B-9000 Gent, Belgium
- 6 Flanders Marine Institute (VLIZ), Belgium

Seabed, living and non-living resources are exploited increasingly: sand and gravel is needed for beach nourishment and for construction purposes, the accessibility of harbours requires regular dredging and disposal operations, offshore windmills contribute to our future energy supply and pipelines and cables transport gas and electricity to the mainland. The interaction of these activities with seabed and water column nature and processes needs careful consideration. A more sustainable ecosystem-based approach to management is needed, based on an overall marine environmental status. Setting-up environmental targets and well-balanced monitoring programs have become timely (Europe's Marine Strategy Framework Directive).

QUEST4D has anticipated through investigating the Belgian marine ecosystem over the past 100 years, addressing: (1) Natural variability of sediment processes; (2) Historic baselines, sediment and benthos; (3) Ecosystem changes, on the medium- to long-term; (4) Case studies, relating seabed and water column changes to both naturally- and anthropogenically-induced sediment dynamics; (5) Climate change scenarios and their effect on seabed processes; and (6) More sustainable exploitation strategies of non-living seabed resources. A combined suite of tools was used, comprising *in situ* measurements, seabed mapping and modelling, on the small to large-scale, and aiming at increasing both process and system knowledge of the Belgian part of the North Sea.

Van Lancker V., Baeye M., Du Four I., Janssens R., Degraer S., Fettweis M., Francken F., Houziaux J.S., Luyten P., Van den Eynde D., Devolder M., De Cauwer K., Monbaliu J., Toorman E., Portilla J., Ullman A., Liste Muñoz M., Fernandez L., Komijani H., Verwaest T., Delgado R., De Schutter J., Janssens J., Levy Y., Vanlede J., Vincx M., Rabaut M., Vandenberghe H., Zeelmaekers E., Goffin A. (2012). *Quantification of Erosion/Sedimentation patterns to Trace the natural versus anthropogenic sediment dynamics (QUEST4D). Final Report*. Science for Sustainable Development, Brussels: Belgian Science Policy, 97 p. + Annexes. (http://www.vliz.be/projects/quest4d/docs/BelspoSSD_QUEST4D_FinalReport2012.pdf)