

## Understanding Tidal Sandbank Dynamics and Impacts of Sand Extraction in Sediment-Scarce Environments

P.C. Roos<sup>1</sup>, V. Van Lancker<sup>2</sup>, D. Van den Eynde<sup>2</sup>, T.J. van Veelen<sup>1</sup>, S.J.M.H. Hulscher<sup>1</sup>

*Keywords: tidal sandbanks, sediment scarcity, marine sand extraction, morphodynamic modelling, morphosedimentary system response, data analysis, Belgian Continental Shelf, sand extraction toolbox.*

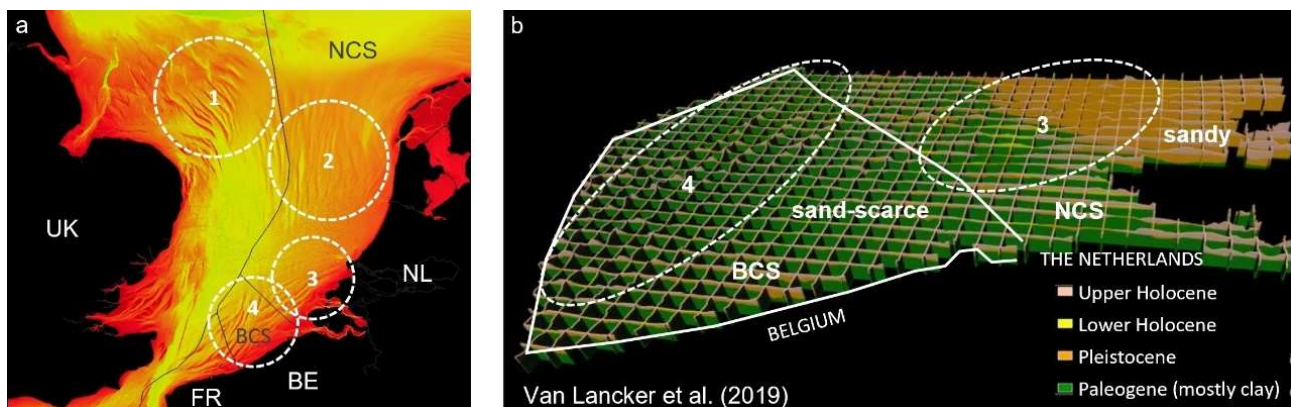
### Abstract

Marine sand extraction is rapidly accelerating, with increasing amounts of sand needed for coastal nourishments, land reclamations, and the construction industry. The impact of depleting sand resources is already felt on the Belgian Continental Shelf (BCS) and is an emerging challenge on the Netherlands Continental Shelf (NCS); see Figure 1. This has severe repercussions on the ecosystem services sandbanks provide and threatens our access to sand supplies in the future.

Here we present the BANX-project, funded by the Netherlands Science Organisation (NWO) and carried out at the University of Twente (UT, The Netherlands) and the Institute of Natural Sciences (RBINS)/Ghent University (UGent) (Belgium). Starting in September 2024, BANX aims to provide knowledge and tools to support the long-term management (years to decades) and sustainable exploitation of tidal sandbanks in environments with sediment scarcity.

To this end, a novel process-based morphodynamic model will be developed to understand sandbank evolution under sediment-scarce conditions, both autonomously and in response to sand extraction (PhD A in Figure 2). A pilot study has already been carried out (Van Veelen et al., 2022). Simultaneously, indicators will be identified that help detect potentially irreversible morphosedimentary system responses based on data from the BCS (including geological substrate, PhD B). Finally, the above will be combined to create an extraction toolbox that supports the spatiotemporal design of extraction strategies (Postdoc C). BANX thus benefits from the modelling expertise of UT and the geological and morphosedimentary expertise at RBINS/UGent. See Figure 2 on the next page for an outline of the project structure.

Utilisation is enhanced by the active involvement of eleven key users, representing government agencies, marine consultancies, dredging industry, knowledge institutes and environmental organisations (from Belgium, The Netherlands and UN). Because sand scarcity, as currently experienced on the BCS and locally on the NCS, has been recognized as an as a major concern by the United Nations Environment Program (UNEP, 2022), the significance of BANX extends far beyond the BCS and NCS.



### References

UNEP (2022). Sand and sustainability: 10 strategic recommendations to avert a crisis. GRID-Geneva, United Nations Environment Programme, Geneva, Switzerland.

Van Lancker, V.R.M., Francken, F., Kapel, M., Kint, L., Terseleer, N., Van den Eynde, D., Hademenos, V., Missiaen, T., De Mol, R., De Tré, G., Appleton, R., van Heteren, S., van Maanen, P.P., Stafleu, J., Stam, J., Degrendele, K., & Roche, M. (2019). Transnational and Integrated Long-term Marine Exploitation Strategies (TILES). Final Report. Brussels: Belgian Science Policy 2019 – 82 p. (BRAIN-be - Belgian Research Action through Interdisciplinary Networks). [http://www.belspo.be/belspo/brain-be/projects/FinalReports/TILES\\_FinRep\\_AD.pdf](http://www.belspo.be/belspo/brain-be/projects/FinalReports/TILES_FinRep_AD.pdf)

Van Veelen, T.J., Roos, P.C., & Hulscher, S.J.M.H. (2022). Sediment Scarcity: Modelling the Morphodynamics of Sandbanks When Sand Is Limited. Proceedings of the 39th IAHR World Congress, 4.

<sup>1</sup> Water Engineering & Management, University of Twente, Enschede, The Netherlands. p.c.roos@utwente.nl  
t.j.vanveelen@utwente.nl s.j.m.h.hulscher@utwente.nl

<sup>2</sup> Institute of Natural Sciences (RBINS), Brussels, Belgium. vvanlancker@naturalsciences.be dvandeneinde@naturalsciences.be

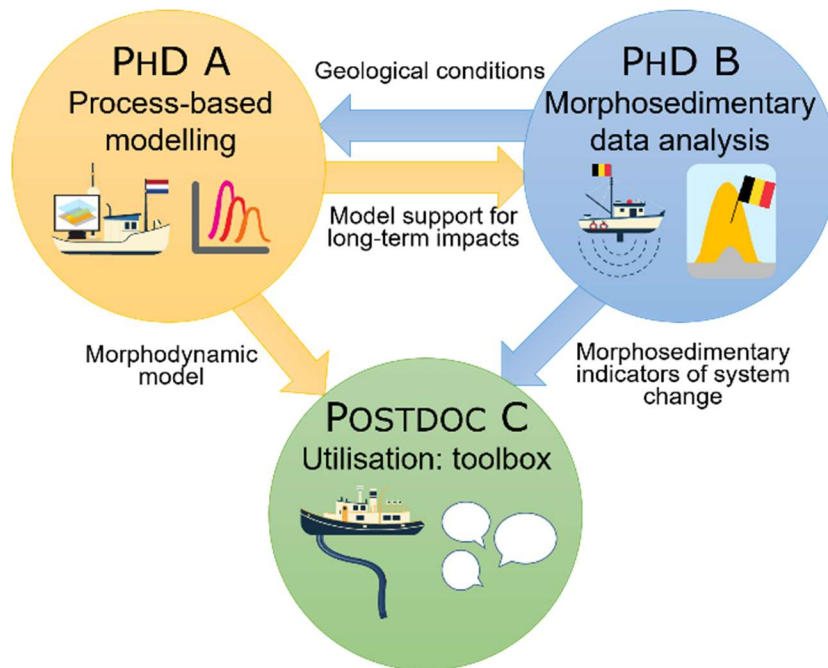


Figure 2: Project structure of BANX, including links among the three subprojects: PhD A (at UT), PhD B (at RBINS/UGent) and Postdoc C (at UT).