

**Title of the project:**

Effects of infragravity waves on sand transport processes on the Dutch lower shoreface

**Assignment no.:** 28.23**Internal/external:**  
external**Head graduation committee:**

Jebbe van der Werf

**Daily advisor:**

Philippe Frankemölle (UT), t.b.d. (Deltares)

**Name(s) of participating companies or institutes:**

Deltares

**Start of the project:**

After January 2024

**Required courses:**

Wave-dominated Coastal Dynamics, Long Waves and Tidal Morphodynamics, Advanced Research Skills, Morphology, Hydraulic Modelling, Mathematical Physics of Water Systems

**Short description of the project**

The offshore North Sea houses many human activities such as offshore wind farms, gas platforms and network cables. Closer to the coast is the nearshore zone that facilitates functions and values such as flood protection, recreation and nature. Between those areas lies the lower shoreface, a relatively flat and sandy area between 8 and 20m deep, that influences how these offshore human interferences affect the nearshore zone (van der Spek, 2022).

Sand transport on the lower shoreface mainly depends on waves, tides and density effects, but the contribution of infragravity waves to sand transport on the lower shoreface is often not taken into account. Though infragravity wave heights are in the order of centimeters, the long wave periods (20s to 200s) can cause the orbital velocities to penetrate deeper into the water column and initiate sand transport in the shallower parts of the lower shoreface (van Rijn, 1997).



Fig. 1: Overview of the Dutch coastal zone (van der Spek, 2022).

In this project, you will study how infragravity waves affect sand transport on the Dutch lower shoreface. In order to do this, you will make use of XBeach: a two-dimensional nearshore model for wave propagation, long waves, sediment transport and many other functionalities. You will model several areas along the Dutch lower shoreface to quantify and explain spatial and temporal variability of lower shoreface sand transport due to infragravity waves.

Are you interested or do you have any questions?

Feel free to contact Philippe Frankemölle ([p.f.v.w.frankemolle@utwente.nl](mailto:p.f.v.w.frankemolle@utwente.nl))

**References**

- van Rijn, L. C. (1997). Sediment transport and budget of the central coastal zone of Holland. *Coastal Engineering*, 32(1), 61-90. [https://doi.org/10.1016/S0378-3839\(97\)00021-5](https://doi.org/10.1016/S0378-3839(97)00021-5)
- van der Spek, A., van der Werf, J., Oost, A., Vermaas, T., Grasmeijer, B., & Schrijvershof, R. (2022). The lower shoreface of the Dutch coast—An overview. *Ocean & Coastal Management*, 230, 106367. <https://doi.org/10.1016/j.ocecoaman.2022.106367>