

Designing Coastal Landforms ...with Coupled Modelling

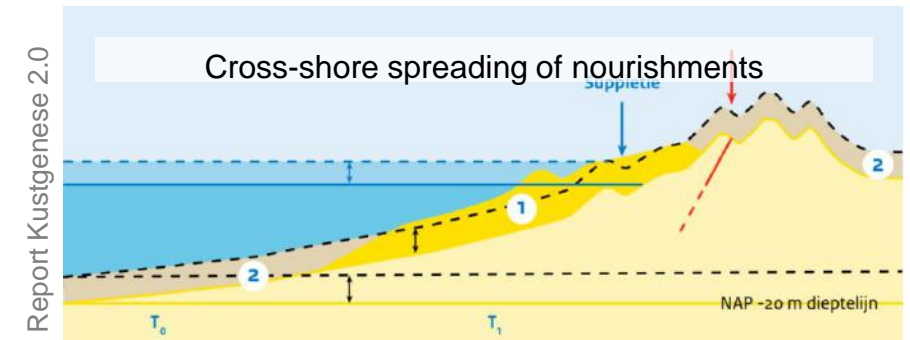
Bart van Westen, together with Tim Leijnse, Arjen Luijendijk, Matthieu de Schipper, Sierd de Vries, Nick Cohn, Anne Ton, Robert McCall and Lisa Meijer

September 23rd 2021

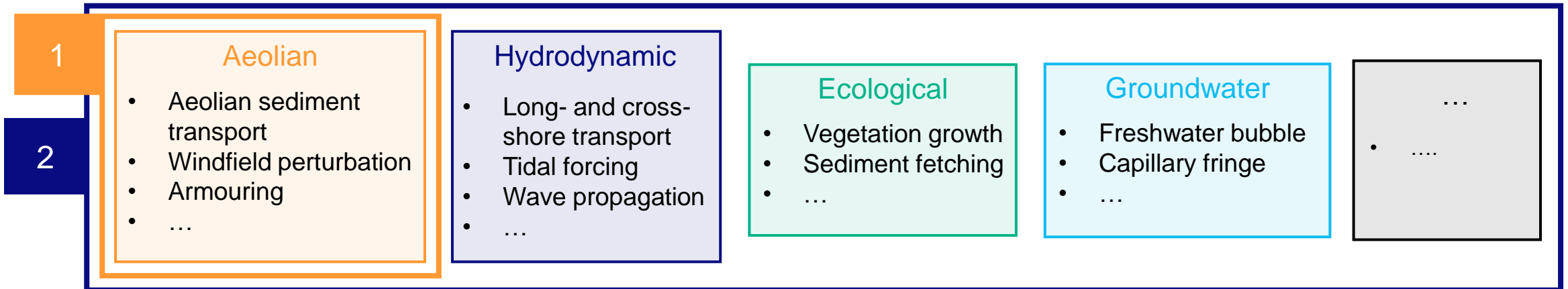
Introduction



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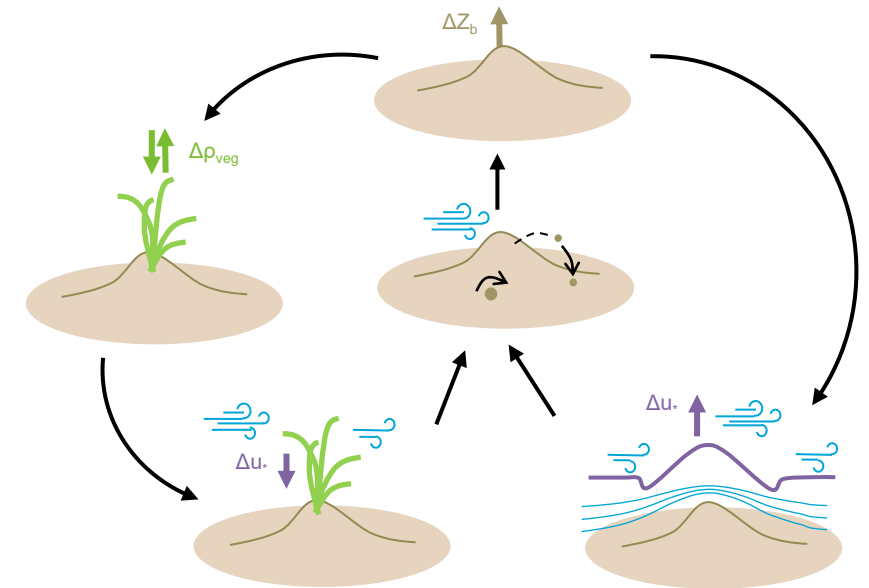
Numerical models can be useful tools for design, but...
A lot of different processes that interact →



Aeolian processes

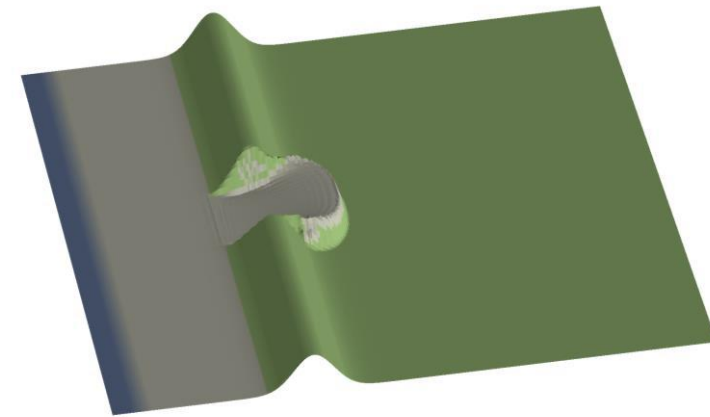
Recent developments

Barchan dunes (Van Westen, 2019)



Van Westen, B., de Vries, S., Reniers, A., den Bieman, J. P., Hoonhout, B., Rauwoens, P., & van Puijenbroek, M. E. B. (2019). Aeolian Modelling of Coastal Landform Development. In *Coastal Sediments 2019: Proceedings of the 9th International Conference* (pp. 1354-1364).

Parabolic dunes and blowouts (Meijer, 2020)

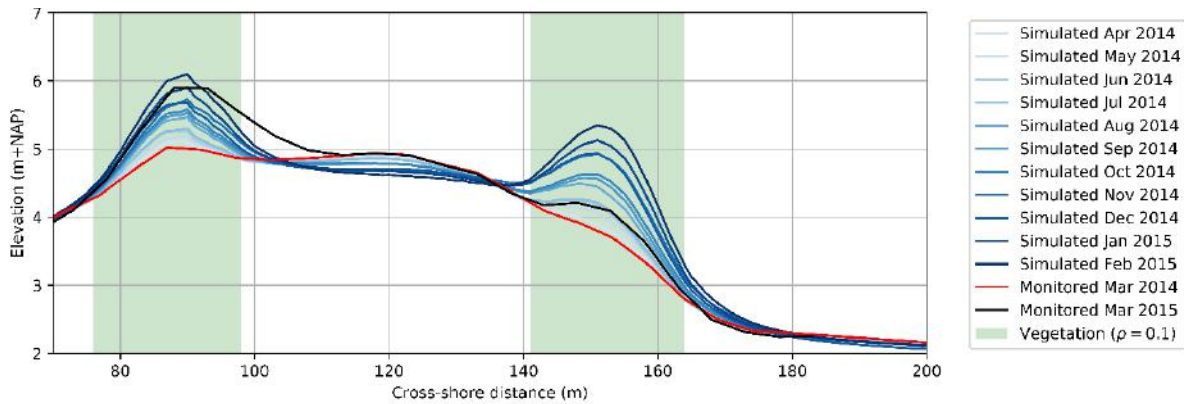
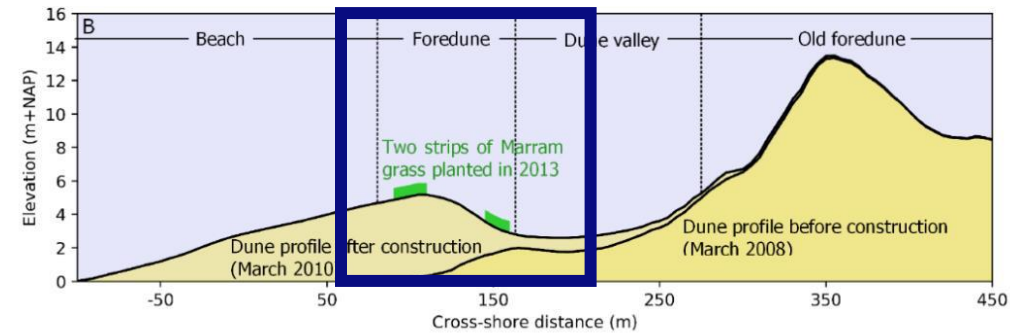


Meijer, L. (2020). Numerical Modelling of Aeolian Sediment Transport, Vegetation Growth and Blowout Formation in Coastal Dunes.

Aeolian processes

Recent applications

Spanjaards Duin (Oude Vrielink, 2021)

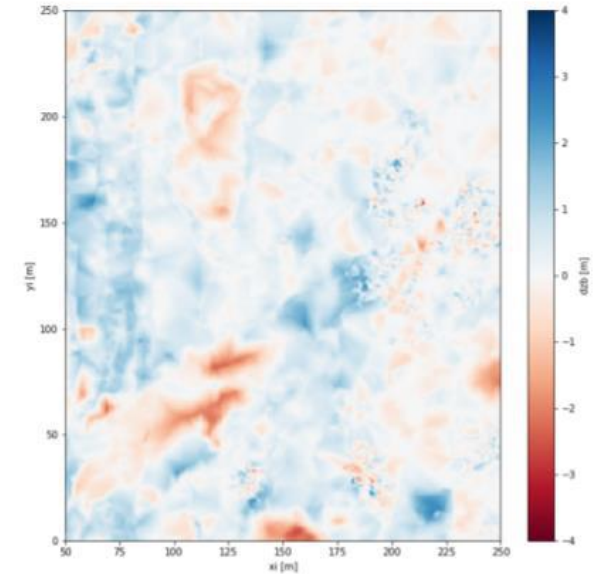


Oude Vrielink, J, Eleveld, M.A., van Westen, B., Galiforni-Silva, F., Wijnberg, K.M. (submitted). Factors regulating sediment fluxes over an engineered foredune and adjacent dune slack. Proceedings Coastal Dynamics 2021.

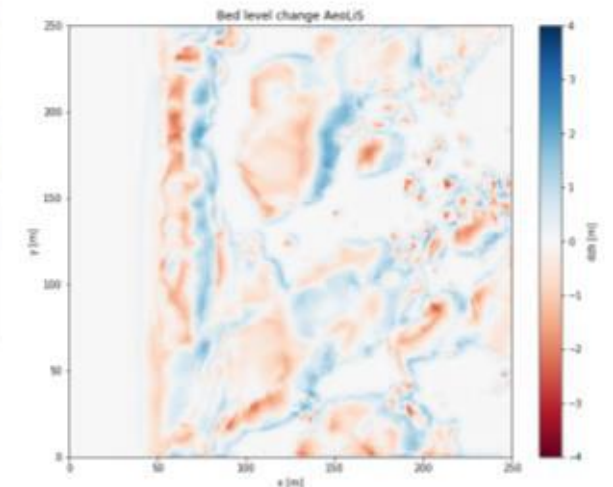
Meijndel (Meijer, 2020)



Measurements



AeoLiS

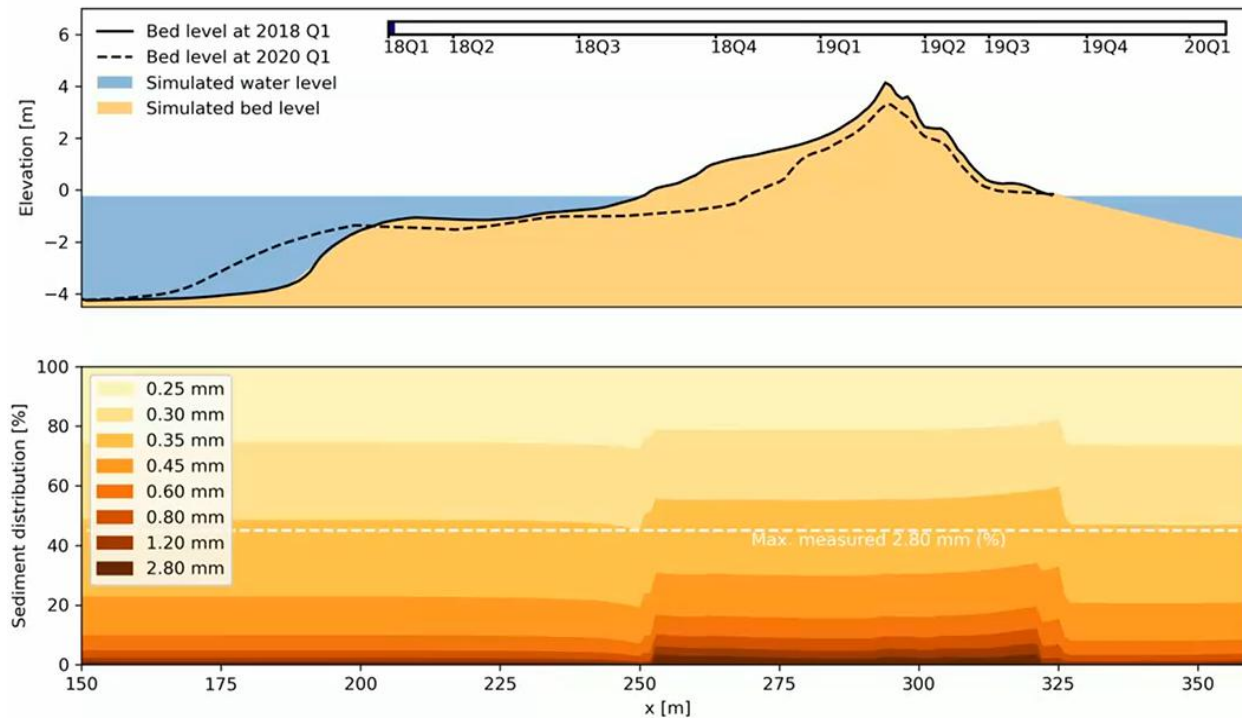


Meijer, L. (2020). Numerical Modelling of Aeolian Sediment Transport, Vegetation Growth and Blowout Formation in Coastal Dunes.

Coupled modelling

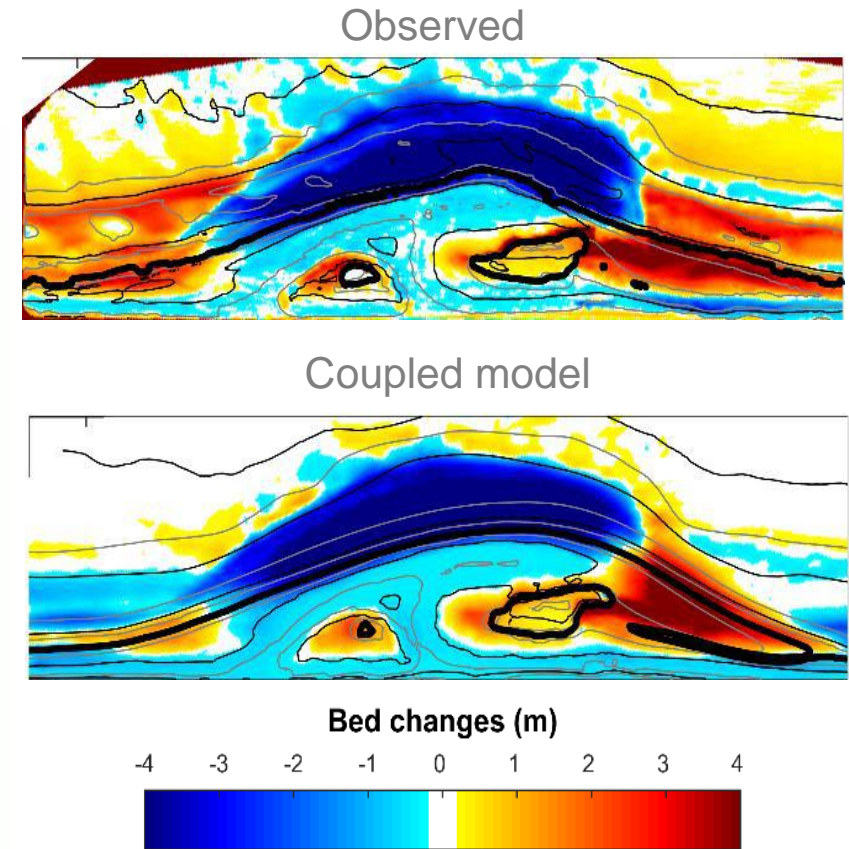
Recent applications

Marker Wadden, AeoliS + XBeach (Van Westen, 2021)



Van Westen, Leijnse, Ton, McCall, De Vries, Cohn, Meijer (2021). Marine and Aeolian Processes in the Coastal Zone. Presentation Coastal Dynamics 2021.

Zandmotor, Delft3D FM + AeoliS (Luijendijk, 2017)



Luijendijk, A., Velhorst, R., Hoonhout, B., de Vries, S., & Ranasinghe, R. (2017). Integrated modelling of the morphological evolution of the sand engine mega-nourishment. Proceedings of Coastal Dynamics 2017, 1874-1885.

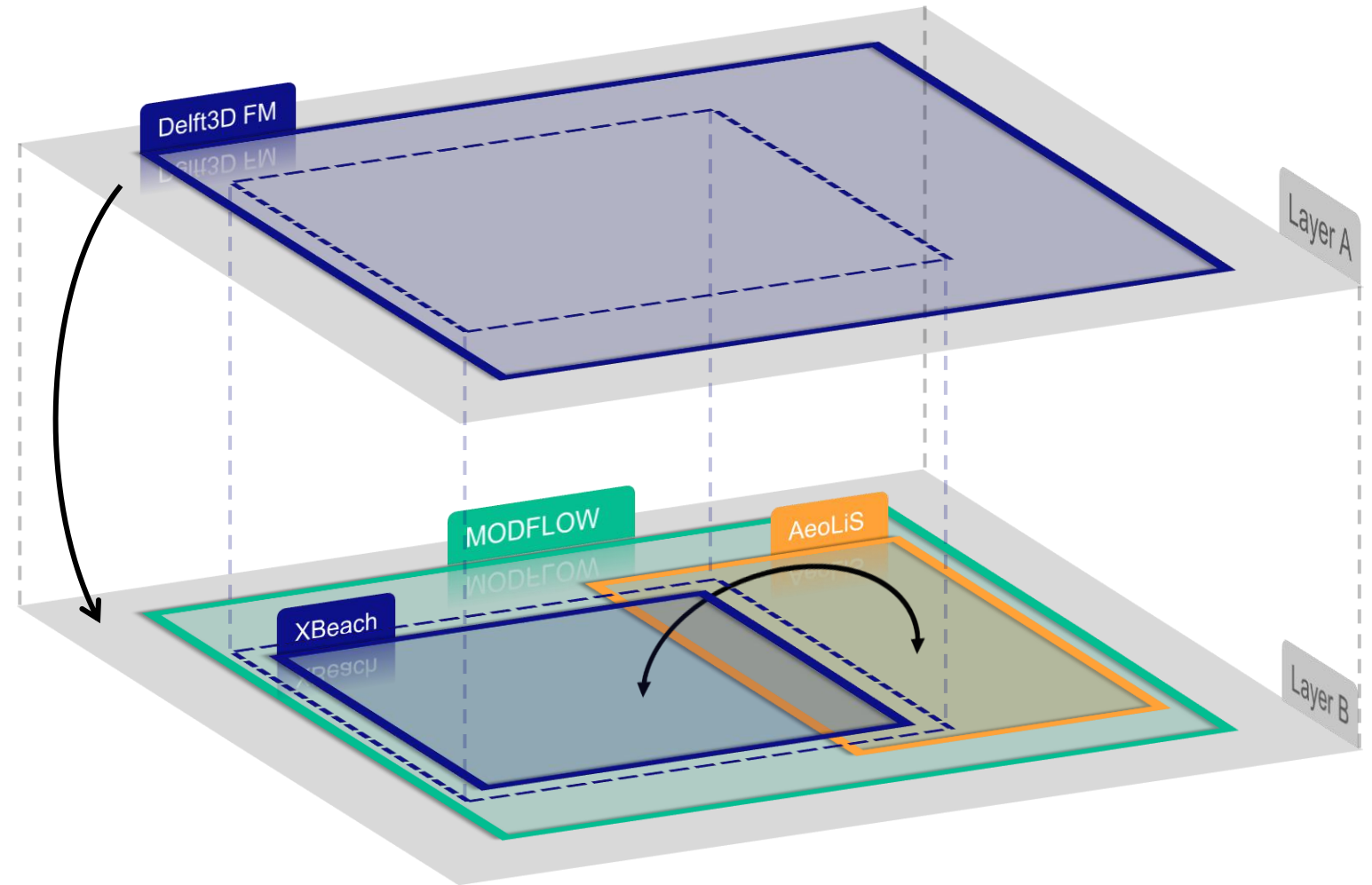
Outlook

1. Towards a generic approach

- Community platform

2. Adding more processes (models)

- Hydrodynamics
- Stormimpact
- Dune erosion
- Aeolian sediment transport
- Vegetation
- Groundwater



We are open for collaboration, so if you have any suggestions for other models, case studies, Please do not hesitate to contact us!

Thanks for your attention

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