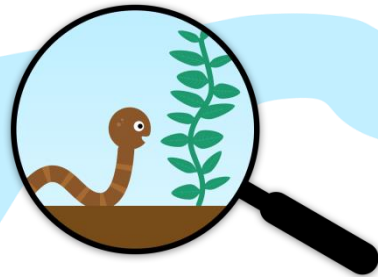




Modelling interactions between bioturbation and mud distribution

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European Research Council

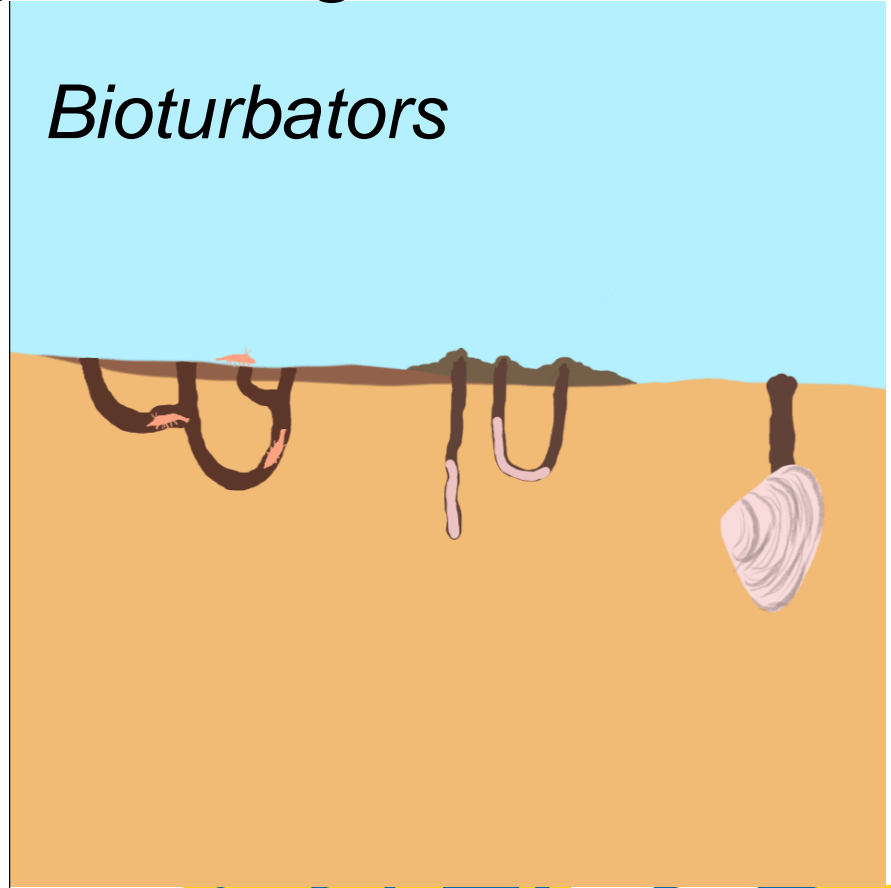
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Eco-engineering

- Macrobenthic organisms increase erodibility through their movement in the sediment
- Facilitated erosion affects large-scale distribution of mud and large-scale morphology

Bioturbators



Two contrasting bioturbators:



- Sandy and dynamic environments
- Low bioturbation potential

Research question:
How large is the effect of

- a) **AM**
- b) **CV**
- c) **AM & CV combined**

on the mud distribution
after 50 years?

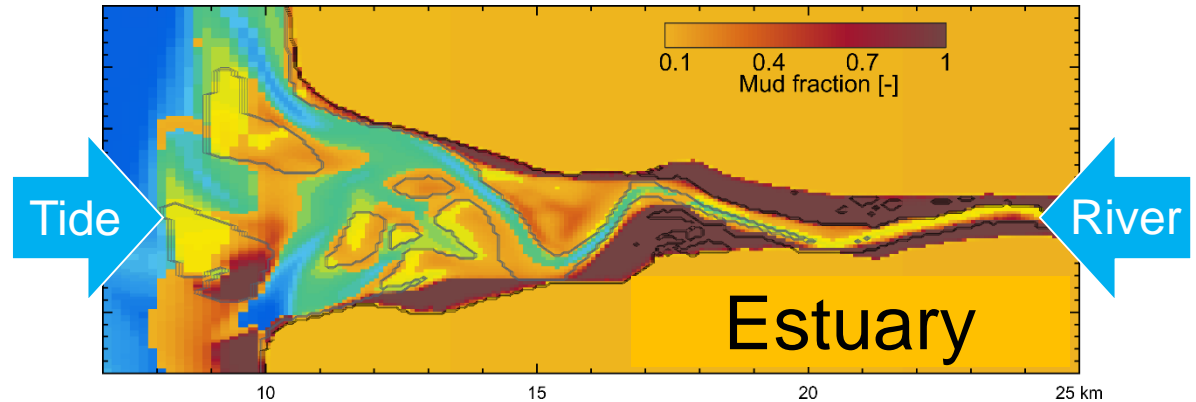


- Muddy and calmer environments
- High bioturbation potential

→ AM

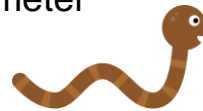
CV ←

The model is a dynamic feedback between a hydro-morphological model in Delft3D (2D) and a bioturbation model in Matlab



Species distribution affects erodibility of mud:

- crit. bed shear stress
- erosion parameter

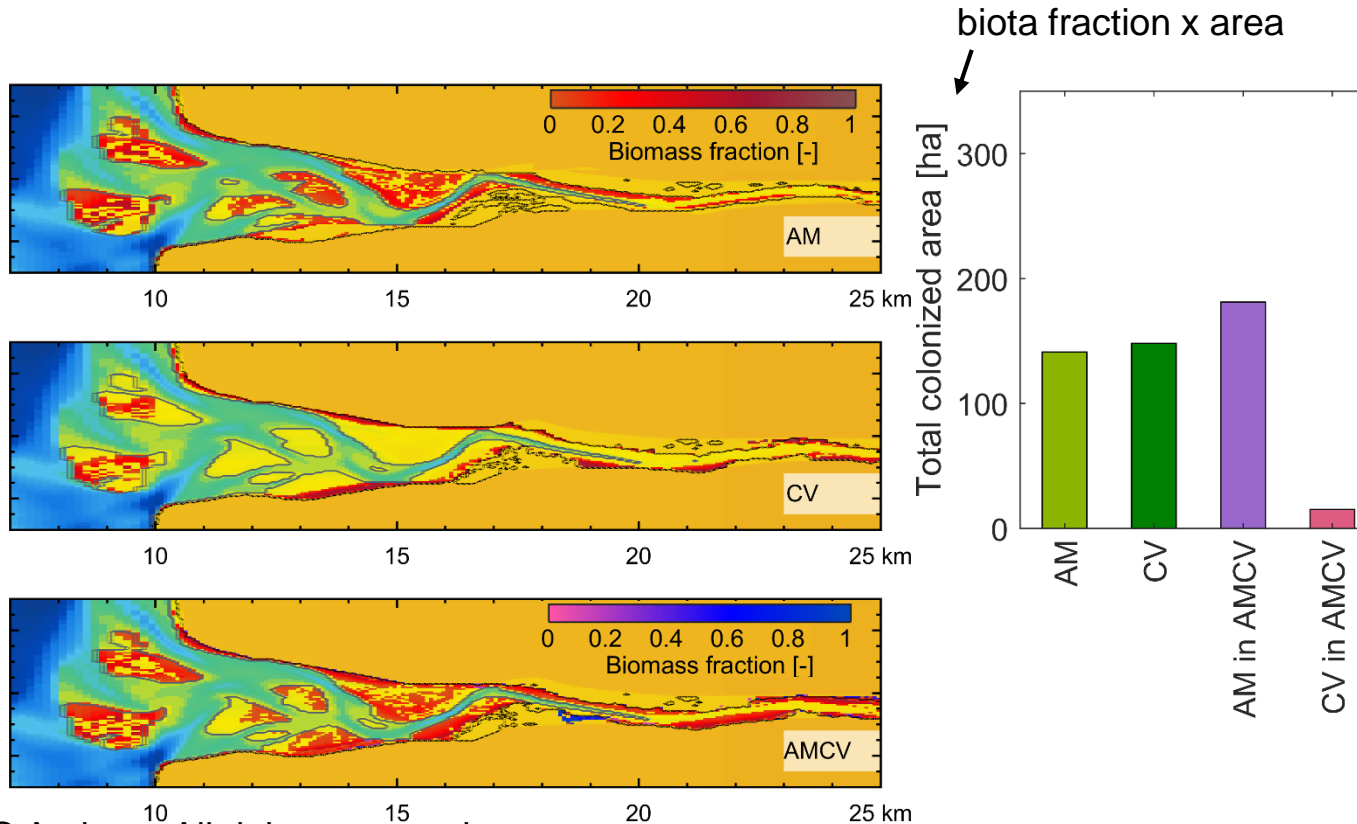


Coupling every M2-tide

New hydro-morphology affects species distribution:

- Inundation
- Flow velocity
- Mud content

Results: The bioturbators occur here:

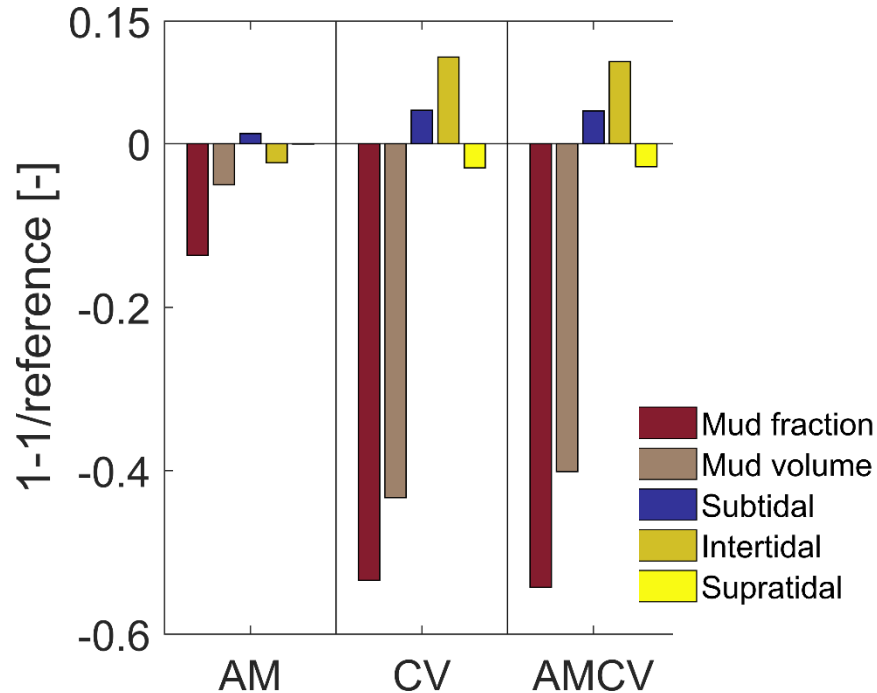


- AM larger extent but similar total area coverage when fractions are considered

AMCV:

- enhanced cover of AM through positive eco-engineering
- CV is reduced through competition

Export of mud by bioturbators increases



- Increasing mud export by AM, CV and AMCV compared to a reference without bioturbation
- CV has much stronger effects on mud volume and fraction
- Erosion of the supratidal leads to increasing inter- and subtidal area

Conclusions

- CV and AM have similar species coverage even with a more constraint habitat for CV
- Species CV has much stronger effects on mud volume
- Erosion of the supratidal leads to increasing intertidal and subtidal area