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OF APPLIED SCIENCES

Perkpolder managed realignment

Transitioning from a freshwater agricultural area to a saline natural environment (EGU2020-20115)

WIETSE VAN DE LAGEWEG, J. SALVADOR DE PAIVA, J. VAN DER WERF, L. DE VET, P. DE LOUW, T. BOUMA, B. WALLS, T. YSEBAERT & A. VAN BERCHUM
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Rijkswaterstaat
Ministerie van Infrastructuur en Milieu



Royal Netherlands Institute
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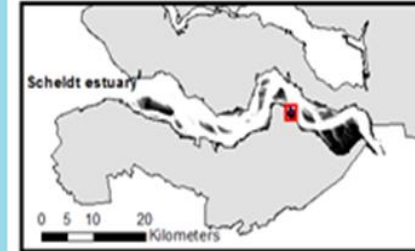
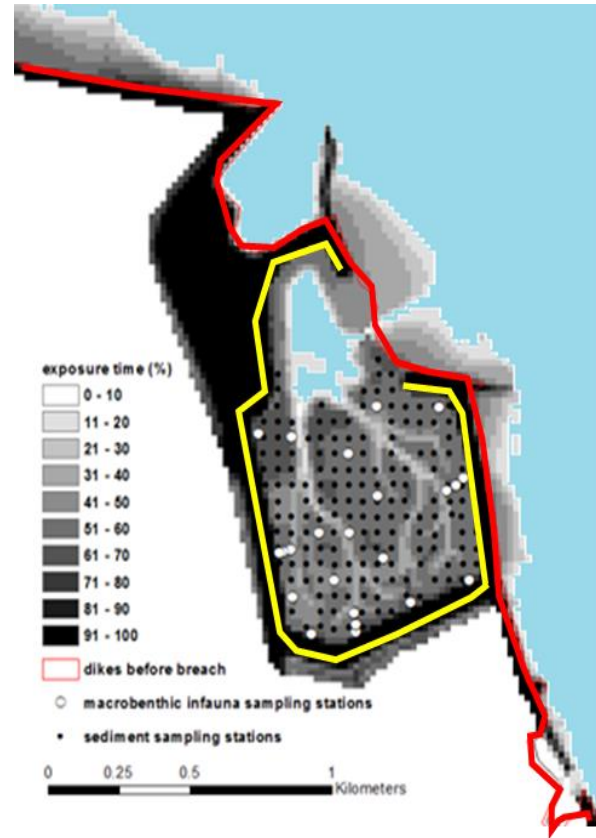
WAGENINGEN
UNIVERSITY & RESEARCH

Deltares
Enabling Delta Life



PERKPOLDER

- Located in Western Scheldt
- ~ 75 hectare
- Nature compensation (*as part of extension of waterway to Antwerp harbor*)
- Monitoring 2015 – 2018:
 - Morphology
 - Groundwater
 - Vegetation
 - Benthic communities



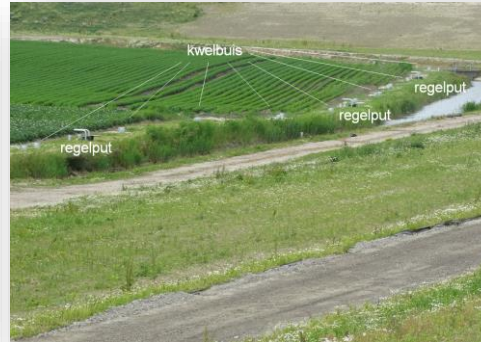
GROUNDWATER SYSTEM

- **'SeepCat' (a mitigation measure)** was installed to protect the freshwater lens used by farmers for irrigation
- SeepCat system was functioning well enough to compensate for the **saltwater intrusion effects** of the new tidal area

--> **field laboratory** where effects of **sea-level rise** are measured and **mitigation measures** to adapt to sea-level rise are tested



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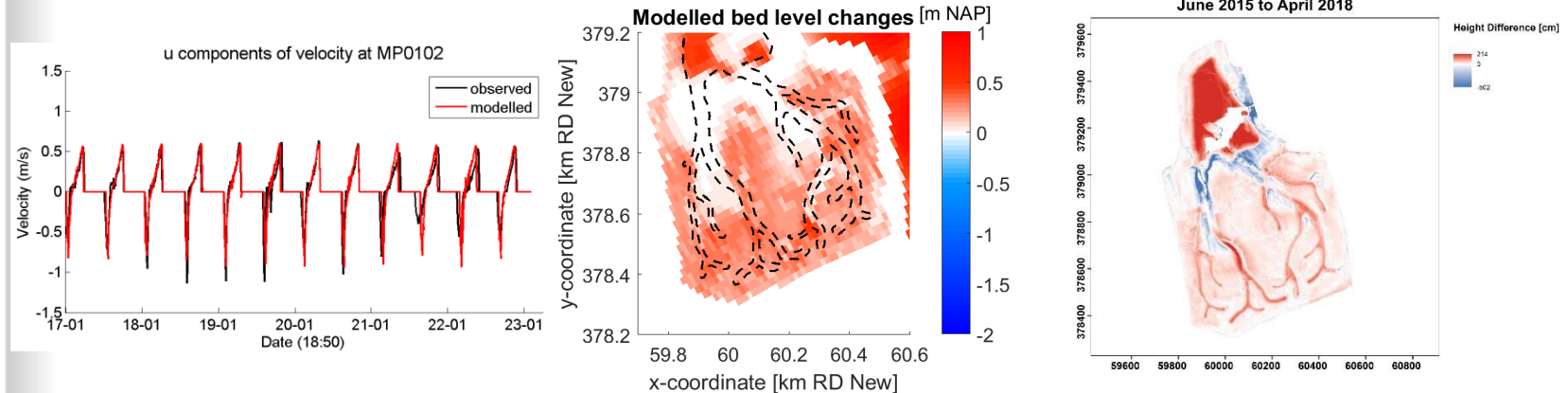


PERKPOLDER: TRANSITIONING FROM FRESH TO SALINE



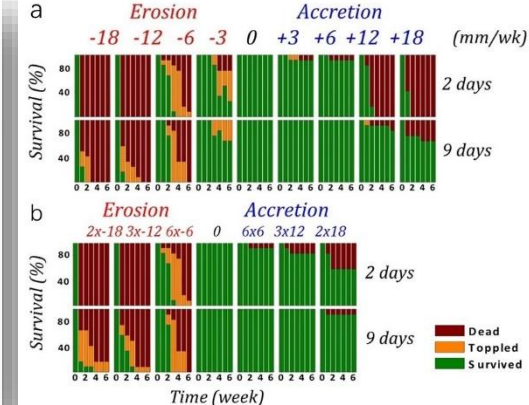
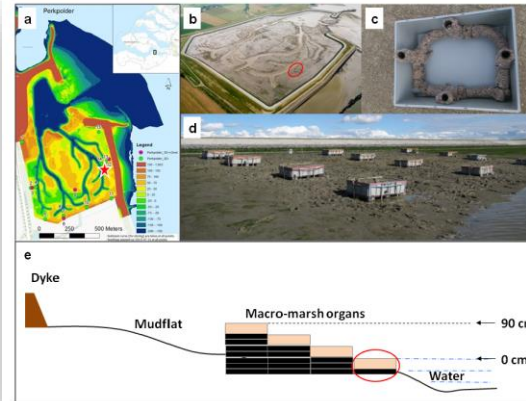
SEDIMENT TRANSPORT & MORPHOLOGY

- The Perkpolder basin showed a **net sediment import** of 34-40 kilotons/year (=13.000-15.000 m³ of sediment)
 - Large fluctuations, largely related to tides
 - Consistent with bed level change observations
- Morphological template** has a large impact on the rates of **morphological change for many years after the initial opening**



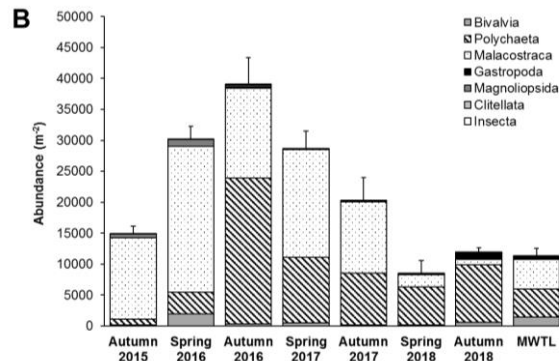
VEGETATION DEVELOPMENT

- No seed limitation in Perkpolder
 - But no vegetation encroachment yet
- Controlled lab experiments show that seedlings:
 - Survive best in a well-drained soil without sediment dynamics
 - They are more tolerant to accretion compared to erosion

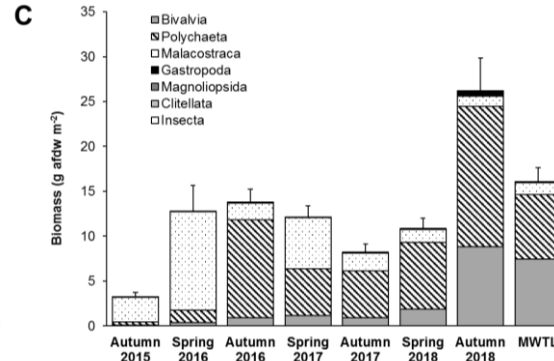


BENTHIC COMMUNITIES

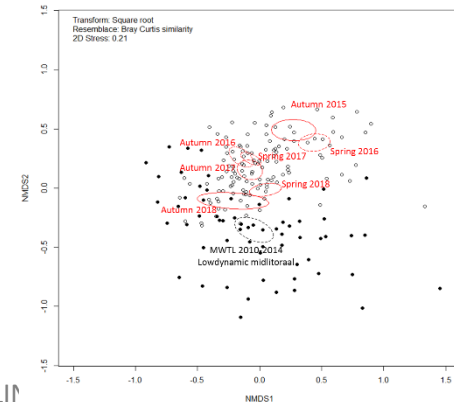
- A biologically active intertidal area has formed within 3 years
 - development towards a macroinfaunal community found on nearby Western Scheldt tidal mudflats
 - a stable community is expected within years rather than decades
- The area is also frequently visited by birds, which forage during low tide and rest on the surrounding levees during high tide



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PERKPOLDER: TRANSITIONING FROM FRESH TO SALIN



SUMMARY & LESSONS LEARNED

- Monitoring has provided important insights into morphological and ecological development following tidal restoration regarding:
 - the design of the inlet
 - the dimensions of the man-made tidal creeks
 - the topography of the tidal flats
- Unique knowledge is obtained on the effectiveness of a seepage installation
- The monitoring will be continued to better understand the medium-term (4-10 years) effects of tidal restoration on abiotic and biotic factors
 - Also focus on socio-economic aspects
 - Input for future restoration projects & adaptive coastal management





RESOURCES

- Report & background information:
https://www.projectenportfolio.nl/wiki/index.php/PR_00302
- Video about Seepage system (in Dutch):
<https://www.youtube.com/watch?v=RNpNydggQqY>
- Perkpolder Facebook page:
<https://www.facebook.com/gebiedsontwikkelingperkpolder/>
- Ongoing tidal restoration project in Western Scheldt estuary:
https://prezi.com/p/hvmg_bkuu_bd/polder2c-s-living-lab-hedwige-prosper-polder/