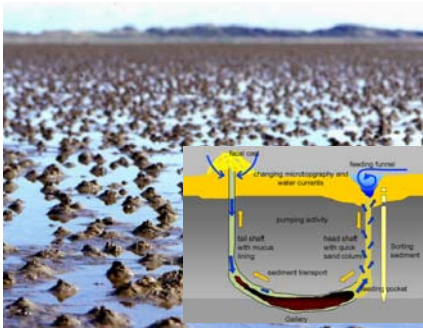


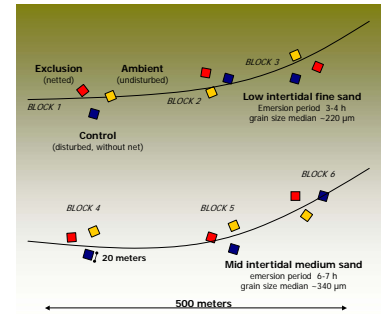
# Ecosystem engineering in intertidal sand by the lugworm *Arenicola marina*

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Lugworms tidal flat and lugworm burrow

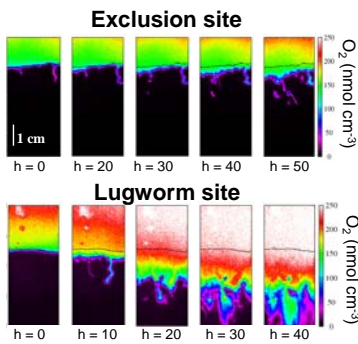
Deposit-feeding lugworms are widespread the dominant large burrowing macrofaunal species and consequently the major source of sediment reworking and bioirrigation of intertidal sediments in the Wadden Sea. In 2002 an ongoing large-scale, long-term lugworm exclusion experiment was started, by meshing the sediment in 10 cm depth on 6 exclusion plots, each with an area of 400m<sup>2</sup> to reveal significant effects of lugworms on ecosystem functioning.



experimental setup: 2-factorial nested block design

## Lugworms affect...

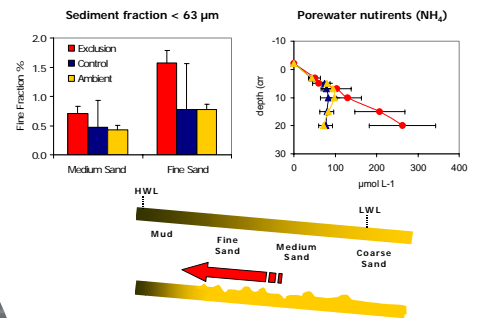
### ...biogeochemical processes



Lugworms maintain sediment permeability and facilitate oxygen penetration with increasing hydrostatic pressures

Lugworms inhibit accumulation of fine particles, porewater nutrients, and sulphide

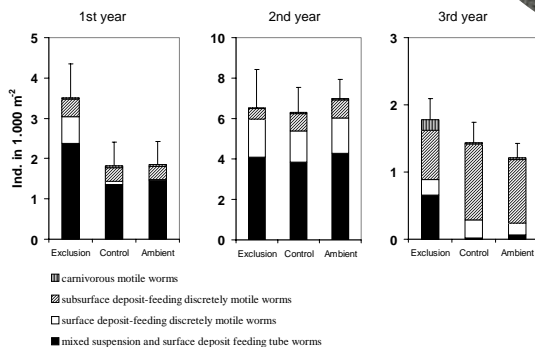
### ...intertidal habitat succession



Hypothesized expansion of permeable sandflats at the cost of cohesive mudflats

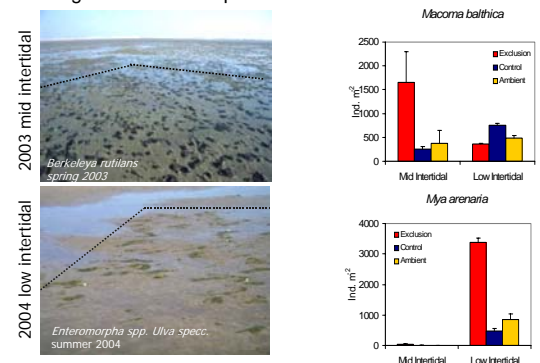
### ...functional diversity

Lugworms facilitate sulphide sensitive species and inhibit tube building species



### ...structural habitat complexity

Algae fixed to protruding polychaete tubes → Enhanced recruitment of byssus drifting bivalves



Exclusion plots, December 2002

### Conclusions and perspectives

- Effects of 'ecosystem engineering' by lugworms extend beyond the vicinity of individual burrows with considerable implications for sediment properties, biogeochemical processes, and the benthic community.
- Effects are variable in space and time.
- The experiment offers ideal testing ground for further research regarding key species, biodiversity and ecosystem functioning.
- The experiment is a contribution to the European network of Marine Biodiversity and Ecosystem Functioning (MarBEF) and one part of the BMBF project NEBROC (Netherlands Bremen Oceanography).