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Large-scale exclusion of the bioturbating lugworm *Arenicola marina* from intertidal sediments in the North Sea

Lugworms comprise eighteen species of tail-tailed Arenicolidae, and constitute the largest and most abundant polychaete bioturbators in coastal sediments, rivalling in importance the thalassinidean shrimps as ecosystem engineers. *Arenicola marina* (L.) has a predominantly northern distribution along Atlantic coasts. This deposit-feeder dwells in J- or U-shaped burrows down to a depth of 0.4 m. Surface sediment sliding through a feeding funnel down to the base of the burrow is consumed, bacteria and diatoms are digested, and the residual sediment is defecated back to the surface as coiled strings. Although worms may intermittently turn to anaerobic metabolism, they ventilate their burrows through the tail shaft with oxic water from above. At the surface, lugworms may displace small tube-builders and seagrass. On the other hand, burrow structures attract a diverse fauna including thiobiotic meiofauna.

Lugworms may transform the entire habitat with their bioturbation and bioconstruction activities. A long-term, large-scale exclusion experiment was designed to detect direct and indirect effects of the lugworms on other benthic fauna, sediment properties and nutrient fluxes in order to quantify their role as ecosystem engineers on sandy intertidal flats. To evaluate these biotic effects relative to physical factors, *Arenicola* enclosures were set up in the upper and lower intertidal zone. Since lateral transport of surface sediment by currents and waves may obscure some effects, single experimental plots have an area of 400 m². Our first results reveal positive and negative effects on other fauna and remarkable changes in sediment properties but these tend to vary with time and tidal level.