Bayed A. (ed.). Sandy beaches and coastal zone management – Proceedings of the Fifth International Symposium on Sandy Beaches, 19th-23rd October 2009, Rabat, Morocco
Travaux de l'Institut Scientifique, Rabat, série générale, 2011, n°6, 135-136.

The effect of tides on the vertical distribution of nematodes on shore environments: a study case of De Panne's beach (Belgium)

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INTRODUCTION

It is widely accepted that the horizontal distribution of intertidal beach organisms is structured by factors related to the tidal regime. In addition, the vertical distribution of small (meiofaunal) organisms might be influenced because these organisms live in intimate contact with the interstitial environment which is heavily influenced by the tidal regime as well. Intertidal benthic organisms are known to ascend in the sediment during the high tide and a descendent migration is expected when the tide goes down (McLachlan *et al.* 1977), but they may also migrate deeper in the sediment, as an adaptive strategy used against desiccation, during the low tide or to avoid the harsh wave impact during the high tide (Fegley 1987). Therefore we investigated the effect of the tidal regime on the vertical distribution and community structure in the upper 5cm of a macrotidal ultra-dissipative beach.

MATERIAL & METHODS

De Panne is located in front of the nature reserve "Westhoek reservaat" (51°05'30''N, 02°34'01''E), Belgium. A transect of 25m parallel to the coast line was established in the middle shore of the beach and replicates were randomly taken during five periods of a tidal cycle: at low, flooding, high, draining, and a second low tide. All cores were sliced into sections of 1cm to the depth of 5cm. Three replicates were destined to meiofauna analysis and fixed in neutral 4% formaldehyde tap water solution. Three replicates for interstitial sea water and chlorophyll pigment equivalent (CPE) were also collected and kept cool till to arrive in the lab. They were storage in a freezer at -4°C for further analysis. Sediment temperature was measured in a specific core using a soil mercury thermometer in order to minimize disturbance since the thermometer was supposed to be introduced in the core until the depth of 5cm.

Meiofauna extraction procedures followed a combination of decanting (through 1000 and 38 µm sieves with tap water 10 times), flotation (in diluted Ludox-TM 50 at a specific gravity of 1.18 BE) and centrifugation (three times at 3000 rpm for 15 min each) of the organisms retained on 38µm sieve. Major meiofaunal taxa were identified and enumerated under a dissecting microscope. A subsample of 50 nematodes were transferred to a series of solution of glycerine, alcohol and formalin (De Grisse solutions) and mounted onto slides for further identification to species level. Interstitial sea water was calculated as the difference between wet and dry weight sediment after drying the sediment in an oven at 100° C for an overnight period; CPE was extracted in 90% acetone and measured with a Turner fluorometer according to Holm-Hansen *et al.* (1965).

RESULTS AND DISCUSSION

The tidal regime indeed influenced the vertical distribution and community structure of the nematodes in the upper 5 cm of sediment. In general, nematode densities were higher during the period of submersion and nematodes mostly occurred in the upper 2cm of sediment in this tidal stage (Fig. 1). Multivariate analyses of nematode community structure revealed a shift in the vertical distribution during the tidal cycle, mainly as a consequence of species-specific vertical migrations since none of the measured environmental variables seemed to be responsible for the difference in the community structure.

Most species showed an upward migration in periods of inundation but other species migrated upwards during emersion periods. For example, upward movements of a predator, *Sigmophoranema rufum,* and some smaller deposit feeding nematodes during submersion were observed while the predator *Enoplolaimus litoralis* migrated upward during emersion. Our results partially corroborate the results of a previous investigated tidal flat (Steyaert *et al.* 2001) where nematodes did not migrate deeper as a consequence of tide increase.

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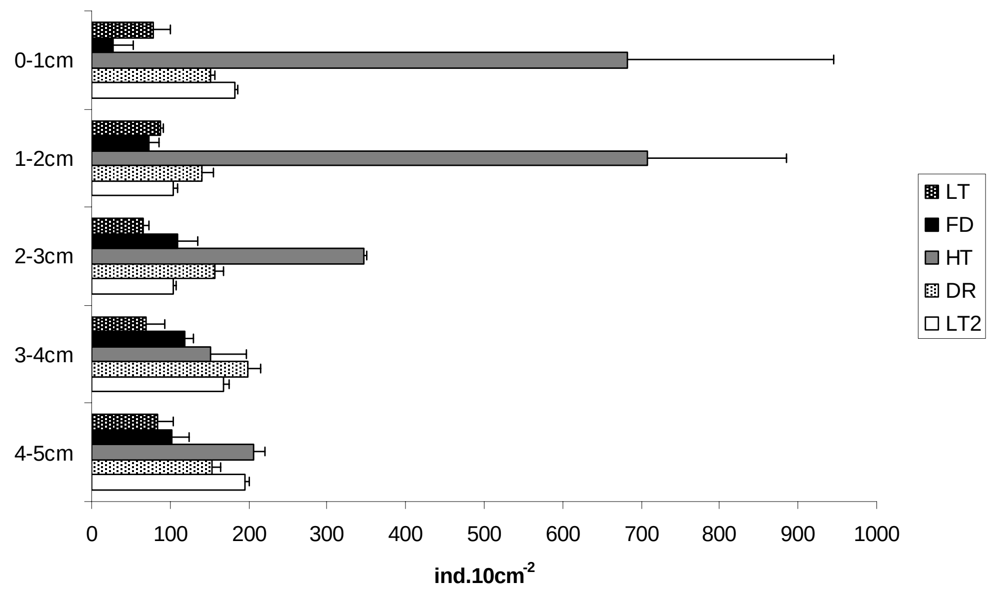

Figure 1: Vertical nematode density (ind.10cm^{-2}) during the five tidal stages studied. (LT: first low tide, FD: flooding period, HT: high tide, DR: draining period, LT2: second low tide).

References

Fegley S. R., 1987. Experimental variation of near-bottom current speeds and its effects on the depth distribution of sand-living meiofauna. *Mar. Biol.*, 95, 183-191.

Holm-Hansen O., Lorenzen C.J., Holmes R.W. & Strickland J.D.H., 1965. Fluorometric determination of chlorophyll. *J. Conseil Permanent Intern. Explor. Mer*, 30(1), 3-15.

McLachlan A., Winter P.E.D. & Botha L., 1977. Vertical and horizontal distribution of sub-littoral meiofauna in Algoa Bay, South Africa. *Mar. Biol.*, 40, 355-364.

Steyaert M., Herman P.M.J., Moens T., Widdows J. & Vincx M., 2001. Tidal migration of nematodes on an estuarine tidal flat (the Molenplaat, Schelde Estuary, SW Netherlands). *Mar. Ecol. Progr. Series*, 224, 299-304.