

## Modern *Macaronichnus segregatis*-like traces found in beach sediment: their paleoenvironmental and paleogeographical significance

# Koji Seike[1]

[1] Earth and Planetary Sci., Univ. of Tokyo

Trace fossils provide not only paleoecological information of ancient animals, but also paleoenvironmental information in which the trace producing animals lived. In order to utilize trace fossils as indicators of paleoenvironments, it is essential to investigate modern counterparts of particular trace fossils.

Trace fossil *Macaronichnus segregatis* is a non-branching cylindrical tube, 3-5 mm in diameter, which preferentially runs parallel to the bedding plane. It is characterized by mineralogical segregation between a tube core and surrounding mantle; namely the former consists of light colored felsic sand grains, whereas the latter consists of dark colored mafic sand grains.

*M. segregatis* known from the Japanese Pleistocene shallow marine deposits has been interpreted as the locomotion trace of a marine isopod *Excrolana chiltoni* (Kikuchi, 1972). Koyama (1983) reported that the trace fossils known from the Japanese Pleistocene strata run parallel to one another on a bedding plane. Based on the above interpretation, he interpreted that the preferential orientation of this trace reflects rheotaxis of the producer (*E. chiltoni*) in response to water current and exhibits an orientation perpendicular to that of shoreline during the trace development.

Subsequently, Nara and Seike (2004) pointed out that *Excrolana chiltoni* has never been observed to produce traces of *M. segregatis* on modern beaches. They considered that such traces originate due to feeding activity of opheliid polychaetes. Therefore, the rheotaxis of *E. chiltoni* cannot account for the preferred orientation of *M. segregatis*, because the marine isopods have never produced the traces.

Observation on a wave-dominated Pacific sandy coast of central Japan revealed that modern *M. segregatis*-like traces and their producer *Euzonus* sp. (Polychaeta, Opheliidae) occur exclusively in the sediment of the mid-foreshore portion of the beach. Because of such limited occurrence of the modern trace, the trace fossil *M. segregatis* might be useful as an indicator of mid-foreshore environment. The longer axes of modern *M. segregatis*-like traces on a bedding plane are arranged perpendicular to the shoreline. Hence, its fossil counterpart *M. segregatis* is capable of reconstructing the ancient shoreline orientation in the rock record.