

Petrography and chemical composition of the trace fossil *Ophiomorpha nodosa* in Nangang Formation, northeast coast of Taiwan

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Trace fossils provide a geological record of biological activity and are able to indicate changes in the depositional environment. Trace fossils including a burrow system of *Ophiomorpha* generated by crustaceans are common in outcrops along the northeast coast of Taiwan. These trace fossils are often preferentially preserved in the outcrops, indicating a different mineral composition in comparison to host sediments. Therefore, this study investigated geochemical aspects of the differential diagenesis of trace fossils and surrounding host sediment. Several sandstone samples were collected showing preservation of the trace fossil in epirelief (i.e. more resistant than surrounding rock) and hyporelief (i.e. less resistant than surrounding rock), in the same sedimentary succession. Geochemical investigation was performed using petrographical thin-sections and Itrax XRF core scanning of rock slab samples that were cut perpendicular through *Ophiomorpha nodosa* burrows. Based on observations made in this study, samples of trace fossil preserved both in epirelief and hyporelief are mainly composed Iron (Fe) and Manganese (Mn). Similarly, they have low contents of Silicon (Si), Aluminum (Al), and Potassium (K). The main difference between two types is that they have different Calcium (Ca) content. In addition, we found that the trace fossils were finer-grained and more matrix-supported compared to substrates under microscope. These observations lead to a preliminary interpretation for this study area that the preservation of *Ophiomorpha nodosa* is related to diagenetic mineralization of the burrow walls, causing differential erosion and weathering. Trace fossils that contain more Ca than surrounding rock are often preferentially preserved, while trace fossils with a lower Ca content compared to surrounding rock are preferentially eroded.