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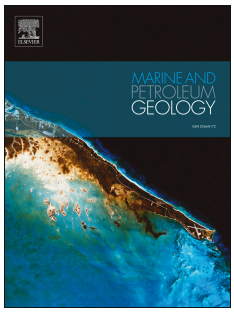

Ichnofabric logs for the characterization of the organic content in carbonates

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Ichnofabric logs for the characterization of the organic content in carbonates

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Abstract

This study proposes an approach to visualize ichnological data from cores that allows direct comparison with downhole logs. It provides preliminary but accurate environmental information, especially on the oxygenation and/or the organic matter content at the sea-floor. The method comprises three steps: Step 1) ichnological analysis of the sediments including quantification of bioturbation intensity, identification of the main ichnotaxa and sizes of the burrows, depth of burrowing or tiering, and documentation of cross-cutting relationships; Step 2) ichnofabric definition following a series of criteria including the bioturbation index, the ichnoassemblage, and the sediment type; and Step 3) the organization of the ichnofabrics from low bioturbation indices and deep tiers to completely bioturbated. The resulting ichnofabrics are plotted against depth and can directly be compared to spectral natural gamma ray logs, which in the discussed example are dominated by variations of the uranium content reflecting the organic matter content in the sediment. The ichnofabric analysis of carbonate sediment cores of the Maldives, recovered during IODP Expedition 359, demonstrates a good correlation between synthetic ichnofabric logs and downhole gamma radiation logs. The combined study of these logs provides information on the main changes in the organic matter content of the sediment. The graphical representation of ichnofabrics together with gamma ray logs presented here is a very useful implement for sedimentologists working on cores.

Keywords: ichnology; bioturbation; downhole logging; Natural gamma-ray logs; Oligocene-Miocene; Maldives; IODP Expedition 359.