

# C and N isotopic studies of sedimentary porphyrins exploring new proxies for paleoenvironments

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Primary producers in the past ocean were one of the most significant factors that had controlled the fate of the whole paleoecosystem and thus intimately related to mass extinction events and the Cretaceous Ocean Anoxic Events (OAEs). Porphyrins are promising biomarkers of such photosynthetic primary producers. The majority of porphyrin compounds found in sedimentary rocks have been known to be derived from tetrapyrrole structures of various chloropigments through structural studies. They should carry information of past phototrophic communities hence surface oceanic conditions. Significantly, porphyrins comprise both C and N and thus are potential biomarkers based on which C and N isotopic compositions of primary producers can be estimated. In conjunction with other geological information, it should allow, not only precursor-biomarker correlation by multi-dimensional isotopic analysis, estimations of ocean-atmospheric states of the past, including N-cycling. We have developed a high-throughput / high-sensitivity method for C and N isotopic analyses of sedimentary porphyrins, aiming for application to high resolution studies of palaeoenvironments. Extracts from organic-rich siliceous mudstones of the middle Miocene Onnagawa Formation are used in the methodological development. Carbon and N isotopic compositions are determined in EA-IRMS with an improved performance.