

¹³C-Labeling of an intact microbial mat from the high-salinity intertidal area of Abu Dhabi, United Arab Emirates

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In this study we present results from an incubation experiment performed in December 2006 on a microbial mat from the Arabian Gulf intertidal area of Abu Dhabi (United Arab Emirates) using ¹³C-labelled bicarbonate as carbon source for autotrophic organisms. In our experiment bicarbonate was labelled with 30% ¹³C (by weight). A control was done using unlabelled bicarbonate. Carbon fixation was measured as the incorporation of ¹³C into total extractable organic matter as well as in major hydrocarbons and phospholipid ester-linked fatty acids (PLFAs) via GC-irMS to determine the development of the isotopic composition as the result of the incorporation over a day-night-day cycle. The microbial mat chosen for this experiment is characterized by a distinct lamination on the millimetre scale. Therefore, the incubated mat was sliced according to its lamination before extraction and reprocessing were done. Natural carbon isotope ratios of the total extractable organic carbon of the investigated layers were very heavy with $\delta^{13}\text{C}$ values ranging from -15‰ to -10‰. Previous analyses to determine the community structure within the microbial mat yielded a huge variety of microorganisms including several primary producers (Abed et al., 2007, 2008). But as was shown by chemical analysis of the mat (Scherf and Rullkötter, in press), the dominant autotrophic microorganisms were cyanobacteria. The total organic extract of the uppermost layer showed an enrichment of 38‰ at the end of the incubation time. The strongest enrichment among the hydrocarbons of up to 60‰ was observed in the cyanobacterial lipid n heptadecane. The PLFA n octadecanoic acid was found to be most enriched after the complete incubation time (89‰). During night time the use of other carbon sources than bicarbonate is obvious through stronger uptake and incorporation of ¹²C and thus depletion of $\delta^{13}\text{C}$ values.

Abed et al., 2007. *Environmental Microbiology* 9, 1384-1392. Abed et al., 2008. *FEMS Microbiology Ecology* 65, 449-462. Scherf and Rullkötter, 2009. *Organic Geochemistry*, doi:10.1016/j.orggeochem.2009.04.002.