Geophysical Research Abstracts, Vol. 8, 07437, 2006
SRef-ID: 1607-7962/gra/EGU06-A-07437


# Detection of active carbon fixing microbes in a microbial mat system using stable isotope probing of lipid biomarkers

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The addition of $^{13}$C-labelled substrates to an ecosystem followed by stable isotope probing of lipid biomarkers reveals direct links between microbial identity and biogeochemical processes. The approach is based on the expectation that the added stable isotope tracer is incorporated into the biomass of metabolically active populations.

We investigated the carbon fixing community of a hypersaline microbial mat system from Christmas Island (Kiritimati, a Pacific Atoll at 10º30´ S, 105º40´ W) using $^{13}$C-labeling experiments with subsequent isotopic analyses of the lipid biomarkers. Microscopic investigations revealed that they are formed by an upper layer mainly composed of Cyanobacteria and a few diatoms, covering purple layers of photoautotrophic sulfur bacteria. The analysis of the biomarkers revealed a high abundance of Cyanobacteria, and also showed evidence of algae, purple sulfur bacteria, sulfate reducers, and other anaerobes. After 6 hours of in situ incubation, uptake of $^{13}$C-bicarbonate into different microbial groups was evident, but the incorporation pattern clearly reflected the predominance of cyanobacterial carbon fixation in the upper layers of the mat. The paper will highlight the dynamics of carbon transformation by

various functional microbial groups in this complex mat system.