

Geobiology of saline fluids from the deep biosphere obtained from the KTB pump test

The major goal of the proposed project is the characterization of microbial biofilms formed in controlled environment biofilm model systems inoculated and maintained with fluids from the KTB pumping test originated from the deep continental biosphere. For this purpose, two controlled environment biofilm model systems are designated for the investigation of biofilm formation. System A is based on a modified Robbins Devices (MRD), that allows testing of different substrata, and coupons can be removed independently after various exposure times for examination of the biofilm or testing the effects of different media on biofilm growth in situ. Thin sections of different types of rock will be used as natural substrata for biofilm formation. For biofilm formation of putative thermophilic Archaea and Bacteria obtained from the deep subsurface fluids, a modified heatable chemostat (System B) is designated. The biofilms obtained from both systems will be investigated with regard to their overall phylogenetic structure, spatial arrangement and the cellular activity of the biofilm associated bacteria using fluorochromes for total cell count determination and fluorescent in situ hybridization (FISH). Analysis of the signature lipid biomarkers additionally provides quantitative measures of abundance, distribution and the nutritional status of the attached communities. Along with the microbiological investigations, biochemical analysis, especially for $\delta^{13}\text{C}$, $\delta^{15}\text{N}$, ^2H isotopic compositions of specific organic compounds in the fluids (e.g. lipids) will be performed that could enable to elucidate microbiological driven processes within the deep biosphere.