

Life and Times of Microorganisms in Deep Subsurface Environments

Tommy J. Phelps

Environmental Sciences Division
Oak Ridge National Laboratory*
Oak Ridge, TN 37831-6036

for

American Geophysical Union Fall Meeting
December 15-19, 2000 (Friday-Tuesday) San Francisco, California

The wide distribution of microorganisms in subsurface environments is well documented. Factors constraining microbial activity in the deep biosphere are not understood though constraints in grain size, pore throat size, aqueous flux, and temperature were related to low microbial mass and activity in one or more of our investigations. However, cells or cellular constituents were often detected outside of the bounds we hypothesized to constrain significant microbial growth. Mounting evidence suggests potentials for the preservation of microorganisms or at least the longterm preservation of biologically active cellular constituents. Multidisciplinary collaborations examining mass balances of carbon and electron flow with said activity related to energy conservation into cell mass will advance our understanding of biogeochemical processing in these subsurface environments. Comparing balanced electron flow schemes, which are linked to appropriate cell mass, across many environments may facilitate defining physical, chemical and geologic constraints on subsurface biogeochemical processing.

*Oak Ridge National Laboratory, managed by UT-Battelle, LLC, for the U.S. Department of Energy under contract number DE-AC05-00OR22725