

GROWTH OF METHANOGENS UNDER CONDITIONS APPROACHING A SIMULATED MARTIAN ENVIRONMENT

T. A. Kral, **D.W.G. Sears**, P.Benoit, and M. Kareev

Arkansas-Oklahoma Center for Space & Planetary Sciences. (tkral@uark.edu/Fax:
501-575-7778)

Viking experiments indicated that life probably does not currently exist on the surface of Mars [1], at least at the two sampling sites, but it is possible that life is present in the subsurface or was present in the past [2]. We have evaluated the survivability of a number of species of methanogens under conditions approaching a simulated Martian environment, using the Andromeda environmental chamber.

Experiments included survivability of methanogens in freeze/thaw cycles, under low atmospheric pressures, and in a Martian soil simulant matrix (JSC-1, [3]). Species tested were *Methanothermobacter wolfeii*, *Methanosarcina barkeri*, and *Methanobacterium formicicum*. Survivability was tested by in situ measurement of methane concentration during experiments, and by demonstration of viability following experiments.

We found that all species exhibited excellent survivability through freeze/thaw cycles. Survival under Martian atmosphere was primarily limited by rapid loss of water by sublimation/evaporation. The soil simulant may provide some element of protection from oxygen poisoning. In the presence of sufficient water, all three species survived a week under hydrogen/carbon dioxide atmospheres with total pressure <400 mbar, *M. wolfeii* showing the greatest increase and *M. formicicum* showing the smallest increase in methane production.

References: [1] H.P. Klein (1978) *Icarus* 34, 666-675. [2] C.P. McKay (1997) *Origins Life Evol. Biosphere* 27, 263-289. [3] C.C. Allen et al. (1998) *Space* 98, 469-476.