Modern environmental conditions on Mars prohibit the existence of liquid water in surface layers of martian soil because of extremely low atmospheric pressure. But according to observational data, large amounts of water ice are present in subsurface layers of Mars. In this case, ice is able to intensively sublime if the surface is heated enough by sunlight. According to TES data, the temperature of some areas of the martian surface can be heated up to 300 K during the daytime. Under such conditions, vapors diffuse through the porous surface layer. As a result, a “wet layer” appears under the sand’s surface. In our experiment, we used a special vacuum chamber for modeling the process of ice sublimation and vapor diffusion while heating. In order to model it, we used a water ice sample covered by several centimeters of sand with a weight fraction of organic matter (glucose) \( \sim 10^{-5} \text{--} 10^{-4} \). Ice sublimation was produced by radiation heating of the sand’s surface.

We studied the possibility of growth of microorganisms in the “wet layer” under three different temperatures: 280 K, 300 K, and 200 K. Bacteria \textit{Vibrio sp. X} were added to the sand. We carried out several experimental runs (3 days each) of the intensive sublimation of ice. As a result, we have discovered an increase of the bacterial population in the “wet layer” after each run at 280 K and 300 K. These results confirm that shallow ground ice and a few hours of heating per day could provide sufficient conditions for growth of bacterial population under the martian surface. Environments of some areas of modern Mars are close to that we have modeled in our experiments.