Geophysical Research Abstracts
Vol. 14, EGU2012-6380-2, 2012
EGU General Assembly 2012

Ultra-low microbial cell abundance and fatal DNA damage at the surface in Central East Antarctica

S. Bulat (1), D. Marie (2), E. Bulat (1), I. Alekhina (3), and J.R. Petit (4)

(1) FSBI "Petersburg Nuclear Physics Institute", St Petersburg, Gatchina, 188300, Russian Federation, (2) Station Biologique de Roscoff, Place Georges Teissier, 29682 Roscoff Cedex, France, (3) FSBI “Arctic and Antarctic Research Institute”, St Petersburg, 199397, Russia, (4) LGGE CNRS-UJF, 38402, Grenoble, France

The objective was to assess the microbial cell abundance in the surface snow in Central East Antarctica and the fate of microbial genomic DNA during summer short-time exposure to surface climatic (and radiation) conditions at Vostok using flow cytometry and DNA-based methods.
The surface snow (until 4m deep) was collected as clean as possible in the vicinity of the Vostok station (3 sites – courtesy of A Ekaykin and ASC Lebedev Physical Iinstitute RAS) and towards the Progress station (4 more sites with one just 29km from the coast - courtesy of A Ekaykin and S Popov) in specially decontaminated plastic crates or containers of various volumes (up to 75 kg of snow). All subsequent snow treatment manipulations (melting, concentrating, genomic DNA extraction, primary PCR set up) were performed in clean room laboratory facilities (LGGE, UJF-CNRS, Grenoble, France). Cell concentrations were determined on meltwater aliquots prepared under clean room conditions using flow cytofluorometry (Biostation, Roscoff, France). The highly concentrated meltwater (until 10000 times down) was used to extract gDNA which were subjected to bacterial 16S rRNA genes amplification in PCR and sequencing. The gDNA of a complex mesophile microbial community for exposure trials were also prepared and put onto a filter under strict clean room conditions. The filters were got exposed open to solar radiation and surface temperature at Vostok during January for various time duration periods (from 25 to 1 day).
As a result no microbial cells were confidently detected in surface snow samples differed by sampling sites and people asked to collect as well. Complementary the mineral dust particle abundance did not exceed 16 mkg per liter with the particle size mode about 2.5 mkm as shown using Coulter counter. Preliminary amongst the microparticles no unusual findings (e.g. spherules of cosmic origin) were observed by shape and element composition using electron scanning microscopy. The gDNA studies came up with only contaminant bacterial phylotypes (mostly of human source). The bioexposure trials showed that even in one day of open exposure the gDNA of rather complex microbial community composition was fatally damaged in terms of long-, mid-range and short-size amplicon generation in PCR.
All this testify for very harsh conditions for cellular life to survive (not to live under!) the climate conditions of Central East Antarctica which could be considered as a modern ‘zone mortale’ or ‘polar desert’ for known Earth-bound microbial life forms. In addition this means that no life seeds are expected to reach subglacial lakes and water reservoirs establishing indigenous lake microbiota during their transit through the thick and aged Antarctic ice sheet upon its bottom melting.