Molecular characterisation of the viable bacterial community in an Arctic subsurface soil, Spits-Bergen.

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The bacterial communities inhabiting permanently frozen soils from our own planet may serve as models for exobiological life in similar extraterrestrial environments. Thus, a better knowledge of bacterial community structures in frozen soils is crucial to understand which bacteria are able to survive these extreme conditions and which adaptations facilitate survival in environments where water is a limiting factor.
A subsurface soil from the Arctic island Spits-Bergen was sampled from the uppermost part of the permanent frozen soil layer. The soil is a relative young subsurface soil estimated to around 1200 years old.
Four different soil incubations were carried out under aerobic and anaerobic conditions for eleven weeks at 10°C: 1) unmanipulated, 2) low water activity 3) substrate amendment and 4) low water activity combined with substrate amendment. For each incubation the bacterial community was characterised by high throughput 16S rRNA gene sequencing and analysis of generated clone libraries. These results showed that a part of the community grew under aerobic conditions resulting in a change in the bacterial community structure. Growth was also observed under anaerobic conditions, but did not result in a significant community change. No bacterial growth was observed when the soil was incubated with low water activities (a_w = 0.91) simulating *in situ* conditions. Further identification of the viable part of the bacterial community is in progress. Community fingerprint analysis by denaturant gradient gel electrophoresis (DGGE) of the 16S rRNA genes and quantification of colony forming units (CFU) and total bacteria will give a more complete characterisation of the viable fraction of the bacterial community under the particular conditions.