Influence of environmental factors on the structures of bacterial communities in a chloroethene – contaminated aquifer

N. SHANI[1]*, P. ROSSI[2] AND C. HOLLIGER[1]

[1]Laboratory for Environmental Biotechnology, EPFL-ISTE-LBE, 1015 Lausanne, Switzerland (*correspondence: noam.shani@epfl.ch, christof.holliger@epfl.ch)

[2]Central Environmental Laboratory, EPFL-CEL, 1015 Lausanne (pierre.rossi@epfl.ch)

Numerous industries have been using chloroethenes (CEs), mainly tetrachloroethene and trichloroethene, as non-flammable solvents since the beginning of the 20th century. Massive usage, along with careless handling and storage, made CEs one of the most abundant classes of aquifer contaminants.

Porous aquifers are dynamic ecosystems showing complex interactions between physical, chemical and biotic components. These environments are inherently extremely heterogeneous in their structure and composition, even at very small scale, in terms of lithological composition, grain size distribution and chemical composition, and thus provide a large variety of living conditions. However, to date only few studies have been focusing on the influence of the aquifer properties on the total bacterial communities in such habitats.

Here, we assessed the influence of environmental factors on the microbial communities present in a CE-contaminated aquifer. Both grain size distribution and geochemical composition showed low correlations with the bacterial community structures. In this aquifer, a very slow groundwater flow combined with a restricted aquifer recharge probably limited the nutrients availability. These limitations were hypothesized to be the main factors driving the apparent structures observed for the communities involved in the reductive dechlorination of the contaminants.

Earthquake generation processes in Western Peninsular India – A petrologic modelling

D. SHANKER[1]*, H.N. SINGH[2] AND V.P. SINGH[3]

[1]Department of Earthquake Engineering Indian Institute of Roorkee, Roorkee –247667, Uttaranchal, India (*correspondence: dayasfeq@iitr.ernet.in)

[2]Department of Geophysics, Banaras Hindu University, Varanasi, India

A Petrologic model has been explained to understand the physical processes responsible for the generation of such large earthquake in the region. Majority of earthquakes are shallow focal depth (15 km) in the trap covered area where the thickness of the lithosphere is low about 100 km in comparison to rest of the shield. It have been observed that thickness of the crust decreases from Central region to the Western Ghats. Less lithosphere thickness and high temperature gradient, the depth of solidus basalt might be rising from 22 to 60 km from west to east causing the thickness of brittle top crust, the middle crust (dehydration zone) and zone of partial melting would change. The anhydrous basalt in the lower crust is heated from below due to presence of lava. Due to high pressure, lava as well gases rise towards the surface. During dehydration process fluid produced in the middle and lower crustal rock rises into the impermeable zone through fault and joints at the top of the mid crust. If the faults and cracks of the weak zone extending to the dehydration zone, the fluid may be injected through these conduits to the brittle crust. As the process continued, might develop tremendous vertical stress in the fault zone that can trigger large earthquakes. The evidence of fluid in the focal zone of Latur and Bhuj earthquakes, sprouting of sands, large number of aftershocks, the direction of stresses for aftershocks sequences and several geophysical anomalies discussed in the paper support model.