Geomicrobial prospecting for hydrocarbon research in Deccan Synclise, India

A.M. DAYAL[1], M.A. RASHEED[1], VEENA PRASSANA AND S.V. RAJU[2]

[1]National Geophysical Research Isntitute, Uppal Road, Hyderabad, 5006060, India (dayalisotope@yahoo.com)
[2]Directorate General of Hydrocarbon, New Delhi

Geo-microbial prospecting for hydrocarbons is an exploration method based on the vertical seepage of light hydrocarbon gases and their utilization by hydrocarbon oxidizing bacteria. The detection of anomalous population of propane or butane oxidizing bacteria in the surface soils or sediments helps to evaluate the prospects for hydrocarbon exploration. The microbial prospecting method applied in Deccan Syneclise, 500 sub-soil samples were collected in a reconnaissance pattern. The thickness of Deccan Traps towards the west coast is of 1.5 km, which decreases towards north-eastern part of about 100 m. In the present study, propane-oxidizing bacteria have been considered as indicator microbes. The maximum propane oxidizing bacterial populations are found to be of 12.8 x 10^5 cfu/gm of soil sample. The arithmetic mean and standard deviation of bacterial counts are found to be 4.2 x 10^4 and 1.0 x 10^5 cfu/gm, respectively. Two significant microbial blooms of high concentration of propane oxidizers were identified in the study area. The Deccan Syneclise study area appears to be a warm zone for hydrocarbon prospects and needs detailed investigation with other geo-scientific methods.

In situ measurements of porewater chemistry in extremely CO_2 rich sediments from a hydrothermal vent

DIRK DE BEER[1]*, MATTHIAS HAECKEL[2] AND ANTJE BOETIUS[1]

[1]Max Planck Institute for Marine Microbiology, Celsiusstr. 1, 28359 Bremen, Germany (aboetius@mpi-bremen.de) (*correspondence: dbeer@mpi-bremen.de)
[2]IfM GEOMAR, Wischhofstr. 1-3, 24148 Kiel, Germany (mhaeckel@ifm-geomar.de)

To study consequences of potential CO_2 disposal in deep sea environments, we investigated a location where natural venting causes very high levels of CO_2 in sediment porewater and in bottom water, At 3000 m depth, hydrothermally formed CO_2 accumulates just below vents, as a liquid in the sediments. The liquid CO_2, present at ca 10 cm bsf, is a potent apolar solvent, thus excludes life. Here we investigated for the first time the biogeochemistry of a water-saturated sediment layer above liquid CO_2. The very high concentrations of CO_2 and concommittant low pH, are expected to induce silicate weathering and to have large effects on microbial life.

To obtain information of the carbonate system, local pH, oxygen penetration and sulfide formation, we measured these porewater parameters *in situ* with an autonomous profiler, equipped with microsensors. Comparative analysis of the biogeochemistry of retrieved sediment cores showed that the decompression during recovery totally changed the porewater chemistry, thus such data must be handled with care. In situ, extremely steep profiles of pH and CO_2 were observed and interpreted in view of microbial rates and silicate corrosion. Despite high sulfide levels very little microbial sulfate reduction occurs. Benthic chamber measurements and geochemical modeling indicate that most CO_2 is absorbed by the sediments by mineral weathering.