

Detection of hydrocarbon micro-seepage using geo-microbiological method: A case study from Deccan Syncline, Maharashtra, India

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Geo-microbial method for hydrocarbon exploration is the search for surface microseeps as clue to the presence of an active petroleum system and / or to the location of possible oil and gas accumulation. It is a surface prospecting technique used to detect the anomalous population of hydrocarbon oxidizing bacteria in the surface soils, which indicate the presence of subsurface oil and gas accumulations. This method is based on vertical seepage of light hydrocarbon gases (C_1 - C_4) from the oil and gas pools to the shallow surface, and are utilized by hydrocarbon oxidizing bacteria. These bacteria utilize hydrocarbon gases as their only food source and are found enriched in the near surface soils above the hydrocarbon bearing structures. These hydrocarbon-oxidizing bacteria used as indicators of invisible hydrocarbon microseepage, and are used to evaluate subsurface hydrocarbon potential. Microbial activity profiles have indicated a good contrast between oil producing and non-oil producing areas.

This paper presents geo-microbial study carried out in Deccan Syncline areas of Maharashtra. In the present study, propane-oxidizing bacteria were considered as indicator microbes as propane gas originates from petroleum pools only. Sub-surface soil samples were collected aseptically in an interval of 5 x 5 km, and analyzed for propane oxidizing bacterial concentration. The propane oxidizing bacterial count in the soil samples of the studied area ranged from 1×10^2 to 6.7×10^5 cfu/gm of soil sample. Two microbial blooms of high concentration of propane oxidizing bacteria were identified and mapped in the study area. Microbial prospecting method has emerged as an important tool for hydrocarbon prospecting and integration of microbial data along with geological, geophysical, and geochemical data, can lead to the successful grading of exploration leads and prospects. The success rate of Microbial Prospecting for Oil and Gas is upto 90% (Wagner *et al.*, 2002). The paper presents the details of microbial prospecting methodology developed at National Geophysical Research Institute and its importance in hydrocarbon exploration.

Reference

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Evidence for the collapse of upper water masses during ice-rafting events: a multi-species planktonic foraminiferal $\delta^{18}O$ approach

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We have measured $\delta^{18}O$ in three planktonic foraminiferal taxa *Neogloboquadrina pachyderma* (s), *Globigerina bulloides*, *Globigerinoides ruber* and benthic foraminifera *Cibicidoides wuellerstorfi* from IODP Site U1313. Concentration of the ice-rafted debris (IRD) and benthic foraminiferal assemblages were also counted. We found similar $\delta^{18}O$ values from mixed-layer and thermocline-dwelling planktonic foraminifera during the large amplitude IRD-events suggesting the collapse of upper water masses. This data suggests that the planktonic foraminifera taxa calcified their shells at similar temperatures in a homogenized upper water column. Similar collapse can be seen from the northern margin of the IRD-belt, implying that this homogenization of water masses were widespread in the region. We suggest that an increase in storminess during large IRD event intensifies vertical mixing of meltwater from ice-rafting in the upper ocean. Lighter $\delta^{13}C$ values correspond to those large IRD-events suggesting coupled perturbation of both surface and deep waters at the subtropical latitude.