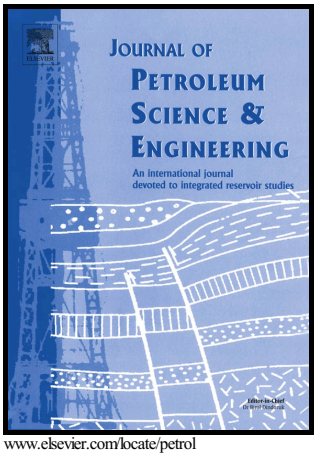

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ABSTRACT

The presented study reports the geochemical investigation for hydrocarbon prospects in western and central regions of Deccan Syneclise to evaluate the near surface manifestations of hydrocarbons due to microseepage; identify the sources of light hydrocarbon gases and integrate the results with geophysical data to demarcate the prospective areas for hydrocarbons. The adsorbed soil gas analysis of soil samples from western and central regions show the presence of C_1-C_4 hydrocarbons with concentrations of C_1 and C_{2+} varying from 2-626 ppb, 0-261 ppb and 4-255 ppb, 0-114 ppb respectively. The propane oxidizing bacteria (POB) ranged between 1.0×10^2 and 2.65×10^5 cfu/g of soil. The evaluation of compositional ratios of adsorbed soil gases indicates that the gas components are co-genetic and migrated from subsurface hydrocarbon accumulations/organic rich beds. The carbon isotopic compositions of adsorbed soil gas methane from western region of Deccan Syneclise range from -29.87 to -13.09 ‰ (VPDB) representing near surface oxidation of gases subsequent to migration and are derived from gas producing type III kerogen. The $\delta^{13}C$ signatures of soil carbonates from central region of Deccan Syneclise falling in the range of -9.61 to -5.1 ‰ (VPDB) indicate diagenetic alteration of seeping hydrocarbon gases in the