## Structural Characterization of Natural Gas Hydrates in Core Samples from Offshore India

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The dedicated gas hydrate coring/drilling program was carried out under NGHP in four Indian offshore areas (Kerala-Konkan, Krishna-Godavari, Mahanadi and Andman) during 28th April to 19th August, 2006 during NGHP Expedition 01, 2006. The programme being first of its kind in the country, all the Geoscientists, Chemists, Microbiologists, Drilling and Petroleum Engineers, who had been working under NGHP, given onboard exposure and experience on this important scientific activity. During this program, total of 39 holes were drilled/cored at 21 sites in these areas. The gas hydrates have been found to be present in large quantities in Indian offshore areas particularly in KG basin. More than 130 solid gas hydrate samples were recovered during this hydrate coring/drilling program.

The laboratory analysis was carried out on the natural gas hydrate samples recovered from offshore India. The gas hydrate characterization for its structure, cavity occupancy and hydration number was carried out using the microscopic techniques such as Raman, <sup>13</sup>C NMR and XRD. From the laboratory analysis and the studies carried out, it is concluded that the gas hydrates occur in grayish green fine sediments, gray medium sands and white volcanic ash as pore-filling hydrate. The visible massive gas hydrates developed in black fine sediments, especially at Site NGHP 1-10B, 10C and 10D in K G area. The structures of the gas hydrates in the studied samples are all sI, with methane as the dominant guest. The occupancy of methane in large cage is almost complete, while it is variable in the small cage (0.75 to 0.99). The hydration number is 6.10  $\pm$  0.15 for most of the hydrates in the samples studied.