Petrographic and Geochemical Characterization of Seep Carbonates and Gas Hydrate Host Sediments from Krishna-godavari (KG) Offshore Basin East Coast of India.

M. Kocherla[1] P.B. Ramamurthy[2] and Reshma V. Gawas[1]

[1]*National Institute of Oceanography, Dona Paula Goa, India*

[2]*National Geophysical Research Institute, Hyderabad, India*

During NGHP-01 expedition ODP LEG-3A-HOLE-10D, deep drilling cores (up to 197 m at a water depth of 1033 m) were collected from the Krishna Godavari (KG) offshore basin, Eastern continental margin of India, by JOIDES resolution in June 2006. Gas hydrates were found between 29 to 157mbsf. Early diagenetic carbonate concretions occur from 6 to197 mbsf as nodules, thin slabs aggregates, porous crusts and carbonate cemented shell fragments within silts and clays. The size of carbonate concretions range between 0.2 and 5.6 cm. X-ray diffraction and EDS analysis show that carbonates are mostly high-Mg calcites and siderites with trace amounts of dolomites and pyrites. The carbonate concretions shows the $\delta^{13}C$ values from -51.6 to -48.8‰ suggesting that their carbon is derived mainly from the oxidation of methane from the gas hydrates.

Rare earth elements (REE) analytical results for whole rock samples of carbonate concretions are typically less enriched in absolute REE concentrations(16.27-37.40 ppm) than host sediments (128-187 ppm). Hydrate host sediments show positive Eu anomaly (Eu/Eu* 1.19-1.33), and a slight positive Ce anomaly (Ce/Ce* 1.01-1.06). Carbonates also show high Sm concentrations. The REE carbonate patterns are distinct from modern authigenic marine sediments. PAAS normalized carbonate concretions show a positive Ce anomaly (Ce/Ce* 1.89-2.05) and do not display positive Eu anomaly (Eu/Eu* 0.09-0.13). This suggests that the seep carbonates most likely formed in reducing pore water conditions.