

Gas hydrate formation associated with migration of deep sourced fluid in the Krishna–Godavari Basin, eastern continental margin of India

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National Gas Hydrate Program Expedition 02 (NGHP-02) was conducted in early 2015 by D/V *Chikyu* in the western part of the Bay of Bengal, India. Analyses of interstitial water in sediment from four drilling sites in the Krishna–Godavari Basin show that dissolved Cl⁻ concentrations decreased with depth from seawater values (~550 mM) near the sediment surface to 300–400 mM at 350–400 m below seafloor (mbsf). The convex profiles suggest upward advection of low-Cl⁻ fluid from below the depths reached by the holes. On the other hand, excursions of Cl⁻ concentrations toward low values in gas hydrate zones in and around two reservoir sections (R1 and R2) were attributed to the presence of fresh water released by dissociation of gas hydrate during core recovery. At two sites, Cl⁻ concentrations below R2 (around 280 mbsf) were ca. 60 mM and ca. 45 mM lower than those from above R2, and $\delta^{18}\text{O}$ and δD values were 1–2‰ and 0.7–1.3‰ higher than those from above R2, respectively. These results suggest that 10–20% of the migrating fluid is trapped at the gas hydrate zone. The $\delta^{18}\text{O}$ and δD values below R2 were 0.5–1‰ higher and ca. 15‰ lower than those of seawater, respectively. The trends suggest that water derived from the dehydration of clay minerals, which generally occurs at temperatures higher than 60°C (deeper than 1000 mbsf).