

Regional stratigraphic framework, Gas Hydrate occurrence and distribution of National Gas Hydrate Program Expedition 02 (NGHP-02) Area-B, offshore eastern India

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Gas hydrates, one of the important resources for the future energy, are abundant in nature existing in a wide variety of forms in land and marine environments. Krishna-Godavari Basin was formed along the rifted eastern continental margin of India in the Late Jurassic to Early Cretaceous, receiving amount sediments with numerous tilted fault blocks and growth faults. The offshore Krishna-Godavari Basin is considered a potential gas hydrate province as well as the presence of bottom-simulating-reflectors. The Indian National Gas Hydrate Program Expedition 02 (NGHP-02) was designed to study the occurrence of gas hydrate along the margin. Area-B of NGHP-02 contains important world-class gas hydrate accumulations and represent ideal sites for the consideration of future gas hydrate production testing. The primary goal was to explore for highly saturated gas hydrate occurrences and distribution in seismic reflectors that would become targets for future production tests.

Twelve holes were logged and measured with logging-while-drilling (LWD) and five holes were cored in Area-B of NGHP-02. This study summarized the log- and litho-units in Area-B and establish the Integrated-Units A, B and C based on the data from twelve LWD and five coring sites in Area-B. Most of the downhole log and core inferred gas hydrate occurrences are in the Late Miocene Integrated-Unit B with several sets of reservoir sections exhibiting favorable conditions for hosting gas hydrate. Based on the core-log-seismic integration, the LWD and coring results in Area-B helped to understand the geological significance of sequence stratigraphy in Krishna-Godavari Basin and identified the occurrence of gas hydrate. The thickness variations associated with the Reflectors R1 and R2 are possibly associated with the development anticlinal structure and are likely related to syn-sedimentary growth of the folding structures. Major gas hydrate zones exist in and around the Reflectors R1 and R2 near the BSR depth, and mostly have coincident with the fractures and mass-transport deposits. The Hydrate-bearing intervals can be identified by resistivity and sonic velocity logs and classified into pore-filling type, fracture-filling type, and a mixture of pore- and fracture-filling types based on borehole image characteristics. In addition, the spatial distribution of gas hydrate in the Reflectors R1 and R2 reservoirs is highly influenced by the anticlinal structure.

Keywords: NGHP-02, Krishna-Godavari Basin, Logging-while-drilling, Gas hydrate occurrence, Core-log facies analysis, D/V Chikyu