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# Quantification of gas hydrates from resistivity and sonic logs in the Krishna-Godavari basin, eastern Indian margin

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The drilling and coring were carried out at 25 sites in the Krishna-Godavari (KG) and Mahanadi basins along the eastern margin of India during the Indian National Gas Hydrate Program (NGHP Exp-02) for establishing gas hydrates in sand dominated reservoirs. The purpose of this study is to evaluate gas hydrates in sand and clay-rich sedimentary units at sites NGHP Exp-02-22 and NGHP Exp-02-23 in Area B of the KG basin, associated with two seismically imaged reflectors (R1 and R2). The upper section, associated with seismic reflector R1 contains both pore-filling and fracture-filling gas hydrates, whereas the lower section, linked to reflector R2, has only pore-filling gas hydrates. Since both the seismic velocity and resistivity increase in the presence of gas hydrates, we have analysed the resistivity log using Archie's empirical equation, and sonic log using a simplified version of three-phase Biot equation (TPBE) based on isotropic assumptions. The downhole log data displays the base of gas hydrate bearing sediments (BGHBS) at the depths of 290 mbsf and 292 mbsf at NGHP Exp-02-22 and NGHP Exp-02-23 sites respectively. At site NGHP-02-22, the average saturation of gas hydrates is evaluated as 29% and 17% within the depth interval of 207-290 mbsf from the electrical resistivity and sonic log data respectively. Whereas at site NGHP Exp-02-23, the average saturation of gas hydrates is calculated as 25% and 60% within the depth interval of 271-288 mbsf using the resistivity and sonic log data respectively. The results are corroborated with the available pressure core-derived gas hydrate saturation at both sites, and show comparable results at R2-linked reservoirs due to pore-filling nature of gas hydrates. We find a good amount of mismatch in the R1-linked reservoirs because of both pore- and fracture- filling nature of gas hydrates. We also observe that the resistivity-derived gas hydrate saturation exhibits more discrepancy than that of the velocity-derived result.