

ABSTRACT

Reservoir modeling was conducted on two carbonate build-up structures of the Baturaja Formation in the ZS Field, South Sumatra Basin, to identify potential hydrocarbon-bearing reservoir zones. The study employed model-based Acoustic Impedance (AI) inversion, as well as RMS amplitude and sweetness seismic attributes derived from 2D post-stack seismic data. The ZA well cluster is associated with a less-developed carbonate build-up characterized by strong seismic amplitudes, high RMS amplitude and sweetness responses, with AI values ranging from 38,000 to 45,000 g·ft/(cm³·s). In contrast, the SE well cluster occurs within a more-developed carbonate build-up exhibiting weaker seismic amplitudes, lower RMS amplitude and sweetness responses, with AI values ranging from 42,000 to 48,000 g·ft/(cm³·s). AI values lower than 47,000 g·ft/(cm³·s), which correlate with a porosity of approximately 6%, were interpreted as potential reservoir zones capable of accommodating hydrocarbon accumulation. The heterogeneity distribution within the two carbonate structures displays distinct patterns, where AI values in the SE cluster tend to be higher in the carbonate core and decrease toward the margins, whereas the ZA cluster exhibits a more variable distribution with relatively higher AI values along the margins and lower values toward the structural center. The integration of RMS amplitude and sweetness attributes with model-based AI inversion successfully distinguished the reservoir characteristics of the two carbonate build-up structures, providing valuable insights into reservoir heterogeneity and hydrocarbon prospectivity within the Baturaja Formation.

Keywords: *Acoustic Impedance (AI), Seismic Inversion, RMS Amplitude, Sweetness, Carbonate Build-up, Baturaja Formation, South Sumatra Basin.*