

## INTISARI

### KARAKTERISASI RESERVOIR KARBONAT MENGGUNAKAN ANALISIS AVO DAN INVERSI SEISMIK SIMULTAN: STUDI KASUS LAPANGAN "S", CEKUNGAN BANGGAI, SULAWESI TENGAH

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Lapangan "S" di Cekungan Banggai, Sulawesi Tengah, memiliki potensi reservoir hidrokarbon di Formasi Minahaki yang didominasi karbonat berporositas baik namun heterogen. Karakterisasi reservoir dilakukan untuk memahami distribusi dan kualitas reservoir karbonat secara lebih akurat dengan metode yang digunakan terdiri dari analisis *Amplitude Variation with Offset* (AVO) untuk mendeteksi respon amplitudo terhadap *offset*, serta inversi seismik simultan untuk memperoleh parameter elastis batuan yang sensitif terhadap hidrokarbon. Data penelitian berupa seismik 3D CMP *gather* yang diubah menjadi *angle stack* (*near* 0–15°, *mid* 15–30°, *far* 30–45°) serta log sumur S-1, S-2, dan S-8. Hasil analisis AVO menunjukkan bahwa reservoir termasuk klasifikasi kelas I, ditandai amplitudo positif pada *near offset* dan penurunan signifikan pada *far offset*, yang mengindikasikan karbonat kompak dengan impedansi lebih tinggi dibanding batuan penutup. Inversi simultan menghasilkan parameter elastis berupa densitas (2,0–2,3 g/cc),  $V_p/V_s$  (1,3–1,6),  $\Lambda$ -Rho (-1,5–13,5 GPa·g/cc),  $\mu$ -Rho (10,3–40 GPa·g/cc),  $Z_p$  (6166–9812 m/s·g/cc), dan  $Z_s$  (3751–6230 m/s·g/cc). Integrasi hasil AVO dan inversi simultan membuktikan bahwa reservoir karbonat memiliki kerangka kaku dengan porositas baik, serta persebaran hidrokarbon lateral yang heterogen akibat pengaruh fasies dan diagenesis.

**Kata Kunci:** Reservoir Karbonat, AVO, Inversi Seismik Simultan,  $\Lambda$ - $\mu$ -Rho, Cekungan Banggai

## ABSTRACT

### **CARBONATE RESERVOIR CHARACTERIZATION USING AVO ANALYSIS AND SIMULTANEOUS SEISMIC INVERSION: A CASE STUDY OF "S" FIELD, BANGGAI BASIN, CENTRAL SULAWESI**

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The "S" Field in the Banggai Basin, Central Sulawesi, has hydrocarbon reservoir potential within the Minahaki Formation, which is dominated by carbonates with good porosity but high heterogeneity. Reservoir characterization was conducted to understand the distribution and quality of carbonate reservoirs using methods consisting of Amplitude Variation with Offset (AVO) analysis to detect amplitude response to offset, and simultaneous seismic inversion to derive elastic parameters that are sensitive to hydrocarbons. The dataset consists of 3D CMP gather seismic data converted into angle stacks (near 0–15°, mid 15–30°, far 30–45°) and well logs S-1, S-2, and S-8. The AVO analysis indicates that the reservoir is classified as class I, characterized by positive amplitude at near offset and a significant decrease at far offset, suggesting compact carbonate with higher impedance than the cap rock. Simultaneous inversion yield elastic parameters including density (2.0–2.3 g/cc),  $V_p/V_s$  (1.3–1.6),  $\Lambda$ -Rho (-1.5–13.5 GPa·g/cc),  $\mu$ -Rho (10.3–40 GPa·g/cc),  $Z_p$  (6166–9812 m/s·g/cc), and  $Z_s$  (3751–6230 m/s·g/cc). Integration of AVO results and simultaneous inversion proves that the carbonate reservoir has a rigid framework with good porosity, as well as heterogeneous lateral hydrocarbon distribution due to the influence of facies and diagenesis.

**Keyword:** Carbonate Reservoir, AVO, Simultaneous Seismic Inversion,  $\Lambda$ - $\mu$ -Rho, Banggai Basin