Perbandingan Kualitas Pencitraan Seismik Berbasis Domain Offset Vector Tile (OVT) dan Domain Common
Offset Konvensional Pada Pre-Stack Depth Migration Di Lapangan Rugby, Cekungan Sumatera Selatan
Adimas Angger Kusumawardana, Dr. Sudarmaji, S.Si., M.Si.; Angkasa Adhy Ajie Pamungkas, S.Si.
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INTISARI

Perbandingan kualitas pencitraan seismik berbasis domain *Offset* Vector *Tile* (OVT) dan domain Common *Offset Konvensional* Pada *Pre-Stack Depth Migration* di lapangan "RUGBY", Cekungan Sumatera Selatan

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Pengolahan seismik domain *Common-Offset* (CO) konvensional mengabaikan distribusi azimuth perekaman, sehingga memicu *azimuthal smearing* yang menurunkan resolusi pencitraan. Penelitian ini menerapkan domain *Offset Vector Tile* (OVT), yang membagi data berdasarkan *offset* dan azimuth secara simultan, dengan tujuan menentukan parameter *binning*OVT optimal, membandingkan kualitas pencitraanOVT terhadap CO pasca-*Kirchhoff Pre-Stack Depth Migration* (KPSDM), dan mendemonstrasikan keunggulanOVT dalam memelihara informasi seismik, pada Lapangan "Rugby", Cekungan Sumatera Selatan.

Data seismik 3D (target kedalaman hingga 6000 m) diolah melalui pembangunan model kecepatan (konversi Dix dan iterasi *Grid Tomography*), *preconditioning*, serta migrasi Kirchhoff PSDM dengan apertur 3000 m. Uji sensitivitas tiga ukuran *bin* OVT (20×20, 40×40, 43×41) menunjukkan konfigurasi 43×41 paling optimal dikarenakan bentuk konfigurasi yang paling aktual dengan geometri asli data seismik, dengan rasio *trace* maksimum-minimum 9,9:1, *Original Standart Deviation* terendah (11.132), dan *Empty Cell Ratio* 0. DomainOVT juga terbukti menghasilkan kontinuitas reflektor, SNR, dan resolusi vertikal yang lebih baik dibandingkan domain CO, serta mampu mempertahankan informasi azimuth untuk mengidentifikasi anisotropi azimuthal (variasi kecepatan NMO *Velocity fast-Velocity slow*) dan melakukan *azimuth stacking* per sektor kuadran, yang mengindikasikan orientasi struktur geologi bawah permukaan secara kualitatif.

Kata Kunci: *Offset Vector Tile* (OVT), *Common-Offset* (CO), PSDM, Anisotropi Azimuthal, Migrasi Kirchhoff

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ABSTRACT

Comprasion of imaging quality beetween Offset Vector Tile (OVT) domain and Conventional Common Offset domain seismic data in Pre- Stack Depth Migration at the “RUGBY” field , South Sumatera Basin

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Conventional Common-Offset (CO) seismic processing ignores the azimuthal distribution of recorded seismic data, leading to azimuthal smearing that degrades imaging resolution. This study applies the Offset Vector Tile (OVT) domain, which simultaneously partitions seismic data according to offset and azimuth, with the objectives of determining the optimalOVT binning parameters, comparing the imaging quality ofOVT and conventional CO after Kirchhoff Pre-Stack Depth Migration (KPSDM), and demonstrating the advantages ofOVT in preserving seismic information in the "Rugby" Field, South Sumatra Basin.

The 3D seismic dataset, with an investigation depth of up to 6,000 m, was processed through velocity model building (Dix conversion followed by iterative Grid Tomography), data preconditioning, and Kirchhoff Pre-Stack Depth Migration using a 3,000 m migration aperture. A sensitivity analysis of threeOVT bin configurations (20×20, 40×40, and 43×41) indicated that the 43×41 configuration was the most optimal because it most closely represented the original seismic acquisition geometry. This configuration achieved the highest maximum-to-minimum trace ratio (9.9:1), the lowest Original Standard Deviation (11.132), and an Empty Cell Ratio of 0. Furthermore, theOVT domain produced superior reflector continuity, signal-to-noise ratio (SNR), and vertical resolution compared with the conventional CO domain.OVT also preserved azimuthal information, enabling the identification of azimuthal anisotropy through Normal Moveout (NMO) velocity variations (Velocity fast Velocity slow) and azimuthal stacking by quadrant sectors, thereby providing qualitative indications of subsurface geological structure orientation.

Keyword: Offset Vector Tile (OVT), Common-Offset (CO), Pre-SDM, Anisotropi Azimuthal, Kirchhoff Migration