

HIGH FREQUENCY REFRACTION/ REFLECTION FULL-WAVEFORM INVERSION CASE STUDY FROM NORTH WEST SHELF OFFSHORE AUSTRALIA

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The robustness of diving wave Full-Waveform Inversion (FWI) has been proven in industry, but the effectiveness is limited by its penetration depth. To target deeper reservoirs, the application of FWI using reflection energy is necessary. This paper presents a real data 25Hz VTI FWI case study from North-West Shelf (NWS) Australia utilizing the full wave-field. Starting from a high-quality reflection tomography VTI model, a top-down approach has been adopted. Diving wave FWI updates the shallow, then reflection FWI is introduced to further update the deeper section. The updated FWI model demonstrates significant uplifts in increasing resolution and conformance with underlying geology. Two promising aspects can be observed: (1) the fairly solid uplifts in mitigating the imaging challenges: FWI reduces wave-field distortions, leads to overall improved focusing, gather flatness, continuity, and better positioning in depth; and (2) uncovers geological features beyond imaging: high-resolution FWI delineates small shallow anomalies and velocity boundaries across faults, and reveals the strong acoustic impedance contrasts at reservoir level. It demonstrates FWI can aid both in reducing the velocity uncertainty as well as understanding underlying geological formation.