

3-D SEISMIC TOMOGRAPHY OF A PALAEOCHANNEL SYSTEM

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A method for conducting a 3-D seismic refraction inversion was assessed by attempting to image the presumably complex structure of a palaeochannel. The trial survey was conducted over a suspected palaeochannel adjacent to the Wyalong goldfields in central New South Wales, Australia. Initial 2-D models showed a four layer sub-horizontal system underlain by a high-velocity basement composed of metasediment. The 2-D models were used to initialise a velocity-depth model for 3-D tomographic inversion of first-arrival data, from which a final velocity-depth model was developed. Reflections were additionally processed to provide estimates of the depth to the basement rock and compensate for a lack of information from refraction data at depth. These depth estimates provided greater control over imaging of the basement rock, and allowed a 3-D image of the erosional upper contours of the basement formation. Correlation of seismic data with existing geological, geophysical and drill-hole data allowed a structural and compositional interpretation. This model suggests the presence of a system of deposits from meandering channels overlying the basement formation, some of which have been imaged. The general palaeodrainage deposit is relatively conductive, indicating a potential saline storage or transport mechanism.