Australian Governments over the past decade have acquired thousands of kilometres of high-quality deep-seismic reflection data. The deep-seismic reflection method is unique among imaging techniques in giving textural information as well as a cross sectional view of the overall crust, including the character of the middle crust, lower crust, Moho, and any upper mantle features. Seismic reflection data can be readily integrated with other geophysical and geological data to provide an unsurpassed understanding of a region’s geological history as well as the mineral and energy resource potential.

Continental Australia is made up of four main elements (blocks), separated by orogens. Most boundaries between the elements are deeply rooted in the lithosphere, and formed during amalgamation of Australia. Major boundaries within the elements attest to their individual amalgamation, mostly prior to the final construction of the continent. Many of Australia’s mineral and energy resources are linked to these deep boundaries, with modern seismic reflection providing excellent images of the boundaries.

All of the seismic surveys have provided new geological insights. These insights have significantly advanced the understanding of Australian tectonics. Examples include: preservation of extensional architecture in an otherwise highly shortened terrane (Arunta, Yilgarn, Mt Isa and Tanami), unknown deep structures associated with giant mineral deposits (Olympic Dam, Yilgarn, Gawler–Curnamona), as well as the discovery of unknown basins, sutures and possible subduction zones (Arunta, North Queensland, Gawler–Curnamona). These new insights provide not only an improved tectonic understanding, but also new concepts and target areas for mineral and energy resources.