

## UTILIZATION OF AEM METHODS FOR COST-EFFECTIVE MAPPING OF SHALLOW NEOGENE INTRA-PLATE FAULT SYSTEMS IN EASTERN AUSTRALIAN COAL SEAM GAS BASINS

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Neogene fault systems are increasingly recognised as an important control on hydraulic connectivity in some of Australia's energy rich basins. However, accurate delineation of these faults systems is challenging and expensive. In this context, the main objective of the Exploring for the Future (EFTF) Surat-Galilee Basin (Phase 1) Project is to test novel methods for more cost-effective mapping of Neogene fault systems in the Coal Seam Gas (CSG) basins of eastern Australia. Methods assessed in this project include morphotectonic mapping using temporal remote sensing data and high-resolution terrain mapping techniques, airborne electromagnetics (AEM), and the use of earthquake databases to inform active tectonic and geomechanical analysis.

The project is funded by Geoscience Australia (GA) as part of its EFTF Programme, and is focussed on exemplar areas in the Surat and Galilee Basins where Neogene fault activity has been interpreted on high-resolution 2D and 3D seismic reflection surveys. This paper reports on the use of airborne electromagnetics (AEM) for detecting near-surface (<50–150m) Neogene faults in both basins. Approximately 4,500 line km of AEM data were acquired in a number of smaller acquisition blocks where Neogene faults had previously been identified. The AEM inversion results are compared with interpretation of seismic reflection data, morphotectonic mapping, and other hydrogeological and tectonic/geomechanical data. The utility of AEM to map the broader hydrogeological system in these basins, including groundwater-surface water connectivity (springs and rivers), is also assessed.