The Atlas of Petroleum Prospectivity, An Innovative Tool for Assessing New Zealand's Future Petroleum Potential

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ABSTRACT

The "Atlas of Petroleum Prospectivity" research programme (APP) is developing a series of digital maps of all key petroleum systems elements in New Zealand's offshore sedimentary basins, synthesising the wealth of data available within GNS Science and other open-file sources. This, for the first time, provides a publically available baseline reference dataset that summarises in one place, the current understanding of these geologically complex basins in a readily accessible GIS format. It provides a consistent template for evaluating petroleum prospectivity within and between basins across New Zealand's extended continental shelf (ECS). It also provides a basis for promulgation and technical administration of exploration permits and for identifying where new geoscience data and interpretations are required to better demonstrate petroleum potential. Outputs include time and depth grids and isochron and isopach maps for a set of consistent regional seismic horizons and updated paleogeographic maps. These form the main inputs for "common risk segment" (CRS) maps of source, reservoir and seal rock presence. Multi-1D basin modelling is used to assess the likely maturity of potential source rock kitchens. The programme, now in the third year of its four-year duration, has taken a phased regional approach, with datasets from the NW (Reinga-Northland, Deepwater Taranaki, and Taranaki basins) and SE (Canterbury-Great South basins) provinces having recently been completed and released. Examples of outputs from these areas, highlighting prospective areas and plays are illustrated. Assessment of the NE province (Pegasus, East Coast and Raukumara basins) is nearing completion, and includes new regional seismic mapping of Raukumara Basin. Data compilation on the poorly characterised "Far Frontier" region is now underway. By adopting a CRS approach, outputs from the APP programme are already delineating exploration play fairways, highlighting the most prospective regions in a number of basins, and the outputs from our new analysis of the NW and SE provinces indicate that there are significant areas prospective for petroleum that (currently) remain unlicensed, such as in Reinga-Northland Basin. Areas with sparse and/or poor quality data have also been highlighted, and whilst these include much of the far frontier parts of the ECS, there are also areas within relatively well explored basins, where more data are required to adequately assess their petroleum potential.