Casting a Bigger Shadow: Big New Opportunities in Australian Basins revealed by Regional Fluid Inclusion Data

Enhanced hydrocarbon exploration, Reduced development risk, Improved geological storage of CO_2

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Australia boasts the largest resource of fluid inclusion data in the world, with more than 800 wells, leading the way in application by the oil and gas industry. For exploration, where constraining the timing, origin and phases of fluid migration is crucial, the contribution to improved understanding of processes that produce, alter, or destroy hydrocarbon systems has been profound. These data revolutionise the mitigation of risk in modern petroleum systems analysis, improve understanding of proven systems for better appraisal and development planning and reveal pathfinders to new petroleum systems that will yield future discoveries.

In field development these data are especially valuable, predicting down-dip oil rims in gas fields, offering constraint on reservoir quality, and by constraining water saturation in fields where formation water samples are contaminated these unique data augment conventional measurements and yield superior control on the accuracy of field reserve calculations.

As geological storage of CO2 emerges as a vital climate mitigation strategy fluid inclusion data provides crucial insights for effective screening of storage sites. From demonstrating the absence of viable petroleum systems to avoid contamination of yet to find petroleum resources to constraining the thermal conditions in wells with poor or no data and providing crucial constraint on the nature of aquifer systems especially for migration assisted storage sites where salinity looms as a critical, but poorly constrained, factor.

This whistle stop tour examines a diverse range of Australian Basins and beyond to demonstrate the utility of these methods, highlight areas where application directly contributed to discoveries or an improved understanding of existing oil and gas fields and reveal those areas with good potential for future discoveries. Early application to identifying suitable sites for the geological storage of CO2 will also be discussed where fluid inclusions can literally help to save the world!