

**Kuala Lumpur Geoscientists Group, Geoscience Lecture Series 2023**

**Revealing New Exploration Plays, Reducing Development Risks and Constraining the geological storage of CO<sub>2</sub> from Regional Fluid Inclusion Data: Examples from Australia and Big Potential in Asia**

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Australia boasts arguably the largest resource of petroleum fluid inclusion data in the world, with more than 1000 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 discoveries of the future. In field development these data are equally 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 CO<sub>2</sub> 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 case studies from Australia and Asia 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 help to reveal those areas with good potential for new discoveries. Future applications in Asia will be discussed, including the opportunity to develop multi-client studies that will address local challenges and deliver game-changing solutions.