

## Strontium isotope stratigraphy

CSIRO's carbonate geology and regional stratigraphy group has capabilities in strontium isotope stratigraphy, a high resolution chronostratigraphic tool to facilitate the discovery of petroleum reservoirs.

Strontium isotope stratigraphy (SIS) offers petroleum exploration companies and researchers the opportunity to develop a more precise sedimentation history of petroleum-bearing basins. This enables them to more accurately determine drilling targets and potential reservoirs in exploration.

SIS research is based on the importance of geological time in exploration. Petroleum exploration depends significantly on models that describe how prospective basins have formed and acquired their sedimentary fill, and the time-temperature framework of source rock burial and migration of hydrocarbons.

Our research applies inorganic chemistry techniques to solve petroleum exploration challenges.

### Expertise

The group has fifteen years experience in the application of SIS in hydrocarbon-bearing basins. This includes extensive work in Papua New Guinea, Southeast Asia and the Middle East.

Our expertise encompasses:

- petrographic and geochemical evaluation of diagenesis
- foraminiferal biostratigraphy
- analytical skills to examine a wide range of materials

The working tenet of the SIS group is the fundamental importance of good chronostratigraphic control for regional exploration and research.

Our research has immediate exploration applications and is combined with commercial work to deliver solutions to the exploration industry.

The group's major research goals include:

- contributing to a general scientific understanding of comparative basin development in a range of tectonic settings
- contributing to an understanding of the temporal development of carbonate build-ups
- establishing accurate chronostratigraphic frameworks within basins or carbonate build-ups
- enhancing predictive aspects of hydrocarbon exploration within particular basins
- improving the larger foraminiferal biostratigraphic resolution.

### Facilities

Strontium isotope analyses are conducted using a VG 354 thermal ionisation mass spectrometer, located at the CSIRO Radiogenic Isotope Facility in North Ryde, Sydney. It is the only laboratory in Australia that provides strontium isotope analyses of carbonates.

Our clean labs are set up to handle both large and small volumes of samples.

### Applying the capability

SIS is integrated with limestone microfacies analysis and foraminiferal biostratigraphy to study basin sedimentation history and provide greater understanding of basin formation.



The technique delivers improved stratigraphic resolution over more conventional correlation techniques, which has important exploration implications.

Other benefits include:

- improved stratigraphic resolution
- accurate structural modelling
- recognition of chronostratigraphic surfaces
- integration of geology, petrography, biostratigraphy, and geochemistry
- strontium ages can be obtained from very small amounts of material, for example, a few foraminifera samples.

## Case study

The carbonate geology and regional stratigraphy research group has been involved in collaboration with various petroleum companies in the Papuan Basin in Papua New Guinea for over ten years. Due to limitations in the use of seismic methods in this structurally complex and karsted terrain, exploration has relied significantly on surface mapping to infer the presence of potential reservoir structures at depth.

The application of SIS has greatly improved the structural mapping of the Tertiary limestones in the basin and is now widely used in the area to provide greater resolution in the structural modelling integrating geology, petrography and biostratigraphy.

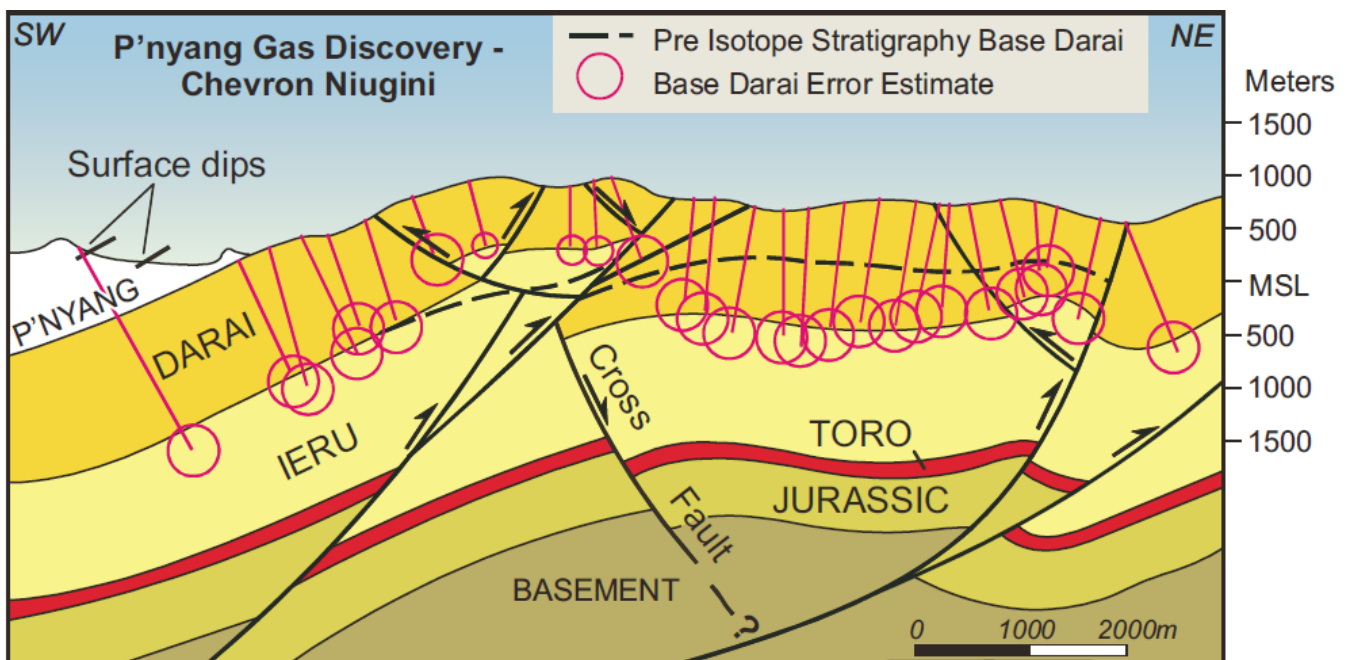
## Our collaborators

The group works closely with CSIRO's argon thermochronology group as well as collaborating with universities, government research institutions including GNS Science, New Zealand and Institut Francais du Petrole (IFP), hydrocarbon exploration companies and a number of external biostratigraphic consultants.

Our list of past and present commercial clients covers a broad mix of operators based in Oceania and internationally. We are working to increase our global profile through projects in the Middle East.

## Getting involved

Strontium isotope stratigraphy services are available to research entities or fee-for-service contracts depending on the nature of the work.



> Depth to base Darai derived from strontium isotope analyses compared to model based on post-drill, pre-strontium data (Modified from Eisenberg, 1996)

### CONTACT US

t 1300 363 400  
+61 3 9545 2176  
e enquiries@csiro.au  
w www.csiro.au

### AT CSIRO WE SHAPE THE FUTURE

We do this by using science to solve real issues. Our research makes a difference to industry, people and the planet.

### FOR FURTHER INFORMATION

**CSIRO Energy – Onshore Gas Program**  
Tony Allan  
t +61 2 9490 8921  
e tony.allan@csiro.au  
w www.csiro.au