

## **PESA ACT Technical Seminar:**

### **Salt Tectonics in the Petrel Sub-basin, Australia**

**12.30pm, Tuesday 5 December, 2017**

**Sir Harold Raggatt Theatre, Geoscience Australia**

**CHRIS ELDERS<sup>1</sup>, CAROLINE CLUGSTON<sup>1</sup>, NESBERT NYAMA<sup>1</sup>, KAIRUI YE<sup>1</sup>, YU YUAN<sup>1</sup>**

<sup>1</sup>*Department of Applied Geology, Curtin University, Bentley, WA 6102, Australia*

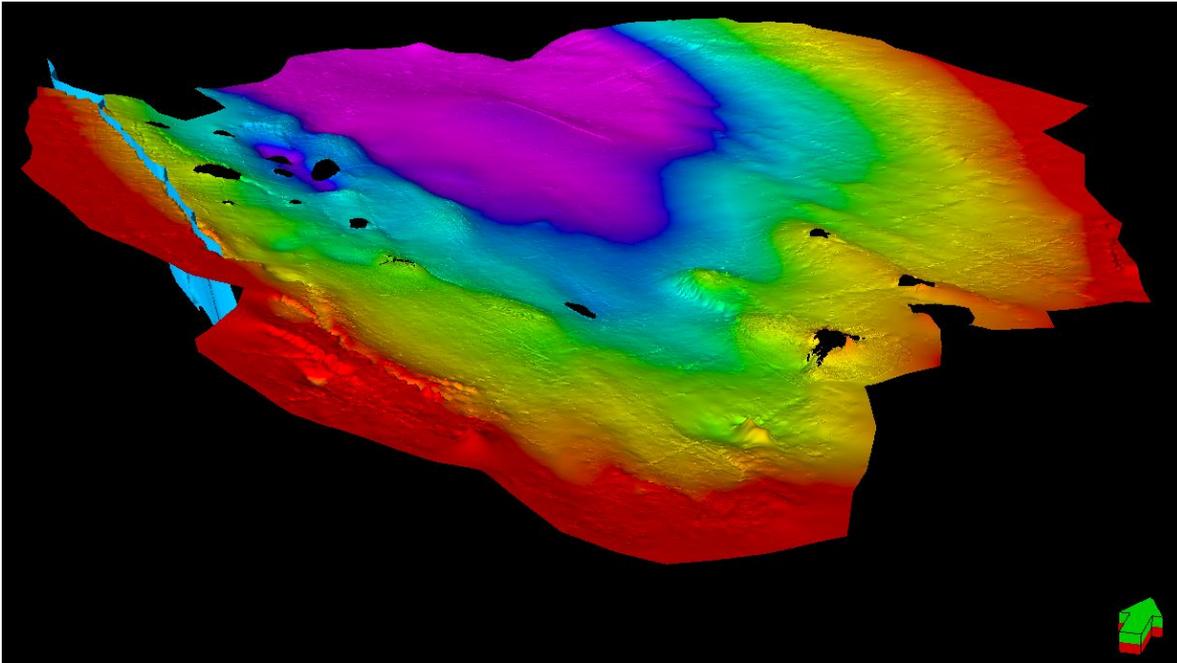
chris.elders@curtin.edu.au

#### **Abstract:**

Neoproterozoic and Lower Palaeozoic salt occurs in a number of Australian sedimentary basins. Although salt structures are associated with hydrocarbon occurrences in a number of these basins, the Lower Palaeozoic Petrel Basin on the North West Shelf is by far the most prolific. However, despite the large number of salt structures, the number of discoveries in the Petrel Basin is relatively small.

The Petrel Sub-basin is a NW-SE trending graben, orthogonal to and most likely older than the NE-SW trending structures that dominate the North West Shelf. The development of salt structures is closely related to the complex multi-phase evolution of the basin and the adjacent passive margin. Although not penetrated by wells, seismic stratigraphy clearly shows that salt was deposited as part of the syn-rift sequence, most likely of Devonian age. A significant phase of widespread mini-basin formation ensued and was terminated by the end of rifting. Hyper-extension during the Lower Palaeozoic resulted in the development of a thick Carboniferous to Triassic sag sequence during which some of the early formed structures evolved into high-relief point-sourced diapirs by a combination of early salt withdrawal and subsequent passive growth. Extensional fault reactivation in the Middle Jurassic, associated with more widespread rifting further outboard on the continental margin, resulted in accelerated subsidence in the basin centre, with extension on the basin margin being balanced by tightening of compressional salt cored folds and daipirs in the basin centre. A phase of compression, most likely associated with the collision of Australia with SE Asia in the Neogene, resulted in inversion of segments of the basin bounding fault system and a final phase of diapir growth.

Most hydrocarbon occurrences are associated with broad salt cored anticlines that developed during Jurassic extension, rather than high relief diapirs that experienced Cenozoic growth. The complex multi-phase growth of these latter structures most likely resulted in seal breach.



*3D Image of the Upper Permian in the Petrel Sub-basin showing to location of salt diapirs and salt cored anticlines.*

**Biography:**

Chris Elders graduated from Oxford University, firstly with a BSc and then a PhD in Geology. This was followed by four years working as an exploration geologist for Shell in the Netherlands, and then 20 years at Royal Holloway, primarily running the internationally renowned MSc in Petroleum Geoscience, but also working with the Fault Dynamics and SE Asia Research Groups. In October 2013 he moved to Curtin University to take up the Chevron Professorship in Petroleum Geology where he has revitalised the MSc programme and established a vibrant research group.