#### Summary of Carnarvon Temperature Maps (as of 1<sup>st</sup> of March 2023)



- 1. Allows a quick regional evaluation of various source rock layers using only two variables: geothermal gradient and depth of burial;
- 2. Provides an alternate and independent look to geochemical modelling method;
- 3. Uses less geochemical modelled variables;
- 4. Allows a quick look back in time when stripping overburden;
- 5. Works well in basins with little uplift and missing sections (extensional tectonic regimes like in the Barrow-Dampier Subbasin);
- 6. Should be treated with caution in the areas where significant amount of section is missing through erosion (the upthrown side of the Flinders Fault System or the Peedamullah Shelf); and
- 7. Doesn't allow for verification of heat flow through time unless geothermal gradient is changed. The Barrow-Dampier Subbasin is currently at its maximum depth of burial and most of the hydrocarbon expulsion from the Oxfordian is relatively recent. The present day geothermal gradient is unlikely to have significantly changed in the last 30 million years as no major thermal activity has affected the area. The 5.5MIn years Australia collision with SE Asia, some 2000kms north of the Carnarvon Basin, may have impacted on the geothermal gradient. Although the effects of the resulting uplift can be measured on the Barrow Island and Cape Range uplift, the temperature impact in AIO is interpreted to be minimal.

## **Geothermal Gradient Scope**







# Carnarvon Basin Temperature Maps Available

Temperature Map (VR proxy) in Carnaryon Basin	Preesent Day (0 Ma)	Uppermost Miocene (5.5 Ma)	Oligocene(TO_ 33 Ma)	Base Tertiary (T 65 Ma)	Aptian (KA-123 Ma)	Oxfordian (JO- 123 Ma)	Sinemurian (JS- 197 Ma)	Rhaetian (TRR- 209 Ma)	base Norian (TRC1 - 229S/229Ma)	Base Triassic (250M_TR/250 Ma)	Base Upper Permian (273S/273Ma)	Base Upper Permian (273S/273Ma)
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Temperature at JO (157Ma) - Oxfordian SR	Available grid	Available grid	Available grid	Available grid	Available grid							
Temperature at JS (197Ma) - Sinemurian SR	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid						
Temperature at TRR (209Ma) -Top Mungaroo SR	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid					
Temperature at TRR (229Ma) -Base M.crenulatus SR												
Temperature at TR (250Ma) -Base Triassic SR	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid	Available grid			
Temperature at 273S_273Ma) -Base Upr Permian												
Temperature at Basement (560Ma)	Free in ppt	Free in ppt	Free in ppt	Free in ppt	Free in ppt	Free in ppt	Free in ppt			Free in ppt		Free in ppt

## **Temperature Map Methodology**







X:-245942.01, Y:8251660.75 Meters









### **Basement Temperature at 123Ma (KA Aptian)**



🐧 Grid: 9999\_B\_Temperature\_123Ma (Admin) (LightMagenta), Data Type: Time

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## **Basement Temperature at 167Ma (JO Oxfordian)**



Grid: 9999\_B\_Temperature\_157Ma (Admin) (LightMagenta), Data Type: Depth



#### **Basement Temperature at 197Ma (JS Sinemurian)**



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Grid: 9999\_B\_Temperature\_197Ma (Admin) (LightMagenta), Data Type: Depth

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### **Basement Temperature at 251Ma (TR Base Triassic)**



Grid: 9999\_B\_Temperature\_250Ma (Admin) (LightMagenta), Data Type: Depth

