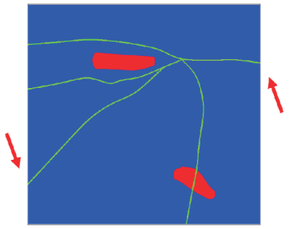
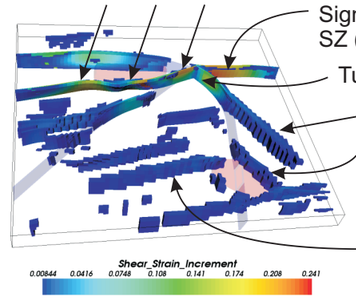
A NNW-SSE directed sinistral strike-slip deformation regime also reproduces the Tunkillia anomaly. This model also produces a broadly ENE-WSW trending high angle set of strike-slip faults that have a similar orienteation and displacement to the cross faults which cut the Tunkillia deposit. Within this stress regime, these faults represent Reidel shears. This indicates that it is possible that the high angle cross faults, which appear to cut the Yarlbrinda shear zone and Tunkillia mineralisation, may actually have been active/forming at the time of mineralisation.



Deformation Regime

Anomalies on Oolabinnia SZ, associated with strain partitioning around Frogs Eyes granites and intersection with Yerda/YSZ.



Significant shear strain anomaly on Yerda SZ (preferentially oriented for reactivation)

Tunkillia anomaly

YSZ splay reproduced

Granite margin shear?

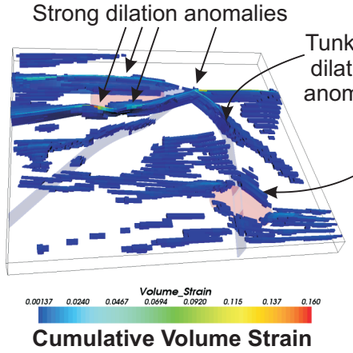
ENE trending strike slip faults such as those which cut the YSZ at Tunkillia reproduced as part of same deformation event that focuses strain at Tunkillia indicating that these structures may also be prospective.

Cumulative Shear Strain

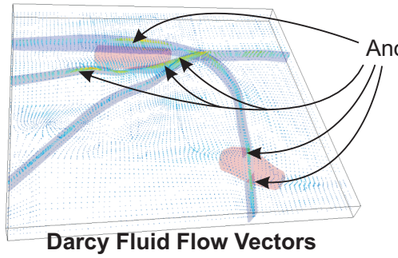
Strong dilation anomalies

Tunkillia dilation anomaly

Granite margin dialtion



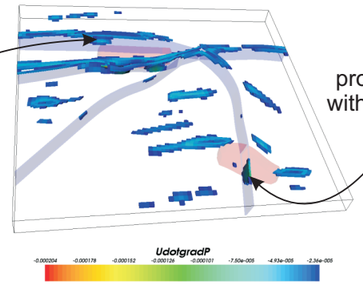
Cumulative Volume Strain



Anomalously high fluid flow

Darcy Fluid Flow Vectors

U.∇P anomalies in shear zones proximal to Frogs Eyes Granites



Anomaly in YSZ proximal to intersection with south side of granite

Several other far-field stress regimes reproduce a localised Tunkillia anomally on the bend in the YSZ. All results are presented in detail in the final report and are accessible on the PIRSA TWiki website.

The predictive targeting outcomes presented in this report result from numerical modelling/simulation of complex mechanical/fluid-flow/chemical/thermal systems. The modelling process utilises both empirical data and geological interpretations as a basis for model construction and some intrinsic assumptions are required by the process. Every effort has been made to simulate these processes as accurately as possible based on the available geological interpretations and data, however, it must be noted that changes to numerical model inputs following further data acquisition or variations in geological interpretation may result in different modelling outcomes.

More information:

https:/pmd-twiki.arrc.csiro.au/twiki/bin/view/PIRSA/WebHome

Warren Potma: CGGP Modelling Project Leader, CSIRO, warren.potma@csiro.au

Martin Fairclough: Gawler Project Leader, PIRSA, fairclough.martin@saugov.sa.gov.au

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pmdCRCb004-06

Predictive simulations of the regional fault and granite architecture

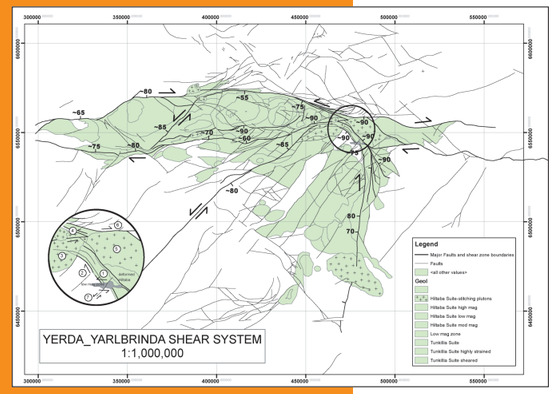
Author: Warren Potma, CSIRO Exploration and Mining

CSIRO report P2006/782

November 2006

Predictive targeting outcomes:

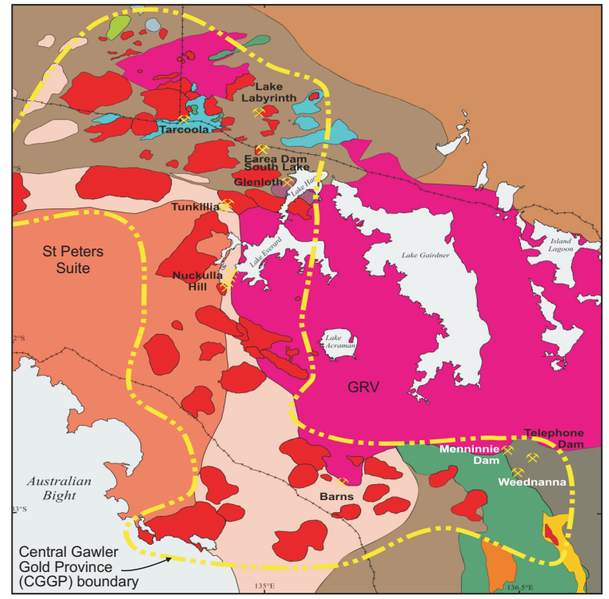
- The location of the Tunkillia deposit was reproduced in several regional scale simulations. These models give a good indication of the potential far-field stress regime(s) active at the regional-scale at the time of the Tunkillia mineralising event.
  These "effective" simulations also highlight several other anomalous regions within the regional Yerda/ Yarlbrinda fault and granite architecture. An integrated analysis of these anomalies across numerous modelling scenarios facilitates prospectivity mapping of zones where quantitative simulations indicate there is the potential for anomalous strain, dilation and fluid focussing.

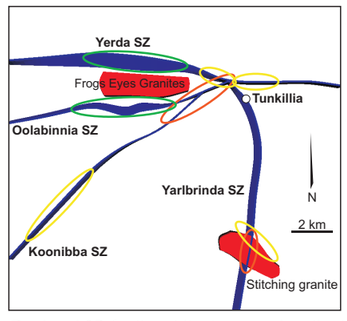


Regional fault architecture interpretation (John Stewart, Monash University, unpublished data)

Aim of the regional-scale predictive deformation-fluid-flow modelling of the greater Yarlbrinda/Yerda fault and granite architecture:

- To test the stress regimes (indicated by the deposit-scale reverse engineering studies) on a regional scale fault architecture to see if the location of the Tunkillia deposit can be effectively simulated/reproduced.
- To run a series of regional-scale simulations to confirm the range of possible far-field stress conditions that could account for the localisation of strain and fluid focussing within the Yarlbrinda Shear Zone (YSZ) at Tunkillia.
- Use this suite of models to assess other likely locations within the regional architecture for anomalous strain localisation, fluid focussing and potential mineralisation during the deformation/mineralising event responsible for the formation of the Tunkillia deposit.





- Best regional targets: multiple coincident anomalies
- 2nd order regional targets: anomalies indicated in good models or present over wide range of stress regimes
- 3rd order regional targets: anomalies present over wide range of stress regimes

Regional 3D fault architecture used as the basis for numerical modelling scenarios with anomalies predicted by numerical modelling.

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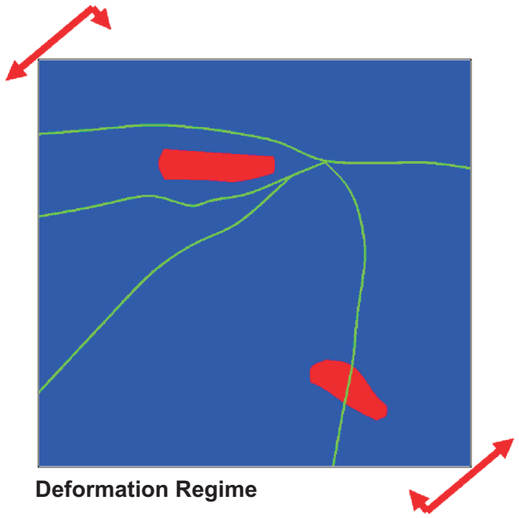
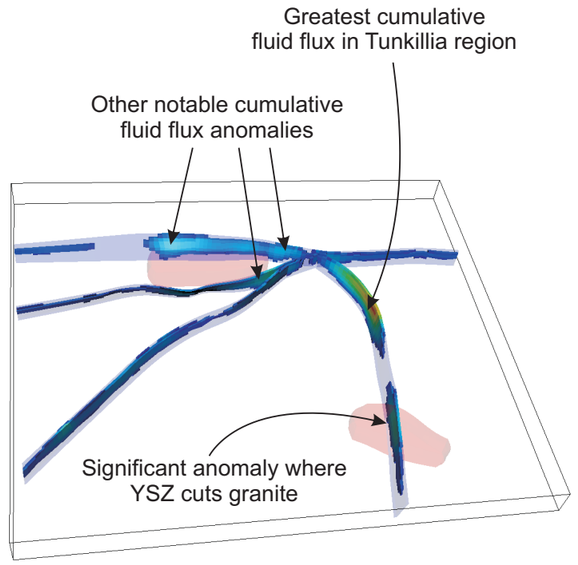
The stress field which yielded the best model for the Tarcoola reverse engineering and Tarcoola Basin models also yielded the 'best fit' regional numerical reproduction of the Tunkillia deposit location, within the bend of the Yarlbrinda Shear Zone, in the regional predictive models.

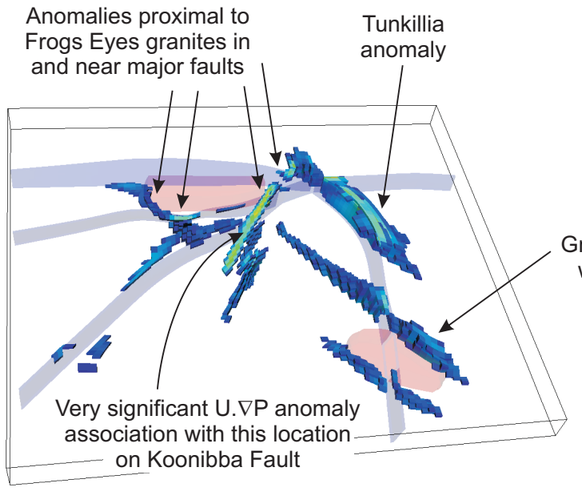
Here, the compression component of the deformation regime is directed NNW-SSE (160°) with a major component of sinistral strike-slip deformation orthogonal to this compression direction. This deformation regime results in high shear strain reactivation of the NW trending portion of the Yarlbrinda Shear Zone, and a splay propagating off the pre-existing YSZ where it turns to be South trending.



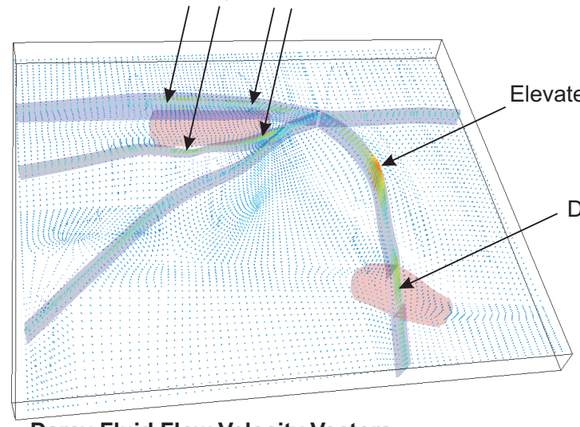
Deformation Regime



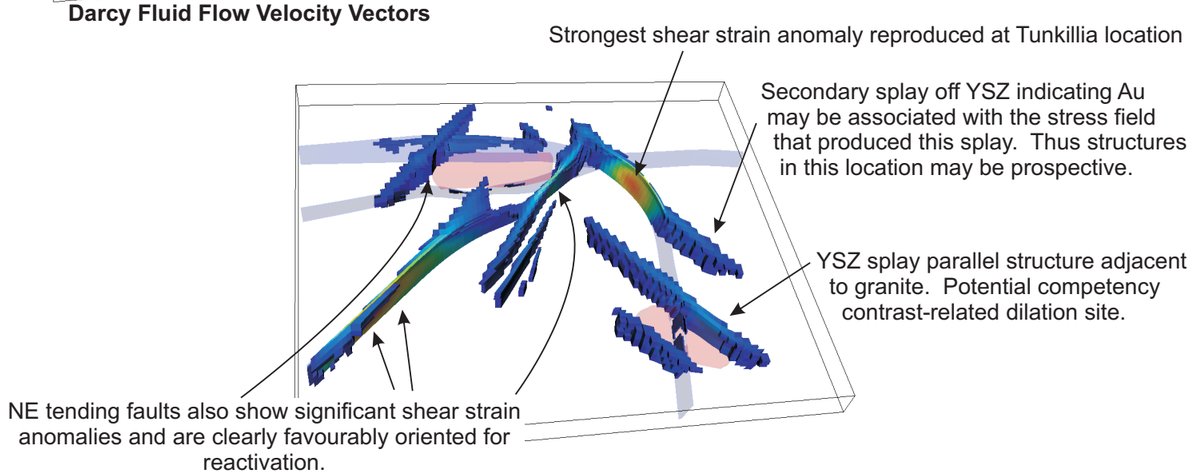
Cumulative Fluid Flux



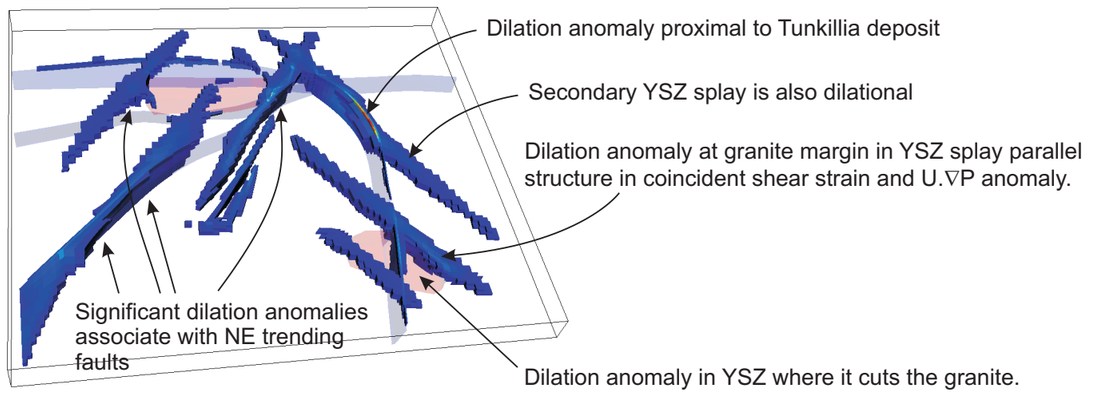
Other moderate Darcy fluid flow anomalies in Yerda and Oolabinnia shear zones



Darcy Fluid Flow Velocity Vectors



Cumulative Shear Strain



Cumulative Dilation