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# Estimation of gold potentials using 3D restoration modeling, Mount Pleasant Area, Western Australia

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A broad variety of gold-deposits are related to fault systems developed during a deformation event. Such discontinuities control the metals transport and allow the relatively high permeability necessary for the metals accumulation during the ore-deposits formation. However, some gold deposits formed during the same deformation event occur at locations far from the main faults. In those cases, the fracture systems are related with the rock heterogeneity that partially controls the damage development on the rock mass. A geo-mechanical 3D restoration modeling approach was used to simulate the strain developed during a stretching episode occurred in the Mount Pleasant region, Western Australia.

Firstly a 3D solid-model was created from geological maps and interpreted structural cross-sections available on the studied region. The backward model was obtained flattening a stretching-representative reference surface selected from the lithology sequence.

The deformation modeling was carried out on a 3D model built on Gocad/Skua and restored using a full geomechanical modeling based on a finite element method used to compute the volume restoration in a 600 m tetrahedral-mesh-resolution solid. The 3D structural restoration of the region was performed flattening surfaces using a flexural slip deformation style.

Results show how the rock heterogeneity allows damages in locations far from the fault systems. The distant off-fault damage areas are located preferentially in lithological contacts and also follow the deformation trend of the region. Using a logistic regression method, it is shown that off-fault zones with high gold occurrences correlate spatially on locations with locally-high-gradient first deformational parameter, obtained from the restoration strain field. This contribution may provide some explanation for the presence of gold accumulations away from main fault systems, and the method could be used for inferring favorable areas in exploration surveys.