LANDSAT INTERPRETED STRUCTURE AND GROUNDWATER FLOW WITHIN THE EROMANGA AND SURAT BASINS

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The methodology and results obtained from the HGG(A) integrated Landsat study of the Eromanga and Surat Basins are presented in this poster display. Approximately 90 false-colour Landsat diapositives provide complete coverage to these basins. Cloud-free winter scenes with low sun angles were selected wherever possible, as these tend to enhance structural features in flat landscapes which are typical of the basins.

The Landsat scenes were rephotographed and projected enlargements annotated onto 1:250,000 scale drainage bases. Linear, circular and bedding traces were identified. Additional data incorporated into these 111 'factual' map sheets includes computer-generated groundwater flow-directions within Jurassic and Cretaceous aquifers, and subsurface control points (petroleum exploration wells, wireline-logged water bores and shallow stratigraphic drill holes). Geothermal gradients and Bouguer anomalies were added to complete the 'factual' data, and provide a basis for structural interpretation.

Duplicate series of the 'factual' map sheets were prepared, and were used as base maps for the structural interpretation. Linear features were classified as faults wherever supportive geological or geophysical evidence exists. Areas of anomalous drainage or areas having landform characteristics denoting possible structural upwarps were identified. Groundwater flow-direction were modified in detail to conform with the structural interpretation.

This study has led to the identification of numerous previously unknown probable folds and faults in the Eromanga and Surat Basins, and has linked other known geological features with basin-wide structural domains. Many of the linear features identified are probably the subtle surface expression of much stronger faults and folds within underlying basins and 'basement'. Very numerous linear features lack supporting geological or geophysical data to be rated as faults. Many of these lie sub-parallel to fault or fold trends, and thus enhance the structural 'grain' of the region. Many of these linear features may in fact be minor faults or fractures, which have displacements which are too small to be resolved in most of the existing seismic data.

The relationships between faults and groundwater flow is considered important in entrapment of hydrocarbons within these basins. The fault-barrier model indicates that displacements as little as 15 m, if at right angles to groundwater flow, could lead to zones of groundwater stagnation and possible associated hydrocarbons. Folds with four-way closure or stratigraphic barriers may also obstruct groundwater flow, particularly if oriented normally to the prevailing flow direction. The overview map illustrates the range of structural conditions which may influence migration and entrapment of hydrocarbons.