Paper 14

A high resolution aeromagnetic survey to image low angle transfer faults within the JDA area of the northern Malay Basin

CLIVE A. FOSS

Encom Tech
Australia

CTOC flew a high resolution aeromagnetic survey in the (correct) anticipation of problems in resolving low angle transfer faults from the seismic data. These faults connect the main north-south trending normal faults and are of prime importance in delineating prospects.

The survey of 40 x 40 km was flown along north-south flight lines with a spacing of 400 metres and at an elevation of 120 metres. An enhancement processing undertaken to reduce some artefacts passed by the conventional processing succeeded in resolving coherent features within a 2,500 metre residual separation with a total amplitude range across the map of only 0.3 nT.

The map shows a fabric of linear anomalies with predominantly WNW-ESE trend, wavelengths of 1 to 2.5 km, lengths of 2 to 7 km, and peak to trough amplitudes of 0.05 to 0.2 nT. A possible but unproven explanation for these anomalies is that they are due to biogenic magnetite created where gas has leaked from faults into near-surface sediments. There are indications of shallow gas on the seismic sections, but there is not a one-to-one correlation between the seismic indicators and the magnetic anomalies. Modelling of two of the sharpest magnetic anomalies locates source bodies within the top 400 metres of section. A steady state model can be invoked to explain the range of anomalies as due to source bodies which are created near-surface and then are buried and subjected to diagenetic changes.

Faults interpreted from the map can be sorted into four groups, several of which have a quasi-regular spacing. The more prominent fault directions are a possibly conjugate set of northeast and northwest trends. When these faults are plotted together with the faults derived from the seismic mapping several interesting relationships are observed. There are in particular many examples of 'seismic' faults terminating against 'magnetic' faults. The wide range in direction of the faults imaged by the aeromagnetic survey, and the control which some of them have apparently exercised on the development of the major normal faults suggests that they may be basement related. The magnetic expression by which these faults have been mapped is however high within the sedimentary section, suggesting that there has been reactivation of basement faulting possibly through to quite recent times. The combined aeromagnetic and seismic fault pattern map gives the most complete image of the structure of the study area and justifies the integration of the aeromagnetic survey within the exploration program.

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 21, No. 6, November-December 1995