AAPG Annual Meeting
March 10-13, 2002
Houston, Texas

Ken McClay[1], M Coral[2], N Comrie-Smith[2], E Russell[2] (1) Department of Geology, London, United Kingdom (2) Conoco Indonesia, Jakarta, Indonesia

3D Inversion Traps, South Natuna Sea

This paper presents a structural analysis of inversion structures in the Belanak area, Natuna Sea, utilising 2D and 3D seismic data to establish the timing of inversion and pre-inversion structural controls on fault and fold development.

The study area includes a number of high relief, NE-SW striking, asymmetric anticlines -- the Kerisi, Hiu, Tawes and Belanak oil and gas fields. Sediments comprise pre-Miocene fluvial and lacustrine syn-rift, with Late Oligocene to Recent fluvial, lacustrine and marine post-rift, syn-inversion and post-inversion strata. These overlie a pre-Tertiary metamorphic and granitic basement.

The inversion structures are characterised by fault-propagation folds with steep to overturned frontal limbs and gently dipping back limbs.

Mapping of the basement shows that the initial Oligocene rift architecture was characterised by a series of en-echelon half-graben systems with associated relay ramps, separated by two NW-SE trending accommodation or transfer zones. During inversion these rift systems were reactivated and linked, and the Cumi-Cumi transfer zone was reactivated as a negative flower structure with minor right lateral displacement.

The onset of inversion can be seen at sequence boundary SB300 (Late Oligocene) based on stratigraphic thinning and onlap onto the flanks of the Belanak and Tawes anticlines. Growth stratal and axial fold surface analysis demonstrate that the inversion event was episodic, and locally extends beyond SB1000 (Late Miocene), into the post-inversion Muda Formation.

An understanding of the timing of these structural events gives an insight into clastic reservoir distribution and permits more rigorous modelling of the petroleum system of the area.