ABSTRACTS OF PAPERS

POSTER

New insight into the recent evolution of the Baram Delta from setellite imaging

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The synoptical effect of remote sensing imaging allows a new vision of active environments of deposition and is now successively applied to the study of modern deltas. Two recent satellite pictures of the Baram River have been interpreted in order to provide a better understanding of the recent evolution of a tropical delta.

The first satellite picture covers the deltaic plain of the Baram River (1:250,000 scale). The upper deltaic plain is characterised by the extensive development of freshwater swamps, mainly covered by peat deposits. The lower deltaic plain is restricted to a narrow fringe of salt-tolerant vegetation which develops on both sides of the distributaries. The abandoned river network can be delineated. Reconstruction of the paleo-meandering belts clearly shows the interconnection between the modern Baram, Belait and Miri Rivers. Major structural features are visible on the satellite image. A continuous flexure line, extending from the Miri Hill to the North East is buried under the lower deltaic plain deposits. A recent active fault sharply delineates the deltaic deposits and the northern flank of the Lambir Hills.

The second satellite picture gives a detailed view of the Baram lower deltaic plain which extends from Kuala Belait in Brunei to Miri in Sarawak (the satellite image was processed at a 1:50,000 scale). The subtle colour variations are related to different vegetation covers and have been used to differentiate between mature (dome-shape) and immature peat deposits. Characteristic arcuate features outline the course of abandoned meandering rivers.

A series of low-altitude aerial photographs illustrates the main sedimentological features associated with the meandering river channel and the river mouth. Oxbow lakes which formed by neck cut-off of the meandering river, locally occur. Sedimentation in the abandoned loops is restricted to suspended matter (silt and mud) introduced into the oxbows during overbank flooding from the main stream. Crevasse splay also occurs along the Baram River. The radial-shape crevasse splay results from the break of a subaerial levee which probably occurred during a combined spring tide and high river discharge period.

The sand belt which develops at the mouth of the Baram River, has an overall semi-circular shape. The preferential growth of the elongated sand bars which form on both sides of the river mouth, indicates a predominant westward to southwestward sand transport direction. Rapid sand deposition

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along these intertidal levees results in the characteristic pincer-shape river mouth. The subtidal mouth bar is cut by a network of shallow channels. These channels correspond to the extension of the Baram River which rapidly bifurcates due to the energy dispersion occurring at the river mouth. The channels are oriented to the West and South-West, as a result of the regional longshore current direction generated by the northeastern monsoon winds.

Interpretation of the satellite pictures, ^{14}C datation of peat deposits (Esterle, 1990) and complementary aerial survey have been used to prepare five schematic maps which summarise the recent evolution of the Baram deltaic plain.

5,400 years B.P. - The early Holocene sea level rise led to the complete floording of the study area. Following this marine flooding, estuarine deposits formed in the inner bay, south of the Marudi "bottle-neck". These deposits consisted of mangrove clays and elongated sand bars developed in the active fluvial/tidal distributaries.

5,000 years B.P. - The gradual filling of the inner bay resulted in the first peat deposits. Peat accumulation proceeded as the coastline prograded following the stabilisation of mudflats by seawater-tolerant mangrove vegetation. The mangrove and fluvial/tidal channels belt prograded to the outer bay (north of the Marudi "bottle-neck").

4,000 years B.P. - As the longshore currents reworked the Pleistocene sand patches, adjacent to the delta plain, a coastal barrier system gradually closed the outer bay where peat rapidly accumulated. A coastal barrier islands system formed the seaward edge of the delta plain and developed parallel to the structural flexure which extends from the Miri Hill axis to the North-East.

3,000 years B.P. - The progradation of the lower deltaic plain was controlled by the constant sediment supply from the three main distributaries and from the reworking of the relic sand patches. A mangrove belt grows in a series of lagoons limited by the inactive barrier and the new barrier.

2 000 years B.P. - The river network evolved with a predominant, central distributary (Baram River) and two adjacent, secondary distributaries (Miri and Belait Rivers). The abandonment of the meander belt, north of Lambir Hills, is probably related to a moderate uplift/tilting of the area as indicated by the presence of an active fault.