

## Environmental reconstruction of a Langhian patch reef (East Kalimantan, Indonesia)

Vibor Novak<sup>1</sup>, Nadezhda Santodomingo<sup>2</sup>, Anja Roesler<sup>3</sup>, Emanuela Di Martino<sup>2</sup>, Juan Carlos Braga<sup>3</sup>, Paul D Taylor<sup>2</sup>, Kenneth Johnson<sup>2</sup>, Willem Renema<sup>1</sup>

1. Department of Geology, Netherlands Centre for Biodiversity Naturalis, The Netherlands.
2. Department of Palaeontology, Natural History Museum London, UK.
3. Department of Stratigraphy and Paleontology, University of Granada, Spain.

The development of isolated patch reefs within siliciclastic sediments epitomise the Miocene carbonate deposits of East Kalimantan, Indonesia. A team of Marie Curie Early Stage Researchers and Principal Investigators from the THROUGHFLOW project collaborated in reconstructing a mixed system, delta-front patch-reef. Based on a multi-taxon analysis of the fossil assemblages, we described the palaeoenvironment and biodiversity of this well-preserved Langhian patch reef.

The studied outcrop is located near Bontang, East Kalimantan, at the NE margin of the Kutai Basin, sedimentary complex dominated by siliciclastic deposition. Fieldwork was undertaken in two steps: 1) characterisation of lithology and geometry of reef deposits, and 2) sampling of fossil assemblages. Lithological units were identified by detailed logging of eight transects along the outcrop in order to detect lateral changes. Microfacies analyses of thin sections included carbonate lithological classification and skeletal component logging, on which relative abundances of LBF, algae, and corals were estimated for each sample, allowing broad palaeoenvironmental separation. The resulting biodiversity data was analysed jointly with the sedimentological information.

Based on the fossil content and lithological characteristics described from thin sections and bulk samples, five different facies types (FT1-5) were defined in nine units. By integrating the results from each fossil group we constructed a facies model suggesting deposition in water depths of 20-50m. We observed facies changes up-section starting with calcarenite sediments (FT1) followed by bioclastic packstone with larger benthic foraminifera and calcareous algae (FT2). Abundant thin platy corals and bryozoans occurred in a fine-grained muddy matrix (FT3) gradually passing into a thick-platy coral framestone (FT4). Reappearance of the bioclastic packstone (FT2) characterizes the next facies change, followed by the muddy matrix facies with thin platy corals (FT3). The demise of reef growth is marked by siliciclastic deposits (FT5) capping the carbonate units. The main factor controlling reef growth is proposed to be variation in turbidity of the water column, most likely as a result of changes in terrestrial runoff from a large river. Multi-taxon fossil assemblage analysis has allowed the formulation of a reference model for equatorial patch-reef systems of this type. In the next phase of THROUGHFLOW we will test the generality of this model by comparing multiple reefs identified during two fieldwork seasons in East Kalimantan.

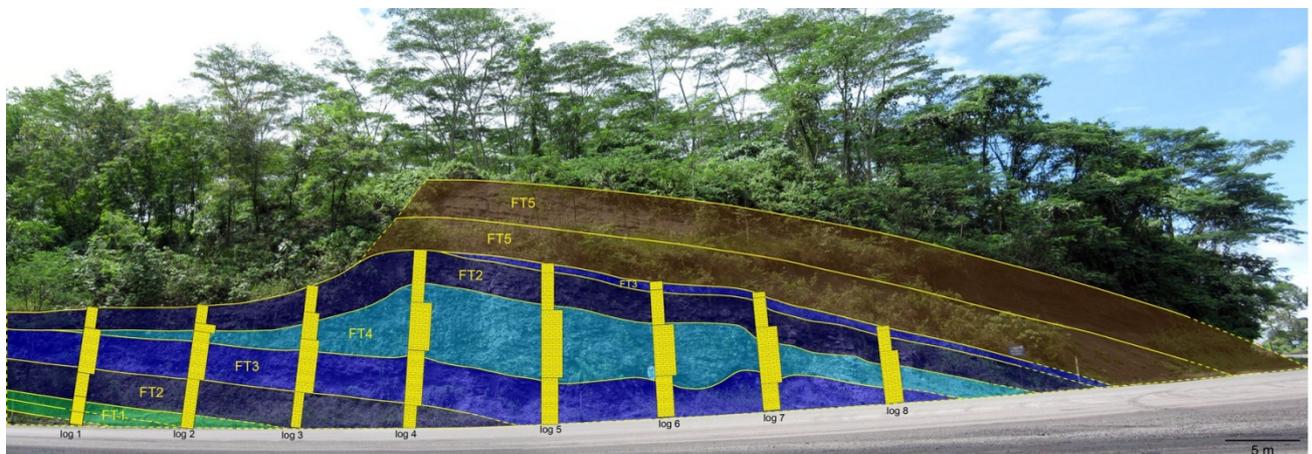


Figure 1: Photomosaic of the logged section with lithologic units, log positions and facies types (FT).