

Understanding the murky origins of coral diversity in the Coral Triangle

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Studies on coral communities living under marginal conditions such as low light, high turbidity, or high nutrients are important to understand how coral reefs will respond to current global changes. The Kutai Basin of East Kalimantan (Indonesia) contains a rich and well-preserved Miocene fossil record of small patch reefs that developed under the influence of high siliciclastic inputs from the Mahakam Delta. Conversely, palaeontological and molecular studies suggest that the Miocene was an important period for diversification in the Coral Triangle. As part of the Throughflow ITN, the aims of this study are to determine the diversity corals during this period and to understand how environmental factors controlled coral diversification on both temporal and spatial scales. A total of 150 morphospecies from 70 genera have been identified. Coral morphologies seem to respond to the gradient of siliciclastic sediments and nutrients input. Platy-coral assemblages were common in the vicinity of the delta, characterized by a higher turbid-water regime, and mainly from the Early to Middle Miocene. Interestingly, about 85 percent of the studied coral genera were already present by the Middle Miocene. In contrast, communities of branching corals mixed with scattered massive corals became more frequent during the Late Miocene in settings located towards the north characterized by less deltaic impact. Our findings suggest that despite the high influence of sediments in this region during the Miocene, coral assemblages could not only cope, but also build reefs and undergo speciation under presumably suboptimal environmental conditions.