

# Palaeogeographic implications of the heavy mineral distribution in Miocene sandstones of the North Sumatra Basin

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*Received 23 August 1993; accepted for publication ---*

**Abstract** - Heavy minerals record major changes in the provenance of Miocene sandstones in the North Sumatra Basin, related to important tectonic events in the basin hinterland. Early Miocene sandstones of the Belumai Member (Peutu Formation) were derived from the east or southeast, from a predominantly granitic terrain in the Asahan Arch or Malaysian Peninsula area. The uplift of the Barisan Mountain range in the early Middle Miocene led to the introduction of sand from the west or southwest, forming the sandstones of the Keutapang Formation. The source terrain can be reconstructed as consisting of regionally metamorphosed pelitic rocks heavily intruded by granites. Contemporaneous volcanic rocks of intermediate to acidic character were also involved, and the presence of diaspore shows that tropical weathering conditions, generating lateritic soils, were prevalent. Chrome spinel is abundant in the Lower Keutapang Member but is rare in the Upper Keutapang Member. This indicates that ultramafic rocks were an important component of the Barisan Mountain source in the Middle Miocene, but were relatively insignificant by Late Miocene times. These ultramafic rocks were either removed through erosion or by northwestward-directed strike-slip motion. In the latter case, the outcrops of the Woyla Group in northern Aceh may represent the remnants of the ultramafic source that supplied sediment to the North Sumatra Basin during the late Middle Miocene. This study demonstrates the importance of obtaining provenance information from basin-fill sequences in constraining tectonic events.