



## **The provenance of Borneo's enigmatic alluvial diamonds**

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Gem-quality diamonds occur in several alluvial deposits across central and southern Borneo. Borneo has been a known source of diamonds for centuries, but the location of their primary igneous source remains enigmatic. Numerous geological models have been proposed to explain the distribution of Borneo's diamonds. To assess these models, we used a variety of techniques to examine heavy minerals from Kalimantan's Cempaka paleoalluvial diamond deposit. This involved collecting U-Pb isotopic data, fission track and trace element geochemistry of zircon as well as major element geochemical data of spinels and morphological descriptions of zircon and diamond. Our results indicate that the Cempaka diamonds were likely derived from at least two sources, one which was relatively local and/or involved little reworking, and the other more distal recording several periods of reworking. The distal diamond source is interpreted to be diamond-bearing pipes that intruded the basement of a block that: (1) rifted from northwest Australia (East Java or SW Borneo) and the diamonds were recycled into its sedimentary cover, or: (2) were emplaced elsewhere (e.g. NW Australia) and transported to a block (e.g. East Java or SW Borneo). Both of these scenarios require the diamonds to be transported with the block when it rifted from NW Australia in the Late Jurassic. The 'local' diamonds could be associated with ophiolitic rocks that are exposed in the nearby Meratus Mountains, or could be diamondiferous diatremes associated with eroded Miocene high-K alkaline intrusions north of the Barito Basin. If this were the case, these intrusions would indicate that the lithosphere beneath SW Borneo is thick (~150 km or greater).