

# Placer Diamonds from Brazil: Indicators of the Composition of the Earth's Mantle and the Distance to Their Kimberlitic Sources

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## Abstract

Sixty-eight alluvial diamonds from three placer deposits in Brazil (Arenapolis in the State of Mato Grosso, Boa Vista in the State of Roraima, and Canastra in the State of Minas Gerais) are characterized by similar crystal shapes, body colors, and surface textures, which are related to growth or resorption processes. The concentrations and the aggregation states of nitrogen impurities in the diamonds, as well as in their carbon isotope compositions, are also similar. A higher proportion of diamonds with radiation spots distinguishes the diamonds from Boa Vista from the other deposits. The majority of the diamonds from Arenapolis (~70%) exhibit transport-related abrasion textures. In contrast, diamonds from Boa Vista and Canastra are characterized by the absence or a low abundance (<15%) of such abrasion textures, which indicates that the diamonds are derived from nearby kimberlitic sources. At this time, kimberlitic sources have been located only in the proximity of the Canastra placer deposits.

The composition of the mineral inclusions is similar for diamonds from all three deposits. The diamonds formed in a strong to moderately depleted peridotitic mantle, with only minor involvement of eclogitic sources. Pressure and temperature estimates for the diamonds from Boa Vista are similar to the estimates for diamonds from other deposits worldwide and are consistent with a geothermal gradient of 40 to 42 m W/m<sup>2</sup> surface heat flow.

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