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Dual origin of alluvial diamonds from Capiibary, Paraguay

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The tale of diamonds in Capiibary begins in 1960s, when a team of geologists identified diamond indicator minerals in the Remata stream bed. In 2008, several macrodiamonds were recovered confirming the diamond potential of the area. Previous studies proposed that diamonds were sourced solely from the nearby olivine lamproite pipe (e.g.,Tayi Caré) based on indicator mineral distribution and composition (Presser, 2024). However, diamond morphology and surface microtextures present two distinct populations within the suite.

This study reports novel data of 105 alluvial diamonds collected from the Saiyú and Remata streams, representing the largest sample set ever studied in the region. The diamonds range from 1 to 3 mm in diameter. They are predominantly yellow, brown, green and colorless, and exhibit octahedral, dodecahedroid and irregular shapes. These diamonds can be divided into two groups: abraded and non-abraded. Abraded diamonds exhibit percussion marks, network patterns, fracture planes, deep pits and naturally polished surfaces. They display magmatic resorption features (Fedortchouk et al., 2019), including resorbed morphologies, intense etching and hillocks, and unusual hummocky textures. Some show green and brown radiation spots and a shift of cathodoluminescence (CL) emission to longer wavelength (Figure 1), typical of long detrital residence in the crust (Bruce et al., 2011). A subset of this group exhibits dislocation network under CL imaging, which indicates a super-deep origin (Smith et al., 2016) (Figure 2). Non-abraded diamonds, commonly octahedra, constitute a minor (~35%) population. They display mantle metasomatic resorption features such as ribbing, negative trigons, and laminae.

We interpret the abraded and non-abraded diamonds as representing distinct provenances. The abraded diamonds may have originated from distal sources or experienced a prolonged detrital history in the crust. These diamonds may have been initially deposited in a sedimentary collector before being reworked into the present drainage basin. In contrast, the non-abraded diamonds may be derived from a separate event in which resorption in the transporting melt was limited. Ongoing study aim to provide constraints on the spatial and temporal evolution of Capiibary alluvial diamonds.

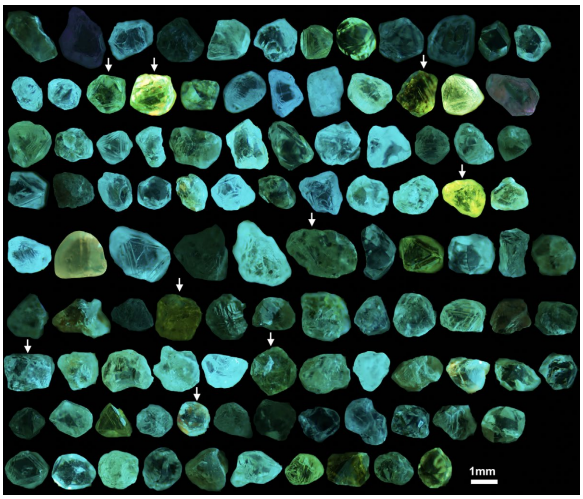


Fig. 1: White pointers indicate diamond with radiation spots and abrasion features.

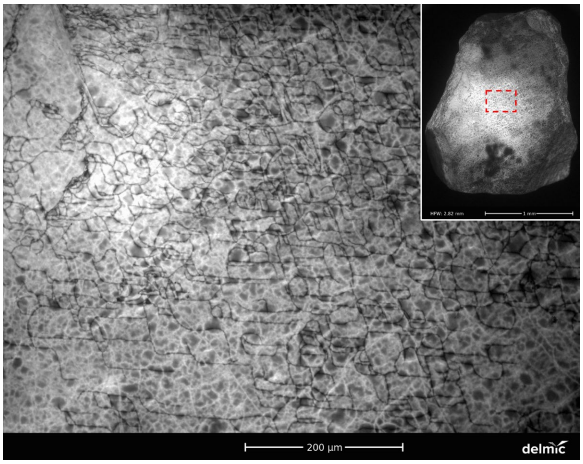


Fig. 2: Dislocation network and network pattern.