

DIAMONDS AND MASS DEATH OF SPECIES CAUSED BY SUPERVOLCANIC ACTIVITY IN WEST MINAS GERAIS DURING THE UPPER CRETACEOUS

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The enigmatic primary source of alluvial diamonds in West Minas Gerais is to date a puzzle. The main hypotheses are (1) weathered Kimberlite Clan Rocks (KCRs) (2) concentration of scattered diamonds from Precambrian tillites (3) pyroclastic rocks sourced from large alkaline complexes. Detail mapping of the headwater regions of the more important rivers suggest that the former two hypotheses can be discarded. As to the latter, mapping of such rocks (e.g. Capacete Fm. and equivalent units), their surface delimitation and volume estimation are of primary importance, however, these estimates are hampered by deep tropical weathering. Geophysical methods are often used as aids in geologic mapping, with gamma-ray spectrometry particularly useful where differences in the radio-element content of K, U, and Th are significant. We present data from airborne gamma-ray spectrometry to discuss differences in radio-element contents and compare these differences with geologic mapping, to show what units are best mapped with implications regarding the probable primary diamond source from the region. The Capacete Fm. and equivalents are best mapped by gamma-ray spectrometry, in particular by the ratio Th/K. The extension of this distribution has been confirmed by surface scintilometric measurements. The authors argue that a derivative map, the Th/K ratio map, should emphasize the unique geochemistry of KCRs and Mg-carbonatites. Gamma-ray data points toward the large volume of volcanic rocks of the Capacete Fm. and equivalent units ($\pm 40.000 \text{ km}^3$) suggesting to have originated from caldera forming eruptions such as the Serra Negra Complex, with plugs down to 60 km, not excluding small contributions from local KCRs. Thus, these Upper Cretaceous diamondiferous units and the spatial distribution and diamond content, could represent an extremely important economic factor. Moreover, alluvial diamonds have been washed from rivers cutting equivalent units of the Capacete Fm. around the city of Uberaba. In the vicinity of such diamond recovery, dinosaur bone remains are embedded in a sandy volcanic matrix showing high scintilometric values as well as other positive anomalies such as high values of REE, Nb, Ta, Ba, apart from quartz fragments showing corrosion gulfs and high perovskite content in the heavy fraction, up to 85%. Bones of some herbivorous dinosaurs show no "biting marks" of carnivores, which could point towards the possibility that the latter had some "surviving" problems too. Supervolcanic activity during the Upper Cretaceous in the region, mainly with the Serra Negra Complex, could be the source of the huge extension of the pyroclastics and epiclastics containing locally diamonds. The eruption could have led to drastic change in environment conditions, possibly over an extended period, that had consequently the local/regional mass death of some species.