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Comparison of vitrinite reflectance in samples from six different coalfields of Botswana

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Abstract

The Karoo Supergroup of Botswana consist of substantial coal deposits of sub-bituminous to bituminous rank. Primarily preserved in the eastern margin of the Kalahari-Karoo Basin in Botswana, somewhat vague estimates of 212 billion tonnes have been made. Though reconnaissance investigations were carried out to explore the Kalahari-Karoo Basin of Botswana, no petrographic information was published. As part of this study, vitrinite reflectance emerged as strong parameter to determine and confirm the rank of these coal deposits. Mean random reflectance was carried out on samples collected from the following coalfields: Lechana (5 borehole samples), South Orapa (5 borehole samples), Morupule (7 borehole samples), Takotakwane (8 borehole samples) and Tuli (8 borehole samples). The obtained results indicated that the Lechana, Morupule, Takotokwane and Tuli coalfield consists of sub-bituminous coal. The South Orapa 3 coal samples indicated coal of sub-bituminous rank, and 2 samples that were affected by heat (yielding high vitrinite reflectance readings) indicating coal of low-volatile bituminous rank.

This research project also includes detailed maceral group analysis, and microlithotype determination, as well as chemical analyses (proximate, sulphur and CV analyses). The maceral group analysis determines the type of coal, and the microlithotype analysis the maceral and mineral associations. The petrographic analyses were carried out using Zeiss Axio Imager m2m reflected light microscope fitted with Hilgers Diskus Fossil software for reflectance and maceral analyses, at a magnification of x500 under oil immersion. The microscope consists of automated scanning system for images, equipped with auto-image focusing. The technique requires installation of the Fossil Student software for maceral group analysis and mean random reflectance.

