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Derived Crustal Thickness Map of Botswana: Implication to the Mw 6.5 April 3, 2017, Botswana Earthquake

Botswana has been experiencing a rise in seismicity since 2010 which culminated in the 2017 Mw 6.5 April 3, Botswana earthquake, the second largest earthquake event in recorded history. This earthquake occurred ~350 km southeast of the Okavango Rift Zone (ORZ), in an area previously not known for large magnitude earthquakes or active faults. The occurrence of this earthquake made it clear that the crustal structure of Botswana is not yet fully understood . To address this, we utilized gravity data to construct a crustal thickness map of Botswana, which has enabled us to study the crustal structure underneath the thick Kalahari cover. Our results also show some localized zones of slightly-thinned crust within intraplate regions. We find that the MW 6.5 earthquake occurred within a region underlain by relatively thin crust suggesting this as a possible region of tectonic inversion and a possible incipient rifting zone. The study also identified regions where earthquake can occur relatively to known earthquake regions. The approach can also be used to determine if the earthquake is the result of a nuclear test or an interplate earthquake in continental stable areas.

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