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Precambrian Geology of Botswana: an update based on the geophysical modeling of gravity and magnetic data



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The Precambrian basement geology of Botswana comprise of tectonic terranes and the major mafic intrusions which defines the ancient Archaean cratons, Proterozoic tectonic mobile belts and the sedimentary basins which have been dated to be Proterozoic in age. The interaction and the relationship between these tectonic crustal provinces especially the cratons and the mobile belts defines the areas of extensions, compressions and accretion which helps to define the tectonic and geodynamic history of an area ¹. Well-defined Precambrian basement geology of Botswana will give an insight of the tectonic history and dynamics hence a need to improve the basement of Botswana using geophysical data. The existing basement geology of Botswana has been worked over the years ²⁻⁵. Despite all the previous work, no attempt has been done to improve the Precambrian basement geology using the high resolution gravity and magnetic data to update the basement geology in Botswana. The tectonic boundaries, internal architecture and temporal evolution of the buried Proterozoic belts in many cases are still unclear in Botswana

In this research, the tectonic boundaries and terranes were delineated and improved using automatic lineaments extraction method. The method, which is mostly used on Digital elevation models (DEM) and satellite images (e.g. ASTER and LANDSAT), was applied in the extraction of tectonic lineaments on geophysical data (gravity and magnetic) using canny edge detection algorithm. The major mafic complexes in Botswana were mapped from reduce to pole magnetic data and added to the tectonic terranes to produce the Precambrian basement geology of Botswana. We then spatially compared the existing basement geology with the mapped geology for terranes improvement and geological collerration. Finaly, we produced a new updated Precambrian Geology of Botswana.

Reference

- [1] Begg G.C. et al (2009), *Geosphere*, vol. 5, no. 1, pp. 23–50.
- [2] Singlerary S.J. et al (2003), *Precambrian research*, vol. 121, no.1-21, pp. 47–71.
- [3] Key R.M. & Ayres N.(1999), *African Journal of Earth Sciences*, vol. 30, no. 1, pp. 427–451.
- [4] Carney J.N. Et Al (1994), *Bulletin of Botswana*, vol. 37.
- [5] Hutchins D.G. and Reeves C.V. (1980), *Tectnophysics*, vol. 69, pp. 201–220.

