JWARP> Vol.3 No.8, August 2011

OPEN ACCESS

Groundwater Potential on the Jos – Bukuru Plateau, North Central Nigeria. Using Lineaments from Gravity Measurements

PDF (Size:1023KB) PP. 628-633 DOI: 10.4236/jwarp.2011.38072

Author(s)

Samaila Crah Alkali, Solomon Nehemiah Yusuf

ABSTRACT

The rocks of the Jos – Bukuru area in North Central Nigeria is characterized by negative and positive gravity residual anomalies ranging from –25 to +20 mGals. Lineaments were extracted from the gravity residual anomaly map for the purpose of assessing the groundwater resources in the area. The region is marked by more than one set of lineaments, each with its distinctive orientation and probably spacing. Lineaments shorter than 20 km in length are shallow structures suitable for this exercise because of their importance in groundwater recharge, transmission and discharge. In a bin size of 15^{o}one major and one minimum striking directions between 000^{o} and 030^{o} were obtained. The major type lies between 000^{o} and 015^{o}, while the minimum one is oriented within the 015^{o} and 030^{o} direction. These directions correspond to the stress axis of the essentially north – south trending geological structures of Nigeria. Invasions of mineralizing fluids might had sealed some of the joints and other fractures, however where the open spaces are not sealed, weathering and erosion widen and deepened the joints paving routes for surface water flows and direct seepage into the underlying strata. On the lineament density and lineament intersection maps the closures suggest probable discontinuity of the aquifer units. On this basis of the lineament density and the lineament intersection results, the area was divided into three hydrogeological zones. Site 1 is considered most favourable for water well development, while site 3 may result in low yields or even in abortive water wells.

KEYWORDS

Groundwater Potential, Residual Anomaly, Lineament, Bin Size, Closure

Cite this paper

S. Alkali and S. Yusuf, "Groundwater Potential on the Jos – Bukuru Plateau, North Central Nigeria. Using Lineaments from Gravity Measurements," *Journal of Water Resource and Protection*, Vol. 3 No. 8, 2011, pp. 628-633. doi: 10.4236/jwarp.2011.38072.

References

[1] A. Maltman, "Geological Maps—An Introduction," John Wiley & Sons Ltd, Baffins Lane, Chichester, West Sussex, England, 1990.

[2] D. C. Turner, "Structure and Petrology of the Younger Granite Ring Complexes," In: C. A Ogbe, Ed., Geology of Nigeria, Rock View International, France, 1989, pp. 175-190.

[3] R. R. E. Jacobson, W. N. MacLeod and R. Black, "Ring Complexes in the Younger Granite Province of Northern Nigeria," Geological Society of London, Memoirs, Vol. 1, 1958, pp. 5-72.

[4] O. Van Breeman and P. Bowden, "Sequential Age Trend for some Nigerian Mesozoic Granites," Nature Physical Sciences, Vol. 242, 1973, pp. 9-11.

[5] ILWIS, Version 3.3, Academic, ITC (RSG/GSD), Netherlands, 2005.

[6] Golden Software, Surfer 8, Golden Software Inc., Gol- den, CO 80401 2003.

[7] Golden Software, Grapher5, Golden Software Inc., Gol- den, CO 80401, 2004.

[8] S. C. Alkali and S. N. Yusuf, "Gravity Study over Jos— Bukuru Younger Granite Complex, North Central Nigeria," Archives of Physics Research, Vol. 1, No. 4, 2010, pp. 178-191.

[9] A. Onugba and O. M. Eduvie, "Hydrogeology of Nigeria. Paper on Groundwater Workshop," Organized by United Nations Children ' s Fund, Jos, 2003, p. 20.

[10] J. B. Wright, "Fracture System in Nigeria and Initiation of Fracture Zones in the South Atlantic," Tectonophysics, Vol. 34, 1976, pp. 43-47. doi:10.1016/0040-1951(76)90093-7

[11] P. O. Oluyide, "Structural Trends in the Nigerian Basement Complex. Precambrian Geology of Nigeria," Geological Survey of Nigeria Publication, Kaduna, 1988, pp. 93-98.

[12] A. N. Udoh, "An Interpretation of Satellite Imageries of Nigeria 7?40'N. Precambrian Geology of Nigeria," Geological Survey of Nigeria Publication, Kaduna, 1988, pp. 99-102.

[13] P. I. Olasehinde and M. O. Awojobi, "Geological and Geophysical Evidences of a North—South Fracture System East and West of the Upper Gurara River in Central Nigeria," Water Resources Journal, Nigerian Association of Hydrogeologist, Vol. 15, No. , 2004, pp. 33-37.

[14] I. B. Odeyemi, Y. B. Anifowose and Y. A. Asiwaju-Bello, "Multi-Technique Graphical Analyses of Fractures from Remote Sensing Images of Basement Regions of Nigeria," Journal of Mining and Geology, Vol. 35, No. 1, 1999, pp. 88-105.

[15] C. Travaglia, "Groundwater Assessment in Hard Rocks. Case Histories: Upper Volta and the People Republic of Yemen," Report of the 8th International FAO Training Course on Application of Satellite to Water Resources, Rome, 18 September 1983, p. 158.