

Paper Number: 3341

Another look at Geological Structures of Part of the Nangodi Belt, North-eastern Ghana: An Integrated Structural and Geophysical Approach



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Integrated geophysical and geological approaches are increasingly being employed to investigate subsurface geology with its inherent structures. This approach provides a high degree of detail especially of structures and formations which are hidden below the surface. Here, we present results of an in-depth study of the poly-deformation and structural pattern of the Paleoproterozoic Nangodi Greenstone Belt in Northeastern Ghana using such an integrated approach. Aeromagnetics and airborne radiometric surveys are applied as penetrative tools to investigate the regional and subsurface structures as well as to delineate the lithologic boundaries. The lithologies present include metavolcanics, metasedimentary rocks and three different intrusive granitoid types: hornblende granodiorites, K-feldspar porphyries and plagioclase porphyries. Metamorphism observed to have affected the rocks is that of the greenschist facies.

The poly-deformational history of the area attests to a combined brittle and ductile deformation marked by the presence of shear zones with structures such as folds and faults, as well as cleavages and lineations. Three deformational phases were observed; D_1 is marked by NW-SE crustal shortening which was responsible for the NE-SW foliation observed mostly in the metavolcanic and metasedimentary rocks. This was followed by a brittle-ductile deformational event mainly responsible for the production of a NE striking shear zone and some associated dextral strike slip faulting in D_2 . This fault was later cut by another NW-SE striking fault. Associated with D_2 is an angularly hinged fold, described as an intramylonitic fold. D_3 is responsible for the production of an ESE-WNW directed compressional force which produced folds with ENE striking axial planes.

Keywords: Nangodi, Greenstone, Ghana, Poly-deformation

