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TECTONIC SYNTHESIS OF STRUCTURAL DATA FROM UBA AREA IN HAWAL BASEMENT, NE NIGERIA

N. E. BASSEY

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ABSTRACT

A structural study of Uba Area in Hawal basement reveals a terrain of metamorphic rocks, intruded by massive and deformed pan African granites aligned at N30OE direction. Common deformational features are shear zones, faults and folds. Exposed mylonitc ridges reminiscent of deep seated faulting are found. Major deformational directions are NW-SE, and NE-SW. These constitute a conjugate pair and align with major fluvio-tectonic features in the country. Stereographic analysis of conjugate faults reveals principal paleostress directions in the E-W and N-S, with low angle plunge. The sense of slip of faults is mainly lateral. Lineament patterns are consistent with satellite imagery observations. Investigation of major deformational directions for possible mineralization is suggested.

KEYWORDS: Granites, shear zones, faults and folds.

INTRODUCTION

The study area lies within longitudes 13:10 to 13:15 E, and latitudes 10:24 to 10:30 N (Fig.1). It is part of Hawal Basement Complex, Nigeria's northeastern exposure of Precambrian rocks which is relatively the least investigated of the country's geological terrains. However in recent times research/publications on the geology, hydrogeology and tectonics of the region have been made by Obiefuna et al. (1997), Bassey et al.(1999), Adekeye and Ntekim (2004), Bassey (2005), Bassey (2006), Bassey and Dada (2006). There is still more to investigate on the geology of the area. The present work is an attempt to bring to light mainly the structural elements of Uba area. The motivation for this work came while the author was examining topographic and satellite maps over the area and noticed a striking alignment of a chain of about ten hills along a N30oE direction over a distance of about 13 km.

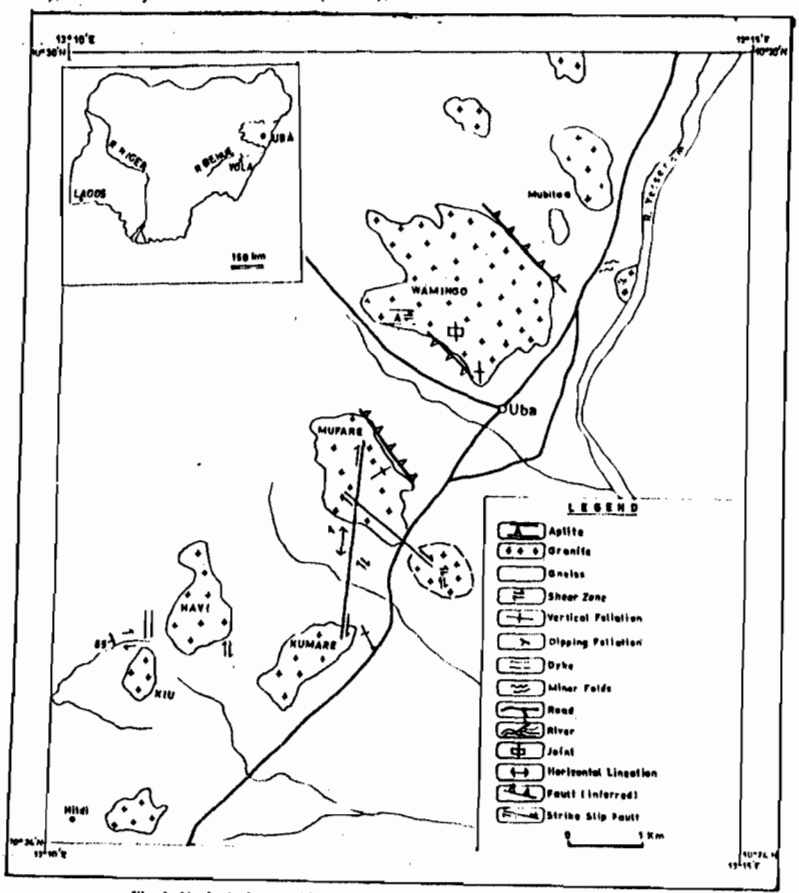

Fig. 1: Geological map of Uba Area, inset: map of Nigeria showing the location of Uba in Hawal Basement.

N. E. Bassey, Department of Geology, Federal University of Technology, P.M.B. 2076, Yola, Nigeria

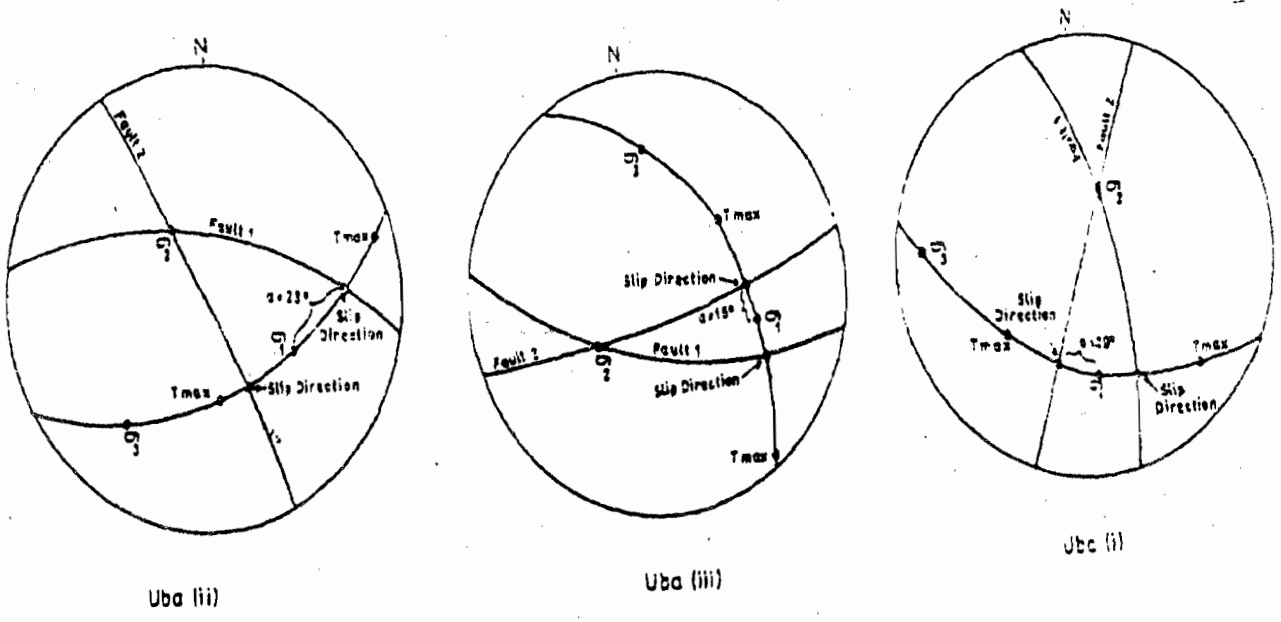

Fig.6: Stereograms of conjugate faults for paleosress analysis in study area.(after Bassey,2005). Symbols used are explained in Ragan (1973).

TABLE 1:Principal paleostress orientations from conjugate faults on granite in Uba Area (culled from Bassey,2005)

S.N	Conjugate faults		Orientation of principal stresses			Direction of slip of fault	Sense of slip
	Strike	Dip	1	2	3		
ai)	N168OE	65OW	N175OE,38OS	N20OE,50OE	N85OW,11OW	N153O,30OS	Mainly strike slip,with normal component
aii)	N20OE	90O				N160OW,38OS	
bi)	N110OE	60ON	N102OE,34OS	N108OW,48OW	N8OE, 22ON	N126OE,25OS	Mainly strike slip.
bii)	N85OE					N94OE,40OE	
ci)	N4OE	50OE	N105OE,32OS	N26OW,45ON	N133OW,26OS	N83OE,17OE	Lateral slip with normal component.
cii)	N60OE	84O				N144OE,44OS	

Summary: The direction of slip of faults in the area is mainly NW-SE, while fault type is mainly strike slip involving horizontal movement. The maximum principal paleostress orientations (1) are E-W and N-S, at low angle plunge. The minimum principal paleostress orientations are E-W, N-S and NW-SE at low angle of plunge.

Results of stereographic studies of of conjugate faults show that faulting in the area is probably largely of strike slip nature, with the direction of slip, NW-SE. This confirms the inferred faults. The principal paleostress directions are E-W and N-S.

E – W deformation seems to be the latest in the area since NW-SE, and N – S structures are affected by E – W structures. Along the SW flowing river near Kiu hill, the porphyroblastic granite with foliation along N160oE is sheared/faulted along N900E direction. N – S trending quartz – feldspatic bodies are affected by E – W shearing at Kiu hill. At Wamingo hill an E –W aplite dyke is sheared along N1100 E (WNW – ESE). N – S, and NE – SW shearing are also found on this dyke and possibly represent late phases of Pan African deformation.

CONCLUSION

The present work has attempted to put together newly acquired structural data over part of a central region of Hawal basement. The rocks in the area have been migmatized, folded, faulted and sheared mainly along N-S, NE-SW, and

NW-SE directions. The NW-SE tectonic direction is promiment in the study area and constitutes a conjugate pair with the NE-SW tectonic direction. They are part of a countrywide system of conjugate fracture/fault system. Prominent among them is that which defines the flow directions of the Rivers Niger and Benue (Fig.1). Lead and zinc mineralizations are found within the adjoining NE trending Benue Trough, hence the deformational direction observed in this study should not be ignored in any economic geological investigation programme in the area.

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