Tectonic Synthesis of Structural Data from Uba Area in Hawal Basement, NE Nigeria

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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 N300E direction. Common deformational features are shear zones, faults and folds. Exposed mylonitic 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 palaeostress 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 Obiehuna 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 N300E direction over a distance of about 13 km.

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

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Fig. 6: Stereograms of conjugate faults for paleostress 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)

<table>
<thead>
<tr>
<th>S.N</th>
<th>Conjugate faults</th>
<th>Orientation of principal stresses</th>
<th>Direction of slip of fault</th>
<th>Sense of slip</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strike</td>
<td>Dip 1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>a)</td>
<td>N1680E</td>
<td>N1750E,38OS, N2000E,500E</td>
<td>N850W,110W</td>
<td>N1850E,30OS</td>
</tr>
<tr>
<td>b)</td>
<td>N1100E</td>
<td>N1020E,34OS, N1020W,480W</td>
<td>N800E, 220W</td>
<td>N1200E,250S</td>
</tr>
<tr>
<td>c)</td>
<td>N850E</td>
<td>N1050E,32OS, N260W,450N</td>
<td>N1300W,280S</td>
<td>N830E,170E</td>
</tr>
<tr>
<td>d)</td>
<td>N800E</td>
<td>N1050E,32OS, N260W,450N</td>
<td>N1300W,280S</td>
<td>N1440E,440S</td>
</tr>
</tbody>
</table>

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 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 later 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 N1600E is sheared/sheared 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 (WWW - 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 Waller basin. The rocks in the area have been migmatized, folded, faulted and sheared mainly along N-S, NE-SW, and
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NW-SE directions. The NW-SE tectonic direction is prominent 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.

REFERENCES


