Geophysical Research Abstracts
Vol. 12, EGU2010-6759, 2010
EGU General Assembly 2010

New geological and tectonic map of Paleoproterozoic basement in western Burkina Faso: integrated interpretation of airborne geophysical and field data

Vaclav Metelka (1,2,3), Lenka Baratoux (1), Mark Jessell (1), and Seta Naba (4)

(1) IRD, Université Toulouse III, UMR 5563, UR 154, LMTG, 14 av E. Belin, 31400, Toulouse, France (metelka@lmtg.obs-mip.fr), (2) UGP, Charles University in Prague, Albertov 6, 12843, Prague 2, Czech Republic, (3) Czech Geological Survey, Klarov 3, 11821, Prague 1, Czech Republic, (4) Département de Géologie, Université de Ouagadougou, Burkina Faso

The recent acquisition of regional scale airborne datasets over most of the West African craton sparked off a number of studies concentrating on their litho-tectonic interpretation. In such polydeformed terrains, where outcrop is very sparse or virtually nonexistent due to the presence of thick lateritic cover, geophysics and specifically geomagnetic surveying provide a wealth of information that facilitates the deciphering of regional litho-structural hierarchies. A revised geological and tectonic map of the Houndé and Boromo greenstone belts was derived by interpretation of aeromagnetic and gamma-ray spectrometric data constrained by field observations where available.

Medium resolution geophysical data gridded at 250 meters acquired during the SYSMIN project served as a basis for the interpretation. This dataset was integrated with the SRTM digital elevation model and over 600 field observations. Furthermore, the BRGM/BUMIGEB SYSMIN project outcrops database (Castaing et al., 2003) as well as older outcrop maps, maintained by BUMIGEB, were used. Locally, outcrop maps and high resolution geophysics provided by mining companies (Orezone, SEMAFO, Volta Resources, Wega Mining) were employed. 2-D geophysical inversion modeling in GM-sys software using the ground gravity and airborne magnetic data was applied to three selected E-W profiles.

Principal component analysis (PCA) of magnetic and radiometric data was a powerful tool for distinguishing different lithological units, in particular tholeiitic suites of basalts and gabbros and various volcano-sedimentary units. Some of the granite pluton limits can be traced as well using the PCA; however thick lateritic cover substantially hinders precise mapping. Magnetic data used on its own gave better results not only for granite limits but also for determining internal structures such as shear zones and concentric compositional zoning.

Several major N-S to NNE-SSW oriented shear zones, representing most probably deep crustal structures were identified, some of them previously unreported. The western-most one runs through the eastern margin of the Banfora belt, continues eastwards through to Houndé belt and defines the northern limit of the Boromo belt. Regional stitches of airborne magnetic data at the craton scale show that this structure continues southeastwards to Liberia, attaining over 1000 km. Another shear zone, one of the newly discovered major structures, is NNW-SSE oriented and it affects granitoids between the Banfora and Houndé belts, joining the N-S trending shear zone limiting the Hounde belt in the west. Tarkwaian type metasediments occur as cca 400 km N-S oriented quasi-continuous unit located in the easterly part of the Houndé belt and they are limited on both eastern and western sides by regional scale shear zones. Finally, the Boromo belt is affected along all its length by a connected system of anastomosing subvertical shear zones, some of them representing the limit between the greenstone and granitoids. Additionally, tight isoclinal folds in the Houndé belt indicating E-W compression during the Eburnean orogeny are clearly visible on the PCA image. Interpreted structures are in a good accordance with the meso-scale structures measured in-situ.

Castaing, C., Billa, M., Milési, J.P., Thiéblemont, D., Le Mentour, J., Egal, E., Donzeau, M. (BRGM) (coordonnateurs) et Guerrot, C., Cocherie, A., Chevremont, P., Tegyey, M., Itard, Y. (BRGM), Zida, B., Ouedraogo, I., Kote, S., Kabore, B.E., Ouedraogo, C. (BUMIGEB), Ki, J.C., Zunino (ANTEA), 2003. Notice explicative de la Carte géologique et miniére du Burkina Faso à 1/1 000 000.