Geophysical Interpretation in the Goren Region, Burkina Faso, Africa

IM2.7

L. Zerbo, P. Andrieu Universite P&M Curie, France; Y. Albouy, ORTOM, France;*
P. Keating, Geological Survey of Canada; J.O. Cavin and T.B. Yanogo, PNUD-Burkina

ABSTRACT

This study is part of a larger survey flown as part of a project of the United Nation Development Program (UNDP) in Burkina Faso. A combined aeromagnetic and time-domain electromagnetic survey (GEOTEM) was flown by CGG-GEOTERREX. The survey covers an area of 372 000 km^2; a similar survey adjacent to the first one was later done for the Mining Bureau of Burkina Faso (BUMIGEB). After delivery of the raw data and the preliminary maps, ground follow up and geophysical modelling were carried out. It soon became clear that it was necessary to develop new interpretation techniques. Using the geophysical data acquired in Goren, new data processing and interpretation techniques have also been used to increase the benefits of the airborne survey.

GEOLOGY

The Goren area is located 100 km to the north east of Ouagadougou. It is part of the Boromo Birrimian trough. A preliminary map of the geology was compiled prior to the airborne geophysical survey. From the southwest to the northeast, an intrusive granite, basic, neutral and acid metavolcanics wrapped around the granitic intrusion and volcano-sedimentary deposits are observed.

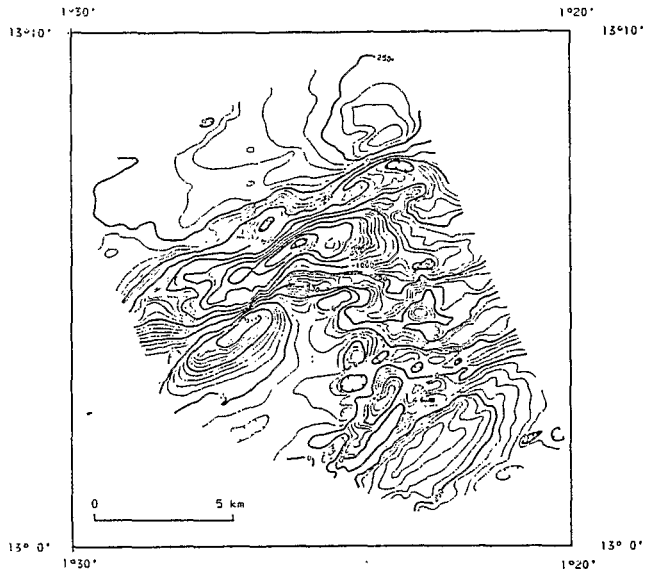
AEROMAGNETICS

The magnetic total field map confirms the general geological picture and provides information on additional features. The boundaries between each unit are rather sharp and interesting anomalies occur close to them. Short wavelength anomalies are also present. Reduction to the pole of this map has been successfully carried out in spite of the very low geomagnetic latitude (6°N). Vertical gradient maps have also been computed. They enhance short wavelength anomalies within the metavolcanics and the volcano-sedimentary units.

Automatic 3D depth determination has also been applied (Euler deconvolution). Shallow and deep features are well clearly indicated and delineated.

AIRBORNE EM RESULTS

Of the two EM maps which were initially produced (channel 8 amplitude and anomaly locations), only the first one can be used for geological interpretation. Two additional maps were therefore produced: channel 16 amplitude (13



Total magnetic field of the Goren region. Field inclination is 4°, flight lines are 250 m apart and oriented 155° E. Flight height was 120 m above ground.

microseconds after turn off of the GEOTEM primary pulse) which is mostly sensitive to near-surface features and a time constant map. All three maps show very similar features which corroborate the results from aeromagnetics. The main contacts between the geological units and additional contacts within the mapped geological unit are clearly outlined. These structural features are the most important benefits from the airborne survey. They had therefore to be identified and confirmed on the ground by geologists with the help of ground follow up geophysical techniques.

GROUND FOLLOW UP

The classical objective of ground follow up, after a GEOTEM survey, is a detailed study of priority targets as defined by airborne geophysics. In a location like Burkina Faso, priorities must be defined by the geologists from the structural information obtained from the airborne geophysics; they cannot be established automatically from the GEOTEM results alone.

It is shown from experience and from modelling that the classical ground techniques (DC, IP, Max-Min and Magnetics) can be successfully used for:

a) Discrimination between horizontal, intra-formational conductors, and conductive mineralization;

b) Aiding geological mapping and to the understanding of the local structural features to help in the discovery of mineralization with no magnetic or electromagnetic signature.

c) Determination of the geometry and the characteristics of the mineralized bodies.

CONCLUSION

In conclusion, it is clear that the combination of airborne magnetics and electromagnetics is a powerful tool for geological and especially structural mapping for indirect mineral exploration in an environment similar to Burkina Faso. It is also clear that the new processing and interpretation techniques especially developed have begun to adapt GEOTEM and ground follow up to such an environment.

Society of Exploration Geophysicists

Expanded Abstracts with Biographies

1993 Technical Program

These abstracts have not been edited for technical content or to conform to SEG/GEOPHYSICS standards. They appear here in the form submitted by their authors.

63rd Annual Meeting
and International Exhibition

September 26-30, 1993/Washington, D.C.