

O10-4**THE STRUCTURE OF THE OPHIOLITIC BELT IN ALBANIA
INFERRED FROM GEOMAGNETIC ANOMALIES****I. KANE**¹, **G. N. TSOKAS**¹, **D. KONTOPOULOU**¹ and **S. BUSHATI**²¹ Geophysical Laboratory Aristotel University of Thessaloniki 54006 Thessaloniki, Greece

E-mail: ilir@lemnos.geo.auth.gr

² Center of Geophysical and Geochemical Enterprises, Tirana, Albania.

The Mirdita ophiolite nappe belongs to the Mirdita tectonic zone of Albania and forms the orogenic lid of Albanides that overrides the essentially sedimentary Korabi and Gashi nappes (Melo 1986). The ophiolites show extensive outcrop and comprise the main subsurface magnetic structures in Mirdita zone. They generate a very distinguishable magnetic anomaly (Angelopoulos and Bushati 1993). The ground total magnetic field data acquired in various campaigns in Albania during the period 1990-1993 were processed and a unique map was compiled after reduction to the epoch 1990.4. The distribution of data point is not even in some areas because of the rugged topography of the country.

The magnetic anomalies in Albania appear elongated along the known ophiolitic belt, which trends NE-SW to the north and NW-SE to the south. The belt is 30 to 50 km wide and it is composed by two parts; the Eastern and the Western belt. The belts are discernible lithologically (Shallo 1992). The Albanian western ophiolitic zone have been formed during Middle-Upper Jurassic oceanic spreading followed by a phase of intraoceanic subduction during the Upper Jurassic. At the later phase the eastern ophiolitic zone was formed (Shallo 1992, Kodra 1993). Both belts are continuing under the central synclinorium, which is filled by thick volcanics and post Jurassic sediments (Bushati 1988, Frasherri 1991).

The highest positive anomalies are above the ophiolitic massifs of Kukesi, Lura and Bulqiza,. The Puka massif is characterized by strong positive anomalies of small wavelength. At the Shebeniku massif, the anomaly is smaller. In the east, over the volcano sedimentary series the anomaly has negative values.

Moderate level anomalies with dominant low wavenumber anomalies are observed over the sedimentary basins of the Quaternary depression of Mirdita zone like the Burreli basin. This is the evidence of the continuity of the ophiolites under these basins. Further, the magnetic anomaly belt is separated in northern and southern part by a corridor, which coincides with Shengjergji flysch corridor. It begins in Korabi and continues through Dumre even further to south-west. It seems that it is associated with the important Diber-Elbasan-Lushnje transversal structural fault.

In order to clarify the magnetic anomaly map and obtain some information on the sources, different processing techniques were applied to the homogenized data set. So the data set was subjected to IGRF removal, wavenumber filtering, reduction to the pole, upward continuation and "terracing" transformation. Also the derivatives of the field were computed. Low pass filters and upward continuation were performed to filter out the high frequency components which are generated from relief sources of small areal extent. Reduction to the pole is applied to shift anomalies so that they are centered above their causative sources. The "terracing" inverse method is applied to delineate the lateral extension of the sources (Cordell and McCafferty 1989). Horizontal and vertical derivatives of the field are calculated in order to make clear the lateral extent of the sources and the surface sources respectively.

Some rock samples were collected from the most representative outcrops of the ophiolitic rocks in order to study their magnetic properties (magnetic susceptibility and remanence). These results were used as reference values when modeling was attempted. Thus, modeling was constrained by the values of the magnetic properties, the lateral extent of the magnetic sources inferred from "terracing", by the regional

geology and the former geophysical studies. Forward modeling was performed using a 2.5D inversion technique in profiles perpendicular to the ophiolitic belt.

Neogenic molasse thickness reaches about 1500 m depth. The eastern ophiolitic part of the northern section has the greater depth extent. It has the greater extent to the Kukesi and Lura massifs where the depth is about 12 km. The magnetic sources have small depth extent in the western belt of this section. For example, to the area of Gomsiqe massif, the depth extent do not overcome 3 km. So there is an abrupt change of the depth extent in the northern section from the western to the eastern belt. In general, the depth extent of the eastern belt is going smaller from north to south. However, in the southern part the depth extent of the eastern and western belts is the same.

Acknowledgement

This paper was done on behalf of the Seis-Albania project (No 972342) in the framework of the N.A.T.O. "Science for Peace" program.

References

- Angelopoulos A. Bushati S. "Unification of Gravity, Magnetic, Radioactivity of Albania, Greece and other Balkan's" Final Report CGGE Tirana, Albania (1993).
- Bushati S. Regional study of gravity field scattering in the inner Albanides, for the tectonic and mineralogenic regionig" MSc. Thesis. Geophysical Enterprise Tirana, Albania (1988)
- Cordell L. and McCafferty A.E "A terracing operator for physical property mapping with potential field data" *Geophysics* **54** (1989) 621-34
- Fraseri A. Nishani P. Bushati S. Hyseni A. "Geophysical study of the Albanides" *Bolletino di Geofisica Teotica ed Applicata* Vol **XXXVII** (1995)
- Melo V., "Gjeologjia strukture dhe evolucioni gjeotektonik i Albanideve", Universiteti I Tiranes (1986)
- Shallo M., "Geological evolution of the Albanian ophiolites and their platform periphery." *Geologische Rundschau* **81/3** (1992) 681-694