

**P9-6**

**INTEGRATED GEOPHYSICAL-GEOLOGICAL-  
GEOCHEMICAL METHODS FOR SULPHIDE  
MINERALIZATION EXPLORATIONS AT PERLAT-SHEBE-  
KULLAXI AREA, MIRDITA OPHIOLITE ZONE, ALBANIA**

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Very detailed integrated geological-geophysical and geochemical surveys have been carried out continuously over the past 20 years, in searching for and exploring sulphide ores in the volcanics of central Mirdita ophiolites (Albania).

It is widely accepted that Albanian ophiolites are divided into two NNE-trending subparallel belts, the eastern ophiolite belt and the western one. The eastern ophiolite belt, consisting mainly of low-Ti basalts, basaltic andesites and dacites (rhyolites) underlain by sheeted dike complex, and the western ophiolite belt of volcanics with high-Ti of MORB affinity.

These surveys already documented that the volcanics are the major host rocks of substantial copper-sulphur and gold mineralizations.

The investigated area consists of igneous and sedimentary rocks affected by reverse and thrust faults. The volcanic rocks are sub-divided into two sequences: a) the lower and, b) the upper sequence.

a) The Middle-Upper Jurassic lower andesite basalt sequence consists mainly of pillow lavas and occasional massive flows, and is about 500 m thick.

b) The upper Jurassic andesite basalt pyroclastic sequence, about 400 m thick, consists mainly of pyroclastic rocks and occasional pillow lavas.

Volcanics rocks are underlain by scarce sheeted dike complex injections and quartz-diorite, gabbro and ultrabasic plutonics.

The Upper pyroclastic sequence is followed by a 1 to 10 m thick Upper Jurassic hematite radiolarian chert, which in turn is overlain by Upper Jurassic-Lower Cretaceous "heterogeneous colored melange", a "block-in-matrix-type" set in argillitic matrix, approximately 300 m thick.

### **Sulphide Mineralization**

The study area belongs to a northeast-trending, 40 km long, Qafe Mali-Perlat belt, where up to now are recognized: Rrenjolla, Kullaxhiu and Perlati sulphide deposits, hosted by volcanics, being located Rrenjolla in lower pillow lavas sequence, whilst Perlati and Kullaxhi deposits in Upper pyroclastic sequence.

At Rrenjolla deposit, already mined, have been discovered about 0.1 $\eta_d$  of copper-zinc-gold and pyrite ores; at Kullaxhi are calculated about 0.25  $\eta_d$  of copper ores.

The biggest deposit recognized up to now, is Perlati deposit, with about 4 Mt drill proved reserve of copper-pyrite ores. The orebodies are located along a N 30<sup>0</sup> E trending, 2 km long axis, very restricted in width (about 150 m) averaging 2% Cu, whilst pyrite ores, have about 40% S and 0.1 to 2% Cu.

The deposit is located at a highly thrust area. Within volcanic are proved three thrusting planes, enlarging prospective for finding new ores. Also gabbros and ultrabasic are over thrust on volcanic as well as on melange.

As geochemical prospecting method was applied mainly soil geochemistry, with determinations of Cu, Zn, Au, and Ag, with special emphasis in the gossans.

### **Methods of Geophysical Investigation**

Geophysical prospecting was conducted from 1973 year through 1997 over an area of 80 Sq km, but focused mainly around Perlati deposit during which Self Potential (SP), Induced Polarisation (IP), and Electrical Apparent Resistivity (EAR) methods were applied, enabling us to compile an IP anomaly map.

### **The Issues of Geoelectric Surveys**

In geophysical point of view, the wallrocks are both, anisotropic and heterogeneous, with intercalation of volcanics rocks and a high conductive melange.

Melange, being itself as a high conductive substance of electric current, performing as a “screen”, decreasing much the depth of searching as well as signal/noise ratios.

To overcome these obstacles, a high power transmitter and a high sensitivity receiver (IPC-715 kw, IPR-10) produced by SCINTREX, Canada, improving signal/noise ratio, was used.

The data obtained in the field were composed to a mathematical-physical pattern of electrical field dispersion.

Due, to the almost horizontally stretching of orebodies, the survey was carried out with a V.E.S-IP schemes, with the length of transmitter lines varying from  $AB/2=15$  m to  $AB/2=1500$  m, within a grid  $200 \times 100$  m.

In total, relying in integrated exploration more than 90%, of drill proved anomalies, have encountered “sulphide zones” and in 46 cases are intersected economic orebodies, whilst at Perlati deposit, about 96% of holes have encountered “sulphide zones” from which 66% have intersected economic orebodies.

At southern Perlati deposit, are delineated two additional areas of anomalies, the first one extending  $800 \times 600$  m, with IP coefficient  $9\% \eta_d$ , and the second one  $400 \times 400$  m, with IP coefficient  $8\% \eta_d$ , with two holes amidst, with  $9\%$  and  $16.6\% \eta_d$ , respectively.

At northern part of Perlat deposit, and in the western of Rrenjolla deposit, is delineated also an IP anomaly axis, not yet proved by drillings. The possibility for finding new ores, exist also, between Kullaxhi deposit and Perlati at Tutriq-Vjollce sector, where are obtained some promising data for copper-zinc and gold ores.

The integrated geological-geophysical and geochemical prospecting needs to continue to enlarge sulphide resources of the area.