O7-3 CASE HISTORIES OF THE APPLICATION OF GEOPHYSICAL METHODS TO CHROMITE EXPLORATION IN THE BALKANS

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Ultramafic rocks are fairly widespread the Balkans and chromite is quite definitely of economic importace to several countries in the region. The geological conditions under which chromite occurs are so complex and uncertain. Furthermore, the physical and chemical proprieties of chromite are such that it does not easily lend itself to the indirect prospecting methods commonly applied to other ores. This paper presents a review of the published literature on the subject. The purpose is to decribe by example the application of geophysical methods to the search for chromite in several countaries of the Balkan.

Turkey. Turkey has been a major chromite producing countary for many decades. The first magnetometer survey for chromite ore deposits in Turkey was carried out at the Guleman mine in 1941. Positive vertical anomalies of more than 1.000 nT were measured over the outcropping ore bodies. During the summer of 1951, M.T.A. undertook a joint gravity and magnetometer survey at the old chromite mines in Mugla. Positive vertical anomaliesof the order of 2000 nT or more were encountered over chromite outcrops. Several other magnetic anomalies were obtained. Drilling on one of the anomalies gave succesful results. Gravity anomalies were also observed over the two ore bodies that gave magnetic anomalies. (Ergin, 1952). From 1952 to 1954 gravity and magnetic surveys were made in Turkey to dicover new chromite reservesin a region rugged topography and complicated geology (Yungul, 1956). The auther shows that gravity prospecting is a more promissing technique for locating relatively large chromite masses, even in rugged topography, than might have been expected. The terrain corrections, which constitute the major part of the computations, and a significant source of geologic noise, must be simplified and it is important that the correct surface densities be employed.

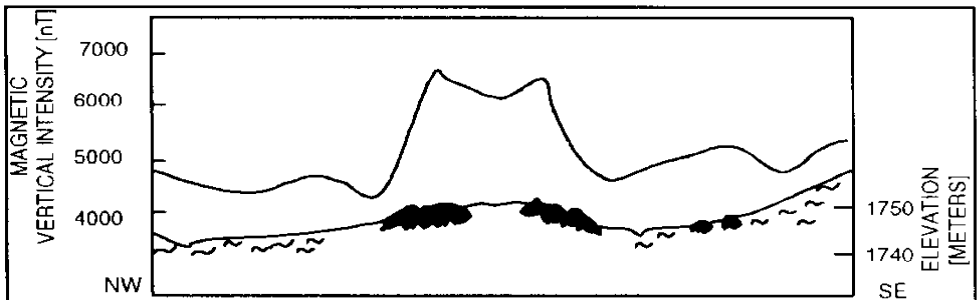

Fig 1. Magnetic profile and geomagmetic cross section, Herpit Yayla Turkey

Greece. Greece is covered by a considerable nýmber of large peridotite-serpantine masses, most of which contain chromite. The systematic geological and drilling work in the mountainous block of Vourinos is the first of its kind ever undertaken in Greece. Field work near Kozani was started in the autumn of 1952. The most interesting chromite deposits in the Vourino-Ftambouro range are undoubtedly the chromite schliren plate chromite deposit in Xerolivado. Thanks to geophysical survey, however, it was possible to follow it for 150 m. more. Thus, this chromite ore was found to be the largest in Greece. The observed magnetic anomalies were exclusively due to the strongnatural remanent magnetisation of chromite, which has different and, in most cases opposite direction to that of the present geomagnetic field.

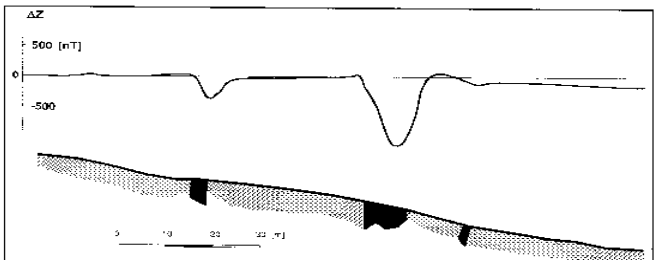

Fig2. Geomagnetic profile above the occurances of the chromite ore body. Xerolivadon, Greece. (after; Zachos, 1953)

Albania. An astounding and a generally little known feature of Albania is that it is prominent producer of chromite. Ultramafic massifs countain numerous chromite deposits some of them are world-class deposits in terms of extension and grade. The ultramafic massif of Bulqiza, is the most important chromite bearing one. Surveying a surface of about 120 square lilometers (30% of massif's area) in that massif with intergrated geophysical methods a consireable number of targest has been discovered (more than 35), from which some are already objects under mine activity. In the intergrated methods for chromite exploration in Albania are included: geological, gravity, magnetic and electical mapping of the scale 1:2000 with survey grids 40 x 20 m. 20 x 5 m. Based on the interpretations of geophysical exploration were projected drillings which led to the discovery of some big ore deposits.

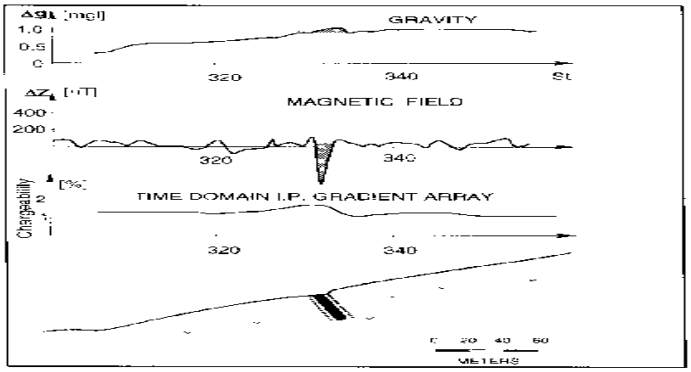

Fig 3. Geophysical results and geologic section Tropoja ultramafic massif, Albania

Yugoslavia. In Yugoslavia during the past decades, various geophysical methods gravimetry, magnetics and IP ought to be mentioned. Gravity has been carried out mainlyover known deposits. Measurements have shown distinctive anomalies. Most of the Yugoslav chromite deposits are in seep mountainous regions, so that is of particular importance to take necessarry topographical corrections. Induced polarisation. Attempts have been made at the application of IP in Radusa district. Measurement taken over known ore bodies have shown that the slightest chromite polarisation gives rise to interesting anomalies. Magnetics is also included in prospecting for chromite in Yugoslavia. Radusa Reka was explored and partly mined from 1924-1934. An outcropping ore body with a length of meters and a maximum width of 5 meters was mined, which was accompanied by several small orebodies along the strike and down dip. The known kength of strike of the ore zone was more than 140 meters. In 1948, Professor O.Meisser carried out a magnetic survey. He found a positive anomaly to +600 nY and a negative anomaly of –480 nT. The ore body were situated within the area positive anomaly.

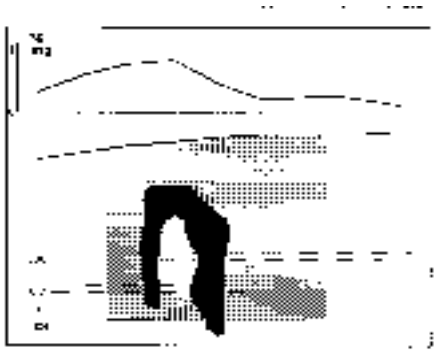

Fig 4: Gravimetric profile over a known choromite ore body. Yugoslavia.

Conclusions

Balkan is a metalogenic provice where chromite is a largely encountered. Although it is considered that the exploration of the chromite ore bodies of alpine-type ultramafics is a task with a low possibility for succes, geophysical methods may be useful under favourable conditions. The succes and failure of the individual methods vary, according to circumstances. As it stressed by many authers the keystone to the succes of study is frequent substantive dialogue among geologists, geophysicist and geochemists.

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