Ultramafic rocks are fairly widespread the Balkans and chromite is quite definitely of economic importance to several countries in the region. The geological conditions under which chromite occurs are so complex and uncertain. Furthermore, the physical and chemical properties 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 describe by example the application of geophysical methods to the search for chromite in several countries of the Balkan.

**Turkey.** Turkey has been a major chromite producing county 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 anomalies of 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 successful 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 discover new chromite reserves in a region rugged topography and complicated geology (Yungul, 1956). The author shows that gravity prospecting is a more promising 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.

**Greece.** Greece is covered by a considerable number of large peridotite-serpentine 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 schliere 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 strong natural remanent magnetisation of chromite, which has different and, in most cases opposite direction to that of the present geomagnetic field.

**Fig 1.** Magnetic profile and geomagnetic cross section, Herpit Yayla Turkey
Albania. An astounding and a generally little known feature of Albania is that it is a prominent producer of chromite. Ultramafic massifs contain numerous chromite deposits, some of which 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 kilometers (30% of massif's area) in that massif with integrated geophysical methods, a considerable number of targets has been discovered (more than 35), from which some are already objects under mine activity. In the integrated methods for chromite exploration in Albania, geological, gravity, magnetic, and electrical mapping of the scale 1:2000 with survey grids 40 x 20 m, 20 x 5 m. Based on the interpretations of geophysical exploration, some drillings were projected which led to the discovery of some big ore deposits.

Yugoslavia. In Yugoslavia during the past decades, various geophysical methods, gravimetry, magnetics, and IP, ought to be mentioned. Gravity has been carried out mainly over known deposits. Measurements have shown distinctive anomalies. Most of the Yugoslav chromite deposits are in steep mountainous regions, so that it is of particular importance to take necessary 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 length 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 was situated within the area positive anomaly.
Conclusions

Balkan is a metalogenic province where chromite is 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 success, geophysical methods may be useful under favorable conditions. The success and failure of the individual methods vary, according to circumstances. As it stressed by many authors the cornerstone to the success of study is frequent substantive dialogue among geologists, geophysicists and geochemists.

References