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# China's Progress in Prospecting for Concealed Deposits by Applying Geo-electrochemical Method

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A new method referred as Geo-electrochemical method (Uniform commercial code: Chastichnoe Izvlechennye Metallov, or CHIM) has been invented to detect ore deposits, especially the deep concealed ore deposits. CHIM is a geo-electro-chemical extraction method for collecting dynamic ions by placing appropriately prepared electrodes in the effective soil area and applying direct-voltage (Luo, 1996; Luo et al., 2013). While its beginning was in the USSR in the 1930s, it was not until that the early 1970s that it was really developed by Ryss, Goldberg and others at the All-Union Research Institute of Exploration Technology at Leningrad (Luo et al., 2013).

In the mid-1970s, a series of experiments on CHIM were designed to apply this method in China, which featured a low current power supply and obtained better results. Their research papers were published in the 1980s (Fei, 1984, 1992; Xu et al., 1989).

In order to encourage the use of this method in China for geochemical exploration, Cui Linpei and Xu Kangle were requested to describe CHIM to Chinese Institute of Geophysical and Geochemical Exploration, after the Asia-Pacific Regional Geophysical and Geochemical Meeting in the early 1980s. Gao Yunlong et al designed the instrumentation equipment of this method based on the research results of USSR.

Gao et al introduced several types of Electric Field Control Meter and patented products to the Chinese geophysical and geochemical community in 1986. Geo-electro-chemical Exploration was being translated into Chinese versions by Zhang and Cui (1986), which greatly facilitated the execution of Geo-electro-chemistry study in China. Upon the foundations of electrolytic technology, Fei created equipment which was suitable for field work and characterized by high voltage, low current (Fei, 1992).

Luo began to experiment on the method in 1982. Luo et al created equipment which was suitable for field work and characterized by low voltage, dipole, lightweight, high efficiency, low operation cost, and easy to carry (Luo, 1996, 2013). Technical specification of geo-electro-chemical method is as follows: 1) the receiver for depositing ions includes two carbon rods with strong conductive ability and sponges without impurities 2) technical parameters of geo-electrochemical method: 9 volt battery, 1 meter polar distance of geo-electrochemical extraction, extract liquid of 15% nitric acid, 48h power supply time. A number of case studies (Fig. 1) have demonstrated that many concealed orebodies were found by recognizing their geo-electro-chemical extraction anomalies. These results show that geo-electro-chemical extraction technique can detect concealed metallic mineralisation (e.g., copper, lead, zinc, tin, gold, silver, arsenic and antimony) in various landscapes and climatic environments (e.g., loess, soil, sandy dune, transported and residual overburden in arid and semi-arid regions) (luo, 1996; Luo et al., 2013).

According to the basic electrochemical properties of ionic solutions and theory of DC electric field, Li and Lu et al have made research analysis, including ionic mobility, ionic electric transference, transference time, transference, transference mass and time-capacity curve (Li, 1992; Li and Lu, 1993; Li et al., 1998). Other scholars (Liu, 1993; Liu et al., 1998; Tan and Cai, 2000; Wang et al., 2000) have reported the presence of geo-electro-chemical anomalies spatially related to mineralization in China.

Due to the short history of development of CHIM, however, there are many challenges including: modeling the mechanisms of the geo-electro-chemical process for particular ores, migration dynamics of various positive ions in the regolith environment and the relationship between power supply, extraction capacity and detection depth (Luo et al., 2013).

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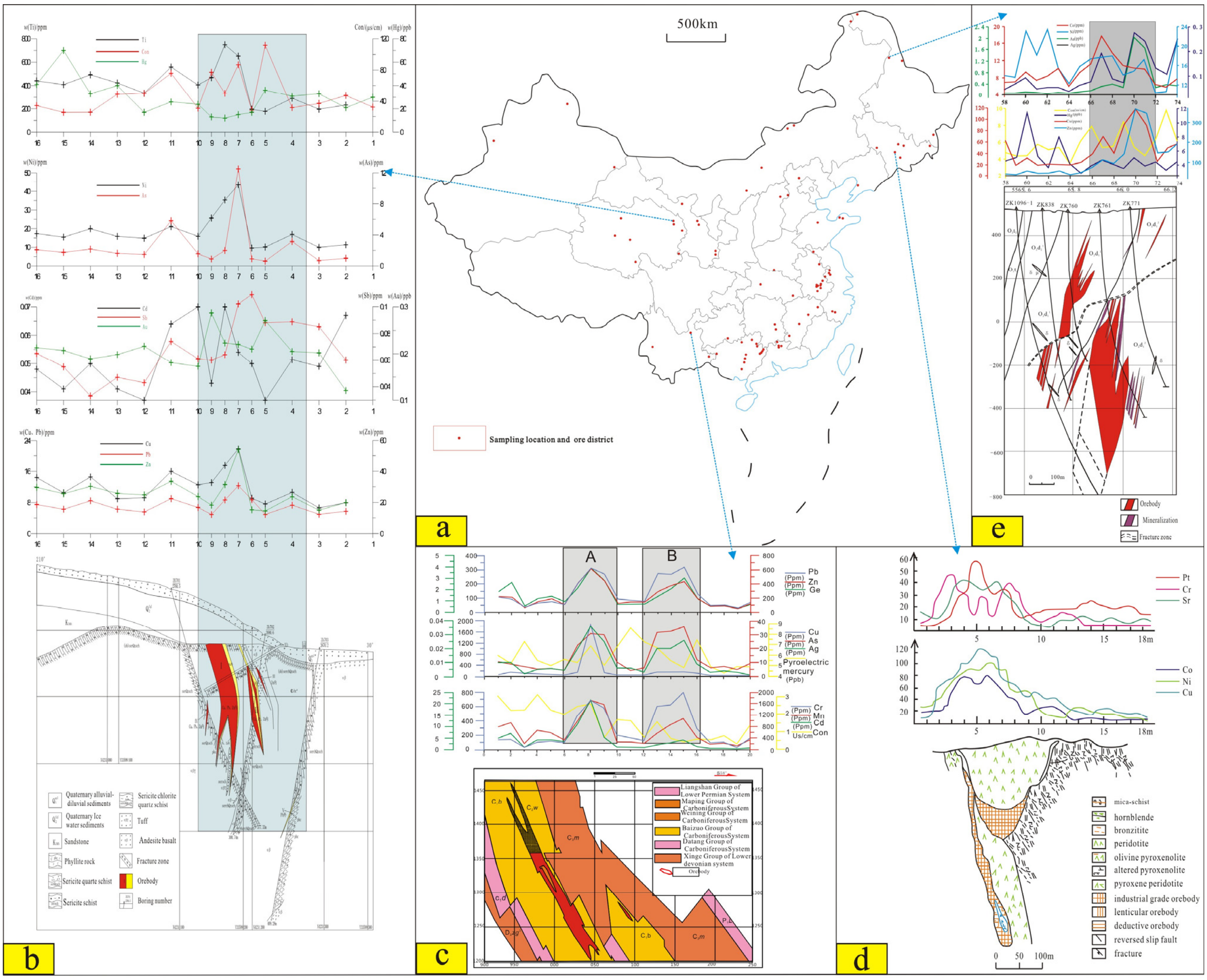


Fig. 1. Simplified maps showing (a) the location of the Sampling Stations (b) cross-section 7 of anomalies of geoelectro-extraction in Gadaban copper deposit, Qinghai (c) cross-section 90 of anomalies of geoelectro-extraction in Huize lead and zinc deposit, Hunnan (d) cross-section 20 of anomalies of geoelectro-extraction in Hongqiling copper-nickel deposit, Jilin (e) cross-section 1096 of anomalies of geoelectro-extraction in Tongshan copper deposit, Heilongjiang

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