



## Geochemical pattern of Pb-Zn mineralization in central part of Sanandaj-Sirjan Zone of Zagros Orogen and verifying new promising target area

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### **Abstract:**

The Sanandaj-Sirjan Zone (SSZ) is a magmatic-metamorphic belt with NW-SE trends which extends over 1200 km length and is located between the Urmieh-Dokhtar volcanic belt to the northeast and the Tethyan ophiolite zone of Zagros in the southwest. The SSZ formed in the late Cretaceous due to closure of the Neo-Tethys and subsequent collision of the Arabian-Iranian plate. It is a major metallogenic zone in Iran, containing lead and zinc, copper, iron and gold mineralization. Based on its metallogenic characteristics, SSZ can be divided in the northern, central and southern subdivisions. The central subdivision is a well known Pb-Zn mining district previously called Malayer-Esfahan Zone. Geochemical sampling and multi-element ICP-OES analysis were carried out on collected representative samples of 104 deposits and prospects, and after preliminary data processing a database was created. We used clustering techniques applied to element distribution for classification of lead and zinc deposits in the central part of the SSZ. The hierarchical clustering technique was used to characterize the elemental pattern and obtained results were put through the K-means and the respective deposits were classified into four distinct categories. K-means clustering reveals that the elemental associations and spatial distribution of the lead and zinc deposits exhibit zoning in the central part of the SSZ. The ratios of ore-forming elements (Sb, Cd, and Zn) vs. (Pb and Ag) show zoning along an E-W trend, while host rockforming elements (Mn, Ca, and Mg) vs. (Ba and Sr) show a zoning along a SE-NW trend. Associations of elements indicate the presence of MVT and SEDEX type mineralization in the central SSZ. Large and medium sized deposits occur mainly in the center of the studied area, which justify further exploration around occurrences and abandoned mines in this



area. New promising areas for future grass-root exploration were introduced for discovering possible target areas for large to medium size ore deposits.

**Keywords:** Pb–Zn deposits, Zagros orogen, Sanandaj–Sirjan metallogenic zone, Cluster analysis, Spatial pattern, Iran