Assessing the performance of BLEG to detect gold anomalies in stream sediment geochemistry (Portugal)

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Introduction

Geochemistry in mineral exploration is of fundamental importance in defining targets. Among several methods, stream sediment surveys are widely used, in the reconnaissance of prospective terrain, to identify anomalous drainage basins for follow up. The BLEG (Bulk Leach Extractable Gold) method is very sensitive for detecting the existence of gold in stream sediment, as well as cost effective and therefore commonly applied.

BLEG exploration programme

Northern Portugal has several geological environments which bear auriferous mineralizations. Gold has been mined in the region since Roman times, and the potential for new discoveries is significant. A stream sediment BLEG sampling programme was carried out to evaluate the potential along the trend of the Régua-Verin Fault system. Due to high rainfall, relatively warm temperature, high water runoff and active erosion, the method was adapted, regarding sampling technique, to the specific conditions of the area.

The BLEG assays were first subject to multivariate analysis which has shown two uncorrelated groups. One comprised by Cu, Pb and Zn and the other by Au (Ag, As), which conforms with the mineralization of the area. Geostatistical studies followed aiming to enhance geochemical patterns and trends. Several gold targets were revealed. Since the effectiveness of the new BLEG sampling approach was not known, a procedure to validate its results was applied. It consisted in a target validation process, where anomalous basins were followed up.

Conclusions

Field checking has demonstrated that not only the adapted BLEG method was able to disclose areas with already known mineralization, but also to focus on completely new areas, where the presence of prospective rocks have been later detected.

References

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S, Pb, C and O isotope evidences for deposit genesis in the Huize carbonate-hosted Zn-Pb-(Ag) district, Yunnan, China

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The Huize Zn-Pb-(Ag) district is a typical of the important medium- to large-size, high-grade Zn-Pb deposits in the Sichuan-Yunnan-Guizhou Pb-Zn metallogenic region, which contains seven are large Pb-Zn deposits in the region of northeastern Yunnan. The Huize district contains the Qilinchang (including Dashuijing), Kuangshanchang large-sized deposits, and the Yinchangpo small-sized deposit. Geotectonically, the district is in the south-central region at the southern margin of the Yangtze Craton and in the southern part of the northeastern Yunnan basin. Regionally, it is at the intersection of NE-, SN- and NW-trending tectonic zones between the Xiaojiang fault zone and the Zhaotong-Qujing concealed fault zone. Tectonically, the ore district is in the Kuangshanchang fault and structural zone in the southwestern segment of the Dongchuan-Zhenxiong NE-trending tectonic zone.

These deposits are located above where the basement of the Kunyang Group is composed of the low-grade greenschist-facies metamorphic rocks (Han et al., 2000), and is overlain by Upper Sinian and Palaeozoic rocks. The cover rocks consist of Middle-Upper Devonian, Carboniferous and Permian rock sequences. The Lower Carboniferous Baizuo Formation is the principal ore-host and is composed chiefly of grayish-white and yellowish-red coarse-crystalline dolomite, compact light-gray limestone, and siliceous dolomitic limestone interbedded with barite. Magmatic activity is marked by the Late Permian Emeishan basalt (K-Ar ages: 218.6 to 253.3 Ma) (Liu et al., 1999). The aerial distribution of the basalts generally coincides with the area distribution of the Pb-Zn deposits (occurrences).

The S isotopic composition of minerals, such as sphalerite, galena, pyrite and gypsum, is generally similar to that of global Carboniferous seawater sulphate that has values ranging from 15 to 20 ‰ (Claypool et al., 1980), suggesting that S in the ore was derived predominantly from evaporite rocks in the strata. The Pb isotopic composition of ore minerals is homogeneous, and is similar to that of the basalts in the region.