

Geochemistry of Felsic Rocks in the Yanıklı Prospect, Artvin District, Eastern Pontides, Turkey: Fertility and Implications for Mineral Exploration

Şafak U. Sönmez¹, Robert Moritz¹, Serdar Keskin², François Turlin¹, Alexey Ulianov³, Ümit Aydın²

1. Department of Earth Sciences, University of Geneva, Geneva, Switzerland, 2. General Directorate of Mineral Research and Exploration of Turkey, Department of Mineral Research and Exploration, Ankara, Turkey, 3. Institute of Earth Sciences, University of Lausanne, Lausanne, Switzerland

Late Cretaceous felsic volcanic and volcanoclastic rocks in the Eastern Pontides are well-endowed in volcanogenic massive sulfide (VMS) and epithermal deposits/occurrences. The Artvin district is one of the most representative regions to examine numerous felsic rock types related to a bimodal volcanic and extensional tectonic setting within the easternmost Eastern Pontides. The purpose of this study is to determine the fertility of Late Cretaceous dacitic/rhyolitic rocks in the Yanıklı prospect within the Artvin district and compare their geochemical characteristics with those of felsic rocks from the major Late Cretaceous Murgul, Tunca, and Kutlular VMS deposits/occurrences of the Eastern Pontides.

Felsic rocks at Yanıklı have been subdivided into four main units, from oldest to youngest, namely (i) feldspar porphyry dacite (KDa), (ii) fine-grained flow-banded rhyolite-rhyodacite (KRDa-1), (iii) flow banded-columnar rhyodacite-dacite (KRDa-2), and (iv) flow-banded feldspar-rich rhyolite-rhyodacite (KRDa-3).

Trace element signatures for the felsic rocks indicate that they have been formed in a subduction setting. The chondrite-normalized La/Yb ratios vs. Yb data of the felsic rocks from the Yanıklı prospect are very distinct. The oldest KDa unit presents low La/Yb_(CN) (up to 4.98) and high Yb_(CN) (up to 28.8) values. The immediate felsic host rock units of the three major Murgul, Tunca, and Kutlular VMS deposits/occurrences share similar geochemical compositions. These felsic rocks have tholeiitic to calc-alkaline rhyolitic compositions, which are generally favourable settings for VMS deposits/occurrences. In contrast, the mainly calc-alkaline rhyodacitic rocks of the younger KRDa-1 and KRDa-2 units at Yanıklı have high La/Yb_(CN) (up to 8.3 and 12.9, respectively) and low Yb_(CN) (up to 6.6 and 6.3, respectively) values. These units are mostly barren in terms of VMS orebodies, but they host epithermal-type polymetallic-Au veins/veinlets. The youngest KRDa-3 unit has alkaline to calc-alkaline compositions, which is commonly barren in terms of VMS and epithermal potential.