SEG-MJD 2016 Conference

Evaluation of Surface Soil Geochemical Data and Statistical Modeling of Akarca Fula Tepe Low Sulfidation Epithermal Au-Ag Mineralization (Bursa), Turkey

Derya Bal[1,*] and Mesut Soylu[2]

[1]Middle East Technical University, Department of Geological Engineering, Ankara, Turkey
[2]Mineral Consultancy, Ankara, Turkey

*E-mail, dbal@mineral.com.tr

The Akarca Fula Tepe zone is located 20 km south of Mustafakemalpaşa in Bursa, west Turkey. The zone is covered by Triassic conglomerates, sandstones, and siltstones that host the mineralization. The pre-Triassic metamorphic rocks (basement), schist, and marble are tectonically overlain by the Triassic sedimentary units. The Fula Tepe zone displays characteristics of a low-sulfidation Au-Ag deposit type in terms of alteration, mineralization, and vein textures. In the study area, a soil survey was conducted to test for a possible covered Au-Ag mineralization. A total of 195 soil samples were collected on 100-m-spaced lines with 50-m sample spacing to transect the vein and structural orientation perpendicularly. The objectives of the study were to evaluate the results of surface soil geochemistry data and to create a statistical model based upon indicator and pathfinder elements to identify new gold targets for further exploration in the mineralized zone. The study focused on seven elements—namely, Au, Ag, As, Hg, Sb, Se, and Te. Univariate and bivariate statistical analyses were performed on the geochemical data. Descriptive statistics, histograms, and Q-Q plots reveal that Au, Ag, As, Hg, and Sb display non-normal distribution while Se and Te have normal distribution patterns. The correlation matrix was generated for the variables to determine the relations between elements. According to the matrix results, Au has positive moderate correlation with Ag and Ag has low correlation with Se. Cumulative probability graphs were created to estimate background, local anomaly, and regional anomaly values. The distribution of Au and Ag has five populations, whereas As and Sb have four and Hg, Se, and Te have two. In order to determine the element distribution in the area, gridded contour maps were prepared for selected elements based upon calculated threshold values. The gridded maps indicate that Au, Ag, As, Sb, and Se form strong anomalies, while Hg and Te do not. Therefore, Te and Hg are not used as pathfinder elements for this study. The strong gold anomalies nearly coincide with the strong silver anomalies at the center of the area. As and Se appear to be associated with the main Au anomalies. As and Se could therefore be used as pathfinder elements for gold exploration. In order to identify new target zones, higher background population was separated from the datasets for Au and Ag. Consequently, three new gold targets were identified for further exploration.