Geochemical exploration for Au, Ag and base metals in Kohat Plateau, Pakistan

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Abstract

Stream sediments geochemistry is extensively used in mineral exploration in any part of the world. Reconnaissance studies have been carried out in order to delineate geochemical anomalies in Kohat plateau. Majority of the streams in the study area receive sediments from Siwalik rocks deposited by paleo-Indus River, Hill Ranges (Paleocene to Cretaceous rocks) and also from Quaternary deposits in the study area. The geochemical survey involve collection of stream sediments (-80 mesh), heavy mineral concentrates (HMC) and samples of Quaternary deposits from various catchment basins at a sampling density of more than 10 square kilometers.

All the samples were analyzed for Au, Ag, Cu, Zn, Cr, Pb, Ni, Co, Cd and Mn using atomic absorption spectrometer (Perkin Elmer 700).

The results for various elements were processed by combination of geostatistical and GIS analysis to display broad-scale regional distribution of the elements on the basis of single elements consideration and to delineate anomalous areas of most interest for further follow-up. A combination of univariate, bivariate and multivariate statistical analysis indicate that Au in the study area is poorly associated with Ag, Cu, Zn, Cr, Pb, Ni, Co, Cd and Mn indicating the lack of source in the study area. Among all the elements Au was found to have significant concentration. High Au concentration (2-13.5 ppm) in the study area has been noticed in HMC as compared to the stream sediments (0.3- 1 ppm). This high concentration of gold is indicative of existence of potential placer gold deposits in the Kohat plateau. Detailed geochemical exploration program in this regard is in progress to understand the provenance and economic potential of gold in the region.