

## **Petro-chemical investigations of the rocks of Golo Das and surrounding areas Gilgit-Baltistan, Pakistan in the perspective of gold and base metals mineralization**

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### **Abstract**

The study area which includes Golo Das and surrounding areas is a part of Ghizar District of Gilgit-Baltistan province. Geologically, it is located just south of the northern suture zone (NSZ), a mega thrust separating the rocks of Karakoram plate from the Kohistan island arc. The rocks exposed in the study area are mainly basalt-andesite sheet dominant (BASD) volcanics and Ishkoman volcanic centre (IVC) volcanics of Ghizar formation intruded by stage-2 diorites of Kohistan batholith. Petrographic study shows that the BASD volcanic are highly deformed while the IVC volcanic are undeformed. Diorites of the study area are fresh looking and consist of two varieties one having majorly plagioclase, hornblende and biotite, while in the second variety plagioclase, biotite and augites are present in abundance. On the basis of whole rock geochemistry, the studied BASD volcanics are basaltic in composition while the IVC volcanics are classified as basalt-andesites. The spider diagrams of both BASD and IVC volcanics as well as diorites indicate enrichment in large ion lithophile elements (LILE) relative to high field strength element (HFSE) with well-defined negative Nb and positive Sr anomalies. The sulfide-bearing altered / sheared zones present within IVC volcanics are studied for chemical concentration of gold and silver and other base metals like Cu, Pb, Zn, Ni, Cr, Co, and Cd. The enrichment of Au, Ag, Cu and Co is noticed in these zones which could be attributed to the alteration caused by the hydrothermal fluid. Major and trace elements data of the studied Ghizar Formation (i.e., BASD and IVC volcanics) and diorites are plotted on the discrimination diagrams. The data suggest that these rocks are akin to the fields defined for subduction related calc-alkaline rocks of island arc type of setting. On the basis of chemical characteristics, the rocks of the Ghizar Formation, especially the IVC volcanics, are considered as the eastern extension of the Teru Volcanic Formation/Shamran volcanics.