DETAILED GEOPHYSICAL SURVEY FOR THE DELINEATION OF METALLIC MINERALS IN BELA OPHIOLITIC BELT UTHAL AREA, DISTRICT LASBELA, BALOCHISTAN PAKISTAN

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Abstract

An integrated geophysical survey has been carried out at the southeastern margin of Uthal area Lasbela District, Balochistan, targeting the Bela ophiolitic belt to delineate its minerals potential and structural settings. The Bela ophiolites extend 450 km in length and 10 km in width that constitute the largest ophiolitic belt in Pakistan. This work is focused to confirm the presence of copper mineralization and other associated minerals as depicted by the aeromagnetic anomaly as well as to establish their structural control. A detailed magnetic survey is executed with a total of two thousand magnetic observations, aided by the vertical electrical sounding (VES) and IP survey. The survey was performed in a north-south grid pattern and profiling covering an area of 25 km^2. The periodic repeating magnetic base station was established to monitor Diurnal variations. The base magnetic values recorded for the ophiolitic sequence are 44000 nanoTesla (nT) and the total magnetic field values range from 44300 to 47300 nT. The raw field data are refined and the total magnetic intensity, reduction to pole, horizontal gradient, upward continuation and residual magnetic maps are prepared using computer oriented software, MagPick and MagMap. The total magnetic intensity fluctuates in a range from -1110 to 1624 nT, reduction to pole value from -2180 to 2470 nT, an upward continuation from -1020 to 900 nT and residual magnetic value from -2131 to 2262 nT. The magnetic survey delineated three anomalous zones; two high magnetic zones (zone 1 & 2) in the south-eastern side and one narrow zone of low magnetism (zone 3) in the NW-SW direction. The copper anomaly shown in the aeromagnetic map in low magnetic zone 3 is also confirmed using VES and IP Surveys having values from 35 to 110 ohm.m and 0.78 to 4.1 mV/V respectively. Results from these surveys confirm lack of copper mineralization; however, this zone is demarcated as a shear zone having deposition of silt and clay. The depths to the centre of anomalous zones are determined using peter half slope method, with the promising depth of 100 meters (zone 1), 40 meters (zone 2) and 60 meters (zone 3). The geomagnetic cross section is also drawn that shows the area has undergone tectonic stretching, having an extensional regime of orogenic forces. All these results confirm that study area has no copper mineralization, contrary to the aeromagnetic anomaly; however, two anomalous zones of probable manganese mineralization can be demarcated.