Electrical Resistivity Tomography and Ground Penetration Radar Techniques for the delineation of Paleocene coal seams along the Main Boundary Thrust belt in Cherat area, Pakistan

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In this study, Electrical Resistivity Tomography (ERT) and Ground Penetration Radar (GPR) surveys were conducted in the Cherat coalfield, located along the Main Boundary Thrust (MBT) in the most prevalent coalfield of Khyber Pakhtunkhwa (KP), district Nowshera. The results of the ERT and GPR profiles indicated varying resistivity values and depths of coal seams. Specifically, in the Cherat region, the resistivity of coal seams ranged from 600 to 1200 ohm-m at a depth of 11 meters and from 500 to 900 ohm-m at a depth of 20 meters. The location and depth of coal-bearing zones were validated by comparing them with existing stratigraphic profiles of coal mines. ERT and GPR profiles were conducted along already explored coal mines to identify resistivity ranges and locate coal seams in the area. Following the structural trends of the Hangu Formation, similar surveys were conducted in nearby areas to delineate coal seams and recommend potential sites for new coal targets. Based on the ERT and GPR profiles, wide ranges of resistivity values were encountered for coal seams in unexplored areas. For instance, at a depth of 8 meters, the resistivity of the coal-bearing zone ranged from 400 to 1200 ohm-m, and in profile 4, it varied from 300 to 1100 ohm-m at a depth of 25 meters, suggesting potential coal prospects. Our results highlight the efficacy of geophysical and geological techniques in providing valuable information for identifying potential coal zones in unexplored regions.