3-D DENSE AMT FOR PODIFORM CHROMITE EXPLORATION

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Podiform chromite is a challenging target for geophysical exploration in most conditions. Although there exist large density contrast between the podiform chromite and host rock, and the podiform chromite shows strong remanent magnetization, it's still very difficult to locate podiform chromites by gravity and magnetic method. Because the podiform chromite is often surrounded by low density serpentine rock, which is altered from olivine. The gravity anomaly is reduced greatly by serpentine surrounding chromite. There also exists magnetite which disturbs magnetic anomaly. We found that podiform chromites are often related to fracture zone and serpentine which show low resistivity anomaly. Then we carried a 3-D dense AMT experiment on a area with known podiform chromite. The spacing of AMT line in south-north direction is 40 m and the site spacing is 20 m. The total area is 360 m (west - east) x 320 m (south - north, line direction). The ore body is located in depth about 40 - 50 m, therefor, impedance data in frequency range as 114.7 - 10400 Hz are used. Then we adopted 3D re-weighted regularization conjugate gradient method with integral equation forward modeling to invert the data set. The inversion volume is 700 (SN direction, x) x 800 (WE direction, y) x 600 (z) m with grid size as 5 x 10 m in XY plane, and layer thickness starts as 5 m then increasing logarithmically in z direction with 64 total layers. The final RMS error of our inversion is less than 1.00 thanks to dense AMT data and good data quality. The inverted resistivity shows low resistivity anomaly related to the ore body and high resistivity anomaly related to the host rock dunite clearly. Our result shows that 3-D dense AMT may reduce the exploration risk of podiform chromites greatly.