Paper Number: 3119

An Application of Audiomagnetotelluric Method to 3D Geological Mapping in Southern China, Jiurui Regional

Lei,D.[1], Wang,S. M.[2], Wang,G.[2], Yao,D. W.[2], Di,Q.Y.[1] and Wang,R.[1]

[1]Key Laboratory of Shale Gas and Geoengineering, CAS , Institute of Geology and Geophysics, Chinese Academy of Sciences, Beijing 100029, China, Email: leida@mail.iggcas.ac.cn
[2]Institute of Geophysical and Geochemical Exploration, CAGS, Langfang, Hebei Province, China

---

A trial audiomagnetotelluric (AMT) survey for 3D geological mapping was carried out in a key metallogenic belt on the middle-lower reaches of Yangtze River, covering a sheet on a scale of 1:50,000. Data processing and interpretation were influenced by strong man-made EM interferences existing in the survey area. However, the data quality was greatly improved by painstakingly collecting raw data in the field, as well as removing tears and smoothing during data processing. Inversions for 23 sounding profiles were performed by using OCCAM technique, and a 3D resistivity model was finally established, so proving a basis for compiling interpreted 3D geological map in combination with inversion results of gravity and magnetic data. This study was the first for large depth 3D geological mapping by using AMT data, setting up an example for such kind of geological mapping.

Test audiomagnetotelluric soundings were carried out in the Jiujiang-Ruichang area by Institute of Geophysical and Geochemical Exploration for the project "Demonstration of 3D Geological Mapping by Applying Comprehensive Geophysical Data in a Key Metallogenic Belt at Middle-Lower reaches of Yangtze River" sponsored by China Geological Survey. Survey lines of 21 km long for each were laid out in north-south direction, line-spacing was 1,000 m and sounding spot interval was 200 m. Totally 2,110 sounding sport were finished.

As seen in Figure 1, the Langjunshan-Dingjiashan anticline and the Gaofengshan-Huangqiao synclinorium appeared between Lines 2826-3695 are striking in NE direction; whereas the anticline is not clear seen over Line 3695. While the Tongling-Laowucai anticline and Leiwan-Tongjiangling synclinorium are striking in EW and turning into NE direction at east of Line 3705. The inferred faults can be classified into 3 groups: the ones in NEE direction are large in size and widely distributed, from north to south they are the Maomushan longitudinal fault, Tongling longitudinal fault and Ruichang-Dingjiashan longitudinal fault, etc., proving good channels for magmatic injection; the ones striking in NNW and NW are well developed and widely distributed in the survey area; the ones striking in NNE-NE are not well developed with comparison to those of NNW and NW, and small in size.

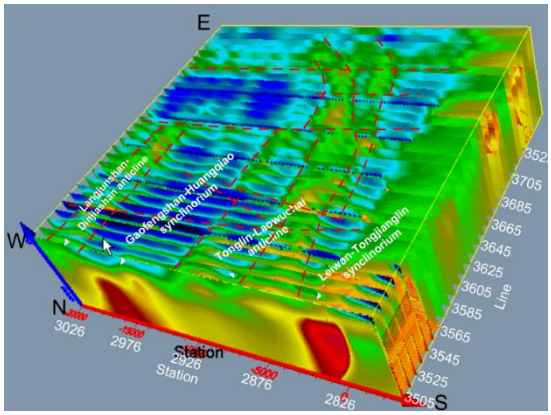

Figure 1: 3D display of inversed resistivity for every survey line in the survey area

As for the AMT 2D inversion, it was convenient to use triangular mesh to accurately model complex terrain conditions and with terrain effects removed effectively and therefore the geo-electrical

structures were well interpreted. The study on 3D inversion technique should be strengthened, so as to realize 3D inversion of AMT data with complex terrain conditions involved, making AMT play an dominant role in deep geological mapping.

References:

[1] Li Z J (1991) An approach to the large-scale and three dimensional stereo statistical prediction of mineral deposits in Yueshan region, Anhui province(in Chinese). 16(3),311-317

[2] Zhao W J (2003) City geology and geophysics, Geological Bulletin of China 22(8):558-562

[3] Teng J W et al. (2007) Prospecting for metalore deposits in second deep space of crustal interior, the building of strategy reserve base of northeast China, Journal of Jinlin university,37(4):633-651