

Accepted Manuscript

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PII: S0926-9851(17)30101-5
DOI: doi:[10.1016/j.jappgeo.2017.01.030](https://doi.org/10.1016/j.jappgeo.2017.01.030)
Reference: APPGEO 3200

To appear in: *Journal of Applied Geophysics*

Received date: 4 May 2016
Revised date: 28 September 2016
Accepted date: 24 January 2017



Please cite this article as: Zhihui, Wang, Xiangmin, Cai, Jiayong, Yan, Jiming, Wang, Yu, Liu, Lei, Zhang, Using the integrated geophysical methods detecting active faults: a case study in Beijing, China, *Journal of Applied Geophysics* (2017), doi:[10.1016/j.jappgeo.2017.01.030](https://doi.org/10.1016/j.jappgeo.2017.01.030)

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Using the integrated geophysical methods detecting active faults: a case study in Beijing, China

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Keywords: active faults, geophysical methods, Beijing, seismic reflection, paleomagnetism

Abstract

Active faults in urban have a potential damage to citizens, because they can induce not only earthquakes, but also damage pavements, utilities, homes, businesses, factories and other manmade structures because of the slow, secular and differential slippage. Consequently, the researches of detecting active faults are of great significance. This paper proposes a set of geophysical methods to detect active faults by an example in Beijing, including gravity, controlled source audio-frequency magnetotellurics (CSAMT), seismic reflection, DC resistivity and paleomagnetism (Natural remanent magnetization in rocks) to locate faults and discuss their activities. In proposed methods, gravity interpretation helps us obtain the distribution and characteristics of buried faults beneath the plain, the results of CSAMT, seismic reflection and DC resistivity reveal features and characteristics of faults from the deep to shallow part; paleomagnetism associated with radiocarbon dating help us analyze the fault slip rate; 3D seismic reflection interpretation shows the structure of two faults in the three-dimensional subsurface and the interaction of each other. Also, a few acquisition parameters, data processing methods and significant suggestions are mentioned.

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