Geophysical Research Abstracts
Vol. 19, EGU2017-2737-1, 2017
EGU General Assembly 2017

Experimental results on rock resistivity and its applications in monitoring and predicting natural disasters

Jianguo Zhou (1,2), Tao Zhu (1,2), and Baolin Tang (1)

(1) Institute of Geophysics, China Earthquake Administration, Beijing 100081, China, (2) Key Laboratory of Seismic Observation and Geophysical Imaging, China Earthquake Administration, Beijing 100081, China

There have been many earthquakes occurring in Chinese Mainland. These earthquakes, especially large earthquakes, often cause immeasurable loss. For instance, the 2008 Wenchuan Ms8.0 earthquake killed ∼70, 000 people and caused ∼17, 000 people missing. It is well known that this earthquake was not predicted. Why? Were there no precursors? After analyzing the geo-electrical resistivity recording at Chengdu station which is only about 36 km to the epicenter, we find that resistivity had changed abnormally very significantly along NE direction but no outstanding abnormal changes had been observed along NW direction before the earthquake. Perhaps this non-consistent changes result in that this earthquake was not predicted. However, in another standpoint, can another observation way be found to supplement the current geo-electrical resistivity observation in Chinese Mainland in order to improve the probability of catching the precursor? This motivates us to conduct experiments in lab and field. Apparent resistivity data are acquired along three common-midpoint measuring lines during the fixed-rate uniaxial compression on two sets of dry man-made samples and a Magnetite sample. We construct the relative resistivity change images (RRCIs). Our results indicate that all RRCIs show a trending change with stress: with the increase of stress, the resistivity-decreased region (RDR) in the RRCIs shrinks/expands, while the resistivity-increased region (RIR) expands/shrinks gradually, which is in agreement with the field experimental results of earthquake monitoring (Feng et al., 2001). Our results encourage us to conclude that the trending changes in RRCI with stress could probably become a useful indicator in monitoring and predicting earthquakes, volcanic eruptions and large-scale geologic movements.

This work is supported by National Natural Science Foundation of China (NSFC, Grant 41574083).