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Quantification of the electromagnetic signals accompanying with the seismic waves of the aftershocks of the Ms8.0 Wenchuan earthquake

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The so-called co-seismic electromagnetic signals became a common interesting topic recently. There are some reports on the electromagnetic signals accompanying with some earthquakes, including some aftershocks of the Ms8.0 Wenchuan earthquake in China in 2008. In order to evaluate quantitatively the relationship between the coupled seismic and electromagnetic signals, we established the empirical transfer function based on the field observation data during the aftershocks of the Wenchuan earthquake. We also investigated the possible dominant frequency range of the above signals. The electromagnetic signals evaluated from the established empirical transfer function and observed seismic data at the seismic station are consistent with the observed electromagnetic signals at the nearby electromagnetic station. The above quantitative analysis based on the field observation data supported that there are clear coupling between seismic and electromagnetic signals. We also performed some numerical simulations based on a 3D numerical technique taking into account the electrokinetic effect in porous media. Our numerical results provided a possible explanation of the above electromagnetic phenomena accompanying with seismic waves.
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