

Ground deformation and earthquake fault related to the 2004 Niigata Chuetsu Earthquake

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The 2004 Niigata Chuetsu Earthquake occurred on October 23, 2004. A series of aftershocks including some M6 class events have been following the main shock. The Chuetsu area of Niigata Prefecture including the aftershock area is characterized by many active faults and the Shibata-Koide Tectonic Line (SKTL) with a NNE-SSW trend. On the basis of field observations of deformation of the ground, we examined reactivation of these faults and SKTL during the earthquake.

Our field investigations of the ground deformation indicated no evidence of the reactivation of these active faults and SKTL. We did not find the earthquake fault of the 2004 Niigata Chuetsu Earthquake. However, several anomalies in temperature and electric conductivity of groundwater are observed around the epicentral area of the earthquake. The temperature of the groundwater increased up to 25 °C. We also found a spring water discharged at the eastern margin of the epicentral area close to SKTL. The water shows higher temperature and extremely higher electric conductivity than the surrounding shallow groundwaters. These anomalies of groundwater resulted from the flow of deep geothermal water to the near-surface along faults and fractures activated during the earthquake. These facts suggest the seismic faulting near the surface along the Yukyu-zan active fault, SKTL, the inferred northern extension of the Muikamachi active fault, and buried active faults during the earthquake.