

Multidisciplinary observation evidence of earthquake precursors

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On January 24, 2010, an earthquake with Ms 4.8 occurred in Hejin city, Shanxi Province, China. Interestingly, distinct precursors of some observation items are observed in Shanxi and Shaannxi areas before the earthquake. These observed precursors are mainly in types of crustal deformations and underground fluids, and showing multidisciplinary precursor recording information. The appearance time of these precursors mainly concentrates 1 - 6 days before the earthquake, with a wide space range (70 - 400 km away the epicenter) and most of the distributions in the intersection region of active fault or fracture. The morphological characteristics of these precursors can be divided into four different types: continuous low frequency fluctuations, pulse sudden jump with low frequency fluctuation, order jump and pulse coarsening. The average velocity ratios and seismic moment release in the source area and its vicinity indicate that these precursors may be related to the earthquake source .