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The Structural Features of Soil Temperature and Precipitation and Soil Heat Flux Fields of Strong Earthquakes

Fan Xin-gang and Tand Mao-cang

Lanzhou Institute of Plateau Atmospheric Physics, Academia Sinica, Lanzhou, 730000, China

A typical distribution pattern of soil temperature and precipitation field has been discovered in areas of strong earthquakes ($M_s \geq 7.0$). A positive soil temperature anomaly existed in the epicentral area of the forthcoming earthquake for ½ to 1 year before the earthquake; meanwhile, a relatively large negative soil temperature anomaly appeared in the surrounding area. Similarly, there was a small pluvial region in the epicentral area during the period of 1-5 months before the earthquake, while the background was dry. The area of positive soil temperature anomaly and the pluvial region expanded and strengthened gradually with time.

Based on these facts, a new method to calculate soil heat flux by using soil temperature data of meteorological stations was designed, which can filter out the influence of atmosphere and obtain the information on the geothermal field in deep earth. In this paper, the soil heat flux of about 200 stations in the area of six strong earthquakes (four in the People's Republic of China and two in Mongolian People's Republic) has been calculated, from which it can be seen that a typical geothermal structure exists under the earth surface. The heat flux in the epicentral area of a forthcoming earthquake is upward, while in the surrounding area it is downward. The geothermal structure has some influence on soil temperature and the precipitation field.

Key words: Earthquake, Soil temperature field, Precipitation field, Soil heat flux, Three-dimensional thermal column structure.