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Correlations between the radon concentrations in soil gas and the activity of the Anninghe and the Zemuhe faults in Sichuan, Southwestern of China

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Abstract

The Anninghe fault (ANHF) and the Zemuhe fault (ZMHF) with left-lateral strike-slip, located along the eastern boundary of the Sichuan-Yunnan block (southwestern of China), are some of the most active faults. These faults mainly control the seismicity of southwestern area of China. Measurement of soil gas radon (Rn) emitted from fault along the ANHF and the ZMHF has been carried out for the research of tectonic activity. We obtained the Rn concentrations at 394 sampling points along 15 profiles across the ANHF and the ZMHF in 2016. The measurement results show that the values of Rn in the ANHF are significantly higher than that in the ZMHF. The relative coefficient K_Q of Rn activity attained in profiles of the ANHF ranges from 3.3 to 9.1, which are obviously higher than that of 2.1 to 2.5 in profiles of the ZMHF. The radon flow brings up the deeper and radon-richer gas upward through the high-level cracked strata caused by the tectonic activity accounts for the anomalously high values attained. The spatial variation of Rn in the concentration profile and the relative coefficient K_Q calculated indicate that the tectonic activity of the south segment of the ANHF is significantly higher than that of the north segment of the ZMHF.

Key words: Soil gas; Radon; Tectonic activity; Western Sichuan

1. Introduction

Survey of anomalously Rn concentration is an effective way to study various manifestations of geodynamic activity in the upper crust (King et al., 1996; Toutain and