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运用古地震数据评价东昆仑断裂带东段未来百年的强震危险性

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Strong earthquake risk assessment of eastern segment on the East Kunlun fault in the next 100 years based on paleo-earthquake data

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摘要 通过收集、整理和分析青藏高原东北部22条断裂带上古地震定量数据,拟定了该区的地震复发概率密度函数.根据此函数对区内东昆仑断裂带东段不同段落上未来100年内强震原地复发的条件概率进行了初步研究.结果表明,该断裂带上自西向东的3个破裂段中,玛沁段和塔藏段未来20、50、100年的复发概率值介于0.76%~7.36%之间,玛曲段未来20、50年的复发概率值介于2.0%~5.26%,属于低概率事件;玛曲段未来100年的复发概率值为10.82%,属于中概率事件;整个段未来100年内至少发生一次7级以上强震的联合概率可达21.87%,属于中概率事件.考虑到概率模型的不确定性,进一步对各段进行了危险性的定性分类,综合评价认为玛沁段在未来百年内发生大震的危险性较低,玛曲段和塔藏段未来百年发生大震的危险性较高.最后将本文拟合的概率密度函数与传统通用函数计算的条件概率值进行比较,发现通用的复发概率函数随着自变量t/R的增大,因变量P的反映不如本文拟合函数的敏感.

关键词 东昆仑断裂带东段, 地震复发概率密度函数, 强震危险性, 复发概率

Abstract: Based on the 22 data of paleo-earthquake in Northeastern Tibet Plateau, we established a probabilistic model of earthquake recurrence in the area, and studied the conditional probabilities for the recurrence of strong earthquakes in the eastern segments of East Kunlun fault zone in the next 100 years. The results show that two segments (Maqên and Tazang) of the fault zone have low probabilistic values between 0.76%~7.36% in next 20~100 years; The recurrence probabilities of Maqu segment in 20 and 50 years lie between 2.0%~5.26%, but the probability in 100 years is 10.82% which is relatively high. Based on the uncertainty of probabilistic model, we made a qualitative classification for different segment in terms of danger, and thought that Maqên segment has lower risk in next 100 years, Maqu and Tazang segment has higher risk in next 100 year. At last, through comparing probabilistic values computed by two different models, we found that dependent variable P is less sensitive with increasing of independent variable t/R in the general probability model of earthquake recurrence.

Keywords Eastern segment of East Kunlun fault, Probabilistic model of earthquake recurrence, Strong earthquake risk assessment, Recurrence probability

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