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汶川地震强震区地震诱发滑坡与后期降雨诱发滑坡控制因子耦合分析

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COUPLING ANALYSIS OF CONTROL FACTORS BETWEEN EARTHQUAKE-INDUCED LANDSLIDES AND SUBSEQUENT RAINFALL-INDUCED LANDSLIDES IN EPICENTER AREA OF WENCHUAN EARTHQUAKE

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- 摘要
- 参考文献
- 相关文章

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摘要 本文以汶川地震强震区北川县典型研究区为例,利用高分辨率航片、SPOT5卫星图像对北川县典型研究区进行了"5·12"地震之后和"9·24"降雨之后诱发的滑坡解译,解译结果显示:"5·12"地震诱发滑坡1999个,"9·24"强降雨诱发滑坡828个,"9·24"强降雨导致原有地震滑坡面积扩大的滑坡150个。研究表明:地震和强降雨都是诱发滑坡的动力成因,"9·24"强降雨诱发的滑坡面积是"5·12"地震诱发滑坡面积的1/4倍,强降雨诱发滑坡的数量增加了41.4%; 强降雨不仅诱发新的滑坡,而且促使原来地震滑坡复活,并扩大其面积,强降雨导致地震诱发的滑坡面积扩大了原面积的68.7%。同时,在遥感解译数据基础之上,开展地震诱发滑坡与降雨诱发滑坡规模对比和控制因子耦合分析及地震与降雨耦合灾害链模式研究,为进一步分析研究地震灾区滑坡的产生、发展趋势、危险性和风险评价等预测预报提供科学依据,也为汶川震区恢复重建中的减灾防灾提供决策参考。

关键词: 汶川地震 强震区 地震诱发滑坡 降雨诱发滑坡

Abstract: This paper selects typical study area in epicenter area of the Beichuan as the site for the landslides interpretations induced after the Wenchuan Earthquake on May 12, 2008 and the strong rainfall on September 24, 2009.It bases on high-resolution aerial photographs and remote sensing SPOT 5 imagery. The results are as follows.the number of the earthquake-induced landslides is 1999."the number of the rainfall-induced landslides is 828.the rainfall enlarged the 150 earthquake-induced landslides. The earthquake and the rainfall are powerful causes for the occurrence of landslides.the rainfall-induced landslide area is 25% larger than the earthquake-induced landslide area. So, the landslide number in the study areais increased by 41.4%.The strong rainfall not only induced new landslides but also made the original earthquake landslides raise, and to expand the area so that the landslide area increased by68.7%.Meanwhile, on the basis of remote sensing data interpretation, the paper further analyse the induced landslides, carries out the trends, hazard and risk evaluation, which provides a scientific prediction basis. The findings in this paper can be useful to the Wenchuan Earthquake restoration and reconstruction in disaster mitigation and preparedness and provide the decision-makers to carry out earthquake-induced landslides and rainfall-induced landslides scale contrast and control factor coupling analysis and the earthquake and rainfall coupling disasters chain mode.

Key words: Wenchuan earthquake Strong earthquake area Earthquake-induced landslides Rainfall-induced landslides Beichuan

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[1] 黄润秋. "5·12" 汶川大地震地质灾害的基本特征及其对灾后重建影响的建议[J].中国地质教育, 2008,(2): 21~24.

[2] Huang Runqiu.Characteristics of geological disasters of 5.12 Wenchuan earthquake and recommendation on its impact on reconstruction.Chinese Geologcial Education, 2008,(2): 21~24.

[3] 何宏林, 孙昭民,王世元,等.汶川MS 8.0地震地表破裂带[J].地震地质, 2008, 30 (2): 359~362.

He Honglin,Sun Zhaomin,Wang Shiyuan,et al.Rupture of the Ms8.0 Wenchuan earthquake.Seismology and Geology, 2008, 30 (2): 359~3

[4] 齐信. 基于3S技术强震区地质灾害解译与危险性评价研究——以四川省北川县为例 .成都:成都理工大学, 2010, 1~99.

[5] Qi Xin.Research on Interpretation and Hazard Assessment of Geohazards in Strong Earthquake Area Using 3S Technology-A Case Study Beichuan County of Sichuan Province.Chengdu; Chengdu University of Technology, 2010, 1~99.

[6] 黄润秋, 李为乐. "5·12" 汶川大地震触发地质灾害的发育分布规律研究[J].岩石力学与工程学报, 2008, 27 (12): 1~8.

Huang Runqiu,Li Weile.Research on development and distribution rules of geohazards induced by Wenchuan earthquake on 12th May, 2008.Chinese Journal of Rock Mechanics and Engineering, 2008, 27 (12): 1~8.

[7] 殷跃平. 汶川八级地震地质灾害研究[J].工程地质学报, 2008, 16 (4): 433~444. 浏览

Yin Yueping.Researches on the geo-hazards triggered by Wenchuan earthquake,Sichuan.Journal of Engineering Geology, 2008, 16 (4): 433~444. 浏览

[8] 陈晓利, 李传友,王明明,等.断裂带两侧地震诱发滑坡空间分布差异性的主要影响因素研究——以北川地区的地震滑坡分布为例[J].地球物理学报, 2011, 54 (3 737~746.

Chen Xiaoli,Li Chuanyou, Wang Mingming,et al. The main factors causing the seismic landslide distribution difference on two sides of the faults-A case study of landslide distribution in Beichuan area.Chinese Journal of Geophysics, 2011, 54 (3): 737~746.

[9] 齐信, 唐川,铁永波,等.基于GIS技术的 5·12 汶川地震诱发地质灾害危险性评价——以四川省北川县为例[J].成都理工大学学报(自然科学版), 2010, 37 (2) 160~167.

Qi Xin,Tang Chuan,Tie Yongbo,et al.Hazard assessment of geohazards triggered by the 5.12 Wenchuan earthquake using Gis technology case study in Beichuan county of Sichuan province.Journal of Chengdu University of Technology(Science & Technology Edition), 2010, (2): 160~167.

[10] 许强, 李为乐.汶川地震诱发大型滑坡分布规律研究[J].工程地质学报, 2010, 18 (6): 818~826. 浏览

Xu Qiang,Li Weile.Distribution of large-scale landslides induced by the Wenchuan earthquake.Journal of Engineering Geology, 2010, 18 (818~826. 浏览

[11] 黄润秋, 裴向军,李天斌.汶川地震触发大光包巨型滑坡基本特征及形成机理分析[J].工程地质学报, 2008, 16 (6): 730~741. 浏览

Huang Runqiu,Pei Xiangjun,Li Tianbin.Basic characteristics and formation mechanism of the largest scale landslide at Daguangbao occurr during the Wenchuan earthquake.Journal of Engineering Geology, 2008, 16 (6): 730~741. 浏览

[12] Tang C,Zhu J,Li W L.Rainfall triggered debris flows after Wenchuan earthquake.Bull.Eng. Geol.Environ. ,2009, 68:187~194.

[13] Lin CW,Liu SH,Lee SY,et al.Impacts on the Chi-Chi earthquake on subsequent rain-induced landslides in central Taiwan.Engineering Geology, 2006, 86 (2-3): 87~101.

[14] Yin YP,Wang FW,Sun P.Landslide hazards triggered by the 2008 Wenchuan earthquake,Sichuan,China.Landslides, 2009, 6:139~151.

[15] Chen H,Hawkins AB.Relationship between earthquake disturbance,tropical rainstorms and debris movement: an overview from Taiwan.Bull.Eng. Geol.Environ. ,2009, 68:161~186.

[16] 柴贺军, 刘汉超,张倬元.一九三三年叠溪地震滑坡堵江事件及其环境效应[J].地质灾害与环境保护, 1995, 6 (1): 7~17.

Chai Hejun,Liu Hanchao,Zhang Zhuoyuan.Landside dams induced by Diexi earthquake in 1933 and its environmental effect.Journal of Geological Hazards and Environment Preservation, 1995, 6 (1): 7~17.

[17] 许强. 四川省8·13 特大泥石流灾害特点、成因与启示[J].工程地质学报, 2010, 18 (5): 596~608. 浏览

Xu Qiang.The 13 August 2010 catastrophic debris flows in Sichuan province: Characteristics,genetic mechanism and suggestions.Journa Engineering Geology, 2010, 18 (5): 596~608. 浏览

[18] 唐川, 李为乐,丁军,等.汶川映秀镇"8·14"特大泥石流灾害调查[J].地球科学(中国地质大学学报), 2011, 36 (1): 172~180.

Tang Chuan,Li Weile,Ding Jun,et al.Field investigation and research on giant debris flow on August 14, 2010 in Yingxiu town,epicenter o Wenchuan earthquake.Earth Science(Journal of China University of Geosciences), 2011, 36 (1): 172~180.

[19] http: //www.sklgp.com·d-1efault.aspx? id=9&subid=9&newsid=248.

[1] 肖进, 李辉. 汶川地震灾区地质环境演化过程与后重建灾害防治措施[J]. 工程地质学报, 2012, 20(4): 532-539.

[2] 陈宁, 王运生, 蒋发森, 苟富刚. 汶川县渔子溪地震地质灾害特征及灾害链成生分析[J]. 工程地质学报, 2012, 20(3): 340-349.

[3] 穆鹏, 吴玮江, 折学森. 汶川地震重灾区陇南红土坡滑坡稳定性分析与防治对策研究[J]. 工程地质学报, 2012, (2): 204-212.

[4] 朱静, 常鸣, 丁军, 齐信. 汶川震区暴雨泥石流危险范围预测研究[J]. 工程地质学报, 2012, 20(1): 7-14.

苟富刚, 王运生, 吴俊峰, 陈宁, 邓茜. 都江堰庙坝地震高位滑坡特征与成因机理研究[J]. 工程地质学报, 2012, 20(1): 21-29.