

## 俯冲带地区压扭断裂型地震触发滑坡及其剥蚀厚度空间分布规律分析

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## SPATIAL DISTRIBUTION OF SEISMIC LANDSLIDES AND THEIR EROSION THICKNESS IN SUBDUCTION ZONE ASSOCIATED WITH SHEAR-THRUST EARTHQUAKE FAULTING MODE

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- 摘要
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摘要 2010年1月12日海地 $M_w$  7.0级地震触发了大量的滑坡。我们基于GIS与遥感技术构建了3类详细完备的海地地震滑坡编录图,分别为单体滑坡面分布数据,滑坡中心点位置数据与滑坡后壁点位置数据。结果表明海地地震触发了30828处滑坡,这些滑坡大致分布在一个面积为3192.85km<sup>2</sup>的区域内,滑坡覆盖面积为15.736km<sup>2</sup>。基于滑坡中心点密度(LCND)、滑坡后壁点密度(LTND)、滑坡面积百分比(LAP)与滑坡剥蚀厚度(LET)这4个衡量指标,使用统计分析方法,分析了海地地震滑坡及其剥蚀厚度与地震参数、地形参数、公路参数的关系。分析结果表明滑坡与坡度、地震动峰值加速度(PGA)存在大致的正相关关系;与距离恩里基约-芭蕉园断裂、距离水系存在大致的负相关关系;滑坡沿着恩里基约-芭蕉园断裂距离的统计结果表明,震中以西距离震中22~26km与8~12km的区域,与震中以东距离震中6~18km的区域是地震滑坡易发区域;斜坡曲率值越接近0,也就是坡面较平的斜坡越不容易在地震条件下发生滑动;LCND、LTND、LAP与LET高值对应的高程区间为200~1200m;滑坡发生的优势坡向为E方向;滑坡的发生与距离震中、距离公路没有太明确的关系。

关键词: 海地地震滑坡 编录图 滑坡点密度 滑坡面密度 滑坡剥蚀厚度 统计分析

Abstract: Many landslides were triggered by Haiti Earthquake( $M_w$  7.0) of January 12, 2010. Base on Geographic Information Systems(GIS) and remote sensing technologies, three detailed landslide inventories were constructed. The three inventories are respectively landslide polygons, landslide centroid points, and landslide top points. It is indicated that 30, 828 landslides triggered by the Haiti earthquake throughout the site with area of 3, 192.85km<sup>2</sup>. These landslides cover a total area of 15.736km<sup>2</sup>. Correlations of landslide occurrence with seismic parameters, topographic conditions and distance from roads are analyzed using the three landslide inventories. Statistical analysis of these landslides spatial distribution is carried out with four indices. They are a) landslide centroid number density(LCND), defined as the number of landslide centroid per square kilometer, b) landslide top number density(LTND), defined as the number of landslide top point per square kilometer, c) landslide area percentage(LAP), defined as the percentage of the area affected by the landslides, and d) landslide erosion thickness(LET), defined as the landslide material thickness per square kilometer. It is to determine how the occurrence of landslides and their erosion thickness correlates with seismic parameters, topographic conditions and distance from roads. It is observed that values of four indices(LCND, LTND, LAP and LET) have generally positive correlations with slope angle and peak ground acceleration(PGA), and have generally negative correlations with distance from the Enriquillo-Plantain Garden fault, and distance from drainages. Statistical results of landslide and their erosion thickness with distance along the Enriquillo-Plantain Garden fault show that areas from 22 to 26km and 8 to 12km, western of the epicenter, and from 6 to 18km, eastern of the epicenter are landslide high susceptibility areas. It also represents more slope curvature close to zero, more difficult to earthquake triggered landslide occurrence. The highest values appear at range from 200m to 1200m in elevation. The landslides have preferred orientation dominated by the eastern. No apparent correlations were found in the LCND, LTND, LAP and LET values with distance from epicenter and distance from roads.

Key words: Haiti earthquake triggered landslides Inventory Landslide number density Landslide area percentage Landslide erosion thickness Statistical analysis

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