

氣象資訊在坡地災害預警的應用

Weather Information for Slope Disaster Warning and Prevention

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摘 要

從過去15年(2006-2020年)統計資料顯示，臺灣坡地災害平均每年有20.8次事件發生，肇生多集中於暖季時段，發生地域又以新北市、南投及嘉義居前3名；尤其是以山區累積的總降雨量最高。針對坡地災害事件，進行個案氣象量場診斷以及個案降雨兩型、特徵以及強度的評估，總結在災害事件肇生前，綜觀環境條件的特徵以及氣象量場分布的特性。

從氣象雷達觀測資料來分析劇烈降雨的結構變化以及強降雨帶分布；由閃電落雷系統來釐清劇烈降雨系統發展延時以及運動趨勢；氣象探空氣球觀測系統可提供劇烈降雨的垂直大氣結構特徵；藉地面雨量站觀測結果掌握降雨的時空分布；由雷雨檢查表可以得知降雨雷暴的肇生可能。綜合研判、診斷分析、事先預警及有效支援，俾利提昇坡地災害防救效能。

關鍵字：氣象資訊、坡地災害、防災預警

Abstract

According to statistics from the past 15 years (2006-2020), Taiwan's slope disasters average 20.8 incidents per year. Most of the incidents occurred during the warm season. New Taipei City, Nantou, and Chiayi ranked the top 3 in the areas where they occurred; especially the total rainfall accumulated in the mountains is the highest. By collecting data from disaster events, we diagnose the related meteorological fields and evaluate rainfall patterns, characteristics, and intensity for the individual case. The diagnosis results could provide the information of the environmental conditions which are closely related to the following slope disaster events.

Results show that the overall environmental conditions for the precursors of the sloping land disaster event, as far as the Mei-Yu front is concerned, the main axis of 850hpa Θ_e points to Taiwan and is higher than 340K, the 850hpa moisture flux is greater than 200gkg-1s-1, the 850hpa low-level jet is greater than 25kTs, and the 700hPa relative humidity field greater than 85% is an important diagnostic field factors, which can effectively support the determination of the strengthened disaster prevention and response commander to carry out disaster alert dispatch. From the overall analysis results, the Threat score value 6 hours before the occurrence of the slope disaster event is 0.65, which shows that the rainfall threshold is capable of forecasting technology. From the Bias score value of 1.42, it means that there is an over-forecast situation, which can be appropriately corrected.

Finally, machine learning model is used to build a stable and reliable collapse potential prediction model, and effectively feed back to the actual preparation operations of disaster prevention and early warning.

Key words: weather information, sloping land disasters, disaster prevention, early warning