

出國報告（出國類別：出席國際會議）

**AGU Fall Meeting 2018**  
**美國地球物理聯盟研討會2018**

服務機關：國防大學理工學院環境資訊及工程學系

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## 摘要

2018美國地球物理聯盟(AGU)秋季會議(Fall Meeting)，於12月10日至14日於美國華盛頓特區Walter E. Washington會議中心和周邊酒店舉辦為期5日的國際會議。會議內容包含大氣與海洋科學(atmospheric and ocean sciences)、固體地球科學(solid-Earth sciences)、水文學(hydrologic sciences)及太空科學(space sciences)等四大主題，每個領域再各自規劃相關的研討主題，供參與者以口頭或海報發表方式進行成果發表與交流研討。本次會議參與的主題，主要為「地球和行星地表變遷(Earth and Planetary Surface Processes)」項下的「山崩和地景演變：機制和回饋(Landslides and Landscape Evolution: Mechanisms and Feedbacks)」，本次發表研究成果為「Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope」。藉由此次國際研討會的參與，可了解世界各國在上述相關領域的發展近況外，亦可透過與會者之間的討論增進學術交流。

# 目次

一、前言.....	1
二、目的.....	3
三、會議議程.....	3
四、會議過程.....	5
五、心得與建議.....	13
六、攜回資料.....	13
七、致謝.....	13

## 一、前言

美國地球物理聯盟(American Geophysical Union, AGU)成立於1919年，每年12月舉行研討會議(又稱為秋季會議，Fall Meeting)，內容包括四大主題，分別為大氣與海洋科學(atmospheric and ocean sciences)、固體地球科學(solid-earth sciences)、水文學(hydrologic sciences)及太空科學(space sciences)等，內容豐富且多元，每年吸引世界各國相關領域之研究學者參與盛會。今(2018)年度為AGU會議舉辦第100年，除例行性的研討會外，亦舉行如百年全會、百年會議、周邊公共活動、AGU-IUGG百年研討會及探討兩性平等在地球科學的研究等相關研討等活動，邀請各相關領域專家學者共同參與。本報告撰寫人所屬研究機構之教師專長涵括土木工程、坡地防災、航遙測影像判釋、衛星定軌與測量、地理資訊系統與大氣科學等學術領域，計有4位教師參加本次研討會，分別就所屬研究主題發表近期研究成果，相關與會人員合影如圖1。



圖1 國防大學理工學院環資系參與 AGU 2018 研討會人員，左起李宏輝副教授、林玉菁副教授、李宜珊助理教授與蔡明達助理教授

表1 AGU議程名稱與發表之論文篇數

編號	議程名稱	議程名稱(中譯)	發表篇數
A	Atmospheric Sciences	大氣科學	3,442
AE	Atmospheric and Space Electricity	大氣和空間電力	69
B	Biogeosciences	生物地球科學	3,552
C	Cryosphere	冰凍圈	1,394
DI	Study of the Earth's Deep Interior	地心研究	838
ED	Education	教育	494
EP	Earth and Planetary Surface Processes	地球和行星地表變遷	1,890
G	Geodesy	大地測量	1,019
GC	Global Environmental Change	全球環境變化	5,371
GH	GeoHealth	地球健康	959
GP	Geomagnetism, Paleomagnetism and Electromagnetism	地磁學，古地磁學和電磁學	433
H	Hydrology	水文學	3,531
IN	Earth and Space Science Informatics	地球與空間科學信息學	946
MR	Mineral and Rock Physics	礦物和岩石物理	1,049
NG	Nonlinear Geophysics	非線性地球物理學	625
NH	Natural Hazards	自然災害	3,008
NS	Near Surface Geophysics	近地表地球物理學	515
OS	Ocean Sciences	海洋科學	2,459
P	Planetary Sciences	行星科學	1,030
PA	Public Affairs	公共事務	931
PP	Paleoceanography and Paleoclimatology	古海洋學和古氣候學	387
S	Seismology	地震學	2,136
SA	SPA-Aeronomy	SPA-高層大氣物理學	514
SH	SPA-Solar and Heliospheric Physics	SPA-太陽和日光物理學	487
SI	Societal Impacts and Policy Sciences	社會影響和政策科學	2,107
SM	SPA-Magnetospheric Physics	SPA-磁電子物理學	574
T	Tectonophysics	構造物理學	1,365
V	Volcanology, Geochemistry and Petrology	火山學，地球化學和岩石學	1,452
總計			42,577

AGU研討會議主題涵括「太空與行星科學(Atmospheric Sciences)」等29大領域，合計發表之論文篇數為 42,577 篇，詳如表1。考量研討會主題涵蓋範圍廣泛，實無法於有限的時間內涉略所有議題，故在行前即規劃以「地球和行星地表變遷( Earth and Planetary Surface Processes)」項下的「山崩和地景演變：機制和回饋(Landslides and Landscape Evolution: Mechanisms and Feedbacks)」領域為本次研習與交流的重點主題，並發表研究成果「Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope」。另在「礦物和岩石物理(Mineral and Rock Physics)」、「自然災害(Natural Hazards)」、「地震學(Seismology)」、「火山學、地球化學及岩石學(Volcanology, Geochemistry and Petrology)」等領域中，亦有邊坡災害之相關研究發表，一併納入本次行程研習項目。

## 二、目的

此行目的在於了解世界各國在自然災害、災害防治、工程地質與岩石力學等相關課題之研究與應用發展，亦透過與會者之間的討論增進學術交流，作為未來深入上述相關課題之研究參考。

## 三、會議議程

AGU研討會的議程包括科學演講(Scientific Oral Sessions)、海報發表(Poster Sessions)、參展商展覽(Exhibit Hall)、實地考察-破冰船(Icebreaker)、頒獎儀式與宴會(Honors Ceremony and Banquet)及博物館之夜(Night At The Museum)等。除了實地考察與博物館之夜活動外，相關會議及展覽活動係在 Walter E. Washington Convention Center 舉辦。而在論文口頭發表方面，依各種不同的主題排定於各演講廳進行，海報則統一於Poster Hall展覽。由於AGU主題豐富廣泛，多加運用主辦單位提供的APP進行主題查詢，可快速掌握相關場次時間及地點。以「山崩和地景演變：機制和回饋(Landslides and Landscape Evolution: Mechanisms and Feedbacks)」為例，其有關訊息如表2所示。

## 表2 山崩和地景演變：機制和回饋(Landslides and Landscape Evolution: Mechanisms and Feedbacks)議程

### EP21C: Landslides and Landscape Evolution: Mechanisms and Feedbacks I Posters

Landslides pose a significant hazard to communities on human timescales while their long-term behavior modulates the pace and style of landscape evolution. Case studies, often rich in physical complexity, can be difficult to generalize across landscapes. Conversely, landscape evolution studies often trade that complexity for broad spatio-temporal applicability. While landslides are driven by local phenomena, collectively they can shape long-term hillslope and channel evolution regionally or globally. Landslide studies that span this spatio-temporal range must include both landscape-scale context and sufficient physical information to understand critical mechanics. This session seeks contributions exploring the role of landslides in a broader surface processes setting. We encourage submissions that advance our understanding of feedbacks between landslides and landscape evolution, such as the signatures of landslides in hillslope and channel processes, along with mechanisms controlling slope failure and mobility. We welcome contributions from field to modeling studies, especially those incorporating multi-disciplinary tools or datasets.

#### EP21C-2251 Regional, tree-ring based chronology of landslides in the Outer Western Carpathians

*Karel Šilhán*

**Karel Šilhán**, *Organization Not Listed, Washington, DC, United States; University of Ostrava, Ostrava, Czech Republic*

#### EP21C-2252 A Combination of Dry Spells and Extreme Precipitation Is Responsible for Triggering Landslides in the Outer Western Carpathians

*Radek Tichavsky*

**Radek Tichavsky**<sup>1</sup>, **Juan Antonio Ballesteros-Cánovas**<sup>2</sup>, **Karel Šilhán**<sup>1</sup>, **Radim Tolasz**<sup>3</sup> and **Markus Stoffel**<sup>2</sup>, (1)*University of Ostrava, Ostrava, Czech Republic*, (2)*University of Geneva, Geneva, Switzerland*, (3)*Czech Hydrometeorological Institute, Ostrava, Czech Republic*

#### EP21C-2253 Geomorphological And Paleoenvironmental Study Between Maca And Lari,Colca Valley, Arequipa, Peru.

*Brent Ward*

**Gioachino Roberti**<sup>1</sup>, **Brent Ward**<sup>2</sup>, **Gael Araujo**<sup>3</sup>, **Rigoberto Aguilar**<sup>4</sup>, **Joseph Huanca**<sup>4</sup>, **Nicholas J Roberts**<sup>1</sup>, **Benjamin van Wyk de Vries**<sup>5</sup>, **Nelida Manrique**, **Bilberto Zavala** and **Swann Zerathe**, (1)*Simon Fraser University, Burnaby, BC, Canada*, (2)*Simon Fraser University, Earth Sciences, Burnaby, BC, Canada*, (3)*Instituto Geológico, Minero y Metalúrgico, Lima, Peru*, (4)*Observatorio Vulcanológico del INGEMMET - Instituto Geológico, Minero y Metalúrgico, Arequipa, Peru*, (5)*Université Clermont Auvergne, Clermont Ferrand, France*, (6)*Observatorio Vulcanológico del INGEMMET, Arequipa, Peru*, (7)*Université Grenoble Alpes, Grenoble, France*

#### EP21C-2254 Comparative analysis between short and long-term landslide erosion rates in the Serra do Mar mountain range - Brazil

*Nelson Ferreira Fernandes*

**Lucia MARIA DA Silva**, *UFRJ Federal University of Rio de Janeiro, Rio De Janeiro, Brazil*, **Nelson Ferreira Fernandes**, *UFRJ Federal University of Rio de Janeiro, Department of Geography, Rio De Janeiro, Brazil* and **Pietro Laba**, *Federal University of Rio de Janeiro, Rio de Janeiro, Brazil*

#### EP21C-2255 Oblique divergence activating large-scale rainfall induced landslides: Evidence from Tarma Ber, Northwestern Plateau of Ethiopia

*Tesfay Kiros*

**Tesfay Kiros**<sup>1</sup>, **Stefan Wornlich**<sup>2</sup>, **Michael Alber**<sup>1</sup> and **Bedru Hussien**<sup>3</sup>, (1)*Ruhr University Bochum, Applied Geology, Bochum, Germany*, (2)*Ruhr University Bochum, Hydrogeology Department, Bochum, Germany*, (3)*Addis Ababa Science and Technology University, Earth Science, Addis Ababa, Ethiopia*

#### EP21C-2256 Climatic and tectonic controls of erosion in the eastern end of Himalaya

*Kevin Shao*

**Kevin Shao**, *University of California Los Angeles, Los Angeles, CA, United States*, **Seulgi Moon**, *Stanford Univ-GES, Cambridge, MA, United States* and **Gen Li**, *University of Southern California, Los Angeles, CA, United States*

#### EP21C-2257 The impacts of landslides triggered by the 2009 Typhoon Morakot on landscape evolution: A mass balance approach

*Clarke DeLisle*

**Clarke DeLisle** and **Brian J Yanites**, *Indiana University Bloomington, Earth and Atmospheric Sciences, Bloomington, IN, United States*

#### EP21C-2258 Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope

*Hung-Hui Li*

**Hung-Hui Li** and **Chi-Chieh Chen**, *National Defense University, Department of Environmental Information and Engineering, Taipei, Taiwan*

#### EP21C-2259 A rapid assessment method of soil slope seismic stability considering effect of dynamic pore water pressure

*Shuai Huang*

**Shuai Huang** and **Yanju Peng**, *Institute of Crustal Dynamic, China Earthquake Administration, Earthquake Engineering, Beijing, China*

#### EP21C-2260 Post-seismic evolution of organic carbon mobilised by landsliding

*Thomas Croissant*

**Thomas Croissant**<sup>1</sup>, **Gen Li**<sup>2</sup>, **Robert G Hilton**<sup>1</sup>, **Jin Wang**<sup>1</sup> and **Alexander Densmore**<sup>1</sup>, (1)*Durham University, Durham, United Kingdom*, (2)*University of California Los Angeles, Los Angeles, CA, United States*

#### EP21C-2261 Preservation and transportation of landslide deposits under multiple timescales in the Taiwan orogenic belt

*Chan-Mao Chen*

**Chan-Mao Chen**, **J Bruce H Shyu** and **Hsiu-Kuo Tsui**, *National Taiwan University, Taipei, Taiwan*

#### EP21C-2262 Scale dependent topographic control of landslide frequency-size statistics

*William Gregory Medwedeff*

**William Gregory Medwedeff**, *University of Michigan Ann Arbor, Ann Arbor, MI, United States*, **Marin Kristen Clark**, *Univ Michigan, Ann Arbor, MI, United States*, **Dimitrios Zekkos**, *University of Michigan, Ann Arbor, MI, United States* and **A. Joshua West**, *Univ. of Southern California, Los Angeles, CA, United States*

#### 四、會議過程

AGU 2018研討會主議程共計舉辦 5 天(12月10日至12月14日)，行程詳如表3，論文海報發表會場如圖2，廠商展場如圖3所示。本次研討會適逢AGU 100週年，承辦單位特別為與會者安排12月13日(四)晚上7時至10時為博物館之夜(Night at the Museums)，配合展出的博物館計有航空與太空博物館(National Air and Space Museum)、非裔美國人歷史和文化博物館 (National Museum of African American History and Culture)、自然歷史博物館(National Museum of Natural History)與美國國家歷史博物館(National Museum of American History)，考量時間有限及研究領域，報告撰寫人參加美國國家歷史博物館之活動場次，詳如圖4。

表3 出席會議期間之行程摘述

日期與時間		行程摘述
台北	美東	
12/8 17:30	12/8 04:15	於桃園國際機場搭乘17:30班機
12/9 8:30	12/8 19:15	抵達紐約約翰甘迺迪機場，入住飯店
12/9~12/10	12/9	搭車前往華盛頓 D. C.，入住飯店
12/11 ~12/15	12/10~12/14	研討會報到，參與研討會議程與論文發表
12/15~12/16	12/14~12/15	離開華盛頓 D. C.前往紐約
12/16 ~12/17 05:50	12/16 0:020	紐約約翰甘迺迪機場搭乘00:20班機，05:50抵達桃園國際機場



圖2 AGU 2018 研討會論文海報發表會場



(a)



(b)



(c)

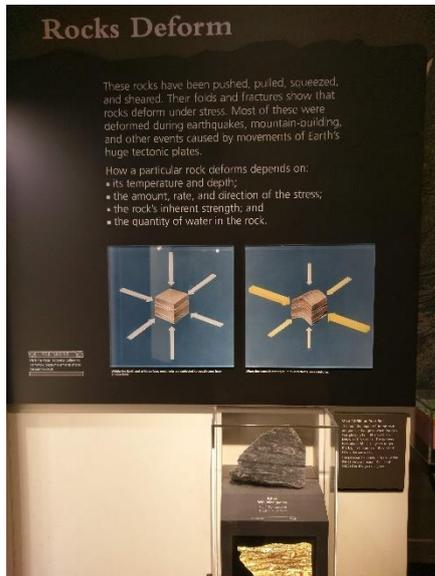
圖3 AGU 2018 研討會廠商展覽會場：(a)報告撰寫人於會場留影、(b)美國NSAS設置的展示攤位，每日均安排不同的演講主題，包括行星與大氣等地球物理，及火星登陸任務等，圖中正介紹NASA洞察號（InSight）成功登陸火星後如何進行岩石標本的採集，並詳細說明採樣器的設計、(c)Google於展場入口處設置電視牆，並解說Google Earth Engine的應用



(a)



(b)



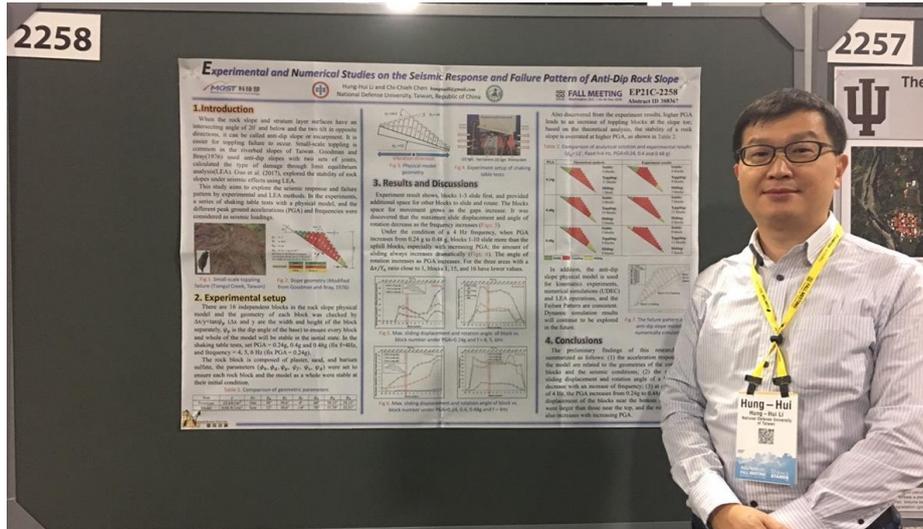
(c)



(d)

圖4 AGU 2018研討會舉辦的博物館之夜共計四個展場，報告撰寫人參加美國國家歷史博物館 (National Museum of American History)之活動場次：(a)博物館大廳留影、(b)(c)(d)透過現地樣本的保存及採集的標本介紹斷層的力學機制及開挖剖面的判釋

除了AGU舉辦的活動，我國科技部地球科學研究推動中心(ESRPC)及國家太空中心(NSPO)亦於廠商展覽會場設置攤位展示我國地科與太空科技研究能量；地球科學研究推動中心另於 12月12日(三)舉辦 MOST-NSF合作的 FACET-GEMT AGU Town Hall Meeting 與 Taiwan Night，提供了國內研究學者與國外合作學者共聚一堂交流的機會，報告撰寫人亦參與了Taiwan Night場次，期間與旅外學者及國內與會之不同領域專家學者有所交流。



(a)

## Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope



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AGU 100 FALL MEETING  
Washington, D.C. 11-14 Dec 2018

EP21C-2258  
Abstract ID 388367

### 1. Introduction

When the rock slope and stratum layer surfaces have an intersecting angle of  $20^\circ$  and below and the two tilt in opposite directions, it can be called anti-dip slope or escarpment. It is easier for toppling failure to occur. Small-scale toppling is common in the riverbed slopes of Taiwan. Goodman and Bray(1976) used anti-dip slopes with two sets of joints, calculated the type of damage through limit equilibrium analysis(LEA). Guo et al. (2017), explored the stability of rock slopes under seismic effects using LEA.

This study aims to explore the seismic response and failure pattern by experimental and LEA methods. In the experiments, a series of shaking table tests with a physical model, and the different peak ground accelerations (PGA) and frequencies were considered as seismic loadings.



Fig 1. Small-scale toppling failure (Tiangul Creek, Taiwan)

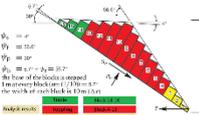


Fig 2. Slope geometry (Modified from Goodman and Bray, 1976)

### 2. Experimental setup

There are 16 independent blocks in the rock slope physical model and the geometry of each block was checked by  $\Delta x/y = \tan\psi_p$  ( $\Delta x$  and  $y$  are the width and height of the block separately,  $\psi_p$  is the dip angle of the base) to ensure every block and whole of the model will be stable in the initial state. In the shaking table tests, set PGA = 0.24g, 0.4g and 0.48g (fix  $f=4$ Hz, and frequency = 4, 5, 6 Hz (fix PGA = 0.24g)).

The rock block is composed of plaster, sand, and barium sulfate, the parameters ( $\phi_b, \phi_a, \psi_p, \psi_s, \psi_d$ ) were set to ensure each rock block and the model as a whole were stable at their initial condition.

Table 1. Comparison of geometric parameters

Item	$f$	$\Delta x$	$\psi_p$	$\psi_s$	$\psi_d$	$\phi_b$	$\phi_a$
Prototype	25 km/m <sup>3</sup>	10m	30°	56.6°	4°	60°	38.15°
Model	0.02 N/cm <sup>3</sup>	5cm	12°	38.6°	-14°	78°	37.79°

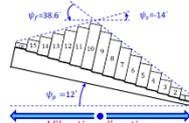


Fig 3. Physical model geometry



Fig 4. Experiment setup of shaking table tests

### 3. Results and Discussions

Experiment result shows, blocks 1-3 slide first, and provided additional space for other blocks to slide and rotate. The blocks space for movement grows as the gaps increase. It was discovered that the maximum slide displacement and angle of rotation decrease as the frequency increases (Figs. 5).

Under the condition of a 4 Hz frequency, when PGA increases from 0.24 g to 0.48 g, blocks 1-10 slide more than the uphill blocks, especially with increasing PGA; the amount of sliding always increases dramatically (Fig. 6). The angle of rotation increases as PGA increases. For the three areas with a  $\Delta x/Y_b$  ratio close to 1, blocks 1, 15, and 16 have lower values.

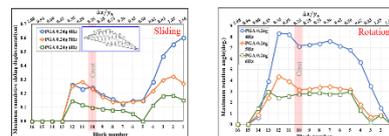


Fig 5. Max. sliding displacement and rotation angle of block vs. block number under PGA=0.24g and  $f = 4, 5, 6$ Hz

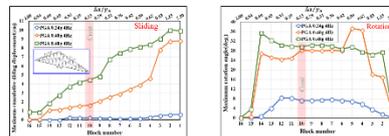


Fig 6. Max. sliding displacement and rotation angle of block vs. block number under PGA=0.24, 0.4, 0.48g and  $f = 4$ Hz

Also discovered from the experiment results, higher PGA leads to an increase of toppling blocks at the slope toe; based on the theoretical analysis, the stability of a rock slope is overrated at higher PGA, as shown in Table 2.

Table 2. Comparison of analytical solution and experimental results ( $\psi_p=12^\circ$ , fixed  $f=4$  Hz, PGA=0.24, 0.4 and 0.48 g)

PGA	Theoretical analysis	Experiment results
0.24g	Stable: 4 blocks Toppling: 11 blocks Sliding: 1 block	Stable: 4 blocks Toppling: 9 blocks Sliding: 3 blocks
0.40g	Stable: 3 blocks Toppling: 10 blocks Sliding: 3 blocks	Stable: 2 blocks Toppling: 12 blocks Sliding: 2 blocks
0.48g	Stable: 3 blocks Toppling: 9 blocks Sliding: 4 blocks	Stable: 0 block Toppling: 13 blocks Sliding: 3 blocks

In addition, the anti-dip slope physical model is used for kinematics experiments, numerical simulations (UDEC) and LEA operations, and the Failure Pattern are consistent. Dynamic simulation results will continue to be explored in the future.

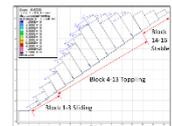


Fig 7. The failure pattern of the anti-dip slope model numerically simulates

### 4. Conclusions

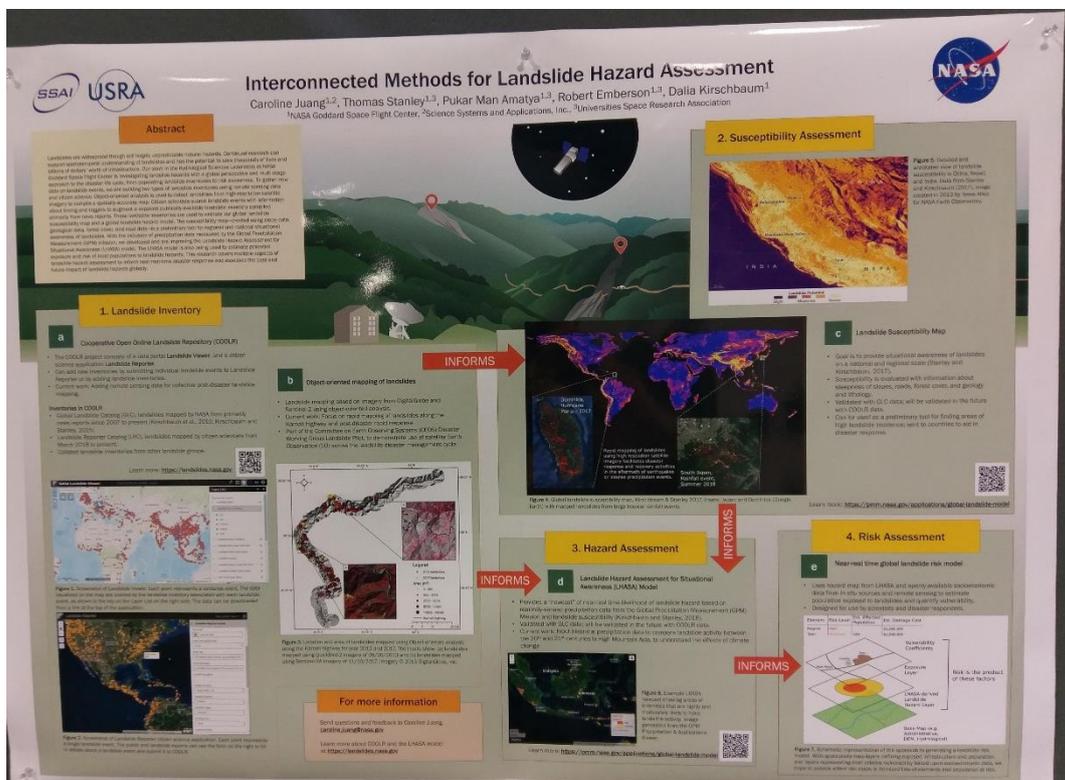
The preliminary findings of this research are summarized as follows: (1) the acceleration responses of the model are related to the geometries of the composed blocks and the seismic conditions; (2) the maximum sliding displacement and rotation angle of a block will decrease with an increase of frequency; (3) at a frequency of 4 Hz, the PGA increases from 0.24g to 0.48g, the sliding displacement of the blocks near the bottom of the slope were larger than those near the top, and the rotation angle also increases with increasing PGA.

(b)

圖5 本次於AGU研討會發表之「Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope」研究成果海報(研討會論文發表編號 EP21C-2258)

在論文海報部分，報告撰寫人發表之 Experimental and Numerical Studies on the Seismic Response and Failure Pattern of Anti-Dip Rock Slope，依大會安排期程於12月11日進行論文海報發表，如圖5。所發表的內容主要是目前所執行的科技部研究計畫「整合不同調查尺度之岩坡破壞潛勢區評估、分析及監測研究之子計畫:地震引致岩坡破壞之變形特徵與潛勢評估」研究成果，係透過物理模型實驗及UDEC數值模型探討逆向岩坡在模擬地震力作用下之受震行為與破壞型態，本研究同步透過高速攝影機擷取模型塊體的運動軌跡，經由軟體分析獲得塊體之位移、速度與加速度歷時，可用於物理模型受震行為之判釋與破壞過程之闡述。

由 NASA 戈達德太空飛行中心(NASA's Goddard Space Flight Center)水文地質科學實驗室等單位發表的 Interconnected Methods for Landslide Hazard Assessment，詳圖6，係結合了NASA坡地災害資料庫(<https://pmm.nasa.gov/landslides/index.html>)、高精度衛星影像及地質、坡地、植被及道路等資料，配合其發展的分析模式(Landslide Hazard Assessment for Situational Awareness, LHASA)產製坡地災害潛勢圖。



(a)

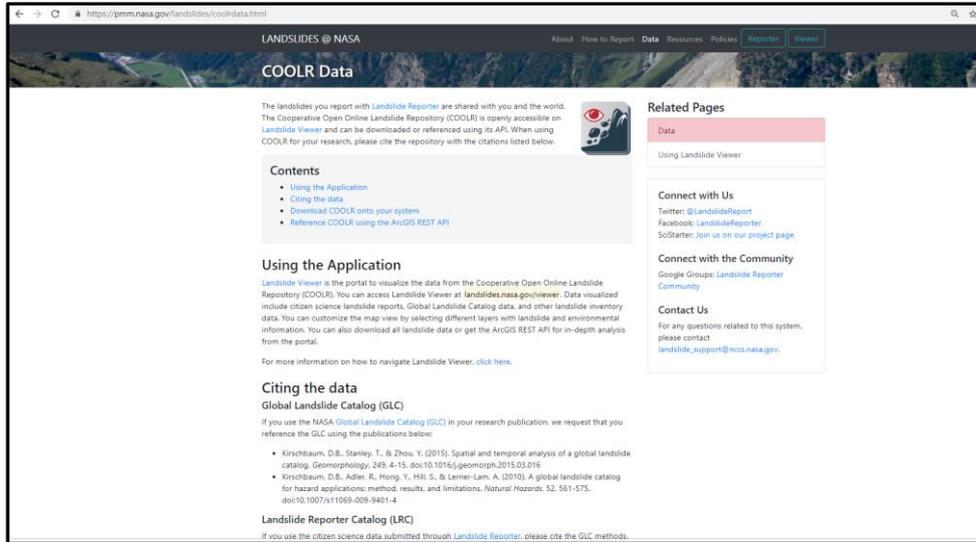
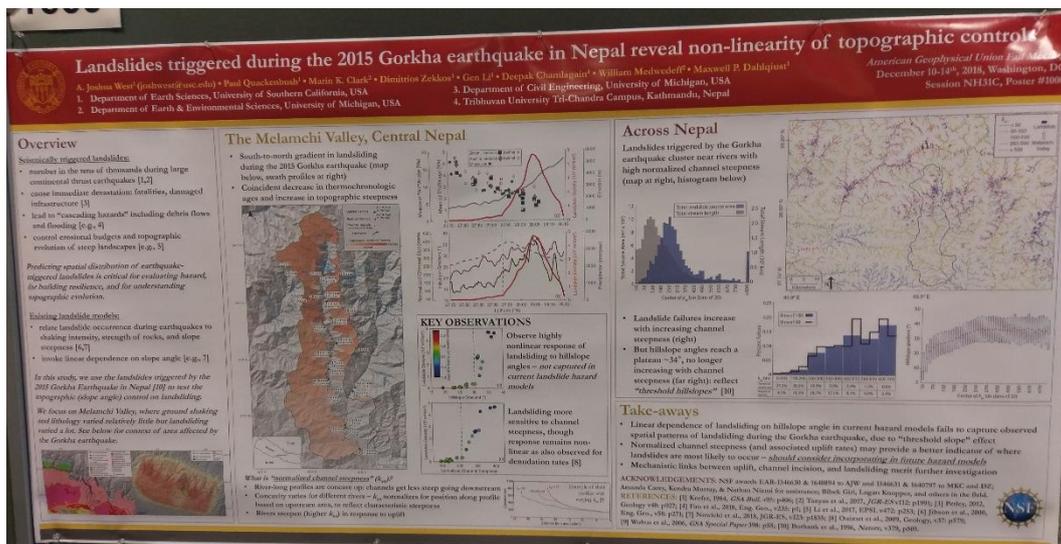
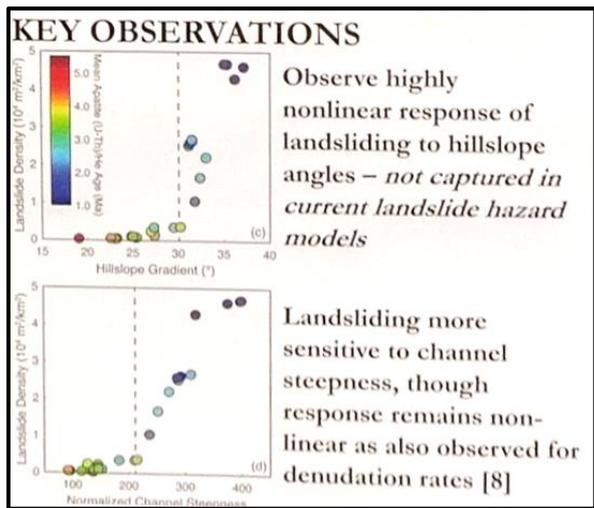


圖6 NASA 戈達德太空飛行中心有關坡地災害潛勢評估之研究：(a)研究成果海報展示、(b) NASA坡地災害資料庫網頁 (<https://pmm.nasa.gov/landslides/coolrdata.html>)

南加州大學等研究團隊針對地形效應對地震引致坡地災害的影響進行探討，詳如圖7(a)，係以Melamchi 山谷為研究場址，並根據2015年尼泊爾地震引致河道兩側的坡地災害進行調查，其研究指出當坡度超過  $34^\circ$ ，坡地災害案例數明顯增加且與坡度略呈指數型遞增的曲線形式，另提出以河槽的陡度(channel steepness)建立其與災害案例數的關係，詳如圖7(b)，作為後續分析模式的輸入參數。



(a)



(b)

圖7 南加州大學等研究團隊針對地形效應對地震引致坡地災害之影響提出其研究成果

另外，中國大陸三峽大學水利與環境工程學院透過數值分析與現地實驗探討降雨致土壤浸潤進而造成坡地災害的研究成果，如圖8。根據其數值模型研究，可觀察到坡面上區分雨水入滲(inhalation zone)與雨水溢流(overflow zone)二個區域，而此二區域的分界與降雨條件、邊坡幾何條件、土壤滲透性有關。

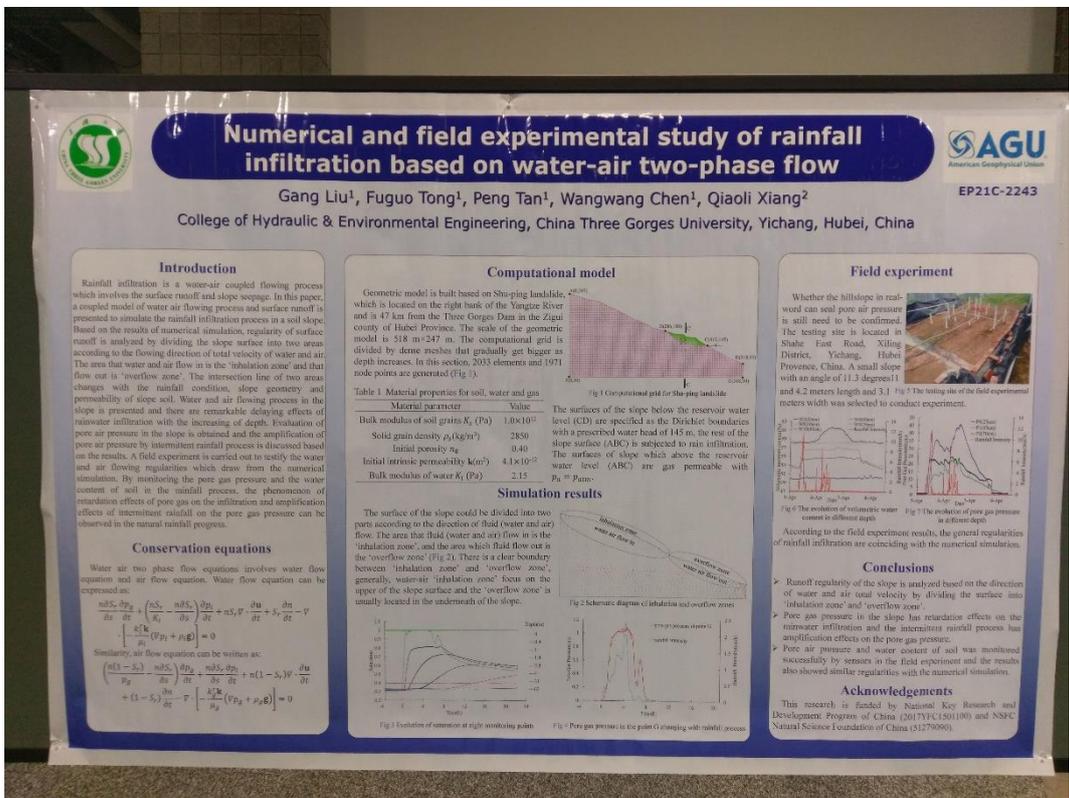


圖8 中國大陸三峽大學水利與環境工程學院降雨致土壤浸潤進而造成坡的災害的研究成果

地震引致的地動(ground motion)現象通常是以 IMs (intensity measures)來表示，即地震作用歷時內的尖峰加速度(PGA)或尖峰速度(PGV)對時間的積分，採PGA對時間積分者即為 Arias Intensity ( $I_A$ )，由於地震作用歷時對結構物的損傷、坡地災害與土壤液化是一重要的影響因子，故 IMs 為地震引致之相關災害評估的重要關鍵參數。美國楊百翰大學(Brigham Young University)與美國國家地質調查所(USGS)共同發表的 Advanced Ground Motion Characterization in ShakeMap Modeling Energy-Related Ground Motion Parameters，如圖9，其提出三種替代的方法藉以迅速產生  $I_A$  分布圖，且可整合於美國地調所的震度圖。

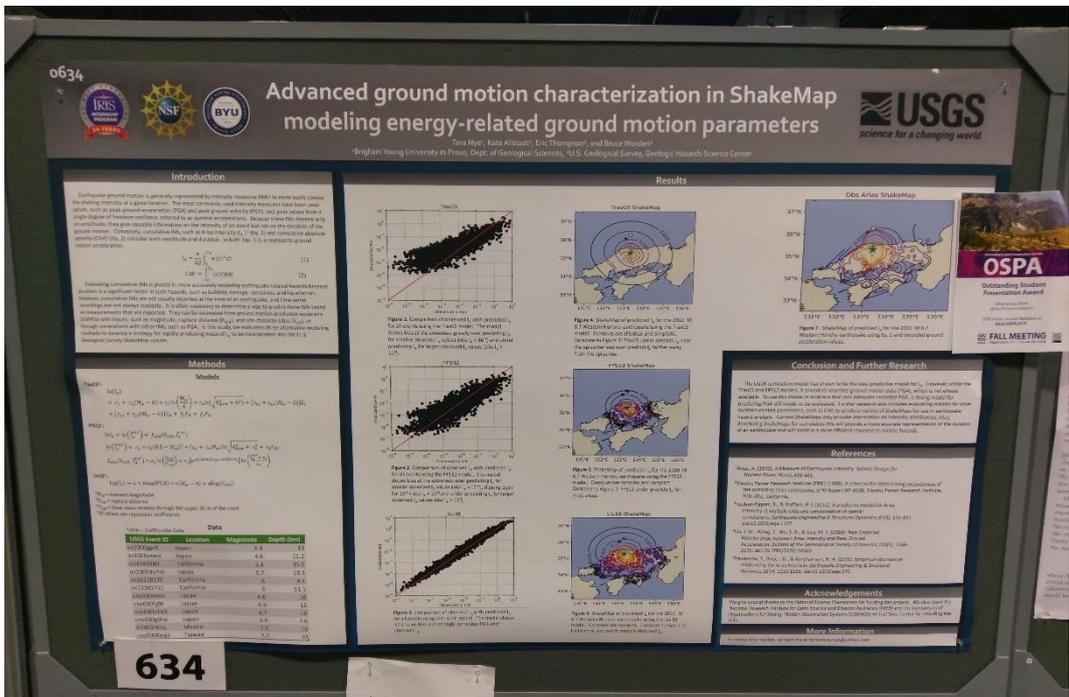


圖9 美國楊百翰大學(Brigham Young University)與美國國家地質調查所(USGS)提出 Arias Intensity ( $I_A$ ) 計算方法及整合運用於震度圖研究成果

## 五、心得與建議

美國地球物理聯盟(AGU)自1919年舉辦第1屆國際研討會迄今剛好舉辦 100 屆，由於其研討議題廣泛且深具科普教育目的，廠商陳展內容多元且豐富，因此每年均吸引眾多國際學者參與，不僅與會人數者眾，來自世界各國參與展覽的政府或是民間科研機構亦相當多，經參與本次年會後，提出下列幾點建議：

- (1) AGU 研討會議主題涵括 29 個領域，議程緊湊且參展的單位甚多，主辦單位開發的 APP 軟體提供了所有與會者需要的會議資訊，包括議程時間、地點、發表的文章題目與摘要等，均可自 APP 軟體查詢與閱讀，其善用智慧型手機相關軟體的經驗可作為我國未來承辦大型國際研討會之借鏡。
- (2) 科技部地球科學研究推動中心(ESRPC)及國家太空中心(NSPO)於 AGU 會議期間參與展示，有助於增加我國地科與太空科技研究現況的能見度，地球科學研究推動中心舉辦 FACET-GEMT AGU Town Hall Meeting 與 Taiwan Night，亦提供了國內研究學者與國外合作學者交流的機會，建議能持續挹注經費辦理類似的活動。

## 六、攜回資料

AGU 2018年會大會議程手冊一本。

## 七、致謝

承蒙科技部提供參與 AGU 2018年會的經費補助，藉此深表感謝。

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