出國報告（出國類別：其他-出席國際會議）

參加 ICATI2017 國際研討會
公務出國報告

服務機關：國立嘉義大學土木與水資源工程學系
姓名職稱：陳建元 教授
派赴國家：泰國蘇梅島
出國期間：2017.06.23-2017.06.29
報告日期：2017.07.04

摘要

本次發表學術口頭報告題目為「Applications of Thermal Images for Monitoring Surficial Temperature Changes of Naked Slope」。Global climate change causes increases in the torrential rainfall brought by typhoons and the monsoon in Taiwan. Torrential rain in turn causes landslides, debris flows, and the formation of earth dams. Most dams were formed in remote mountainous areas and are difficult to reach for safety evaluation at the beginning of their formation. A long distance and non-destructive testing methodology is necessary for evaluating the safety of landslide dams. This study used an infrared imager for monitoring naked slopes. The thermography can detect surficial radiation temperature changes in the slope to locate potential unstable areas for further monitoring. This study proposes radiation temperature change (T) per unit of time (Δt) as an index (T /Δt) for nondestructive monitoring. The index was used for monitoring and analysis of artificial earth dams constructed at Huishun farm in Nantou County. The results of the analysis show that the failure zone of the artificial dam exhibited the greatest change in the index and the potential failure mode could be predicted once the dam breached. The proposed model could be used for potential unstable slope monitoring.

關鍵字：熱影像、崩塌、監測。

目錄

一、參加國際會議之目的

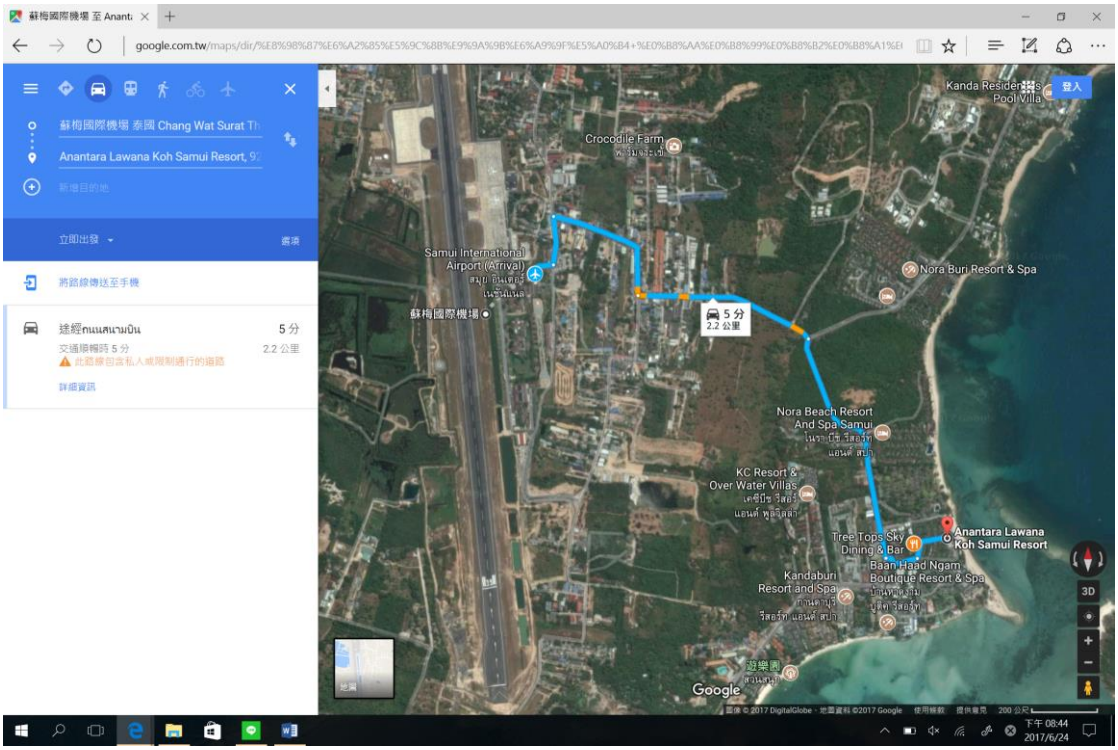
參加本次國際研討會 ICATI 2017(International Conference on Advanced Technology Innovation 2017)之目的除受邀擔任為研討會的目的為研究論文的口頭發表。本次出席發表學術口頭報告題目為「Applications of Thermal Images for Monitoring Surficial Temperature Changes of Naked Slope」。有鑑於氣候變遷造成山坡地災害的情形增加，本研究評估以遠距離、非破壞性檢測的熱影像來監測邊坡土壤滑動的反應分析。以進一步了解邊坡的熱影像特性，作為工程設計、整治成效之參考。

藉由此次國際學術研討會議的參與不但有助於了解國際間的研究現況，也從口頭發表場次中，增進自己視野與未來研究發展能力，有助於日後進行相關研究之本質學能提升與精進研究技巧及實際國際研討會務的參與。

二、參加國際會議之過程

會議時間與地點

本會議於 2017 年 6 月 25-28 日於泰國沙美島(Koh Samui)舉行(圖一)。研討會場從沙美島機場搭乘計程車僅約需 10 分鐘不到車程即可到研討會場之旅館 Anantara Lawana Koh Samui Resort。圖一為研討會地點位置圖與搭車路線。圖二為研討會會場外觀，圖三為研討會報到櫃台。



圖一、研討會場 Anantara Lawana Koh Samui Resort 位置圖(摘自 Google 網頁)

圖二、研討會會場 Anantara Lawana Koh Samui Resort 外觀

圖三、研討會報到櫃台

會議議程

本次會議議程如下(表一)，表二為研討會本人發表場次議程表:

表一、研討會議程表(摘自研討會網頁)

ICATI 2017 Agenda

Date	Time	Event		
25th June (Sun.)	14:00~	Hotel Check-in Assistance (Hotel Reception Desk)		
	16:00~18:30	Registration (Library)		
Date	**Time**	**Lawana Meeting Room**	**Lawana Meeting Room 2**	**Foyer**
26th June (Mon.)	08:00~17:00	Registration (Lawana Meeting Room)		
	08:00~10:00	Session A1		Poster I
	10:00~10:15	Coffee Break (Foyer)		
	10:15~12:15	Session A2		Poster II
	12:15~13:30	Lunch Break (Ocean Kiss Restaurant)		
	13:30~13:40	Opening Ceremony (Lawana Meeting Room)		
	13:40~14:40	Keynote Speech I- Prof. Olivier Bonnaud Topic: Knowledge and know-how in microelectronics; strategy of innovative practice to counterbalance the new theoretical on-line courses approach		
	14:50~15:50	Keynote Speech II- Prof. Dae-Jin Kim Topic: A Two-Scale Generalized Finite Element Method for Computational Fracture Mechanics Analysis		
	16:00~17:00	Keynote Speech III- Prof. Hsiang-Chen Hsu Topic: Reliability Design and Structural Analysis on IC Packaging Wearable Medical Device on Knee-Joint Disease		
	17:00~17:10	Group Photo		
	18:30~21:00	Group Dinner (Beach front)		
27th June (Tue.)	08:00~12:00	Registration (Lawana Meeting Room)		
	08:00~10:00	Session A3	Session B3	Poster III
	10:00~10:15	Coffee Break (Foyer)		
	10:15~12:15	Session A4	Session B4	Poster VI
	12:15~13:00	Lunch Break (Ocean Kiss Restaurant)		
Date	**Time**	**Event**		
28th June (Wed.)	7:30~16:30	Culture and study tour		

表二、研討會部分議程表(本人發表場次)

Session B4

Date	Time	Lawana Meeting Room 2 E. Chemical & Biomedical Engineering, G. Green Technology & Civil Engineering, J. Mechanical Engineering, L. Environmental, Food, Health Science & Technology, O. Other Engineering and Technology related Topics *Prof. Josef Machacek, Session Chair*
27th June (Tue.)	10:15~10:27	**CG7001** **Single-Crossarm Stainless Steel Stayed Columns** *Radek Pichal, Josef Machacek*
	10:27~10:39	**CG7003** **Applications of Thermal Images for Monitoring Surficial Temperature Changes of Naked Slope** *Chien-Yuan Chen, Zhe-Hao Liu*
	10:39~10:51	**CG7006** **Design and Testing of a Remote Deployable Water Purification System Powered by Solar Energy** *Amber E. Keith, Jesse J. French*
	10:51~11:03	**CG7007** **Design and Analysis of a Water Channel for Characterization of Low Reynolds Number Flows** *Judah D. Rutledge, Jesse J. French*
	11:03~11:15	**CG7011** **Long-term Structural Performance of Simplified Slab System with Steel Deck-plate and SFRC** *Geonho Hong, Seungkoo Hwang*
	11:15~11:27	**CL7002** **The Influence of Density of the Materials and Body Mass Index on The Elderly's Sleep Efficiency** *Wichan Torobrum, Nandh Thavarungkul, Preecha Termsuksawad, Nakorn Srisukhumbowornchai, Purit Thanakijkasem*
	11:27~11:39	**CL7004** **A GI Proposal to Display ECG Digital Signals Wirelessly Real-time Transmitted onto a Remote PC** *Marius-Corneliu Rosu, Hamed Yassin-Kassab, Adriana Iliesiu, Serban Georgica Obreja*
	11:39~11:51	**CL7006** **Keeping Piglets Comfort with Hot Water by Biogas Combustion under Controllable Ventilation** *Cheng-Chang Lien, Ching-Hua Ting*
	11:51~12:03	**CL7009** **Energy-effective Predictive Temperature Control for Soy Mash Fermentation based on Compartmental Pharmacokinetic Modelling** *Ching-Hua Ting, Chien-Ping Wu, Yung-Tsong Lu, Sophia Ferng, Cheng-Kuang Hsu, Robin Yih-Yuan Chiou*
	12:03~12:15	**CE7009** **Simulation Study of Direct Methanol Fuel Cell for Optimizing the Cell Performance** *Murali M Seepana, Nitin T, Aruna Pagidi*

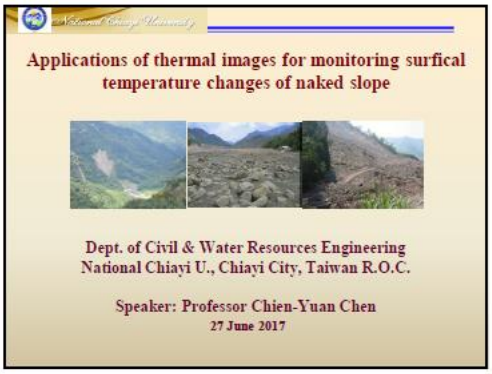
與會過程

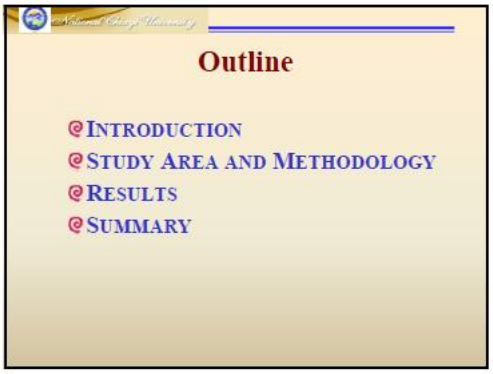
本研討會會議期間共有三天，主要論文發表日期為 6 月 26-27 日。除專題演講外，論文發表共分成 6 個場次(sessions)。本人發表的文章則被安排在 6 月 27 日上午 10:15 的 B4 場次。圖四及圖五為研討會口頭發表情形。

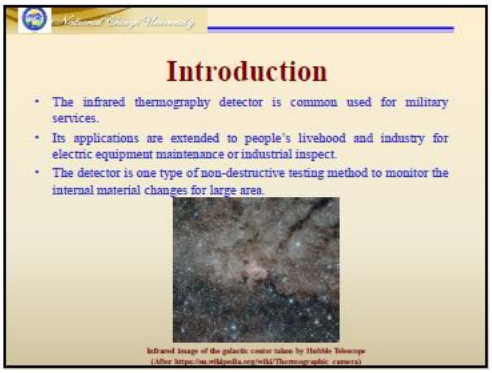
圖四、研討會主要發表會場(一)

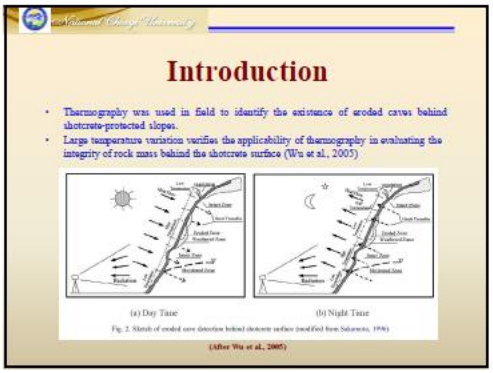
圖五、研討會主要發表會場(二)

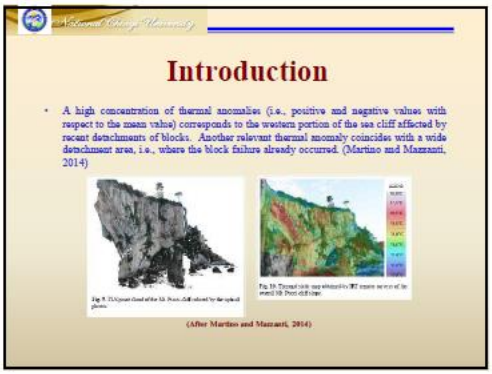
由於此次研討會由台灣學術單位主辦，與會者主要為台灣、東南亞學者，少數受邀專題演講之歐美學者參加。本人已有甚多次口頭發表經驗，在發表上尚稱順利。口頭發表簡報檔資料如下(圖六)。

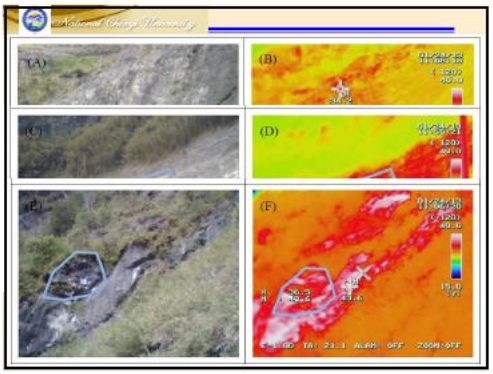




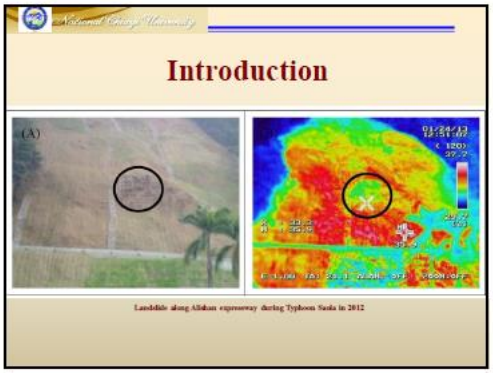


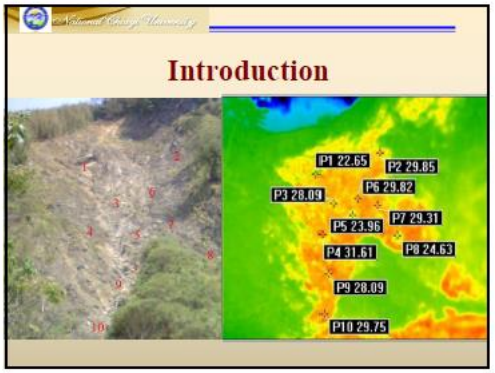


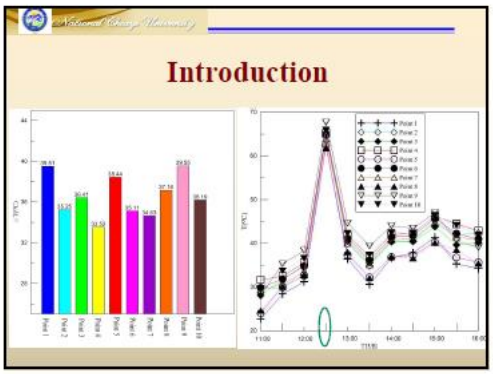


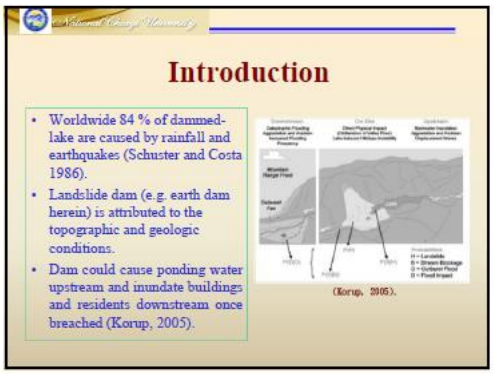


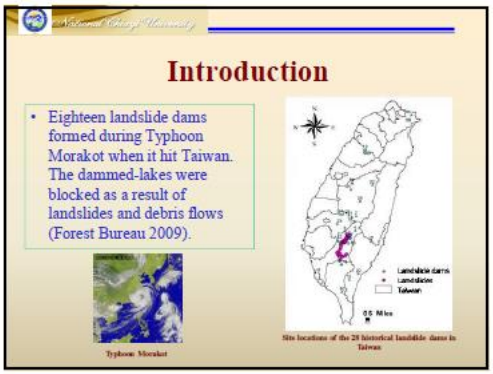
圖六、作者口頭報告簡報檔

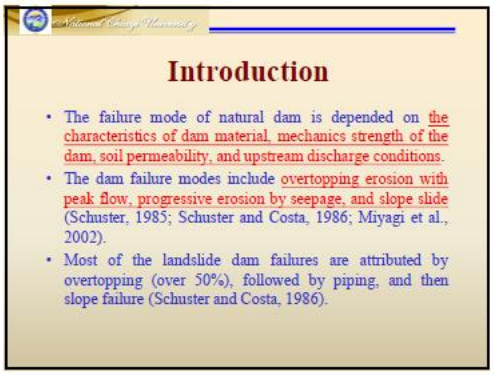












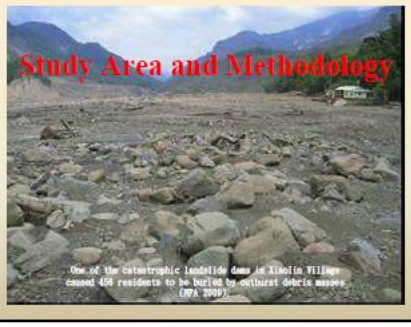
圖六、作者口頭報告簡報檔(續)

Purpose of the Study

- These natural dams are inaccessible and not able to survey and evaluate their safety in the first stage.
- Their stability and potential failure mode evaluation are valuable for disaster prevention and mitigation; if a long distance of non-destructive test is available.

A historical landslide dam in Taiwan

Study Area and Methodology



One of the catastrophic landslide dams in Xiaolin Village caused 458 residents to be buried by outburst debris masses (NFA 2009).

Study Area

- The field experiment site is located in the Landao creek in Huisun Forest, Nanotu County in middle Taiwan (Fig. 1).
- The creek is one of the potential debris flows in Taiwan.
- The creek initiated debris flow in 2001 during Typhoon Toraji and in 2004 during Typhoon Mindulle landed on Taiwan.

Site location of the study area in Taiwan

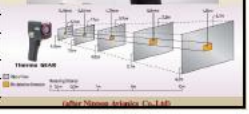
Study Area

- The field test was located at the downstream of the creek.
- The artificial earth dam was constructed to be 25 m long and 2 m high (Fig. 2).
- The discharge was released upstream toward the earth dam.

Fig. 2 Size of the artificial earth dam

Methodology

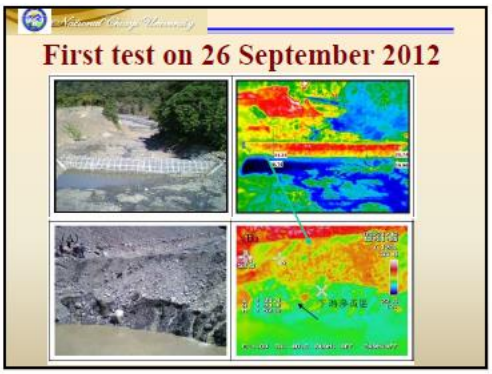
- The dam failure process was monitored using the infrared thermography detector.

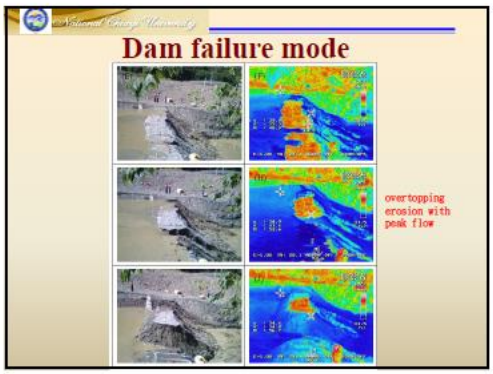


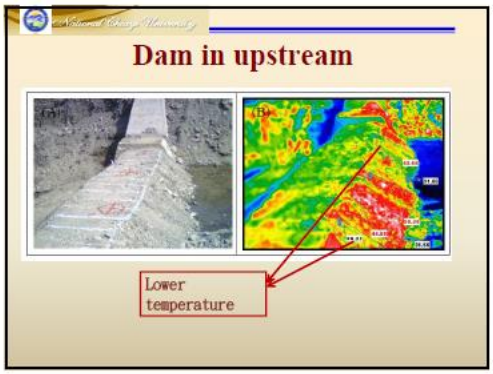
Methodology

- The study proposed a new index for monitoring the surficial changes of soil slope by water infiltration using thermal images. The index ($T/\Delta t$) is a measurement of the surficial radiation temperature changes (T) in the time period between the times the two images were taken (Δt). The changes of surficial radiation temperature over time are used for monitoring during the field test for potential failure mode evaluation.
- The surface of the earth dam downstream was divided into grids for monitoring the temperature changes. There are 27 grids monitored as marked in the image from left to right: a1~a3, b1~b8, c1~c8, and d1~d8 (Fig. 1). The temperature is taken as an average within the grid. Fifteen successive images were taken for the analysis. A positive value of the index shows the temperate is increasing. A negative index shows reduction in the temperate due to seepage and piping with the increasingly blocked water table.

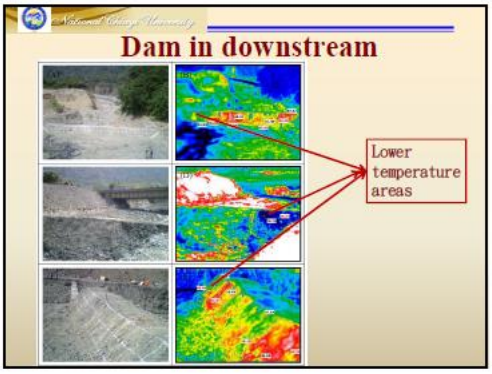
圖六、作者口頭報告簡報檔(續)

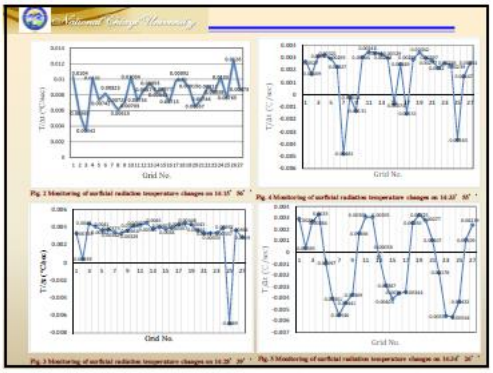


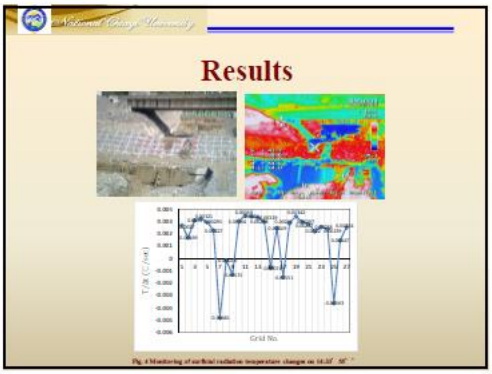


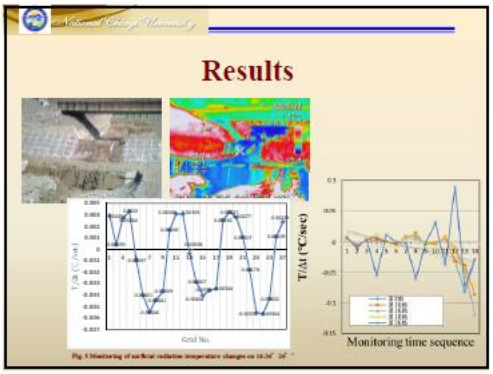


圖六、作者口頭報告簡報檔(續)

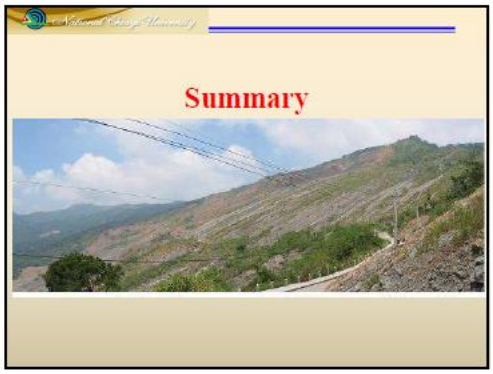


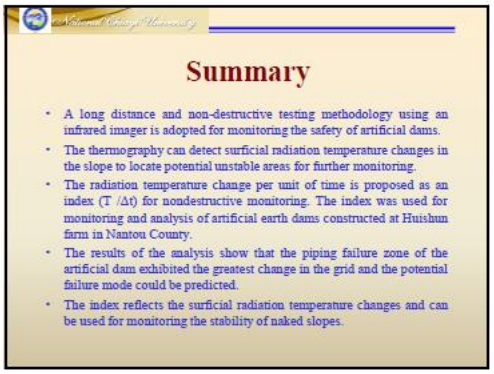






圖六、作者口頭報告簡報檔(續)





圖六、作者口頭報告簡報檔(續)

本次研討會攜回資料包括:

1. 期刊論文電子檔隨身碟，
2. 研討會會議手冊，
3. 研討會致贈紀念品。

考察參觀活動

研討會舉辦沙美島外乘船至鄰島安通國家公園現地參觀，參觀行程包括划船及山中湖等名勝。

圖七、研討會現地參觀

三、心得及建議

泰國在國際旅遊市場的競爭力排名上領先台灣。儘管隨著經濟波動，泰國物價已有高於台灣的消費趨勢，但仍吸引無數國際觀光客前來。在研討會停留期間，本人觀察沙美島有下列幾點特點:

1. 道路狹窄、汽車機車爭道，交通顯得混亂。
2. 島上國際高級飯店鄰立，吸引國際遊客眾多，儘管風景比不上澎湖群島，但島上乾淨潔白沙灘甚多且服務人員多能用英語交談，加上眾多泰國美食是吸引遊客到來因素。

<table>
<tr><td colspan="2" rowspan="5">訪談對象之聯絡資料</td><td colspan="4">姓名：　　服務單位：
職稱：</td></tr>
<tr><td colspan="4">電話:　　傳真:-</td></tr>
<tr><td colspan="4">e-mail:</td></tr>
<tr><td colspan="4">地址：-</td></tr>
<tr><td colspan="4">建議事項：無</td></tr>
<tr><td>簽章</td><td></td><td>系所主管簽章</td><td></td><td>院長簽章</td><td></td></tr>
</table>