TCCIP 臺灣氣候變遷推估與資訊平台
Taiwan Climate Change Projection and Information Platform

氣候變遷衝擊下河道沖淤變化評估－以高屏溪為例

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行政法人國家災害防救科技中心
National Science and Technology Center for Disaster Reduction

2017/1/23

TCCIP 成果發表會

tccip.ncdr.nat.gov.tw

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- 動力降尺度資料
- 極端颱風降雨事件選擇
- 河道沖淤模式
- 試區介紹
- 河道沖淤模式檢定與驗證
- 氣候變遷模擬
- 目前成果
- 結論

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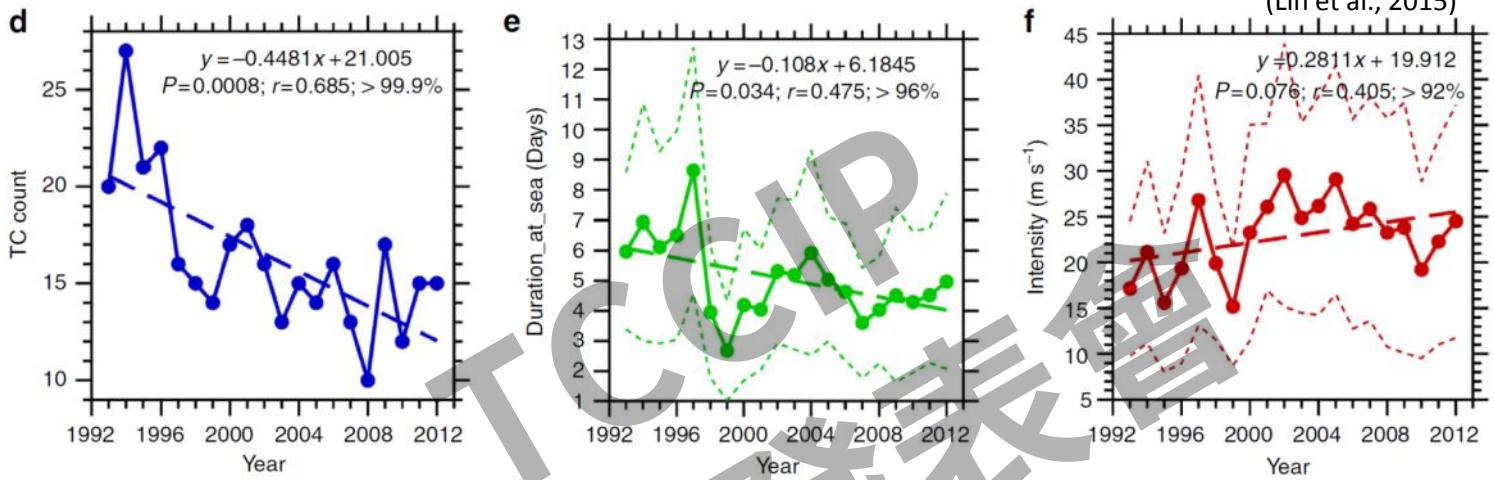
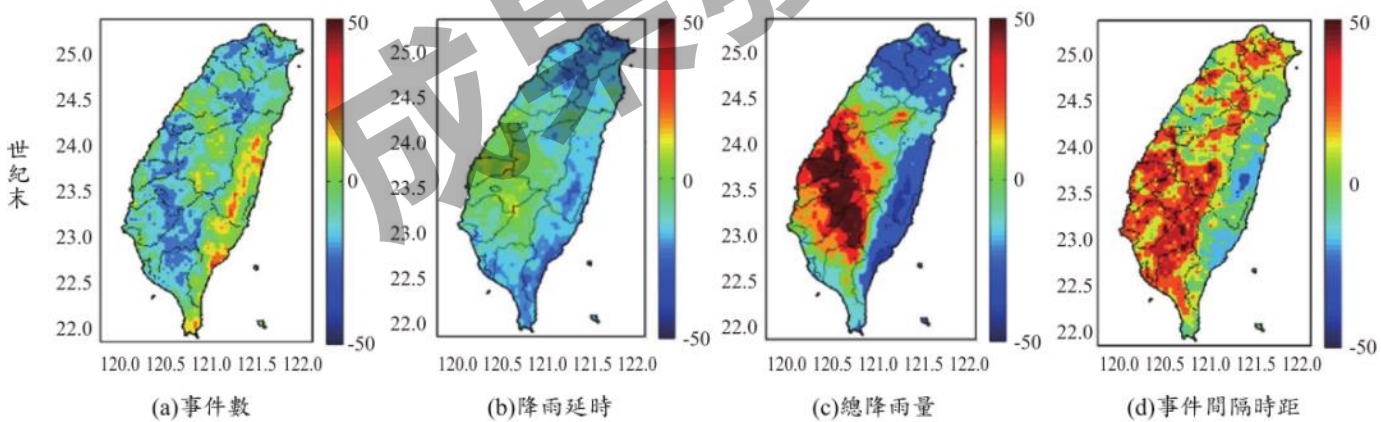
前言

- 觀測：颱風數目及生命減少；但強度增加

(Lin et al., 2015)



- 模式：數目減少，總降雨量增加，降雨強度增加



世紀末颱風降雨特性改變率(%)

(蘇元風等, 2014)

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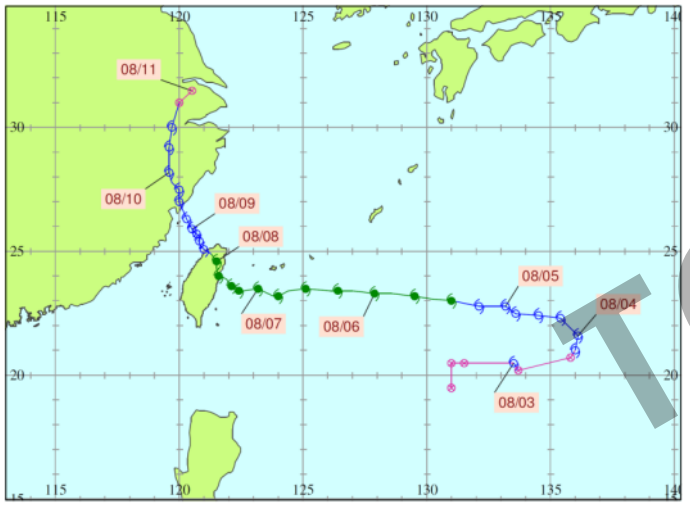
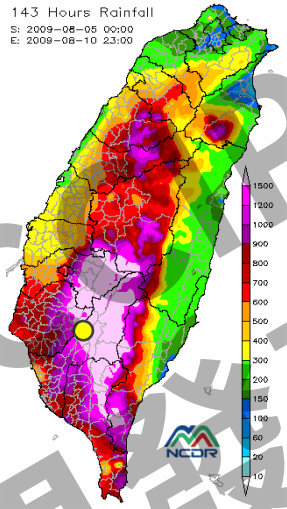
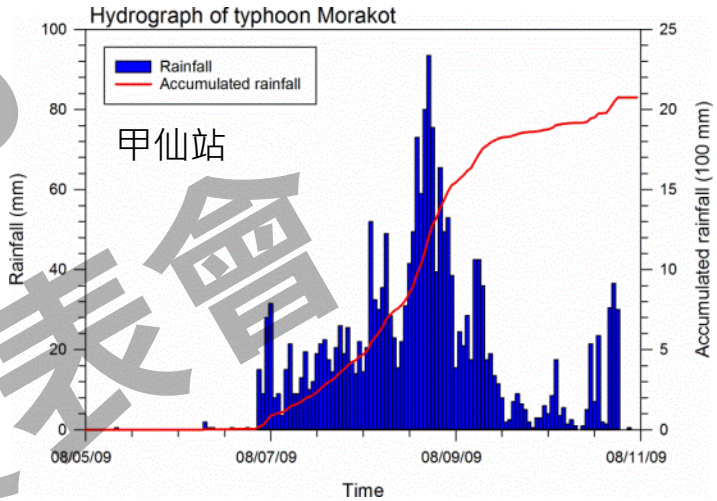
前言

➲ 莫拉克颱風：677人死亡、22人失蹤、NT$110億

莫拉克颱風路徑







小林村崩塌(水保局)

隆華國小

東港(水保局)

未來又來一個莫拉克？

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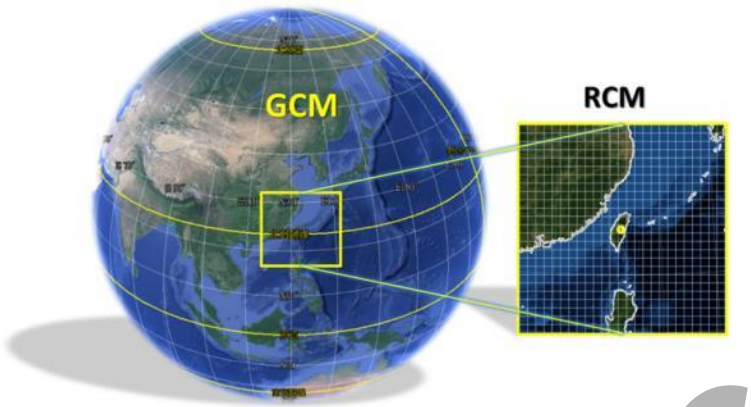
動力降尺度資料



全球模式：MRI-AGCM (Mizuta et al., 2006; 2012)

+

區域模式：WRF

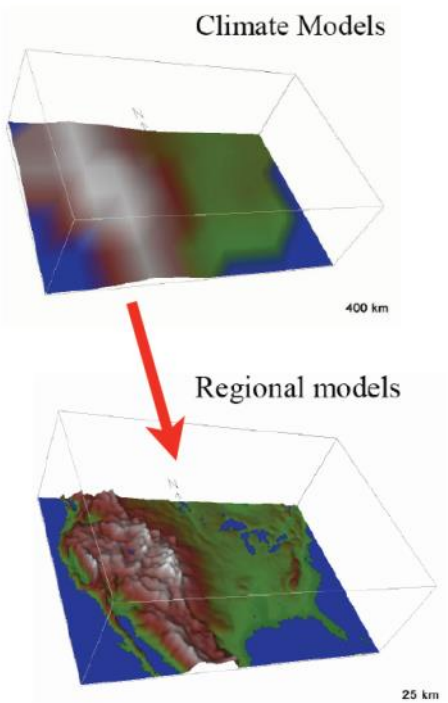
||

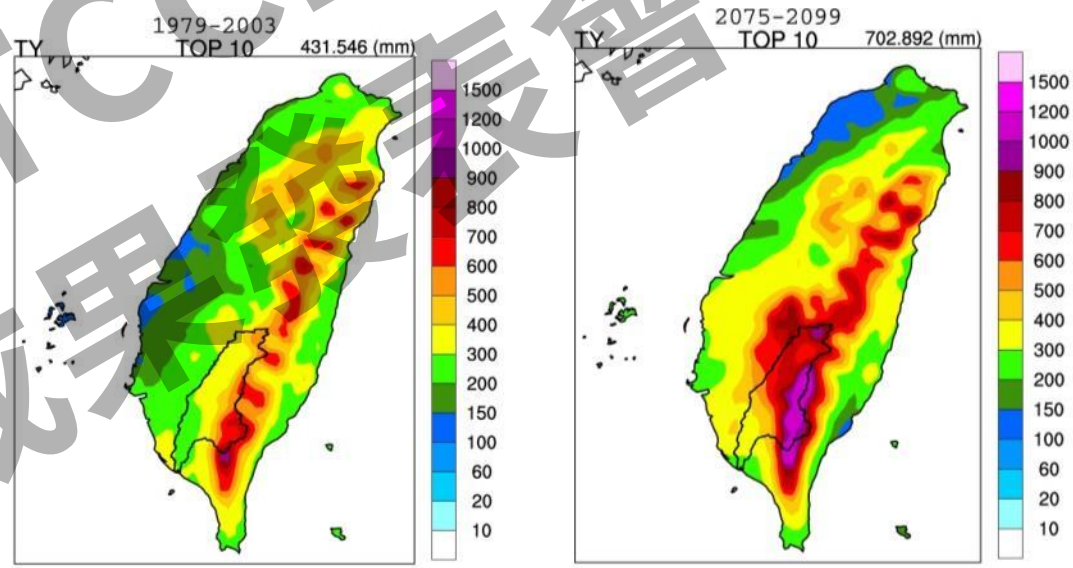
WRF-MRI

模擬資料長度：1979-2003(20世紀末)

2075-2099(21世紀末)

氣候情境：CIMP 3_A1B及CIMP 5_RCP 8.5





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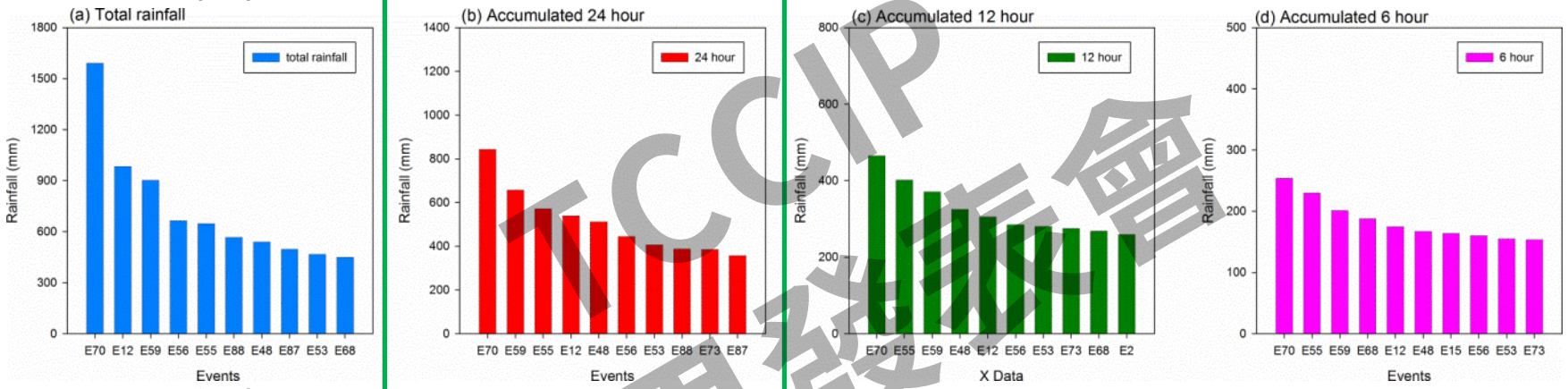
優點：高解析度地形、時雨量

極端颱風降雨事件選擇

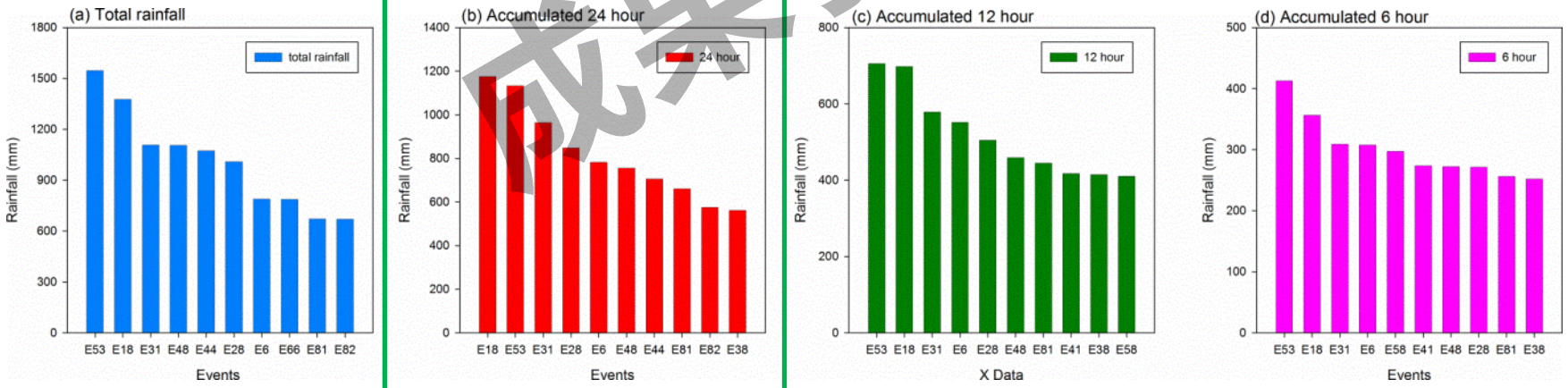
➲ 累積降雨、最大24小時、最大12小時、最大6小時

- 事件排序選擇：依據研究設定選取

A. 20世紀末



B. 21世紀末



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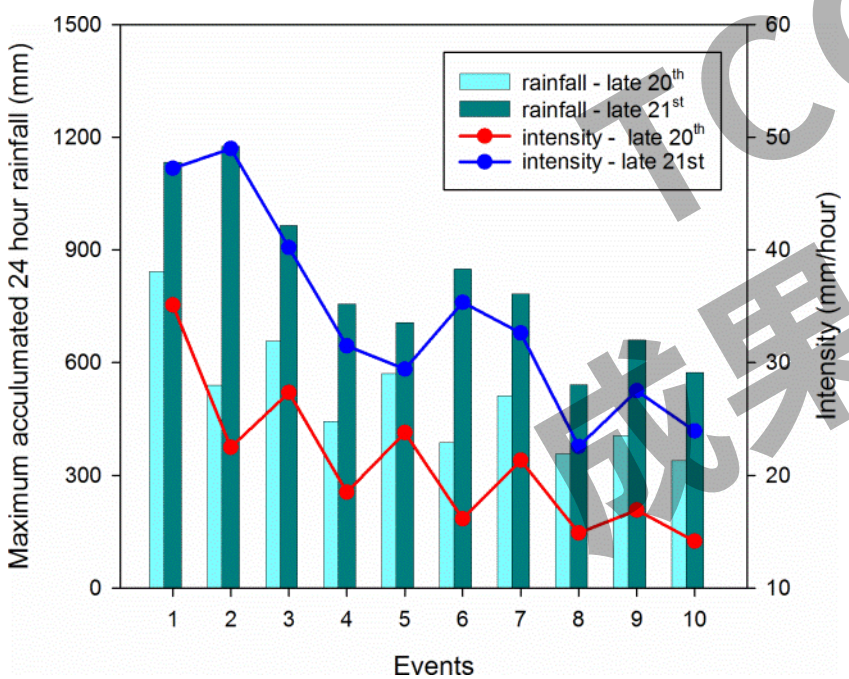
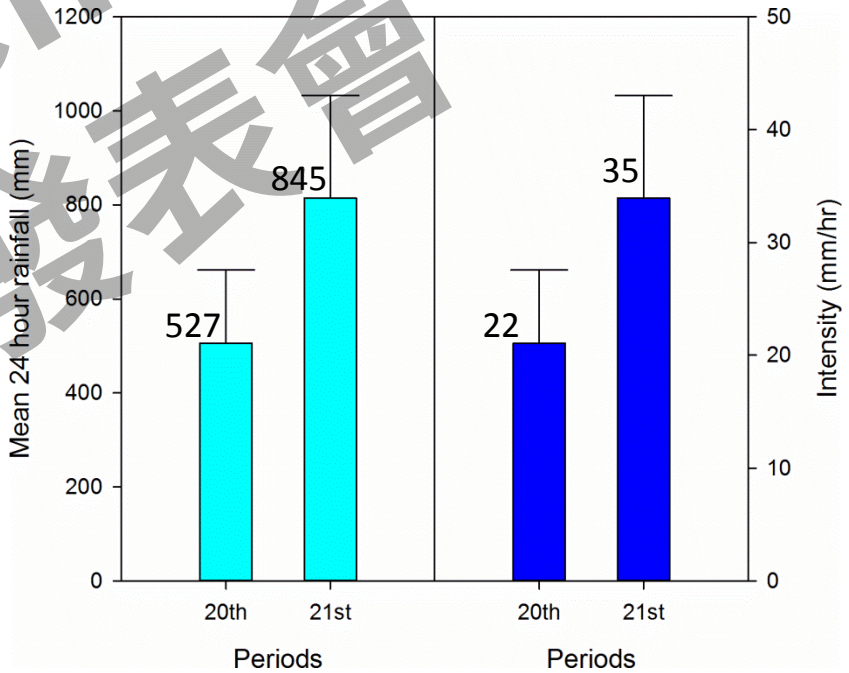
極端颱風降雨事件選擇

➲ 最大24小時(20世紀末、21世紀末)

- 平均最大24小時降雨：527 mm、845mm
- 平均最大24小時降雨強度：22 mm/hr、35 mm/hr





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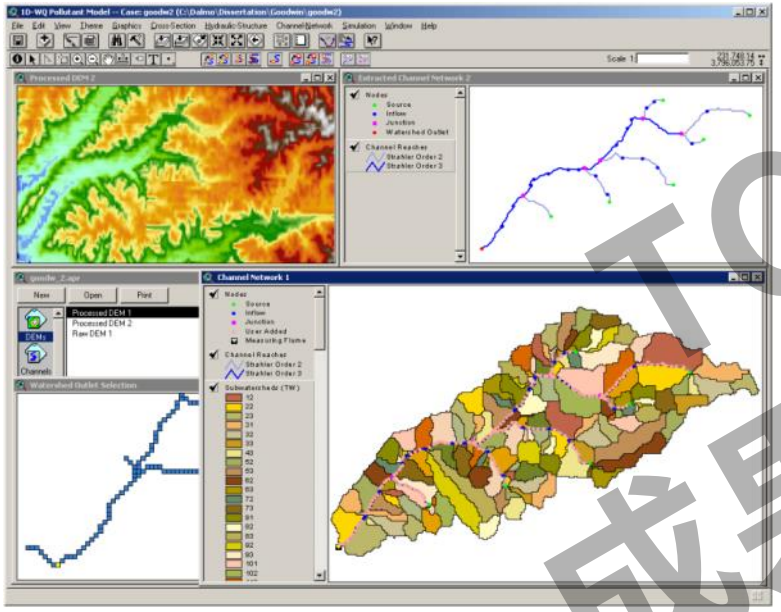
河道沖淤模式

➲ CCHE1D/2D：美國國家計算水科學及工程中心

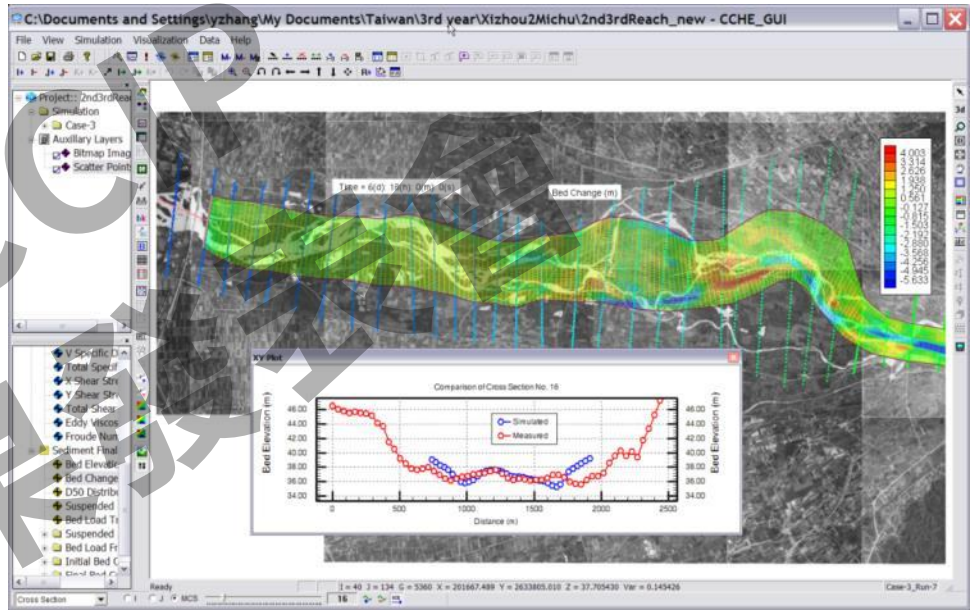
（National Center for Computational Hydroscience and Engineering）

CCHE1D：大甲溪、濁水溪



- 水理模組
  - 變量流河道網路
- 輸砂模組
  - 非均勻砂傳輸
  - 底床沖淤變化
  - 岸壁沖刷與土體破壞

CCHE2D：高屏溪

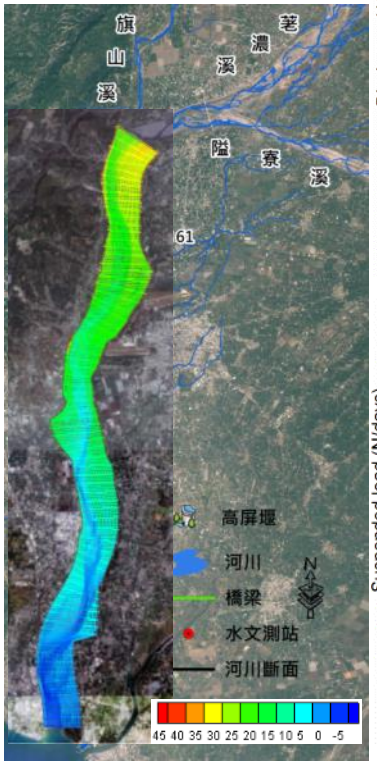


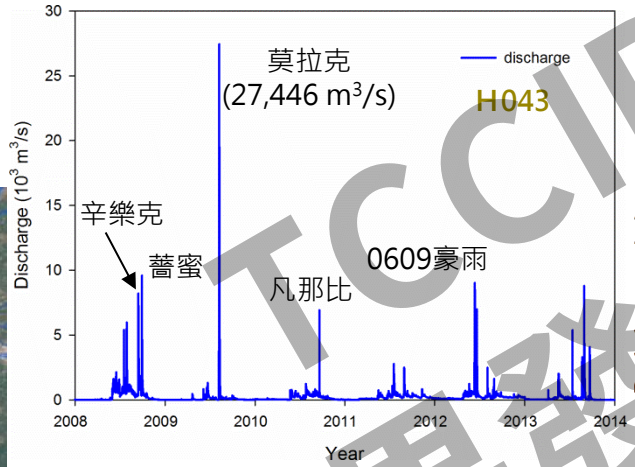
- 變量流自由液面流問題
- 水深平均控制方程式
- 三種紊流模組
- 乾濕點處理技巧
- 非均勻輸砂
- 非平衡輸砂
- 地貌變化
- 植生影響

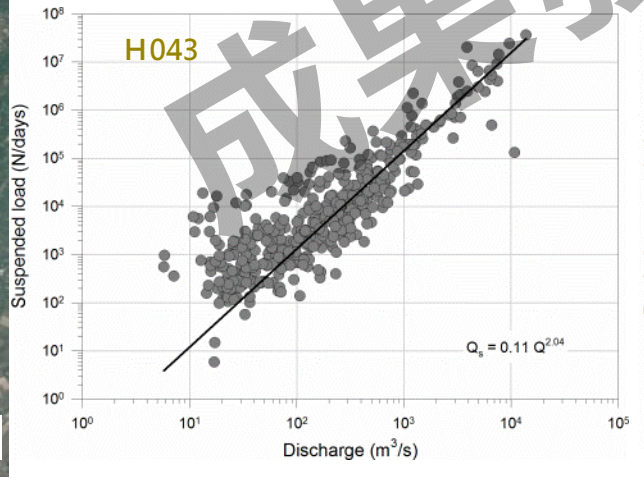
TCCIP 成果展示會

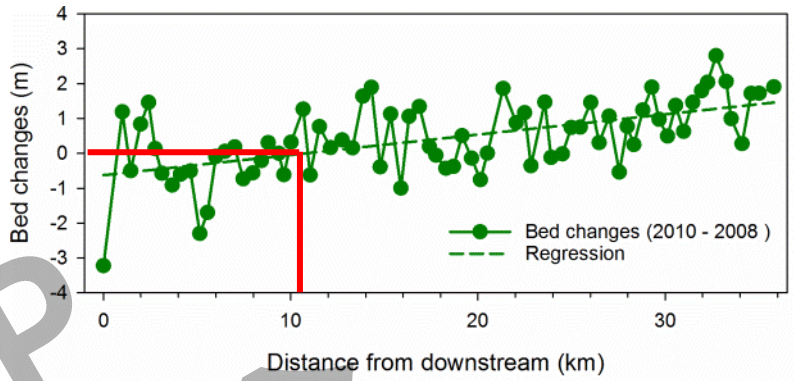
試區介紹－高屏溪

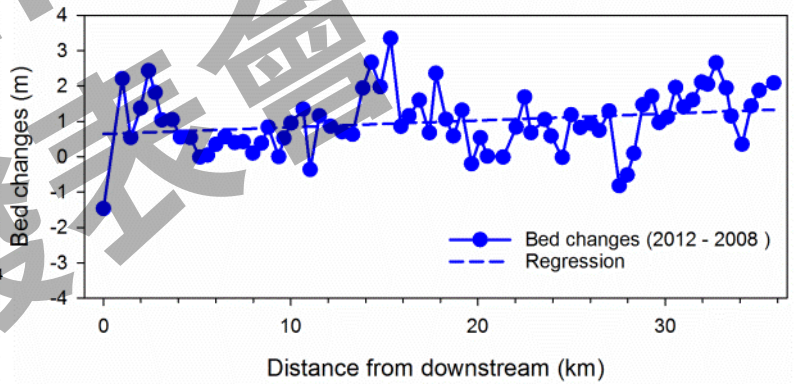
年平均降雨：1,980 ~ 4,350 mm
斷面資料：2008, 2010, 2012, 2013
模擬河段：35.8km
模擬河段坡度：1/1,327 ~ 1/1,175

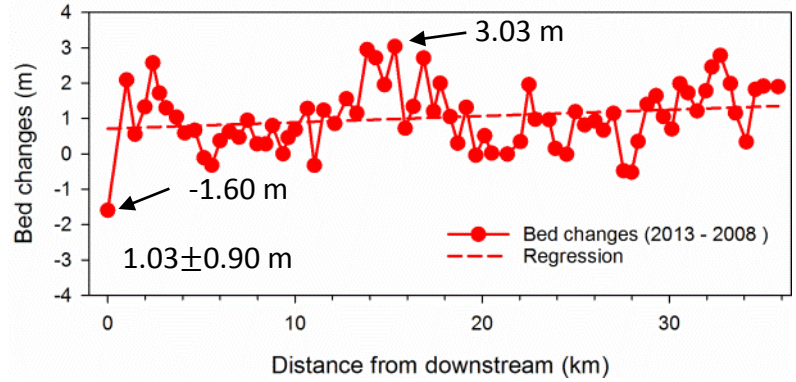












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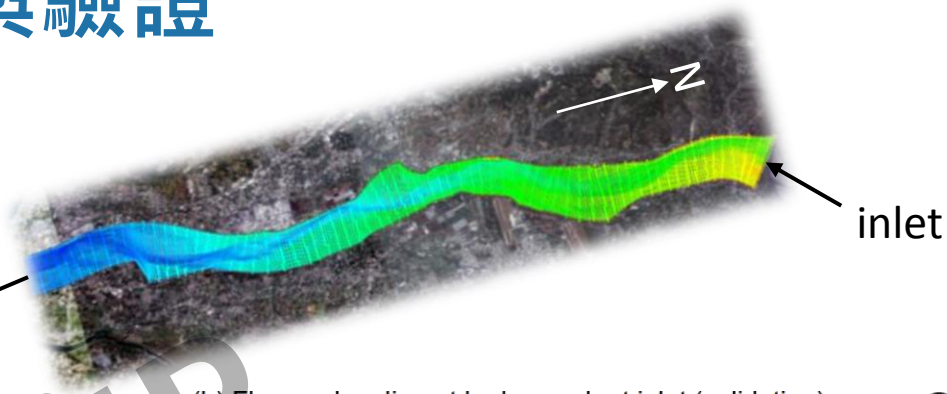
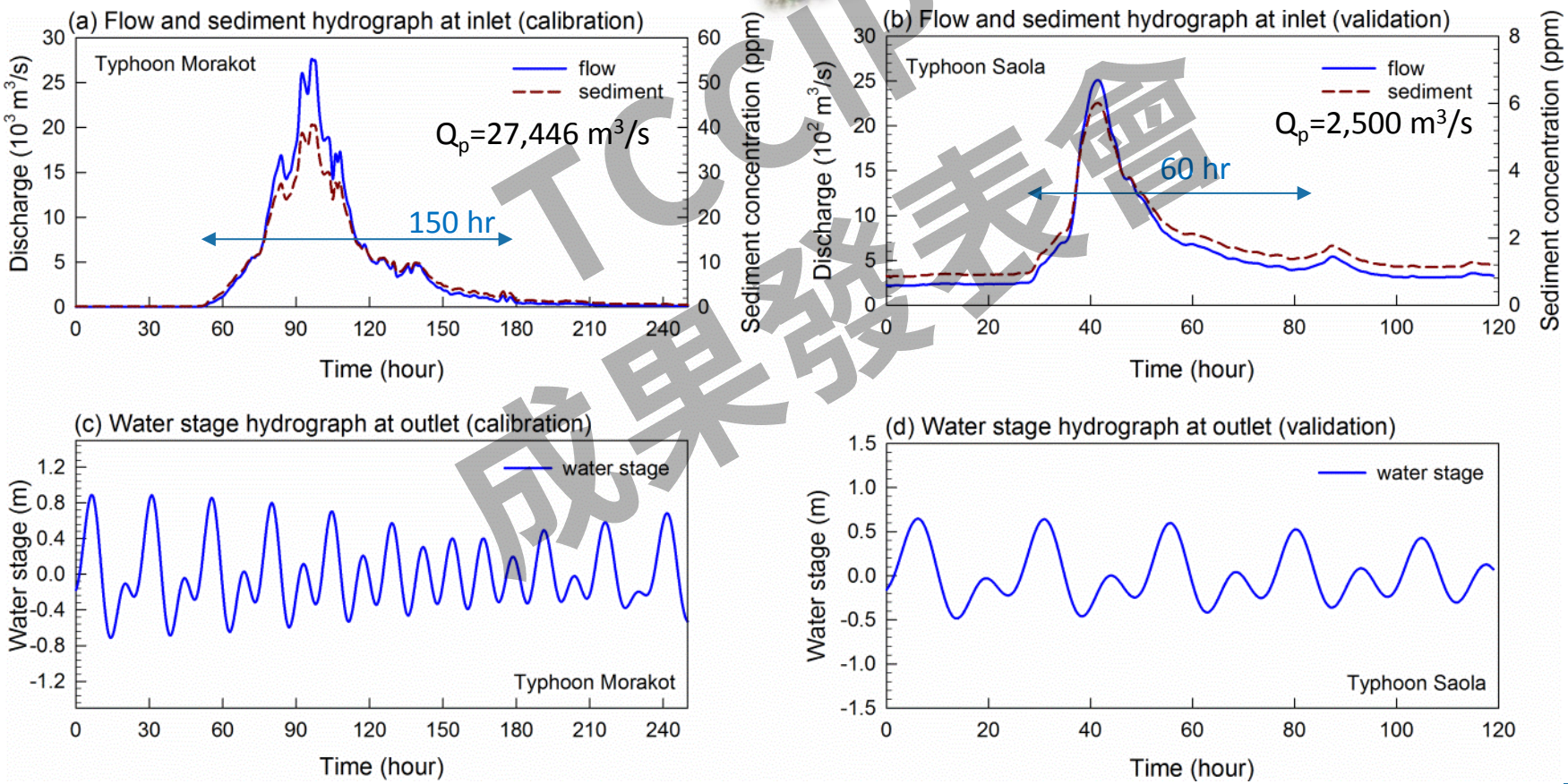
河道沖淤模式檢定與驗證

➲ 邊界條件設定





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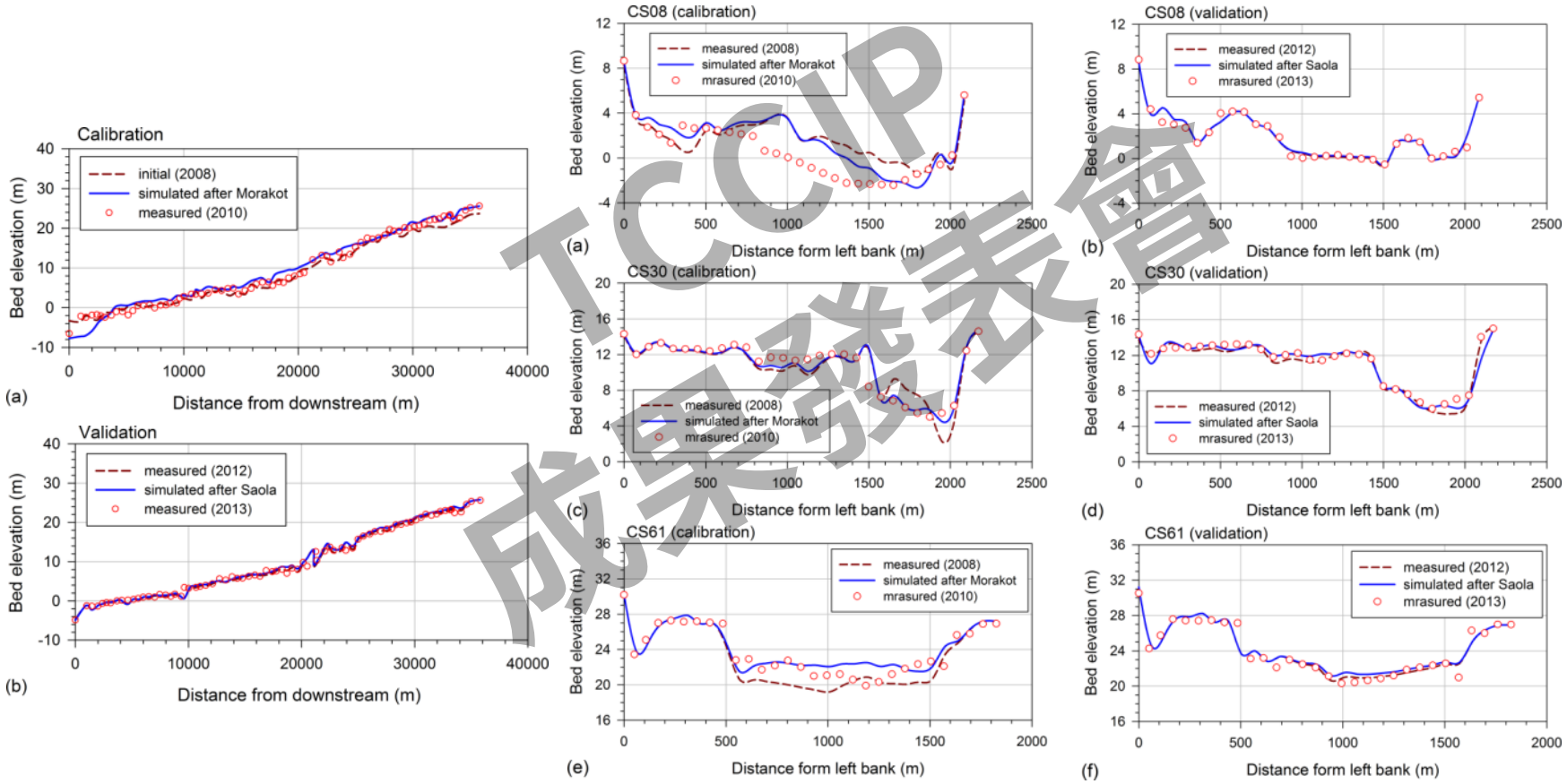
河道沖淤模式檢定與驗證

➲ 檢定與驗證結果

- 模式限制 – 側向侵蝕能力
- 颱風過後河道清淤



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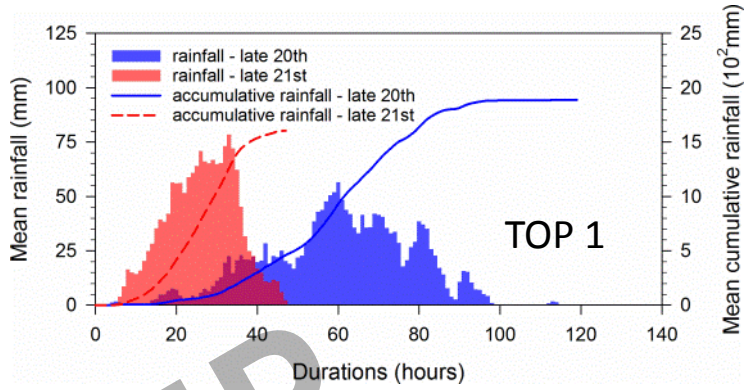
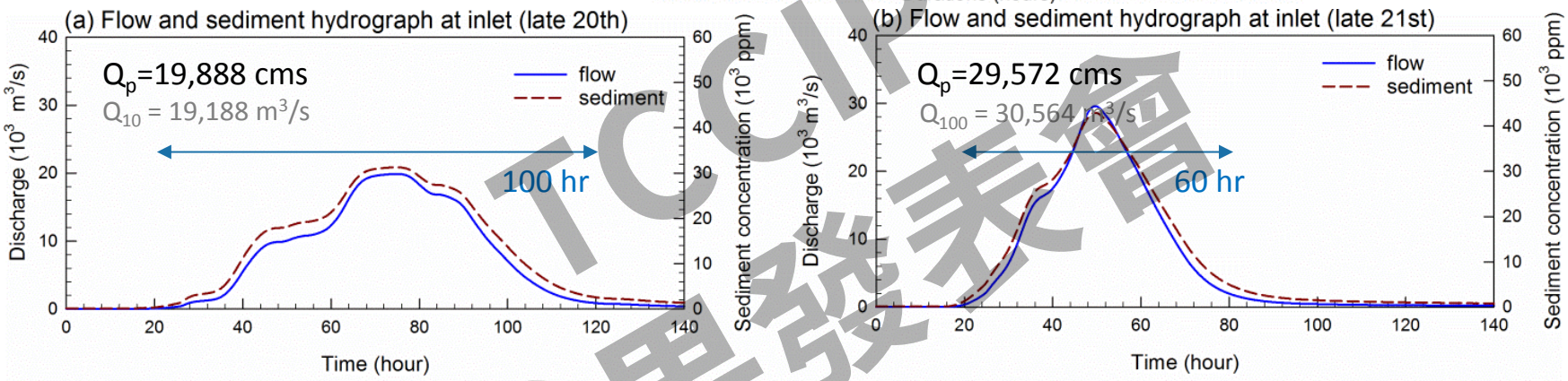
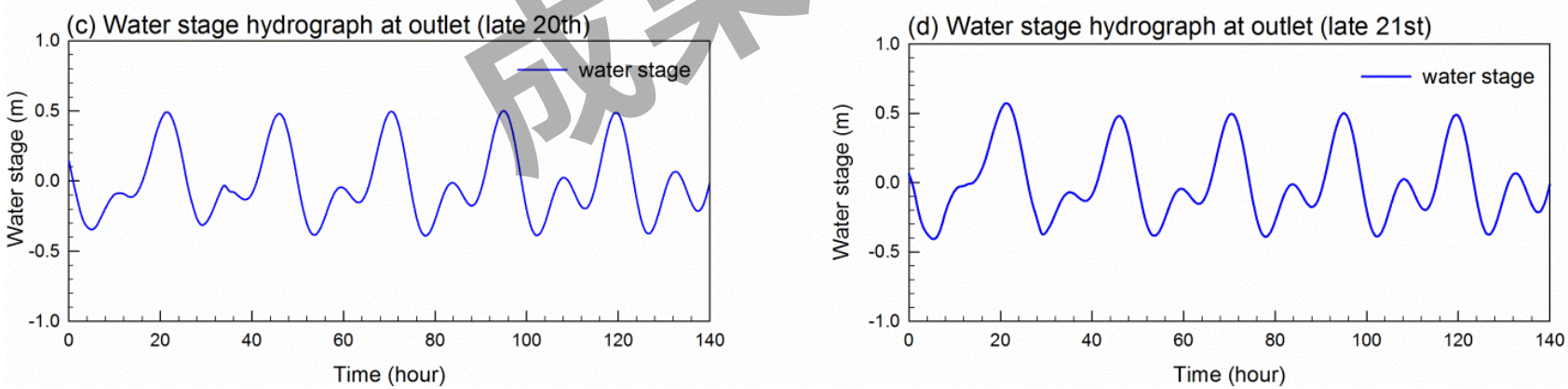
氣候變遷模擬

➲ 邊界條件







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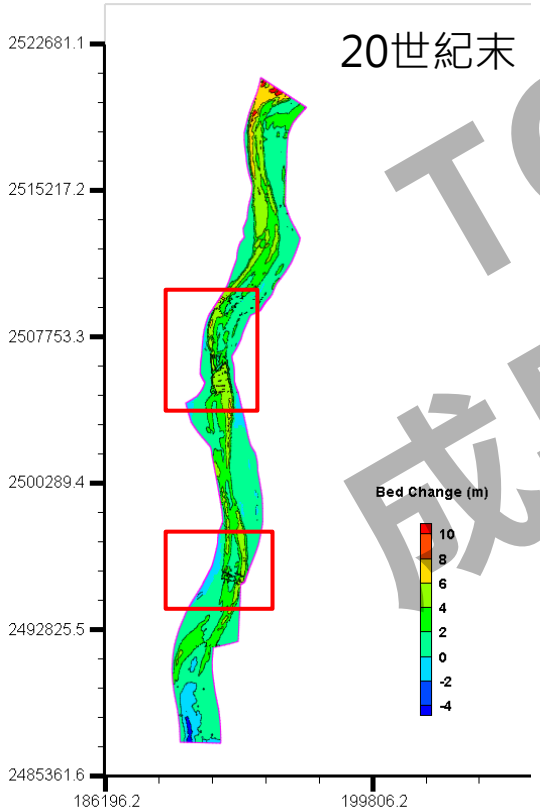
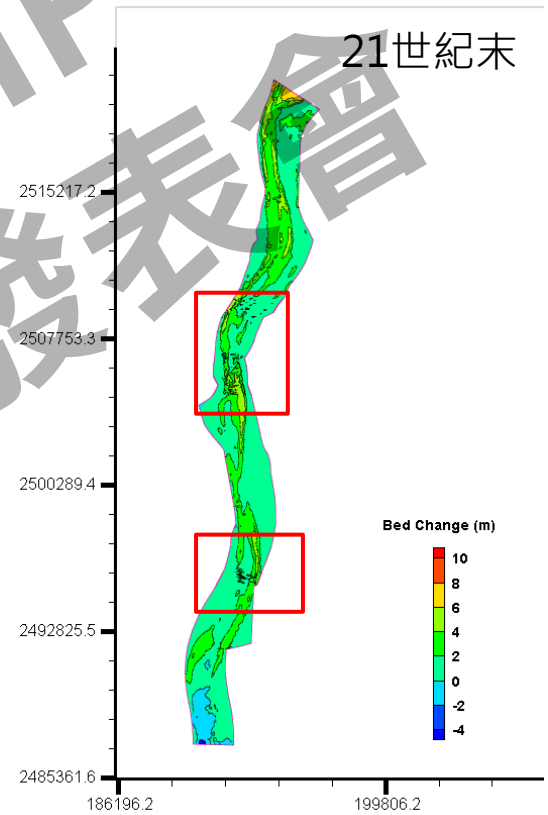
模擬結果

➲ 二維結果

- 可了解淤砂分佈（優），但需大量計算資源（缺）
- 計算範圍過大，局部模擬結果差





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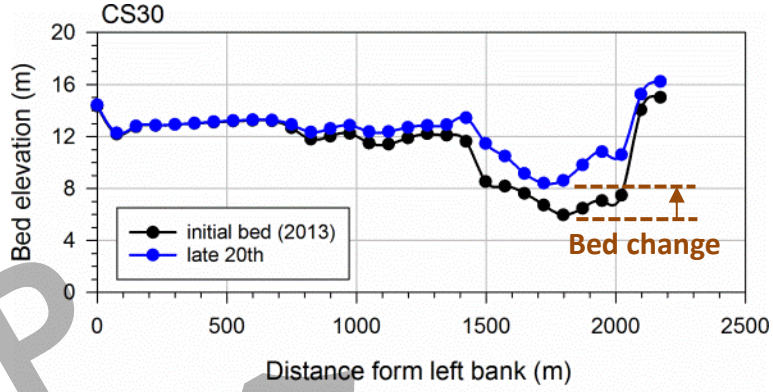
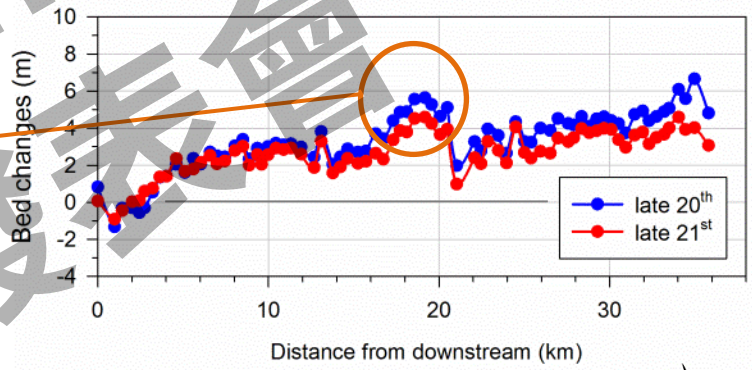
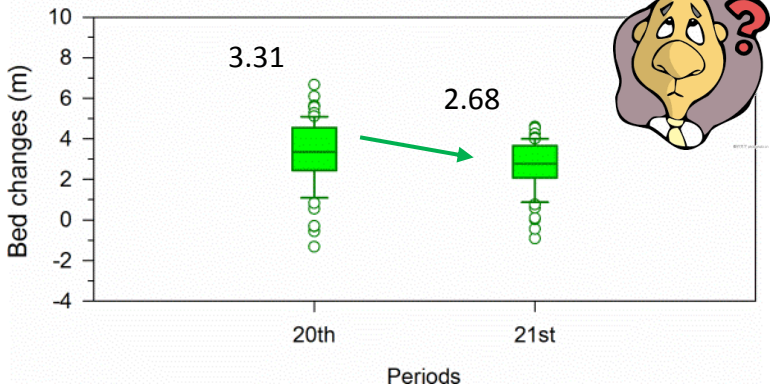
模擬結果







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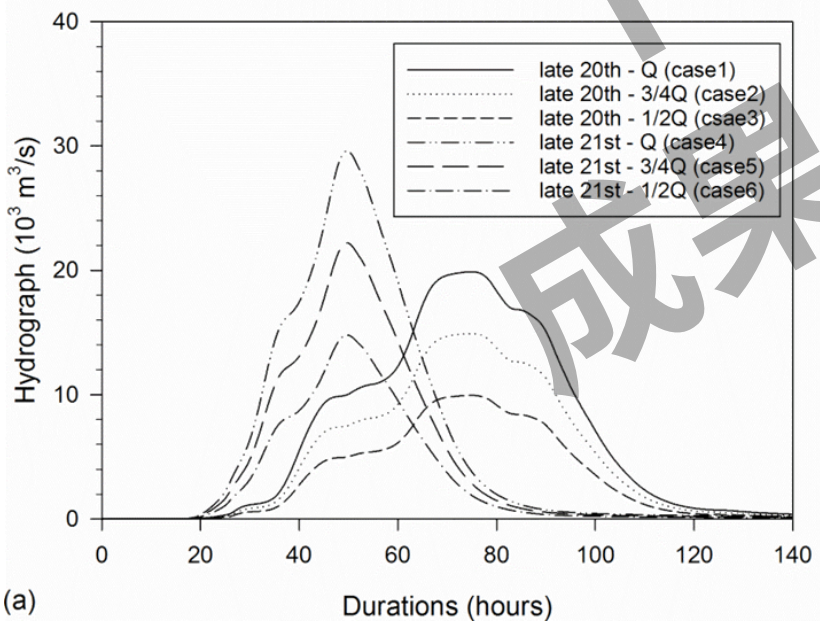
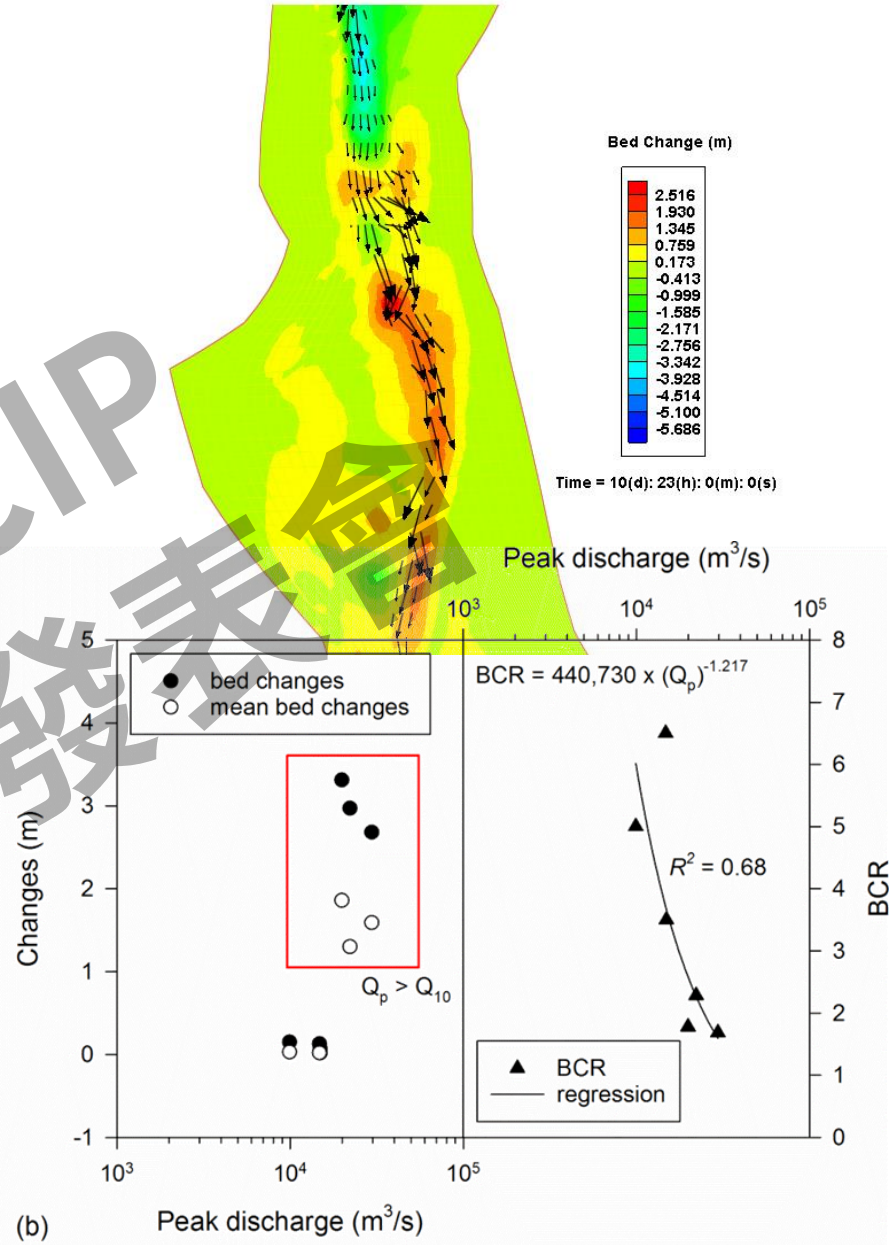
模擬結果

- 更多颱風事件
- 實驗設計
  - 各減少25%及50%流量
  - 共6組

$$BCR = \frac{bed\ change}{mean\ bed\ change}$$





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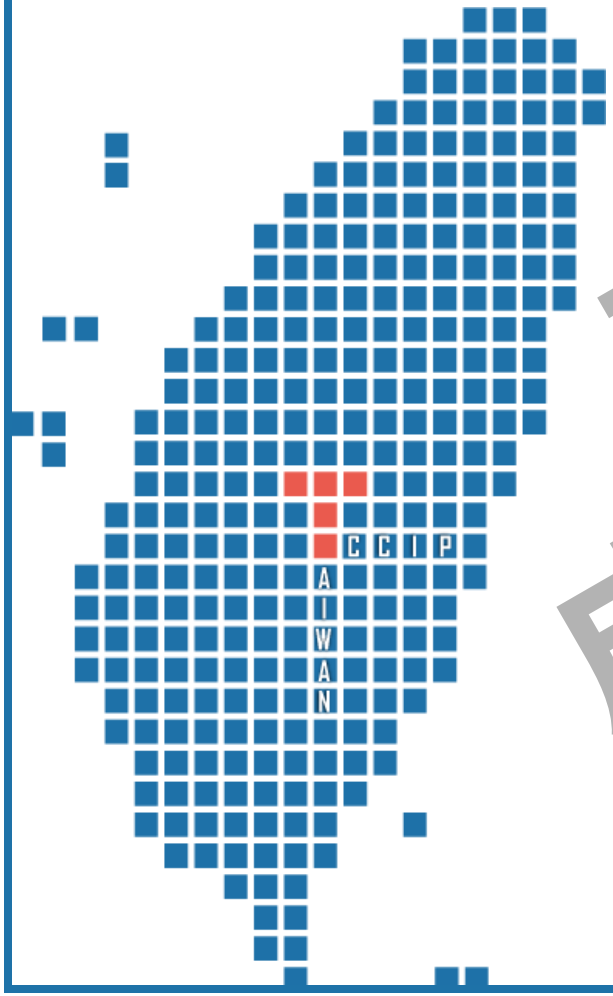
NCDR 行政法人
國家災害防救科技中心
National Science and Technology Center for Disaster Reduction



謝謝各位

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