

Introduction to Taiwan Climate Change Projection and Information Platform Project (TCCIP)

Dr. Lee-Yaw Lin (林李耀)

Deputy Director of NCDR



Presentation Outline

⇒ Why is TCCIP necessary?

- Taiwan's complex characteristics
- Taiwan's challenges to face climate change

⇒ What does TCCIP do?

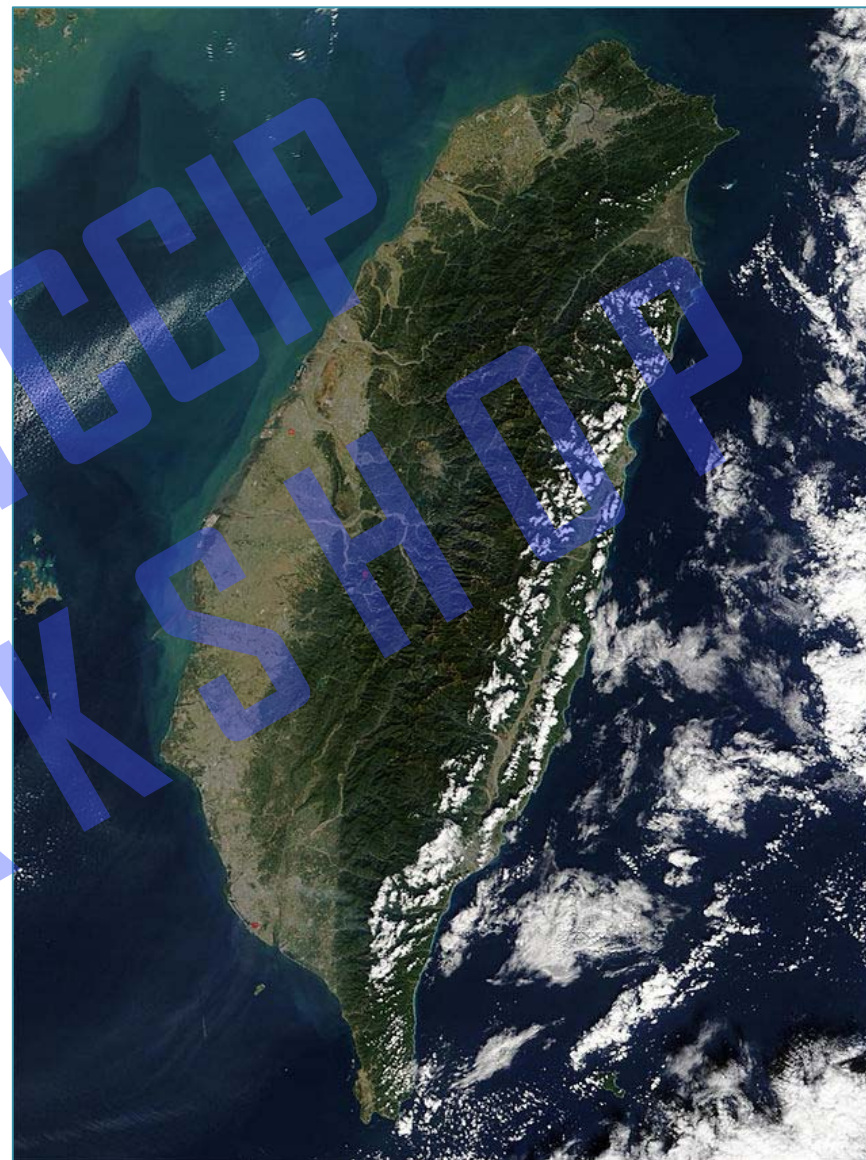
- What is TCCIP?
- What have we achieved?

⇒ What is TCCIP's next step?

Taiwan's complex characteristics



- **Area: 36,193 km²**
- **Population: 23 million**
- **Density: 644/km² (17th)**
- **Featured by:**
 - High mountains ~70% area ,
 - Short rivers,
 - Rush river flows,
 - Steep slopes,
 - Active erosion,
 - Subsidence in low-lying costal area



Taiwan's complex characteristics

High risk to natural hazards



Uneven distribution of water resources



Long coastline (1,566.3 km)



High urbanization (5 cities > 2 m people)



These characteristics make Taiwan vulnerable to climate change

Challenges to face climate change

➔ Threat from Increasing Temperature

- Crop yield, public health, eco system, energy demand/safety...

➔ Too much water but difficult to keep

- **Extreme rainfall** caused by typhoon and mei-yu bring severe damages and casualties. **85%** of the economic loss is caused by typhoons, and **11%** is caused by mei-yu.
- Short rivers and rush flows make it difficult to keep water. Drought is another cause of economic loss.

The 1st step is a national scientific research project—to collect climate data, to assess impacts, and to draft adaptation policies

What is TCCIP?

- ➔ Ministry of Science and Technology (MOST) launched 3 national climate change programs.

Consortium for Climate Change Study (CCiCS)

Modeling Capacity Building

Period: 2011-2016

Taiwan Climate Change Projection and Information Platform (TCCIP)

Climate Change Data and Information

Period: 2010-2012, 2012-2015

Taiwan Climate Change Adaptation Technology (TaiCCAT)

Impact Assessment & Adaptation
Technology

Period: 2011-2013

What is TCCIP?

➔ A scientific project of climate change research in Taiwan.

- Downscale global CC projection data to Taiwan area.
- Local CC and it's impact research(EX: flood and drought).
- Taiwan CC information application and data services.
- phase 1 : 2010-2012 (~3 million USD)
- phase 2 : 2013-2015 (~3 million USD)
- Funded by MOST, Taiwan.
- Interdisciplinary cooperated : 2 research institutes, 3 governmental departments, 8 universities are included.

Structure of TCCIP

Research & Development



International Cooperation

IPCC CMIP data

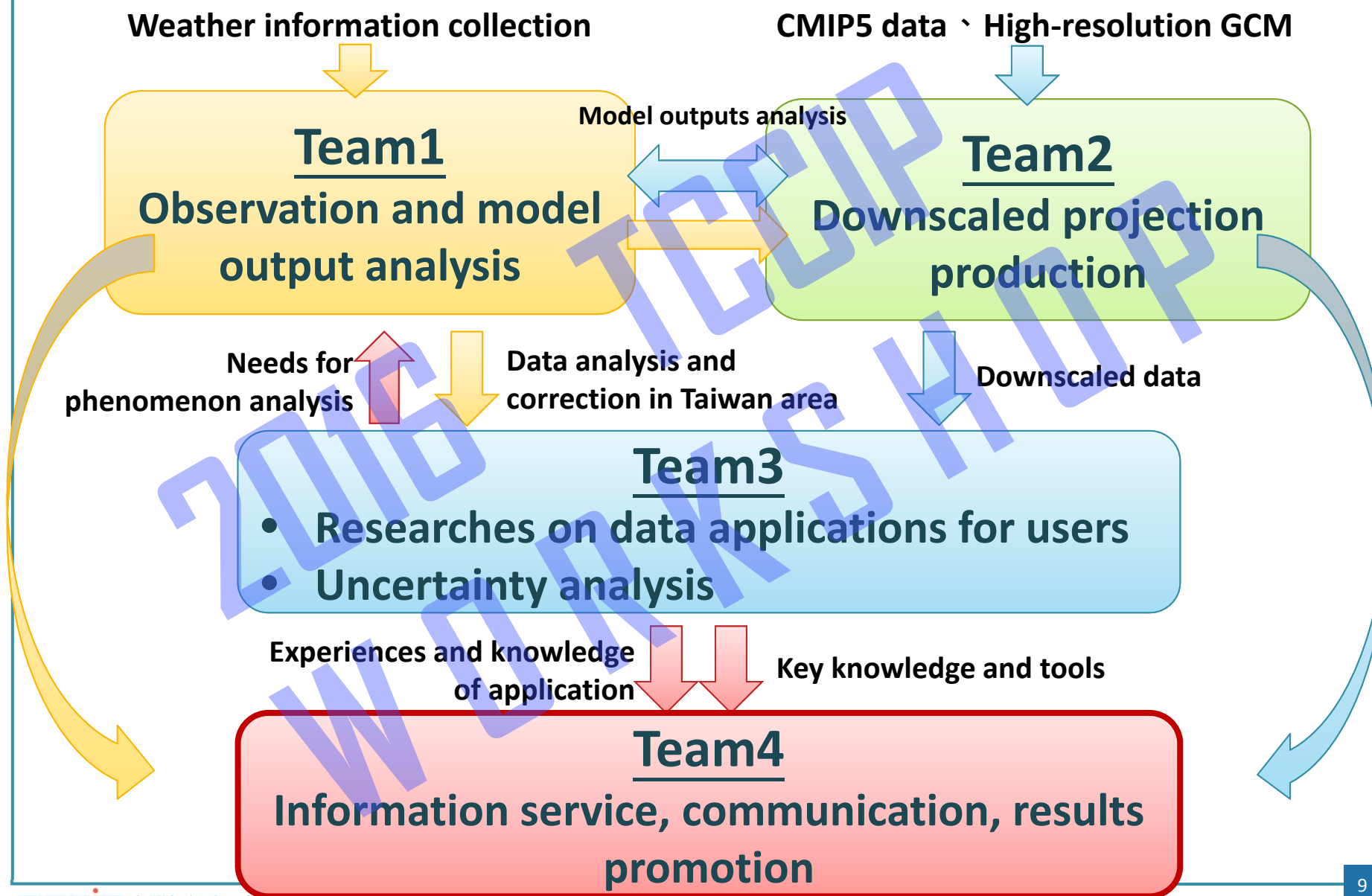
SOUSEI program, Japan
High-resolution MRI AGCM
 High-Resolution AGCM
 (GFDL HiRAM, NCAR CAM5)

Application

Climate Change Adaptation Policy
 Framework fields (NDC)



TCCIP research Teams



What have we achieved?

For Climate
research

The first time to gather more than **1400** stations for long term rainfall record and to make it homogeneous and Gridded in Taiwan

High Resolution (**5Km x 5Km**) projection data based on Statistical downscaling in Taiwan

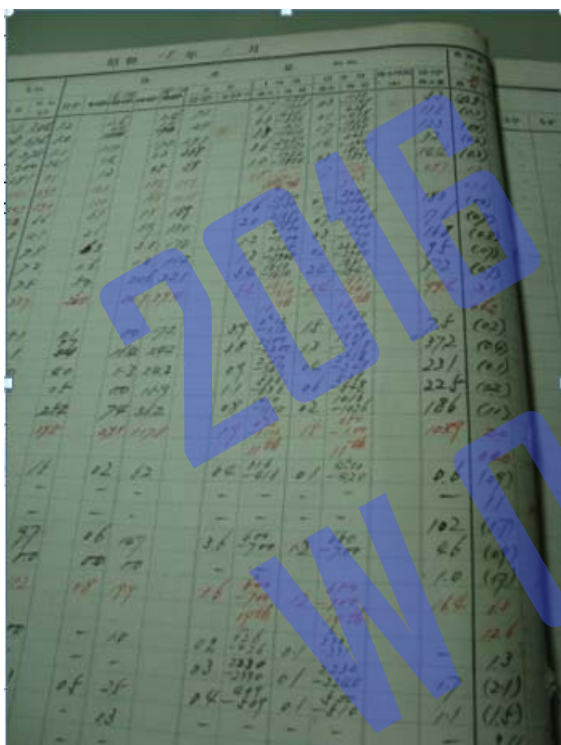
Projection data of **extreme event** based on Dynamic downscaling in Taiwan

Module creation for connection between **Meteorology** and **Hydrology** study on Climate Change

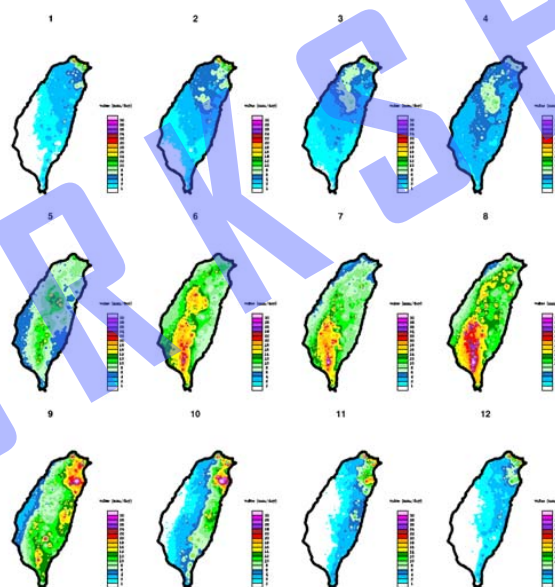
What have we achieved?

➔ Observational Climate Data Collation

- Digitalization and Homogenization for long-term station records
- Produce high resolution gridded data



High-resolution gridded data is derived



High resolution Grid format data archive

Datasets now available
(Jan 1960 – Dec 2009)

- 1km & 5km monthly mean Precip.
- 1km & 5km monthly mean Tavg
- 1km & 5km monthly mean Tmax
- 1km & 5km monthly mean Tmin

Datasets to be available
(Jan 1960 – Dec 2009)

- 1km & 5km Daily Precip.
- 1km & 5km Daily Tavg
- 1km & 5km Daily Tmax
- 1km & 5km Daily Tmin

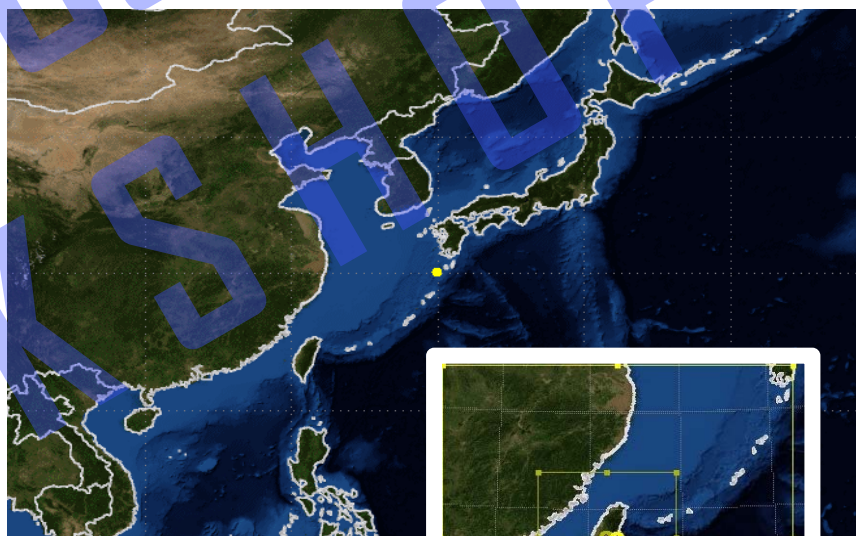
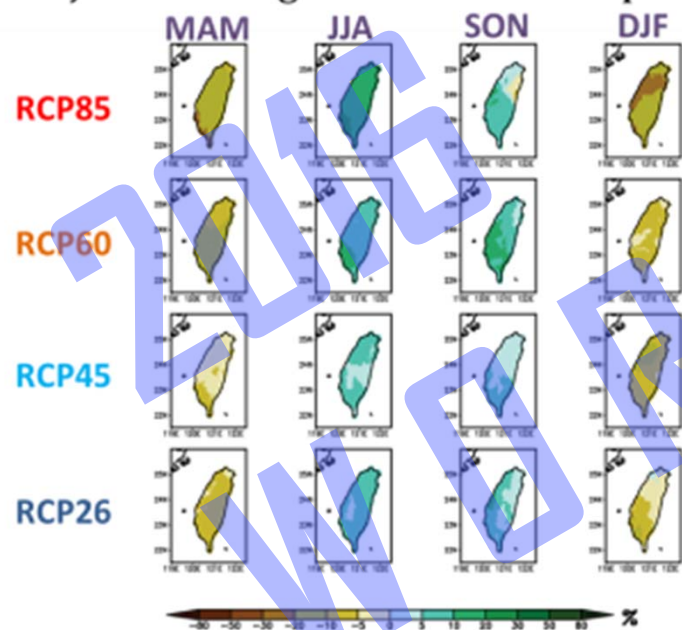
TCCIP Team 1

What have we achieved?

➔ Projection data downscaling

- Statistical downscaling
- Dynamical downscaling (MRI-WRF & HiRAM-WRF)

CMIP5 (2081~2100-1986~2005)/(1986~2005)
Projected Change in Medium Precipitation



TCCIP Team 2

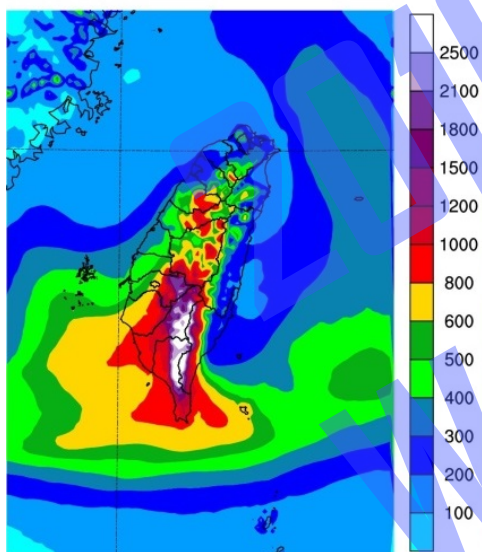
What have we achieved?

➔ Methodology development

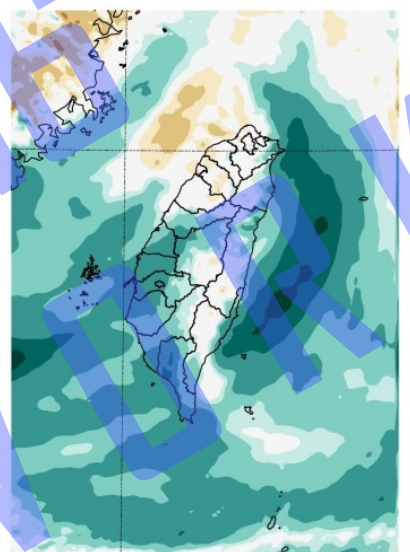
- Pseudo Global Warming typhoon (PGW)
- Simulate precipitation of extreme typhoon events
 - PGW Typhoon Morakot

2009 Morakot
00Z 05 AUG-Z00 10
AUG

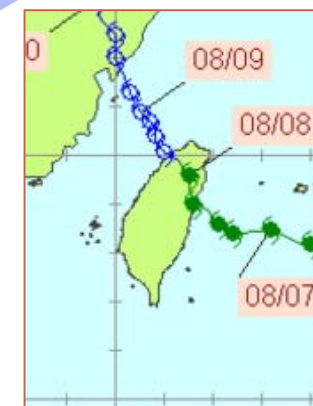
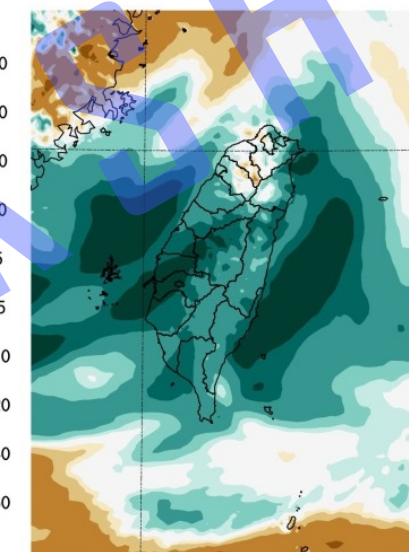
(a) Mean Rainfall in Historical run



(b) Rainfall Change rate in 2075 at A1B



(c) Rainfall Change rate in 2075 at RCP85

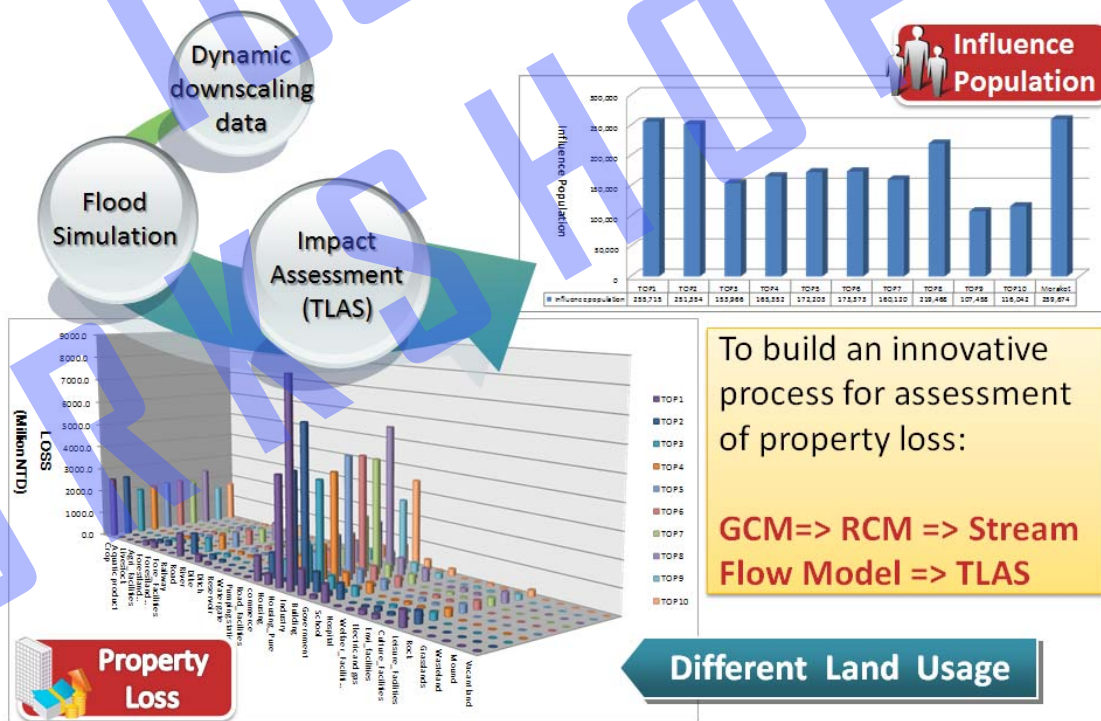
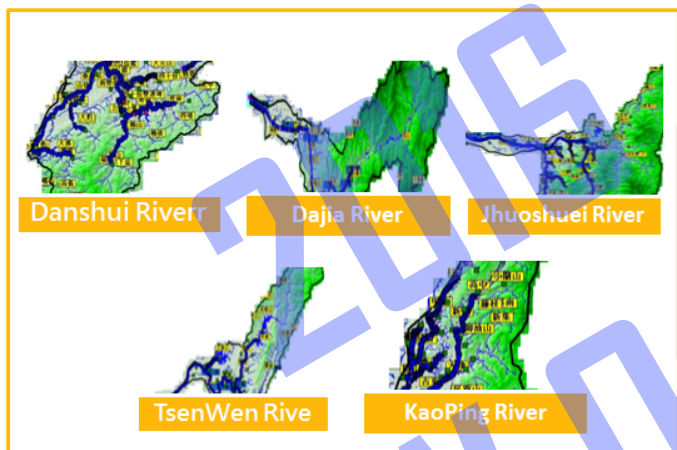


TCCIP Team 2

What have we achieved?

➔ Methodology development (in disaster area)

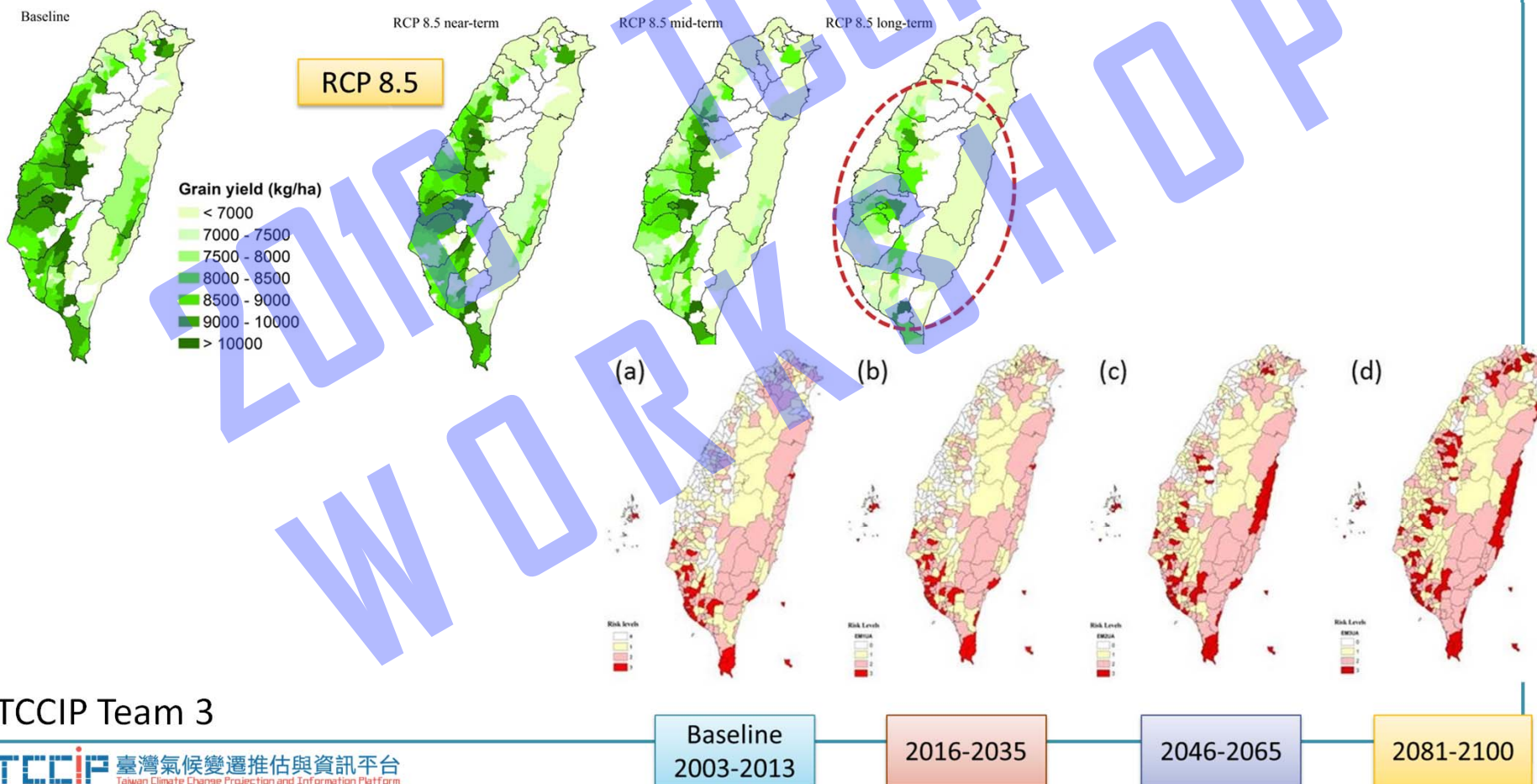
- Flooding impact assessment
- Precipitation, flood simulation, and loss assessment



What have we achieved?

➔ Data application in different impact areas

- Agriculture (Rice production would decline)
- Public health (Dengue fever risk would increase)

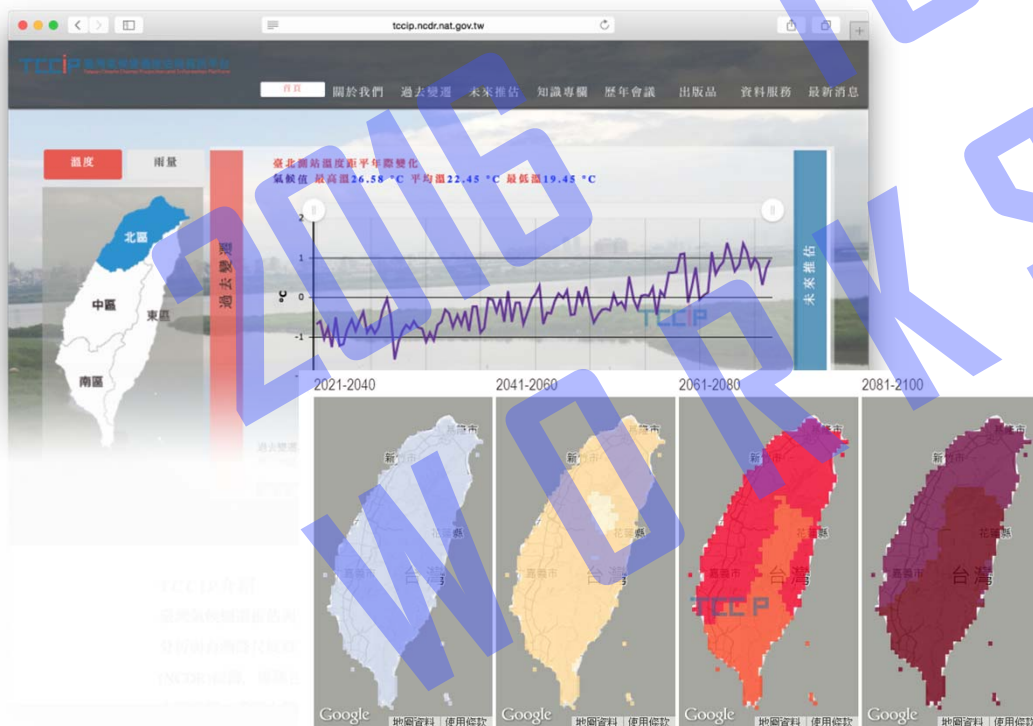


TCCIP Team 3

What have we achieved?

➔ Translation and Dissemination of Climate Change Knowledge

- TCCIP Website
- Publication



Translation of IPCC Report



Video

What have we achieved?

➔ Climate Data Service

- Communicating with data users

臺灣氣候變遷推估與資訊平台建置(TCCIP) 計畫資料應用說明會系列

TCCIP氣候變遷資料 使用經驗分享研討會

2014 / 3 / 14



科技部 TCCIP

指導單位: 行政院科技部 || 主辦單位: 國家災害防救科技中心、科技部「臺灣氣候變遷推估



What is TCCIP's next step

- **Observational Data**
- **Projection Data**

Local Data Integration

**Methods not Good Enough—
Next Step: Methodology Refine**

Adaptation Policy making

TCCIP

Scientific Research

Methodology development

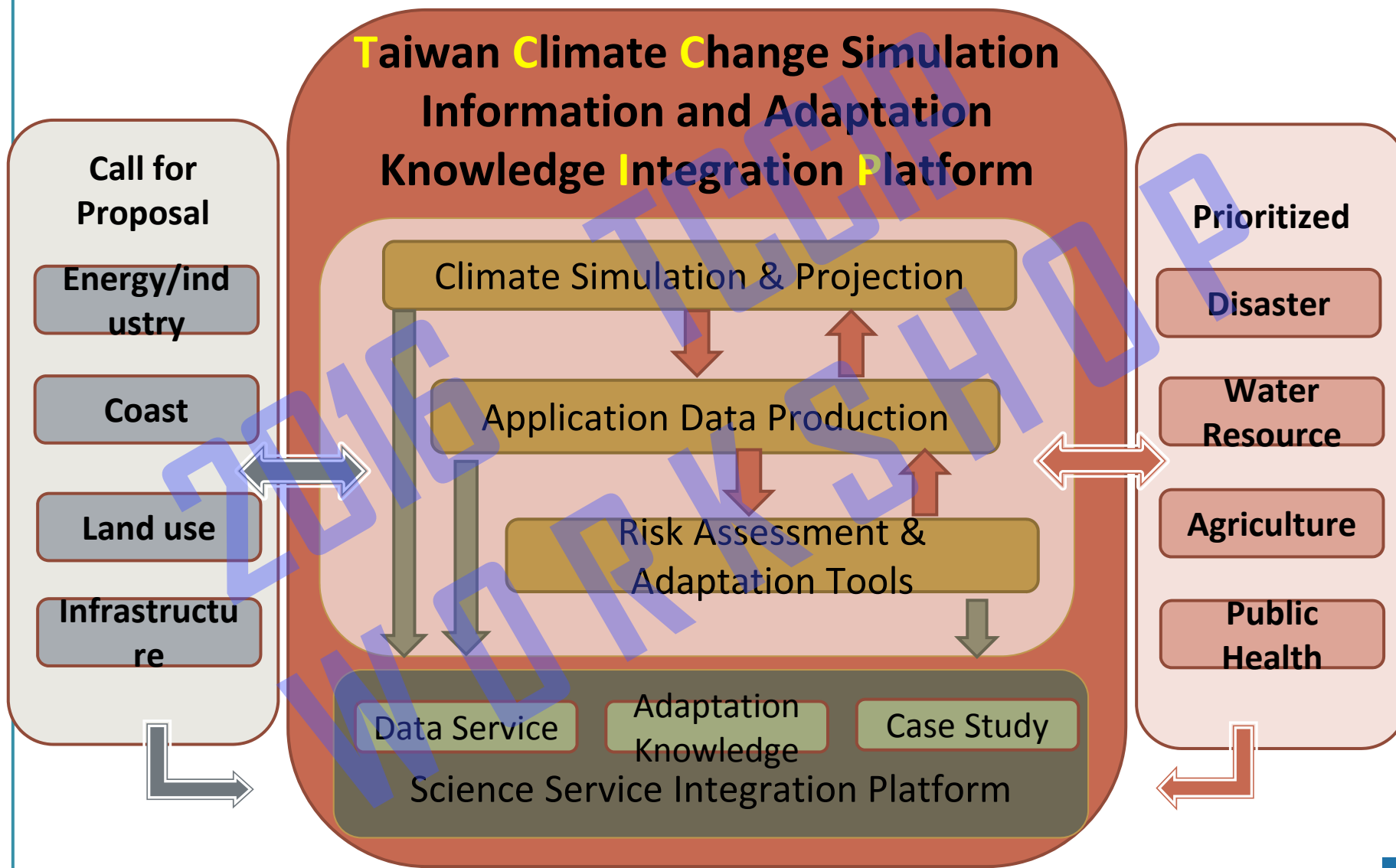
**Gap btw science and policy—
Next Step: Enhance implementation**

Some Impact Assessment

- **Disaster, Water Resource**
- **Agriculture, Public Health**

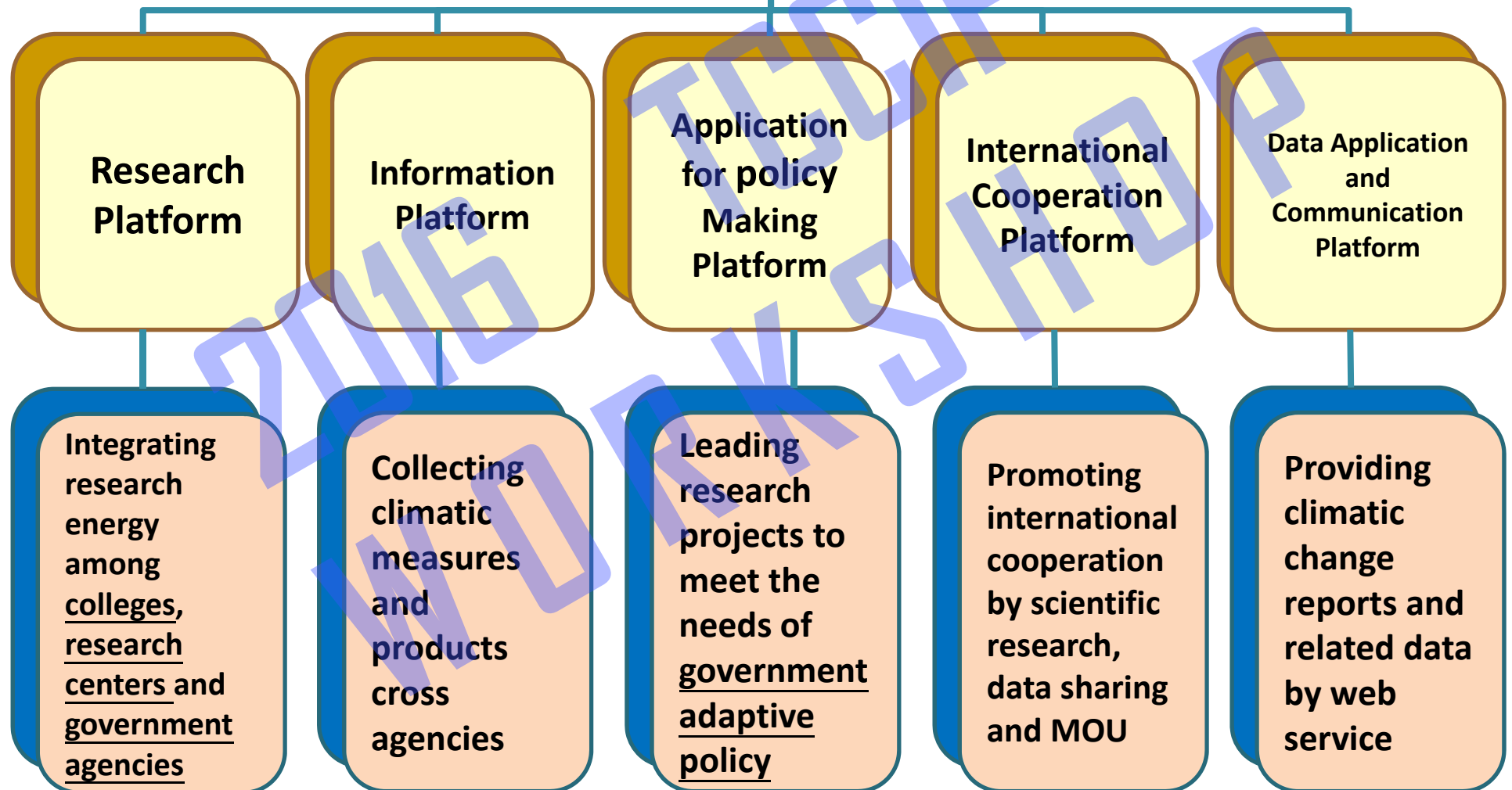
**Some impact areas not assessed—
Next Step: More Application**

TCCIP Next Phase (Proposed Structure)



TCCIP is not only a platform but also a Brand.

Platform for Climate Change Research and Application





國家災害防救科技中心

National Science and Technology Center
for Disaster Reduction

Thanks for your
attention!

We look forward to interacting with you all.