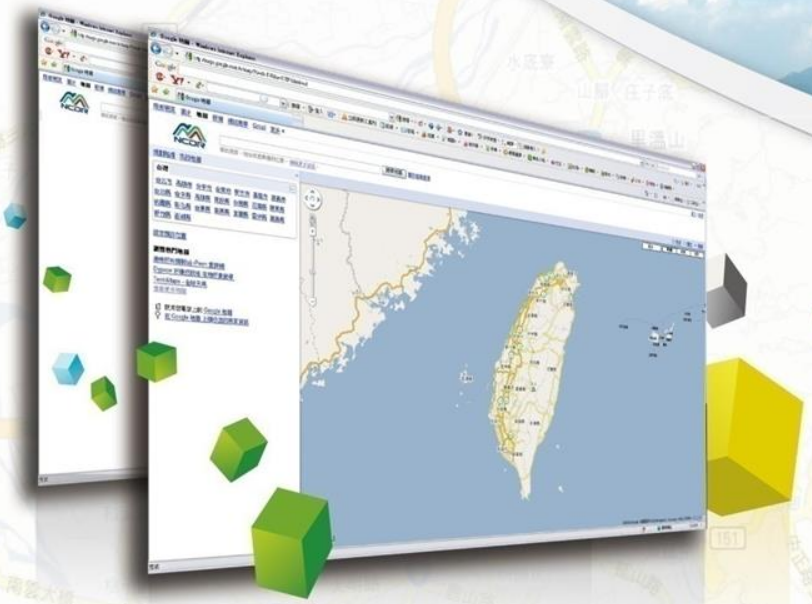
Introduction of TCCIP Project



Lee-Yaw Lin

National Science & Technology Center for Disaster Reduction, Taipei, Taiwan

Outline

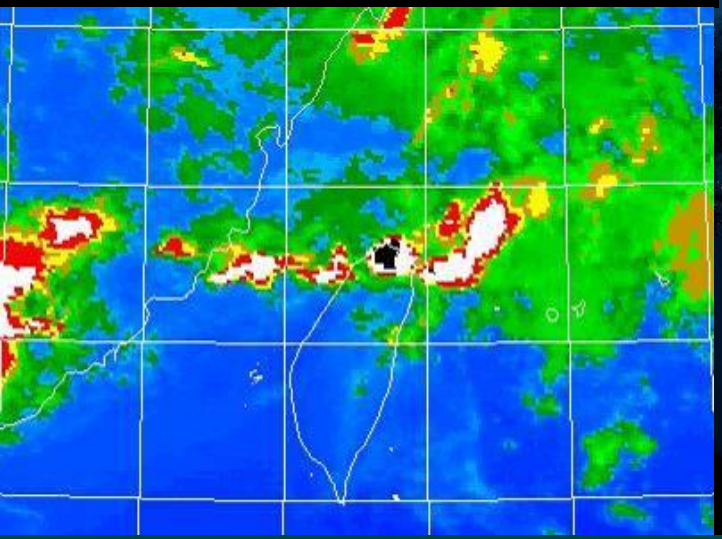
Taiwan Climate Change and information platform

(TCCIP)

- Introduction
- The role of TCCIP
- Overview of TCCIP
- Summary

Introduction

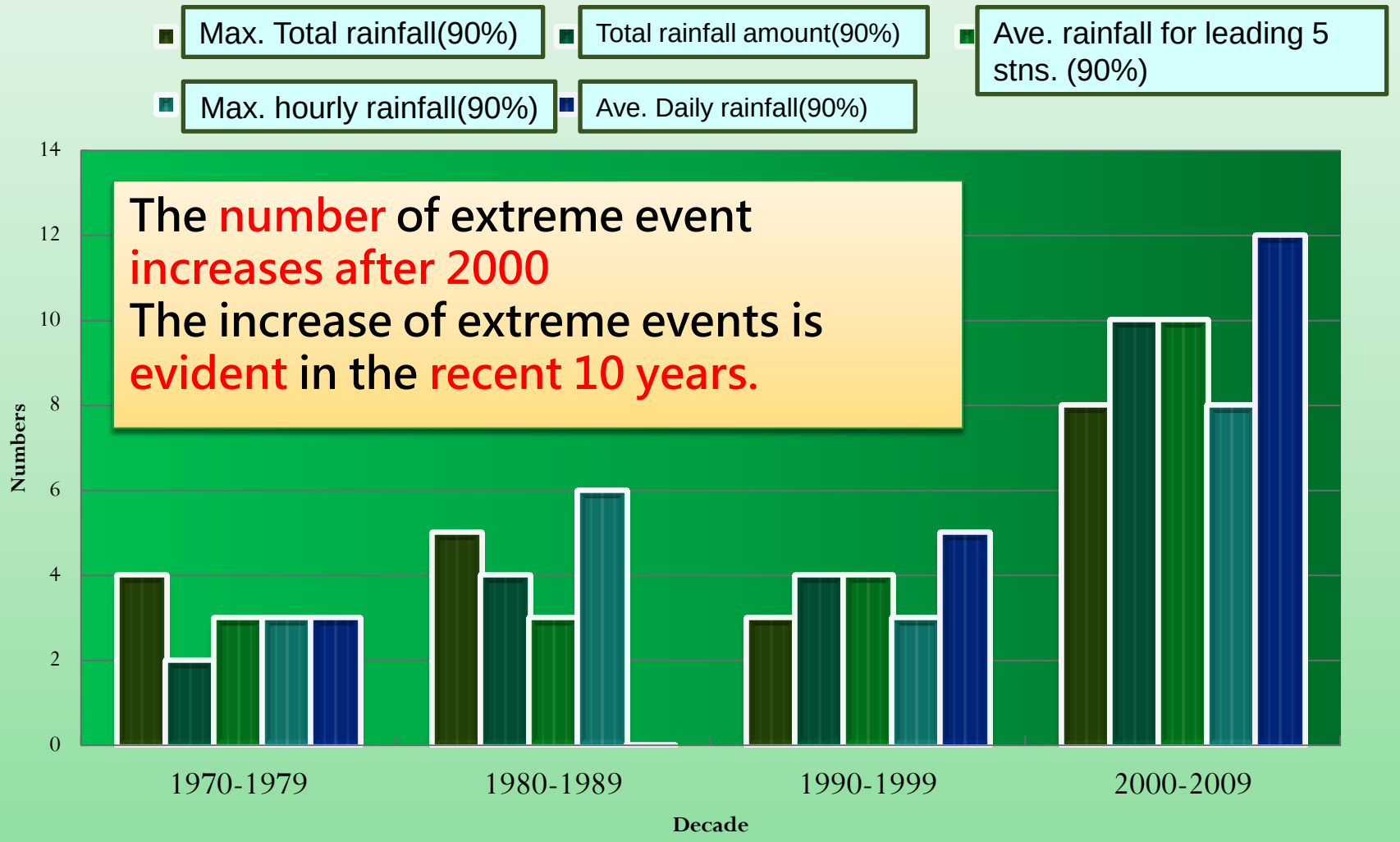
Typhoon



Mei-Yu

Typhoons with extreme rainfall

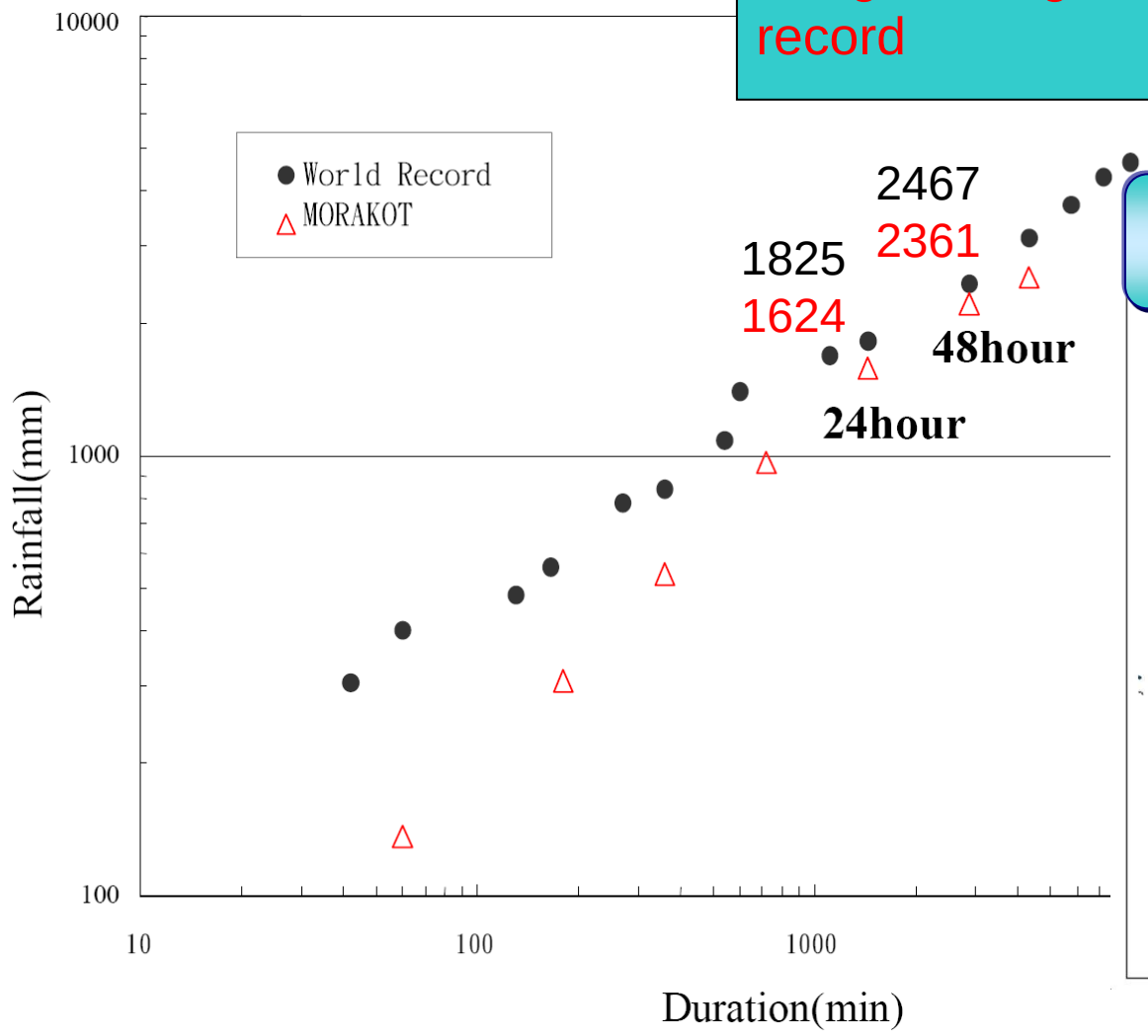
（TOP 20 during 1970~2009 ）



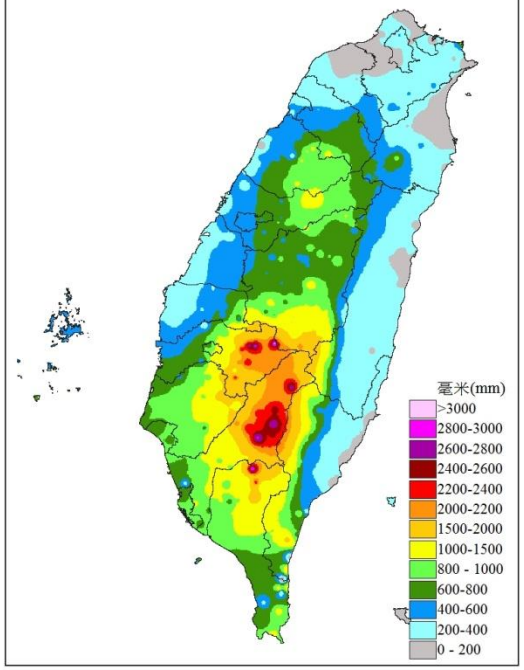
More and More Extreme Events in Taiwan ?

Typhoon Morakot (2009)

■ 24 to 48 hours accumulated rainfall is high enough to close to the world record



0805-0810 accumulated rainfall



Typhoon Morakot claimed alomost 700 people lives

■ Massive deep landsliding Caused by Morakot

More than 400 killed at this area

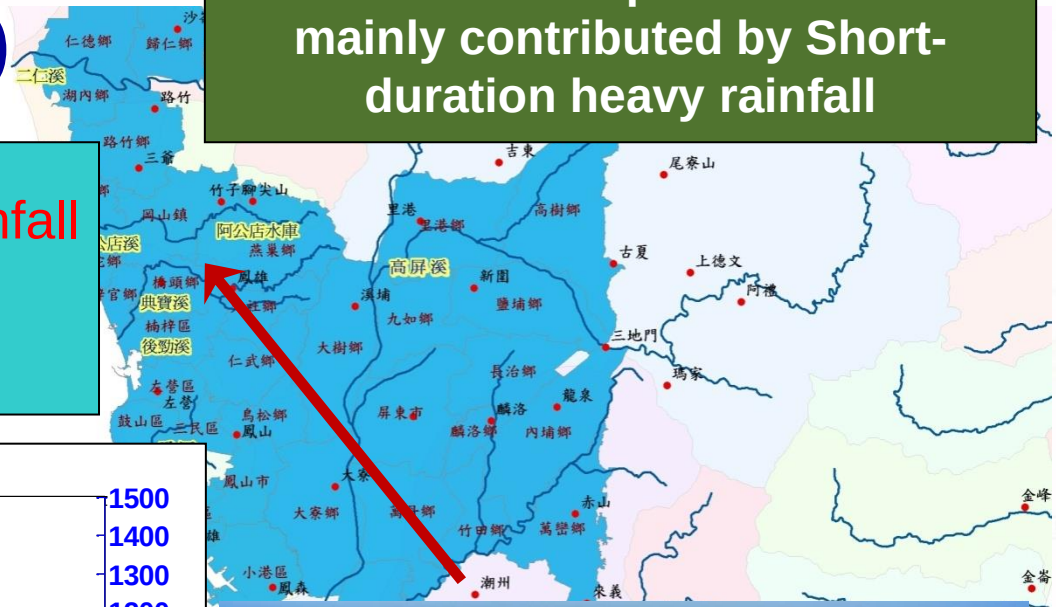
32 killed at this area

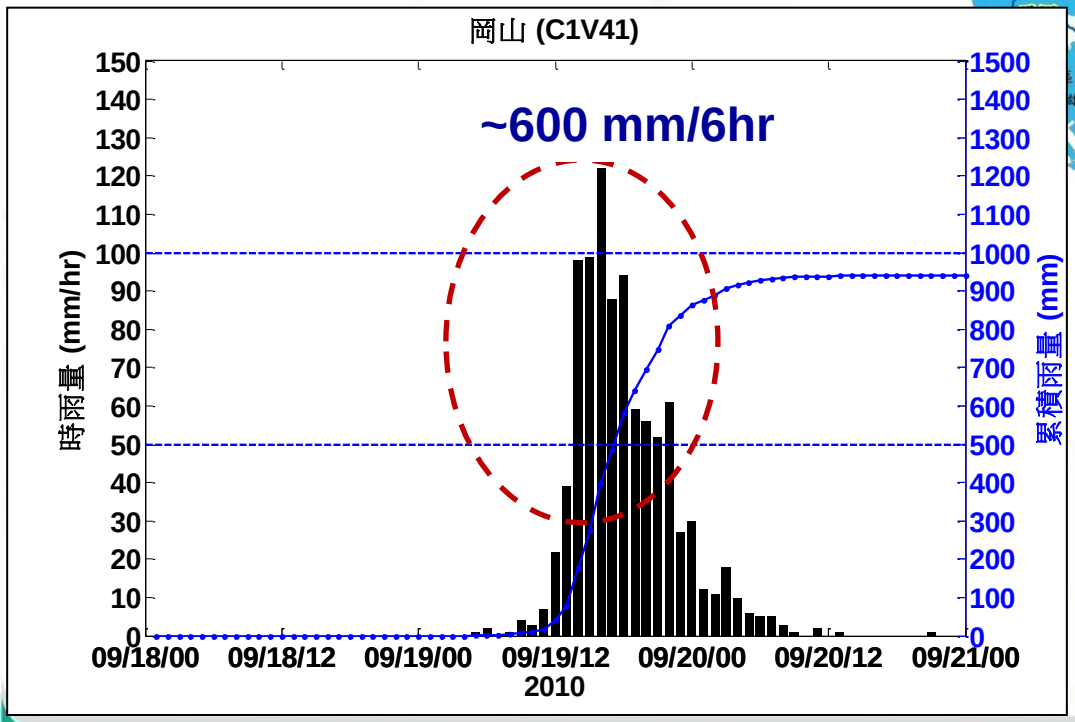
More and More Extreme Events in Taiwan ?

Typhoon Fanapi (2010)

Water in flood-prone areas is mainly contributed by Short-duration heavy rainfall

■ Totally 600mm accumulated rainfall during 6 hours was found at Gang-Shan station.

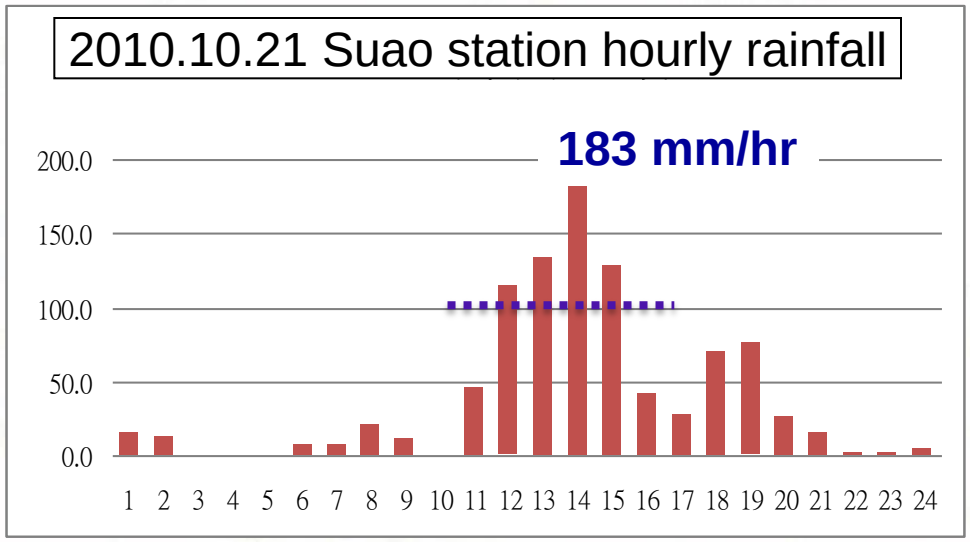




More and More Extreme Events in Taiwan ?

Typhoon Megi (2010)

- The rainfall with the magnitude over 100 mm/hr over 4 hours.
- The peak value is reach 183 mm



Landslide in Su-Hua Highway During Megi

Taiwan Climate Change and Information Platform Project

University (NTU, NTNU, NCKU….)

Central Weather Bureau (CWB)

National Science Council (NSC)

Organized and Implemented by NCDR

Research Center for Environmental Changes (RCEC), Academia Sinica

Research & Development

International Cooperation

- **KAKUSHIN program, Japan**

  High-resolution (20km) Climate Simulation

  （Climate Projection for IPCC AR4 ）

  Present : 1979-2003

  Near Future : 2015-2039

  End-of-century：2075-2099

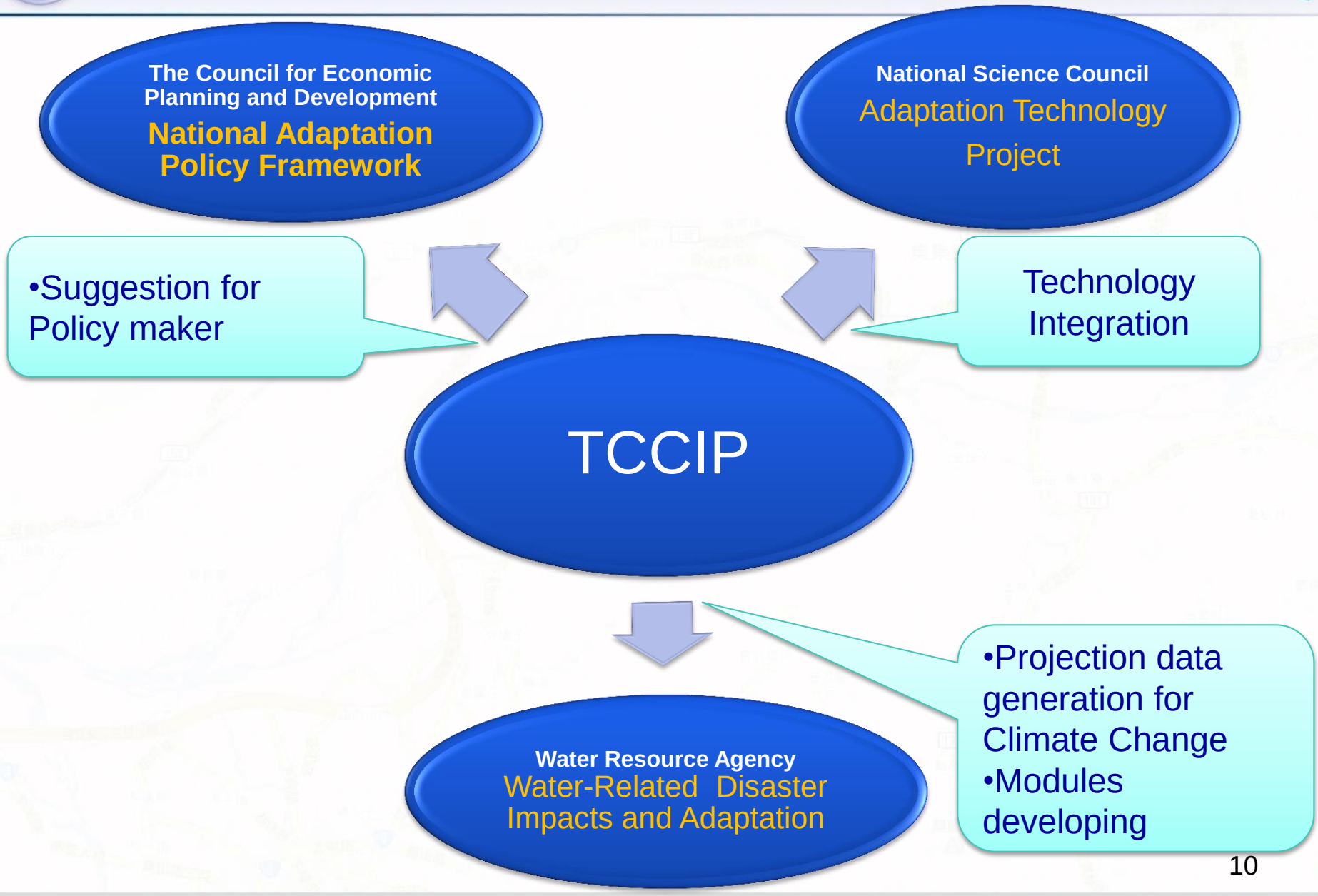
- **IPCC data analysis**

Application

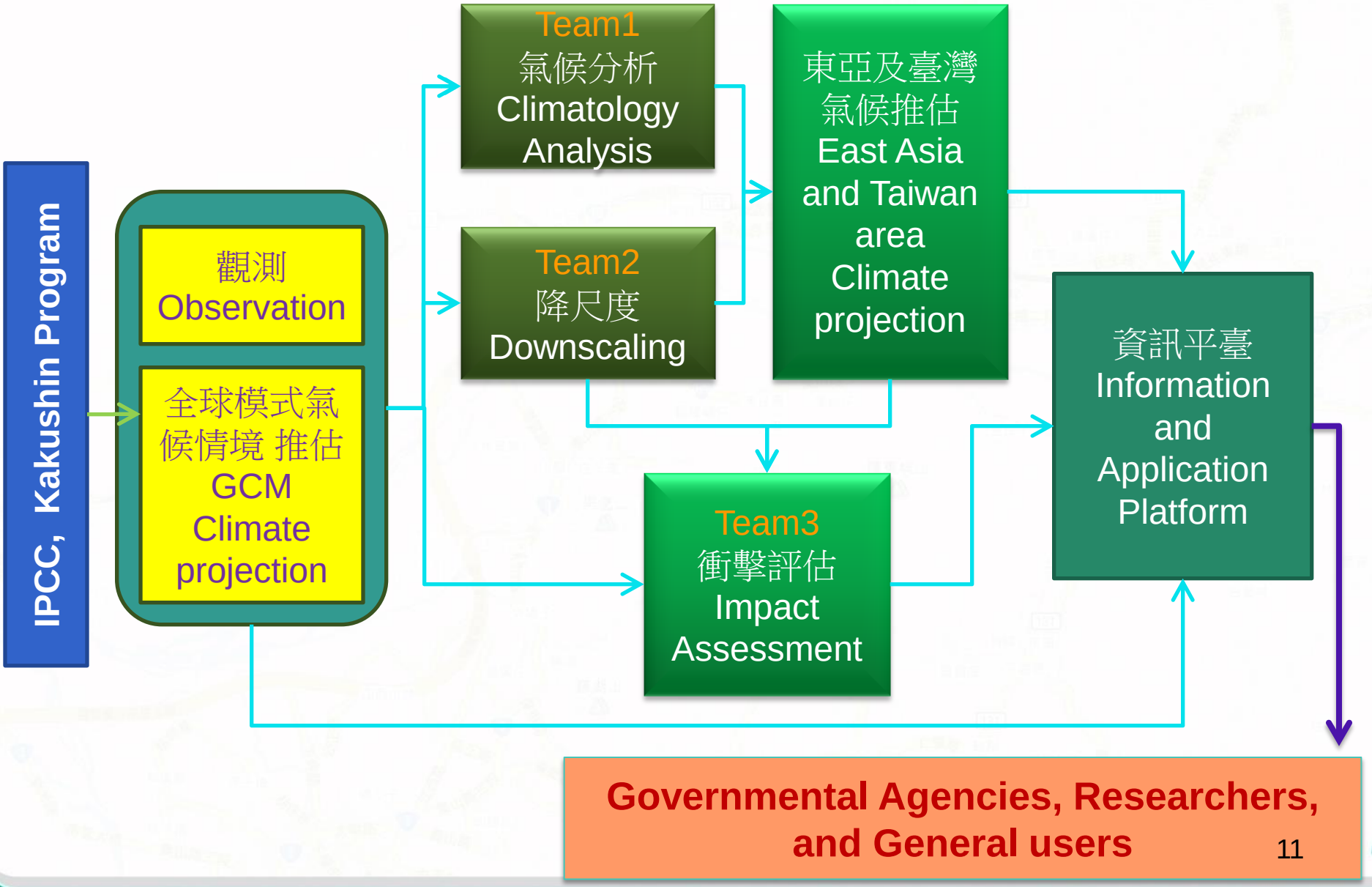
- Homeland Security and Disaster Reduction
- Land Use Planning
- Water Resources Management
- Agriculture
- Environment & Ecosystem
- Public Health

3-yr Project Period : 2010~2012

The Role of TCCIP in Taiwan



Overview of TCCIP



Overview of TCCIP

Team 1

Shaw LIU
Huang-Hsiung HSU

East-Asia Climate Diagnosis

1. Asian monsoon system and hydrological cycle
2. East Asian summer monsoon
3. NW Pacific typhoon
4. Winter monsoon

Taiwan Climate Analysis

1. Seasonal precipitation analysis
2. Temperature and extreme temperature
3. Typhoon, Meiyu
4. Winds, sea level

Station Data Conduction

1. QA, QC of precipitation data from 19xx-20xx
2. Build up precipitation measurement data base(Regrid)

Model evaluation (IPCC, MRI)

1. Monsoon system
2. Precipitation & Temperature simulation
3. Statistics of NW Pacific typhoons
4. Statistics of Meiyu precipitation
5. extreme precipitation events

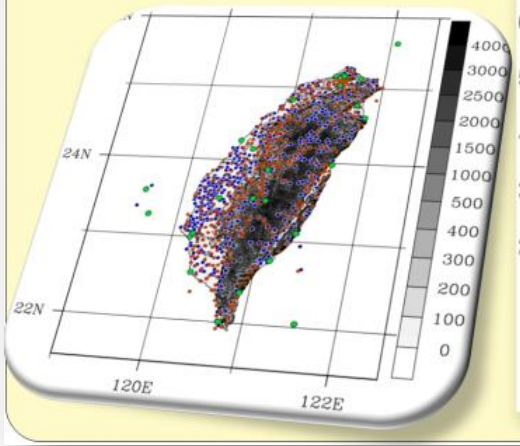
Team 1

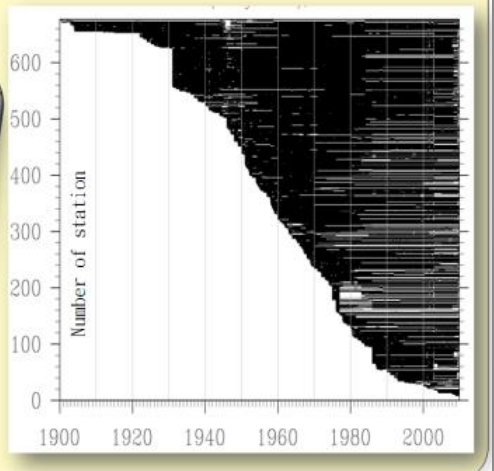
Station data homogenization

Build up an historical observation data base

- Traditional station for CWB(26)
- Auto-Rain gauge for CWB(401)
- Others(WRA, Taiwan irrigation association, Tai-Power)

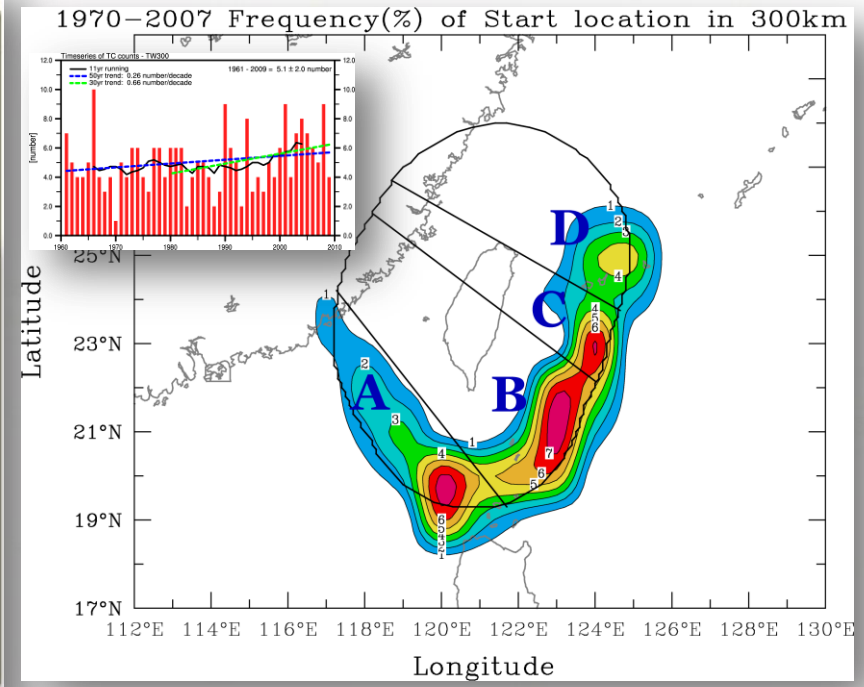
Data Homogenization





1. Station data from CWB and WRA is included in.
2. More than 1000 stations (cover the whole island)
3. Record for 100 years will be homogenized and digitalized

Typhoon analysis



1. 300Km away from Taiwan is defined as the attack-prone area for Typhoon
2. An increasing trend is found for TC number

Overview of TCCIP

Team 2

Cheng-Ta CHEN

Statistical Downscaling

1. Build up statistical downscaling methodology(25Km x2 5Km)
2. Development statistical downscaling methodology for grid points and stations(1Km x 1Km)

Dynamic Downscaling

1. Select model domain and apply local land-use data
2. Test physical parameterization
3. Dynamic downscaling based on MRI high resolution GCM data

Station Data Regriding

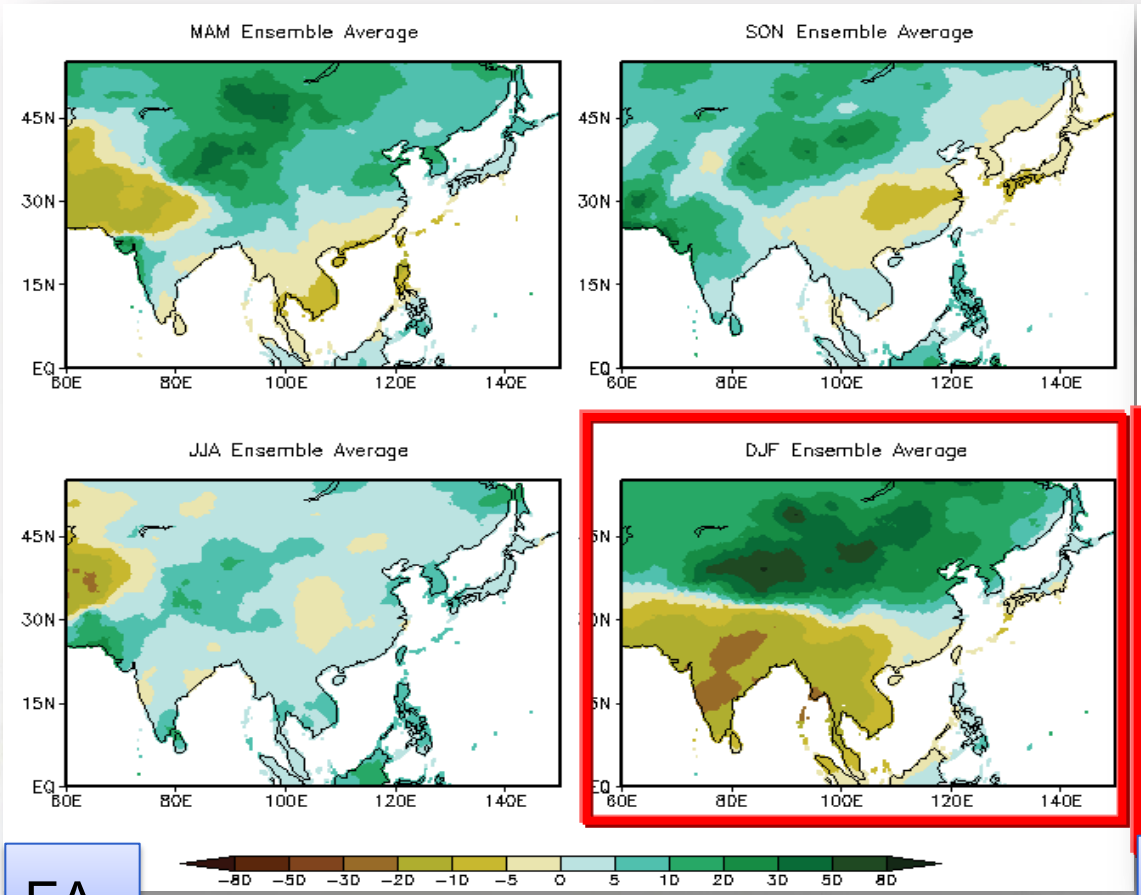
1. Station data analysis
2. Method develop
3. Gridded data evaluation

Uncertainty Analysis

1. Probability analysis
2. Projection data analysis

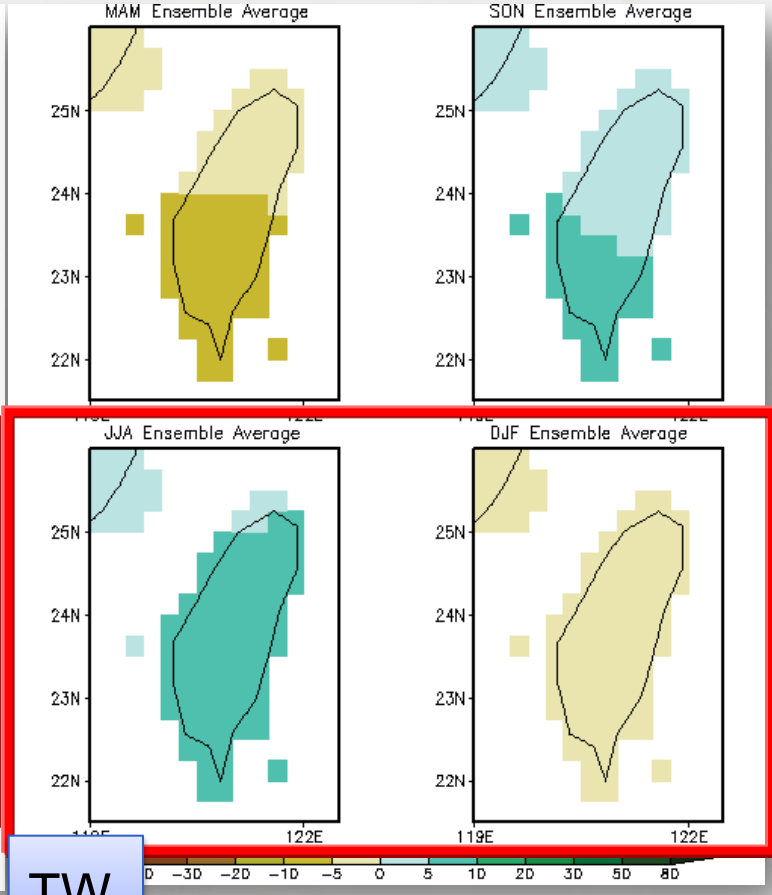
Statistical Downscaling

Change rate of projected monthly rainfall climatology (2020~2039) A1B



EA

1. Increasing rainfall is expected for most of EA in general
2. Decreasing rainfall is found in mid-China and Japan
3. change of rainfall is evident in Winter

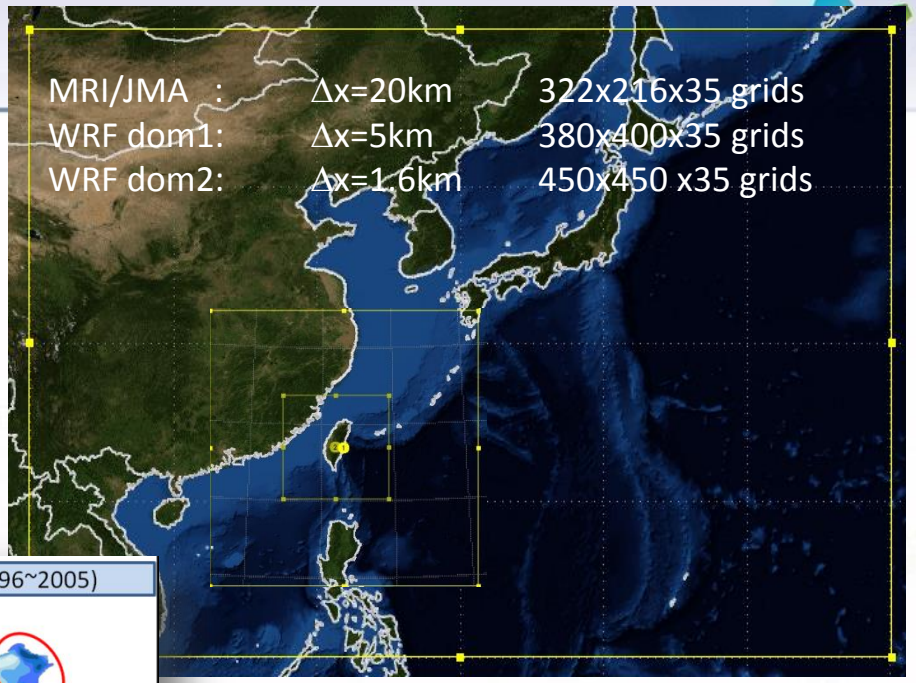


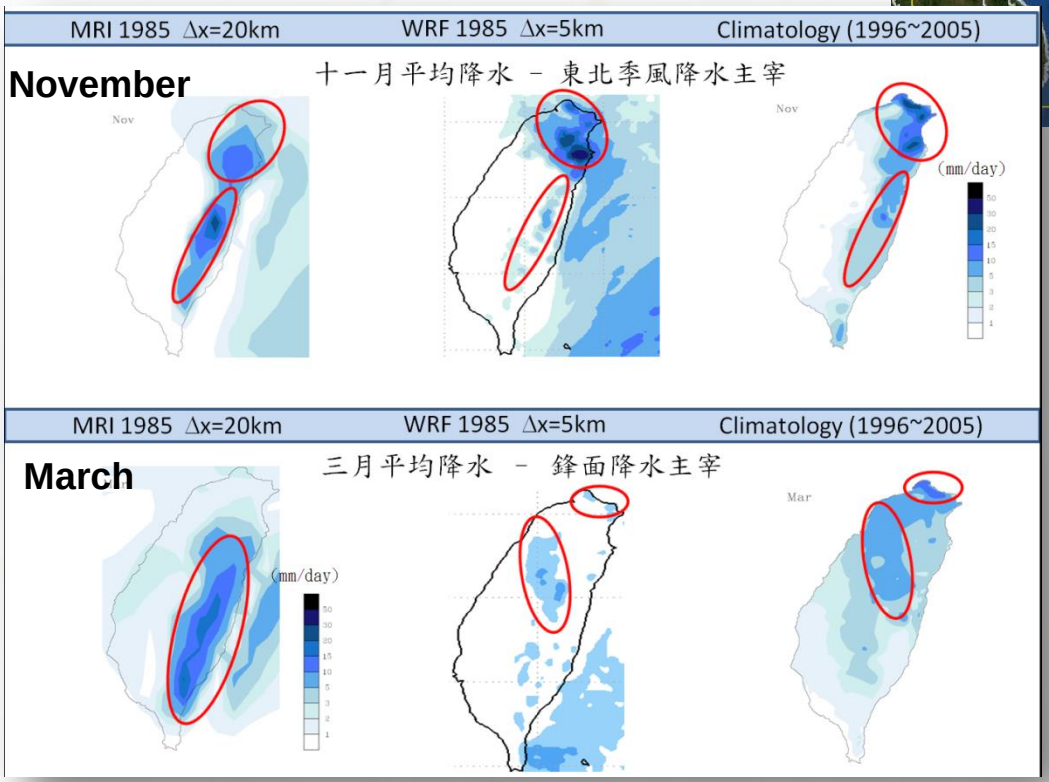
TW

1. Decreasing in DJF and MAM
2. Increasing in JJA and SON

Dynamic Downscaling

MRI High-res. Analysis
1. Land Use setting in WRF Model
2. Dynamic downscaling based on WRF
3. MRI 、WRF Data comparison





Collaborate with KAKUSHIN Project/JAPAN
High resolution model outputs (MRI/JMA 20Km x 20Km)

Dynamic downscaling (WRF 5Km x 5Km)

Overview of TCCIP

Team 3

Pao-Shan YU
Jong-Dao Ben JOU

Extreme Rainfall Variability and Flood Impact

1. Historical statistics of extreme rainfall events and flood disasters
2. High resolution Model Verification and Projection on extreme weather variability.

Seasonal Rainfall Variability and Drought Impact

1. Historical statistics of drought events
2. Model Verification and Projection on seasonal variability.

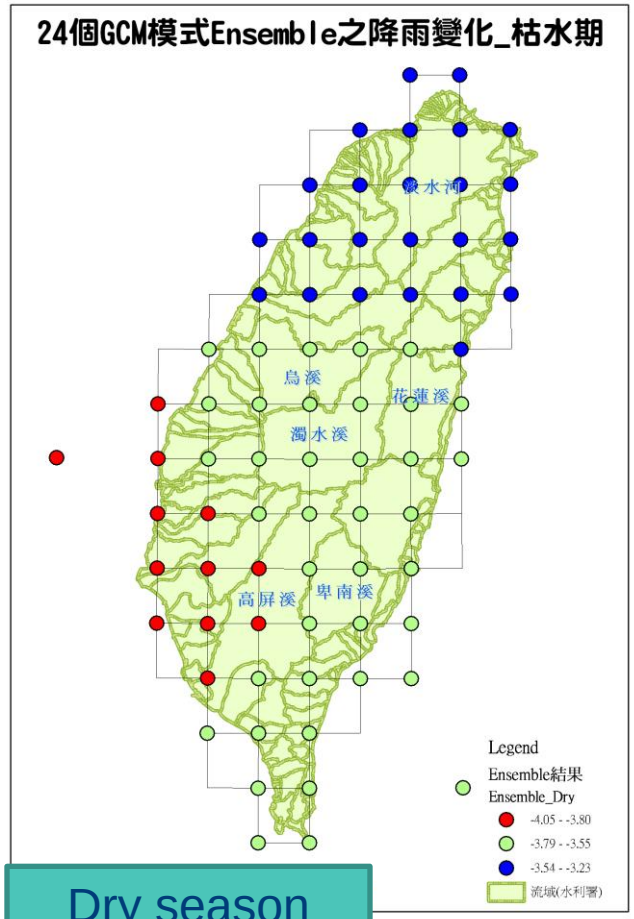
Flood Impact Simulation

1. Hydrological Model Experiment for Flood Simulation
2. Uncertainty Analysis

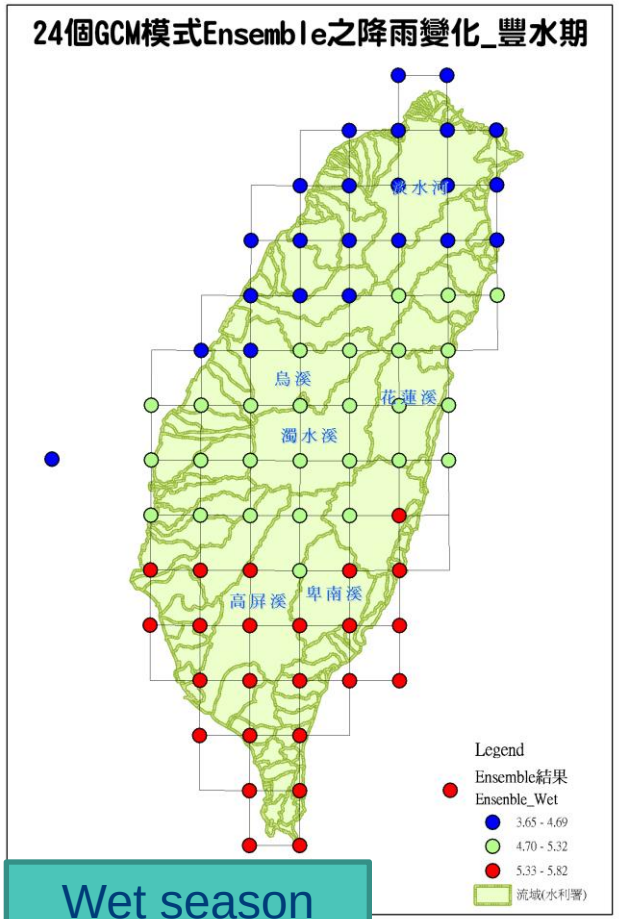
Drought Impact and Water Resource Management

1. Hydrological Model and Water Resource Model Simulation
2. Uncertainty Analysis

Projected rainfall based on MME during Dry and Wet seasons (A1B)



Dry season



Wet season

2020~2039 climatology mean

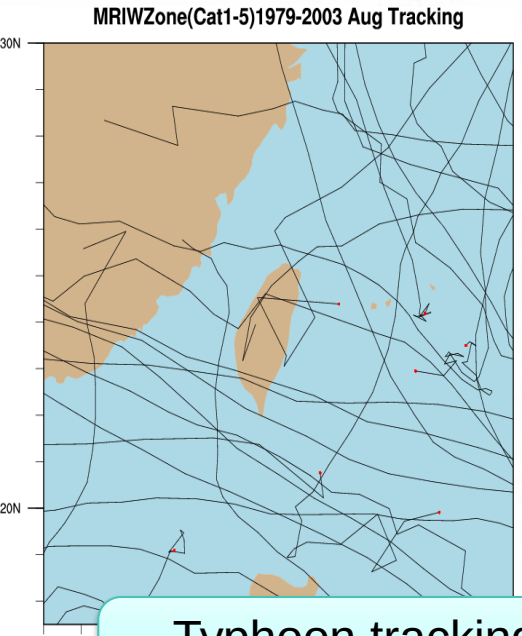
Wet season
Rainfall increasing

Dry season
Rainfall decreasing

Flood Disaster Assessment Request

MRI /JMA 20Km ⇨ Hourly (WRF 5km/CreSS 1Km) ⇨ **Extreme Water Level Simulation**

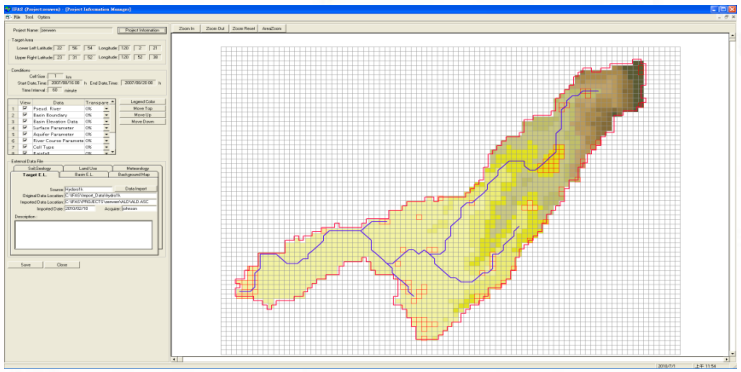
Data of 10~20 extreme events per 25 years



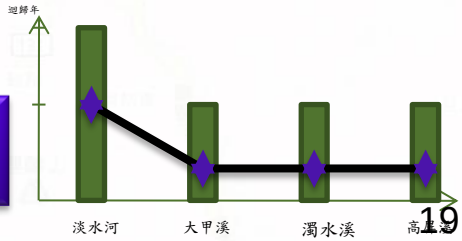
Typhoon tracking from MRI model

Dynamic Downscaling to 5Km res.

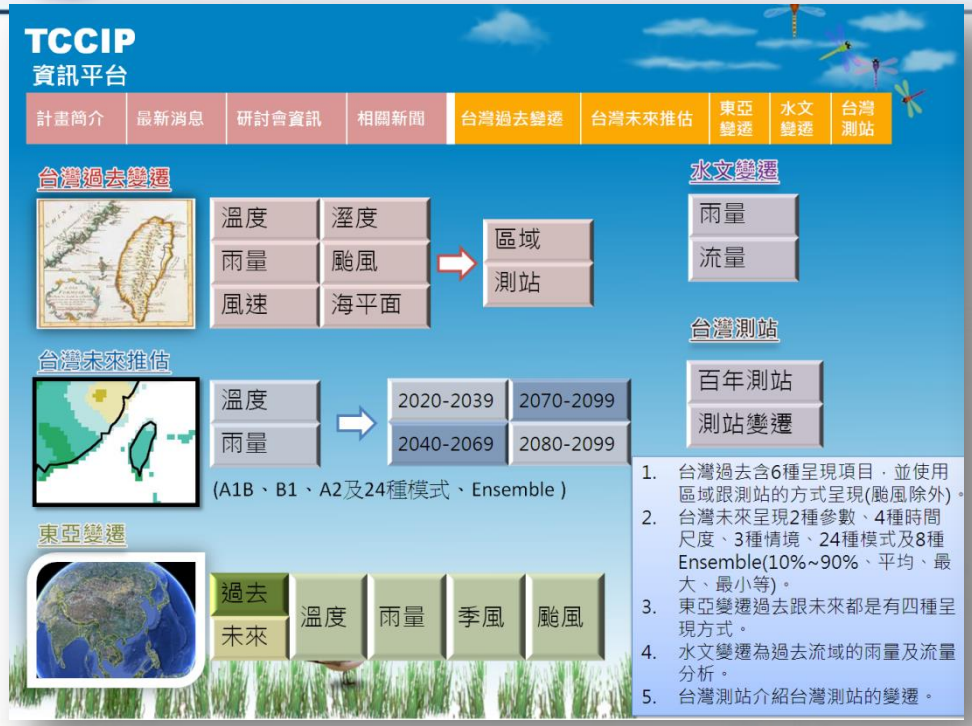
IFAS Flow Model



Flood Impact Assessment in various river basins



TCCIP Website



Main Content:

1. **History of Taiwan climate**
2. **Future Projection of Taiwan rainfall and Temp.**
3. **Hydrological variability under Climate Change**

1. **Create a user-friendly platform**
2. **Design a flexible interface to display model projections**
3. **Share Climate Change products**

Summary

- Produce projections of climate change in Taiwan through scientific methods
- Build interdisciplinary cooperation and information integration for climate change research
- Extend international connection and collaboration on climate change research for enhancing regional capacity
- Apply results of TCCIP to policy making at governmental level
- Issue routine reports of climate change research and achievement of Taiwan

THANKS FOR YOUR ATTENTION