



気候変動予測先端研究プログラム

Advanced Study of Climate Change Projection (SENTAN)

# Introduction of Japan's National Climate Program (SENTAN Program)

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Kyoto University



# Projection of extremes is important in Asian hazard assessment

# But... Extreme hazard projection is limited





# Quantify the Hazard Risks

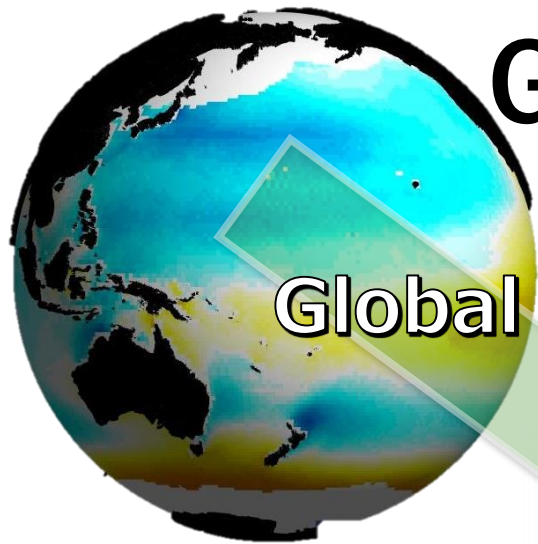


## Potential risk change

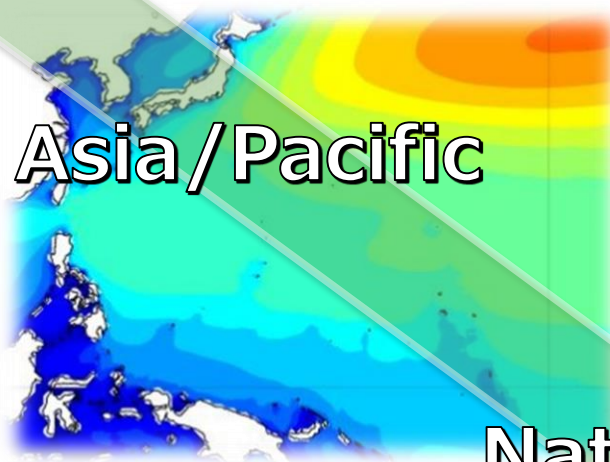
- sea-level rise
- precipitation
- river flooding
- coastal flooding
- water resources
- heatwave

# Global to local climate risk

Time-line  
Hazard intensity  
Adaptation



Typhoons, Extra-TCs  
Sea level rise



Heavy precipitation  
Storm surges  
Water resources

National

River and coastal flooding  
Hazard Risk

Local

Extreme Projections  
Winter Storms  
ENSO  
Tropical Cyclones



# SENTAN Program

2022-2026

Japan's National Climate Research Program by MEXT

1. Theme 1 AORI, U Tokyo Watanabe
2. Theme 2 JAMSTEC Kawamiya
- 3. Theme 3 MRI Takayabu**
- 4. Theme 4 DPRI, Kyoto Mori**

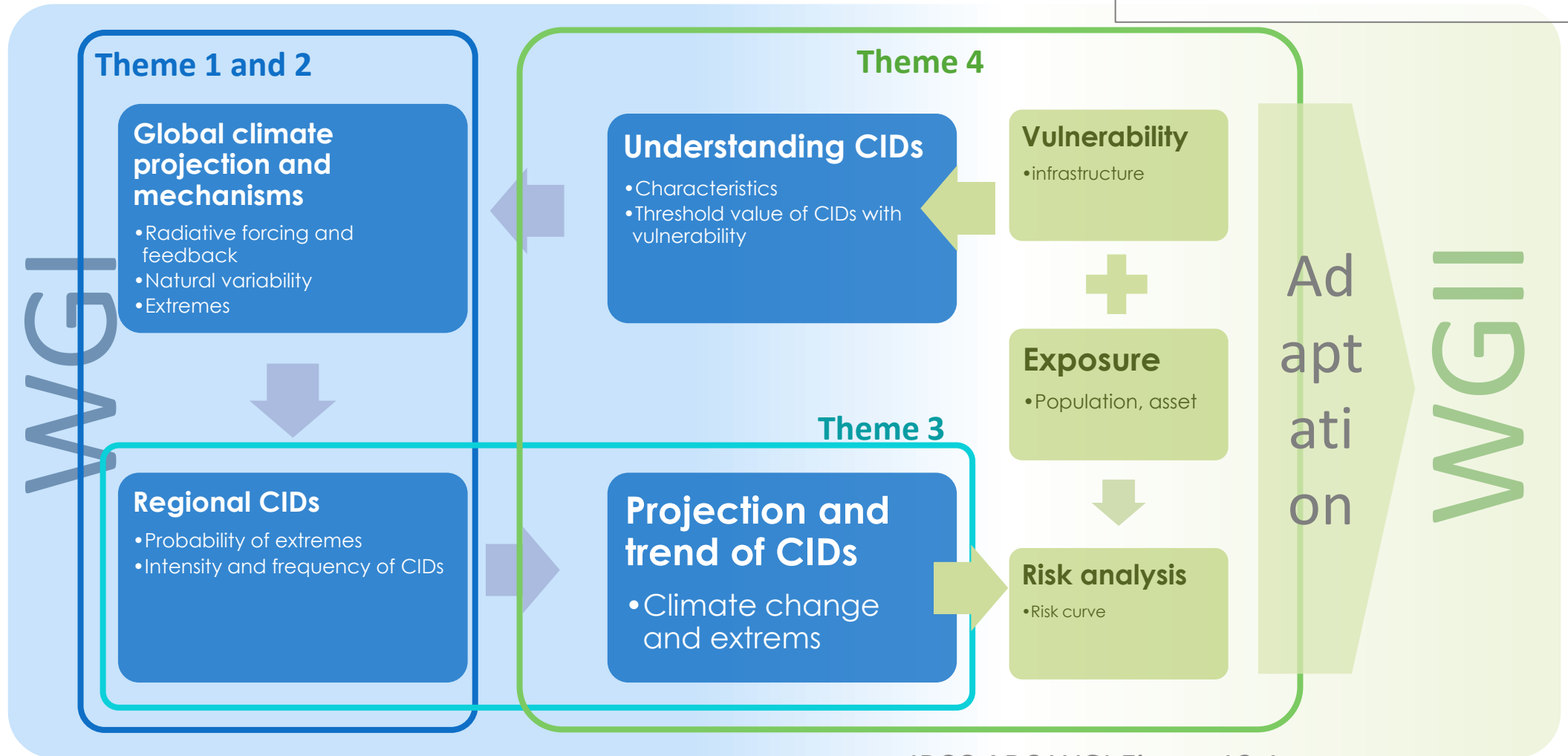
Cooperative working groups (WGs)

- EA, AI, land model, SLR, wildfire, JAXA and international cooperation

# SENTAN Program and Climatic Impact Drivers (CIDs) in AR6 WGI

**Major CIDs**

Temp      Rain & drought      Snow & ice      Wind      Coastal & oceanic



IPCC AR6 WGI Figure 12.1

# SENTAN P4 Goals

## Targets

1. Integrated hazard model
2. Hazard to risk assessment
3. Making climate risk information

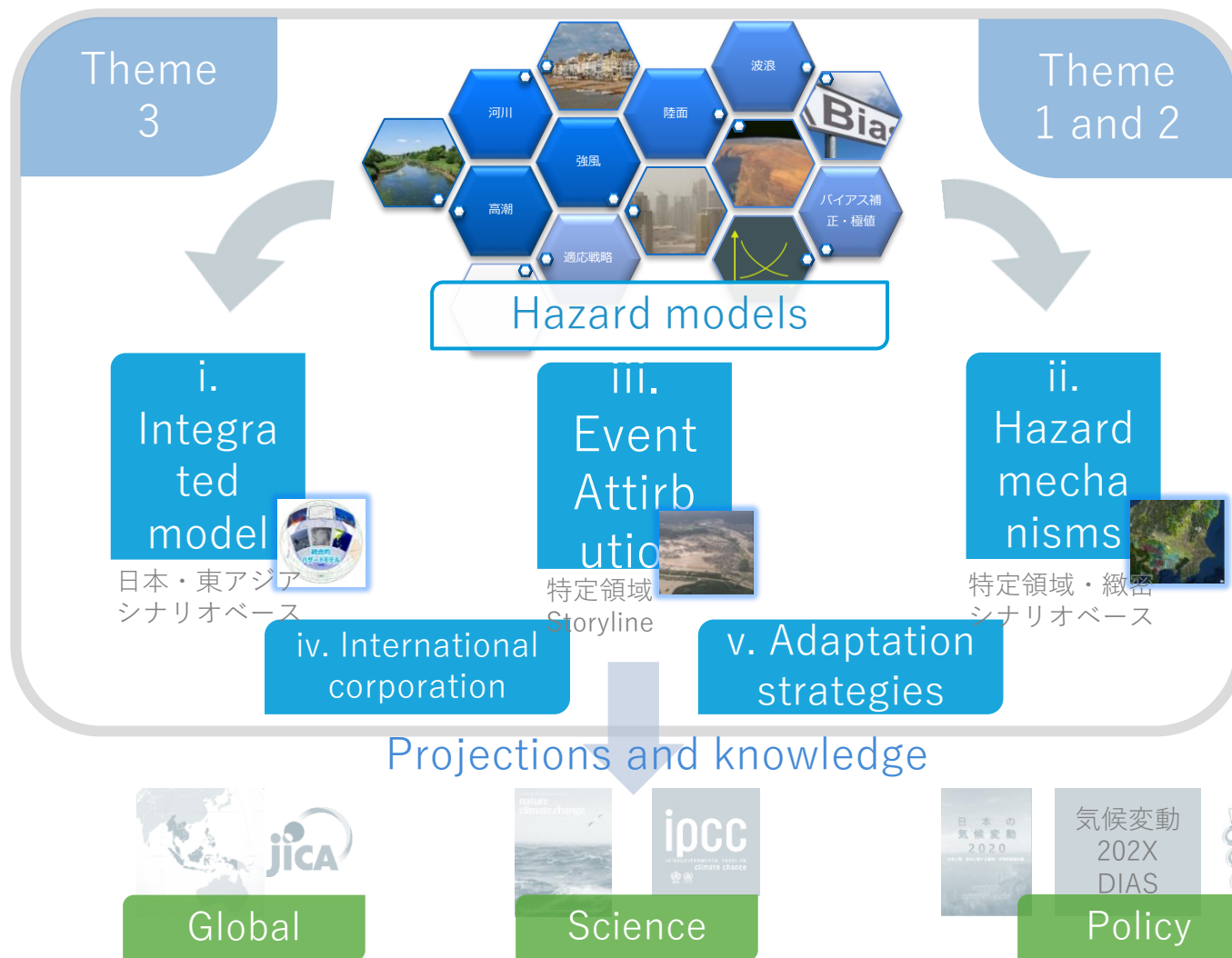
## Outcome

- A) IPCC AR7 and related Special Report
- B) National report and dataset
- C) Collaboration with governmental agencies and technical users





# SENTAN Program Theme 4: Outline

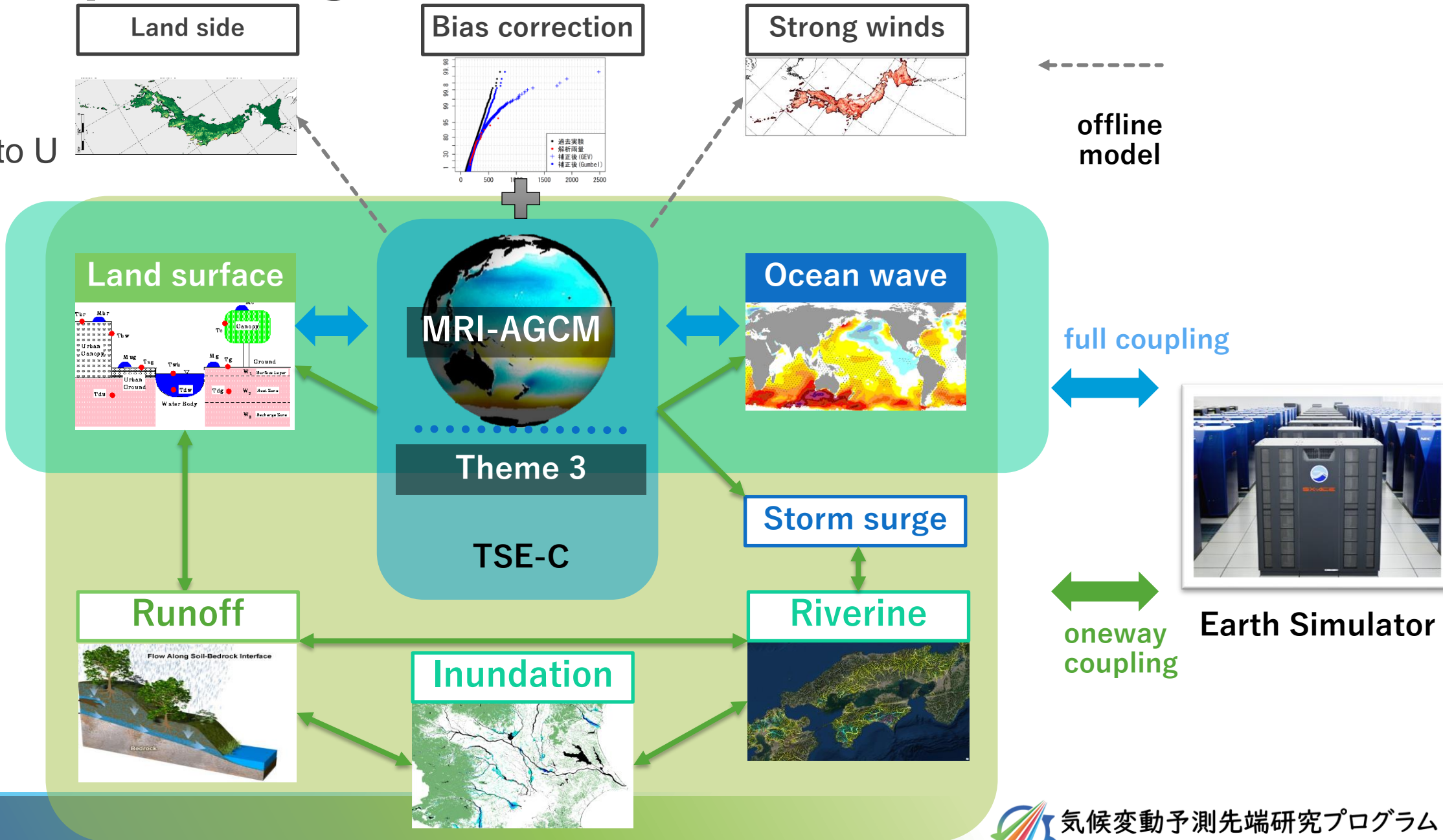


- i. **Integrated hazard model development**
  - Prof. T. Sayama (Kyoto U)
- ii. **Hazard mechanisms**
  - Prof. K. Tanaka (Kyoto U)
  - Prof. M. Fujii (Hokkaido U)
- iii. **Hazard Event Attribution**
  - Prof. T. Takemi (Kyoto U)
- iv. **International cooperation**
  - Prof. Y. Tachikawa (Kyoto U)
- v. **Adaptation strategy**
  - Prof. T. Fujimi (Kyoto U)

Contribution to science and society

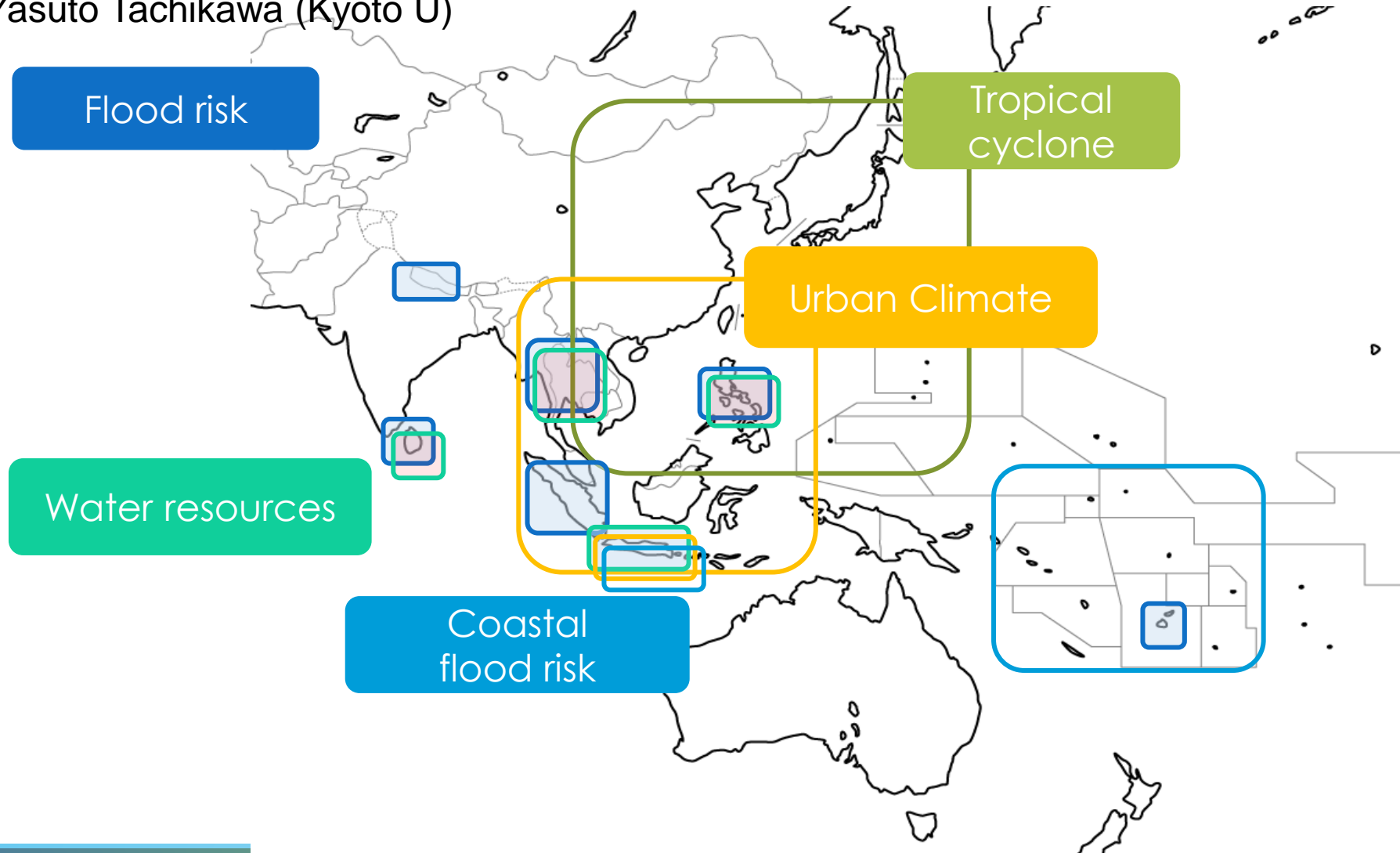
# Group i: Integrated hazard model with GCM

Leader  
T. Sayama  
DPRI, Kyoto U

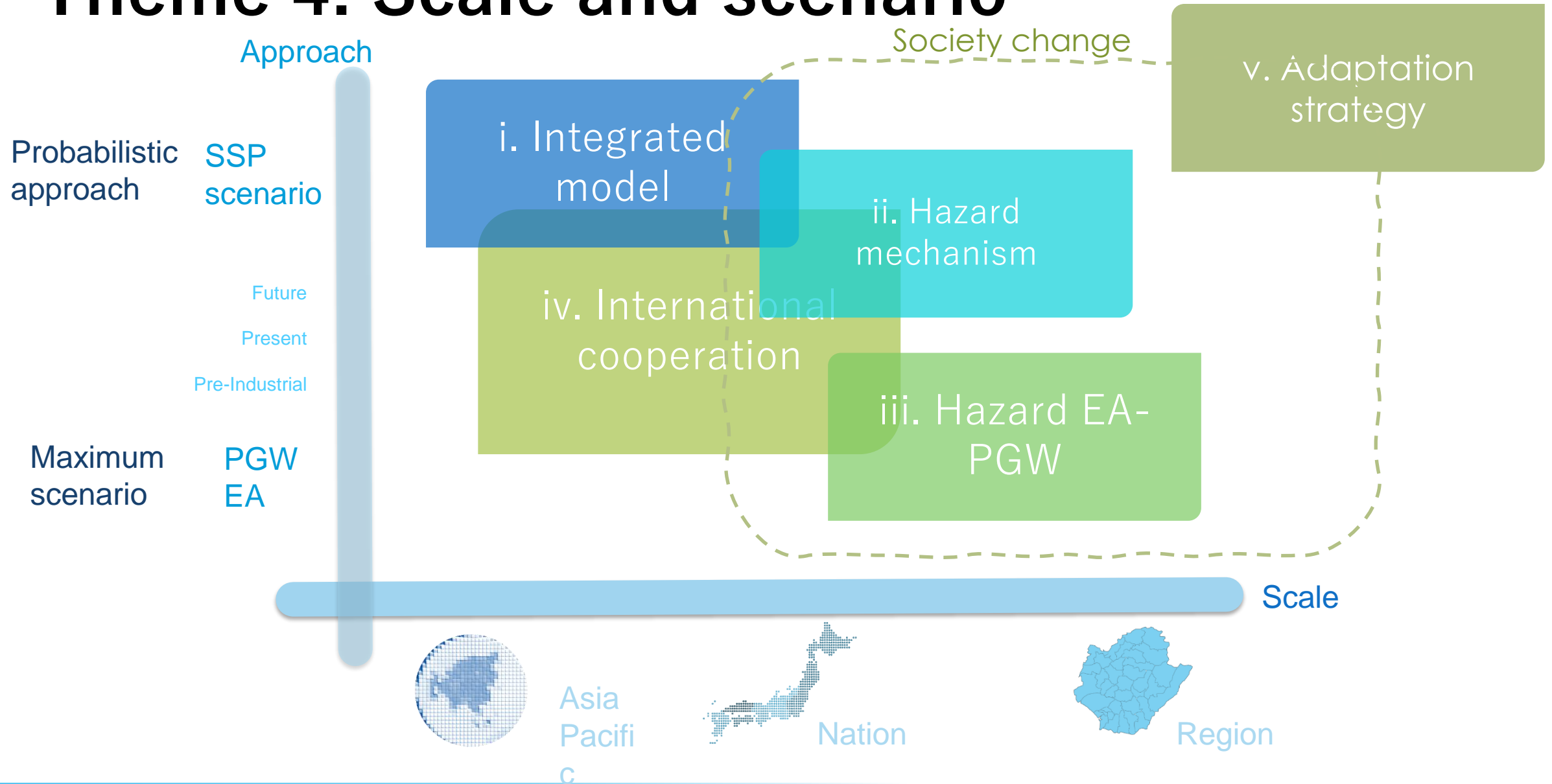


# Sub-theme iv : International cooperation for hazard and risk assessments in the Asia-Pacific region

Leader: Yasuto Tachikawa (Kyoto U)



# Theme 4: Scale and scenario

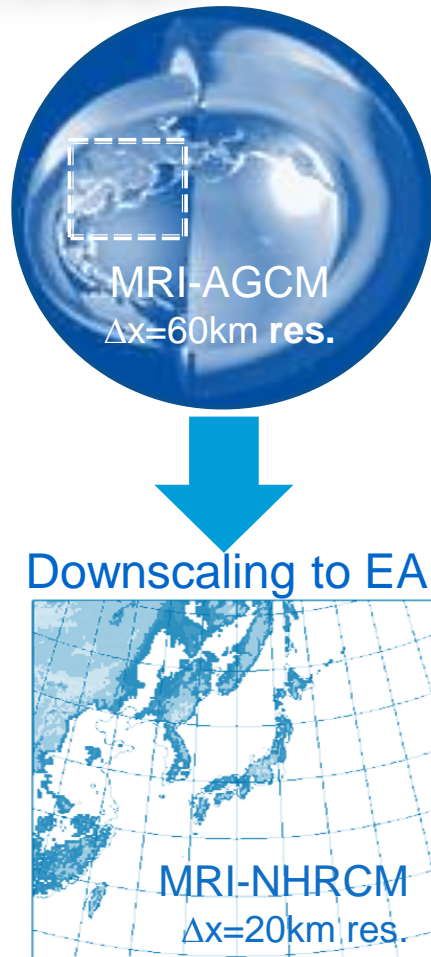




# Developing impact assessment model Making projection (with theme 3)

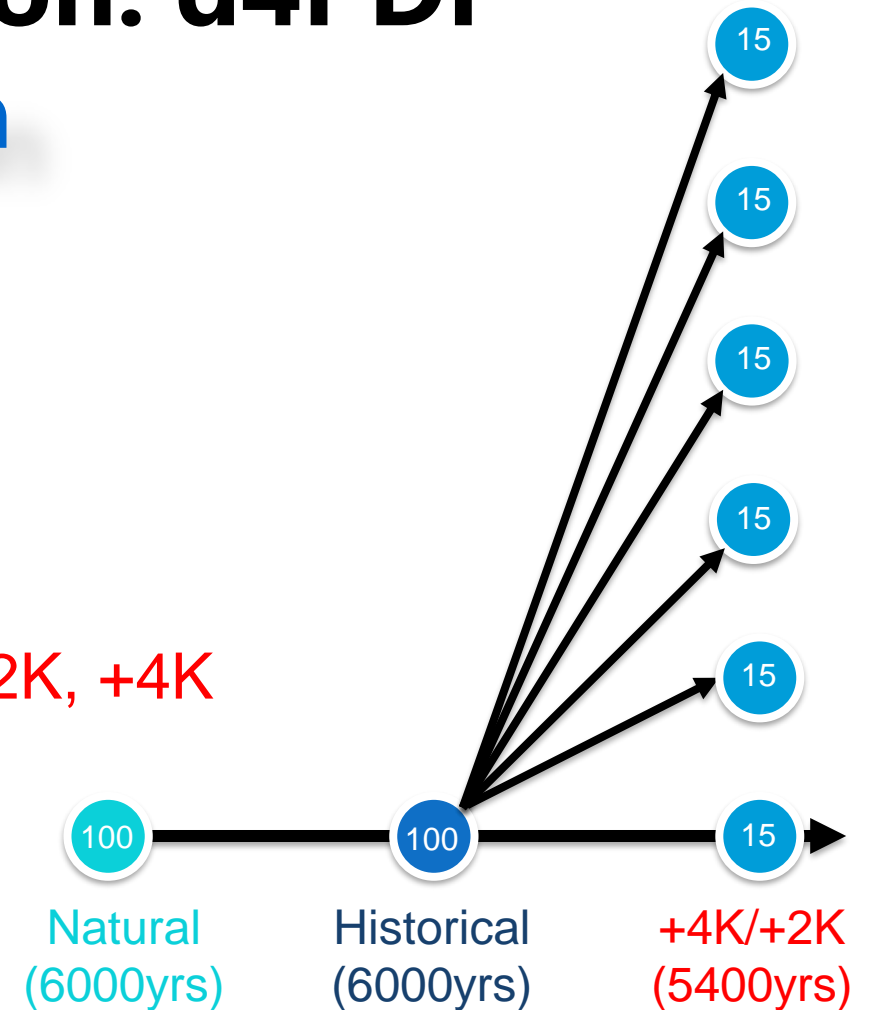
# Large Ensemble Projection: d4PDF

## Model



## Exp. Configuration

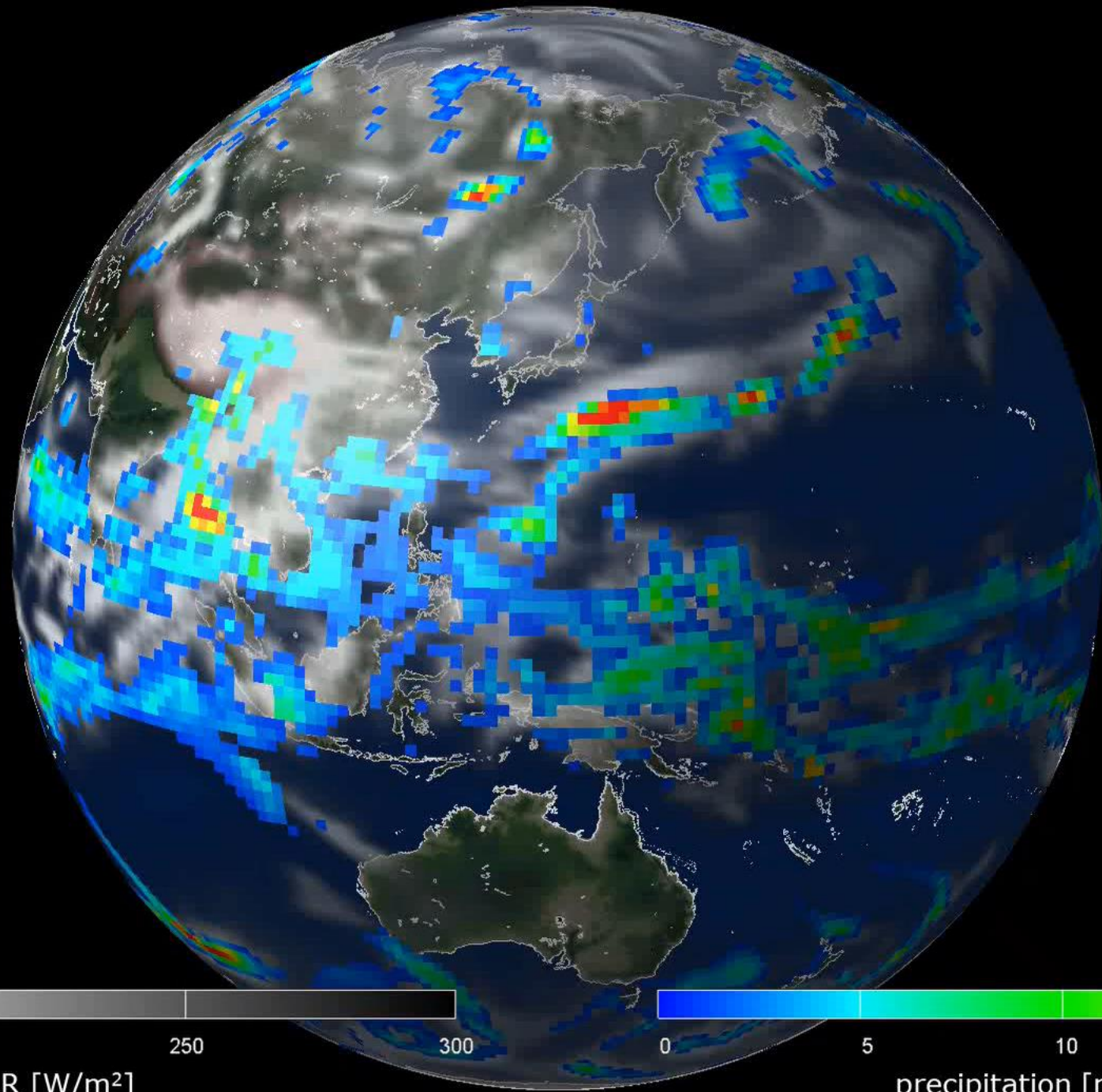
- One ensemble
  - 60yrs
- Initial perturbation
  - 100 for historical/Nat.
  - 15 for future
- Future climate
  - **Global mean temp. +2K, +4K**
- SST/Sea ice
  - Historical
    - COBE2-SST
  - Future
    - **SSTs from CMIP5**



Ishii and Mori (2020) PEPS

# d4PDF example

06/10 02:00

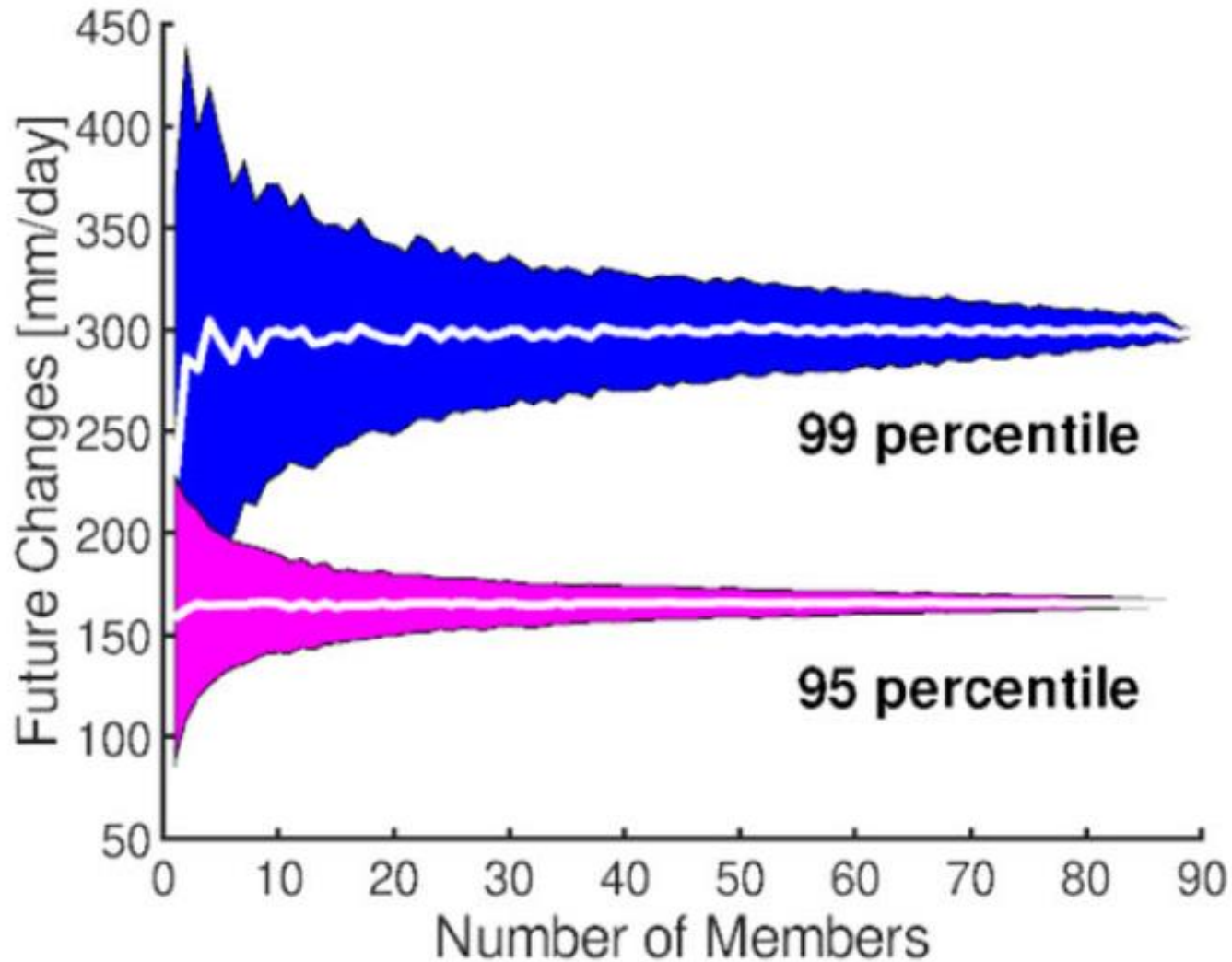


OLR [ $\text{W/m}^2$ ]



precipitation [ $\text{mm/6hr}$ ]

# Large ensemble can reduce uncertainty





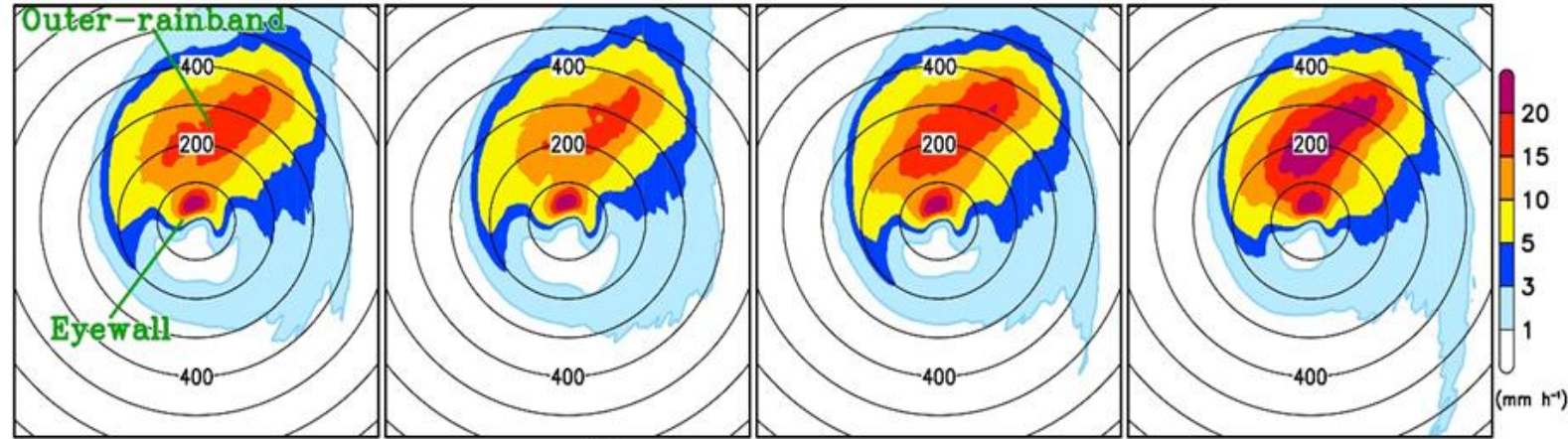
# Pesudo Global Warming Exp. : TC2019#19 (Hagibis)

Control

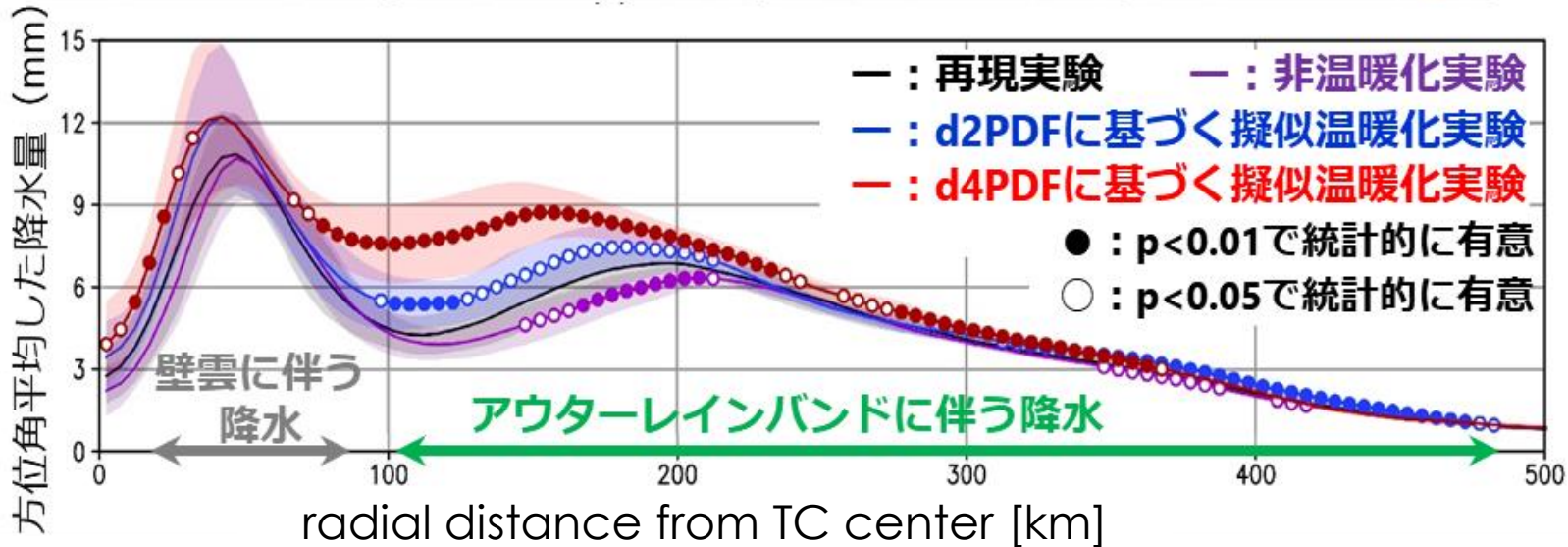
Non GW

+2K

+4K



Precipitation [mm]



上段：11日00UTC - 13日00UTCで平均した台風中心周辺の1時間降水量  
 下段：同期間で平均した1時間降水量の動径プロファイル



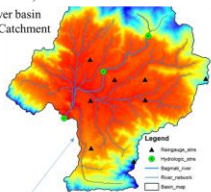
# River flood modeling: Nepal case



Flooding at Radhe trial center, Bhaktapur (2018)

Flooding at Kalanki, Kathmandu (2019)

Study area: Bagmati river basin upstream of Khokana; Catchment area is 593 sq. km

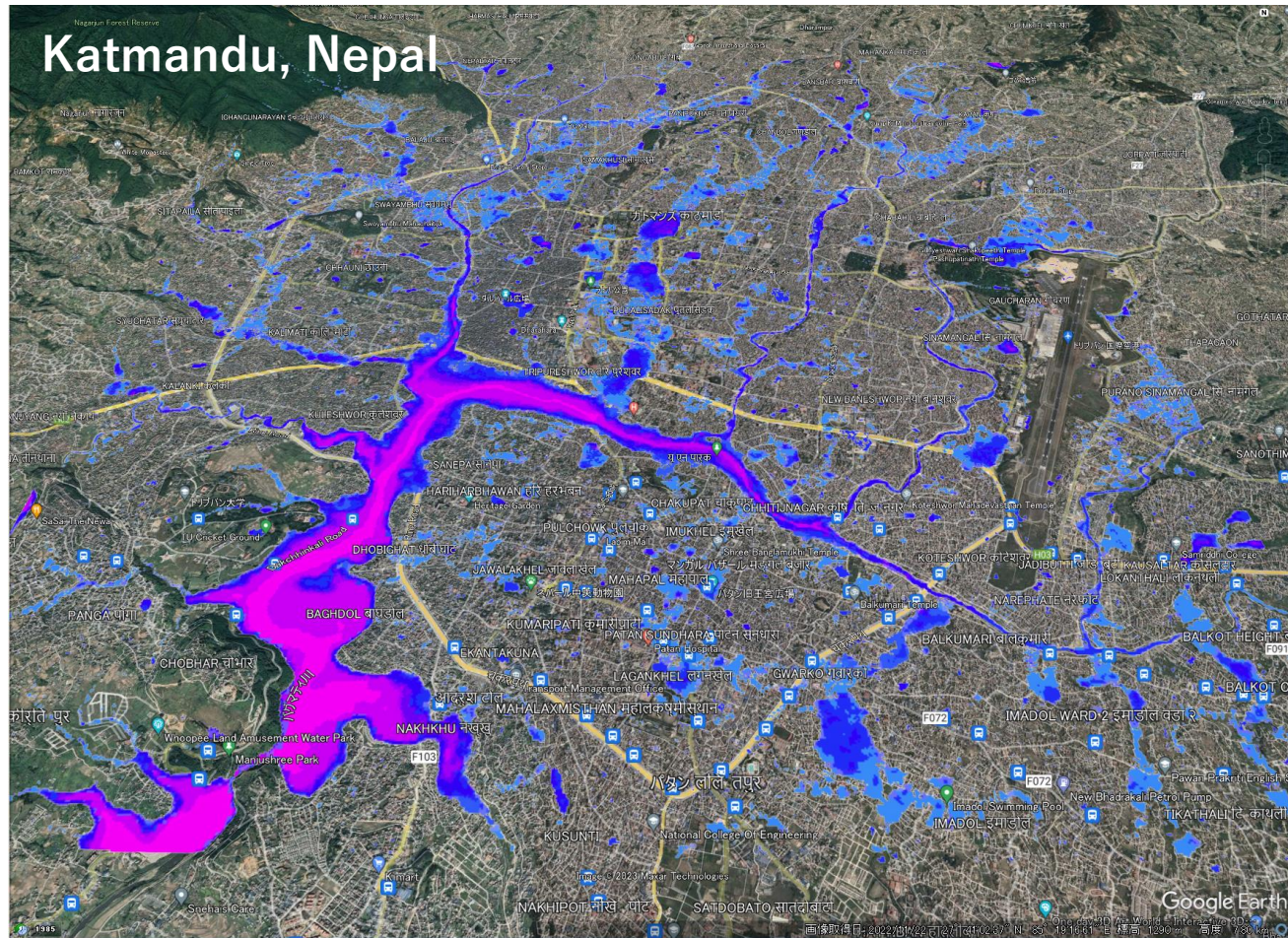
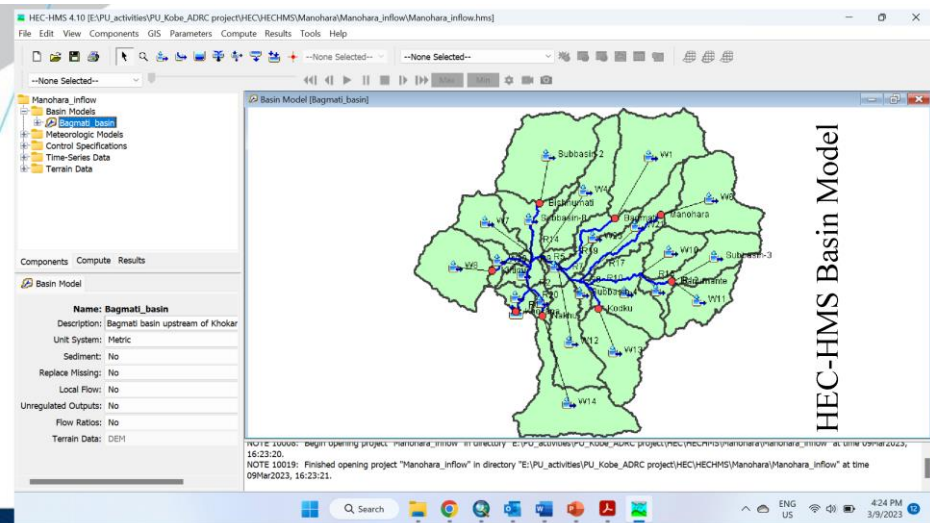


ネパールBagmati川流域 (首都カトマンズ含む)を流出モデルHEC-HMSでモデル化し流量の推定をする (ポカラ大学).

HEC-HMSはネパールで Defacto standardに近い ため, 現地の河川計画にそのまま反映できる可能性があると考えている.



Map of Nepal with 77 districts





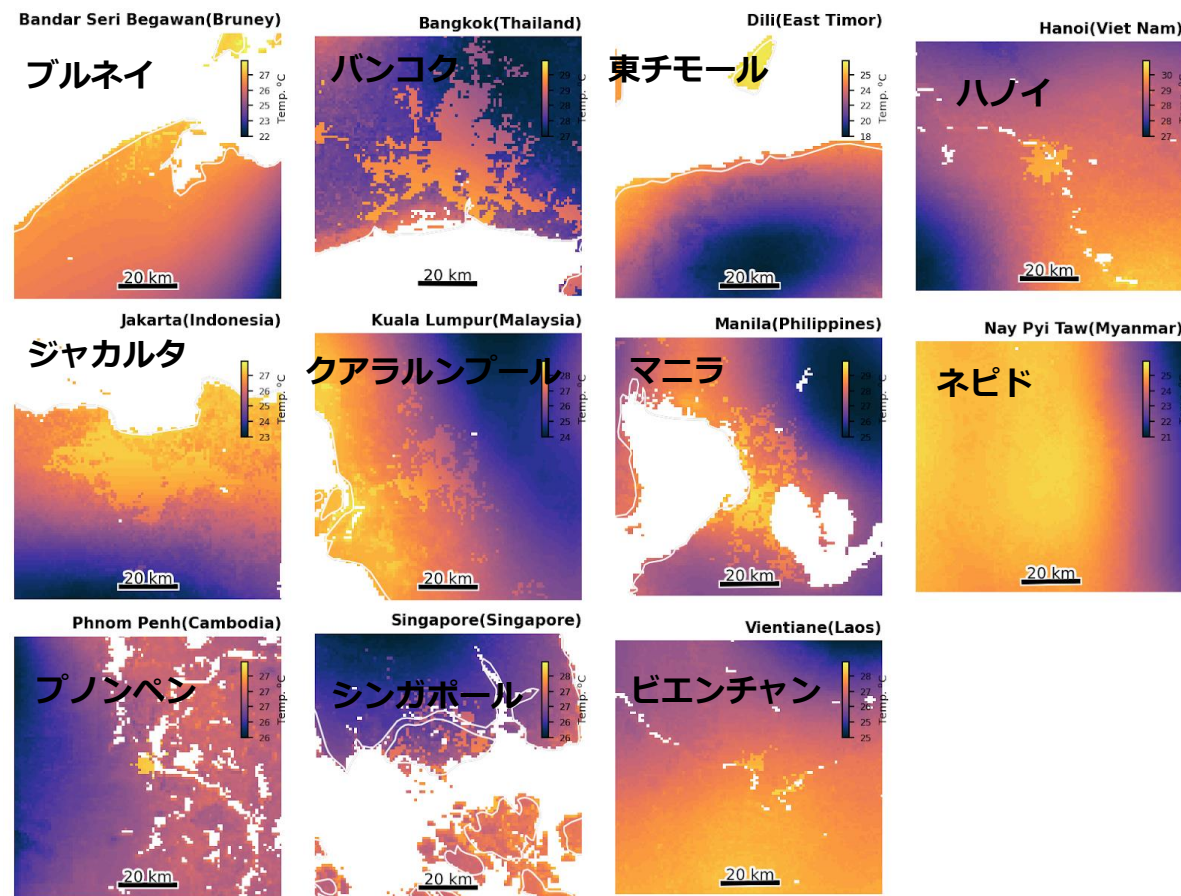
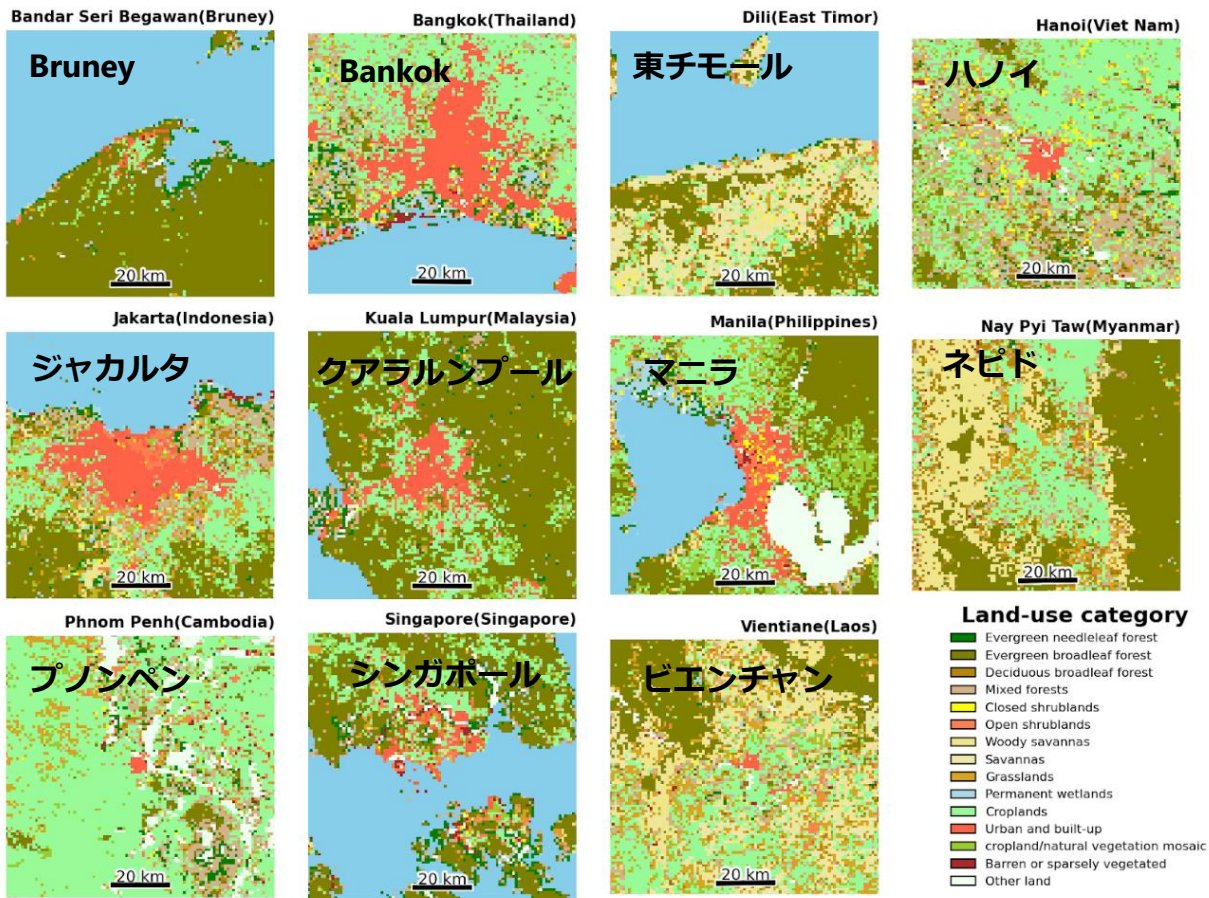


# Heat Island in Southeast Asia

1-km land use (MODIS)

Land-surface-model-base DS

Ground temperature





# Summary

- Impact assessment for extremes will be dramatically improved in SENTAN program.
- Targets for the next 5 years
  - Multi-hazard assessment
  - Risk assessment
  - Maximum class assessment
  - Close linkage with adaptation measures
- Impact assessment for Asia and the Pacific areas
  - IPCC does not care individual country
  - Need for international cooperation

**Thank you for listening  
and willing to collaboration**