



ECOMORE2 PROJECT 3rd Steering Committee,
Vientiane, November 27-28, 2019

Climate Data in Southeast Asia & Collaboration with the GEMMES project

Thanh Ngo-Duc (University of Science and Technology of Hanoi)
&
the Climate WP of ECOMORE2

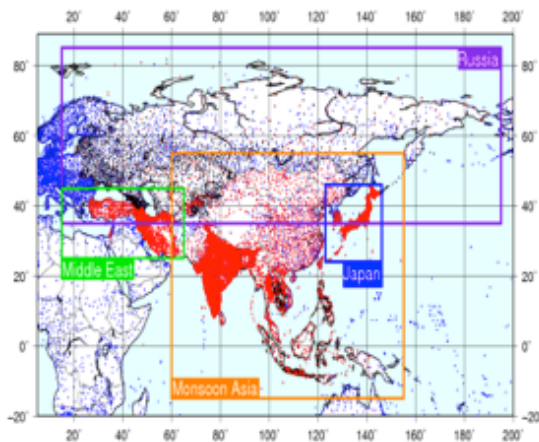
Climate data in Southeast Asia

Past data

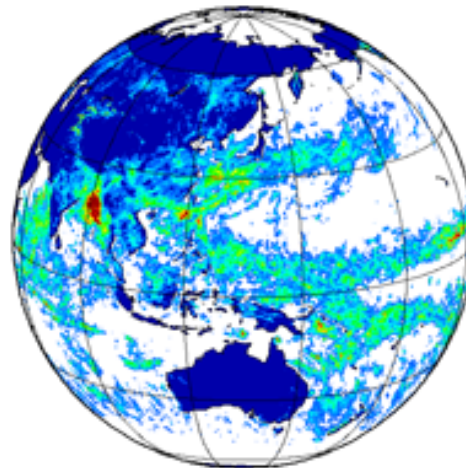
- Station data
- Observationally-based gridded data
- Satellite data
- Model data
- Combined products

Future data

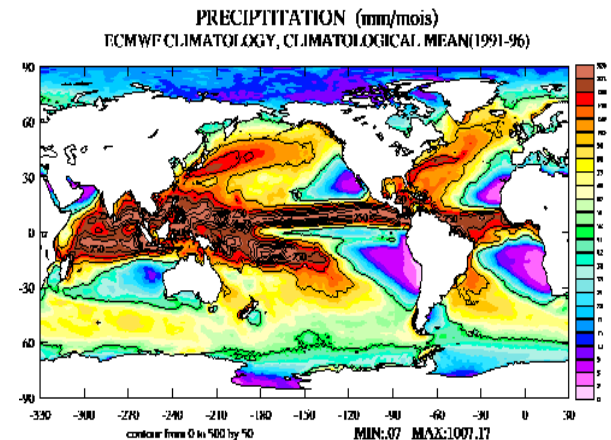
- Model data → projection based on different Greenhouse Gas concentration/emission scenarios



Station data



Satellite data



model & combined products

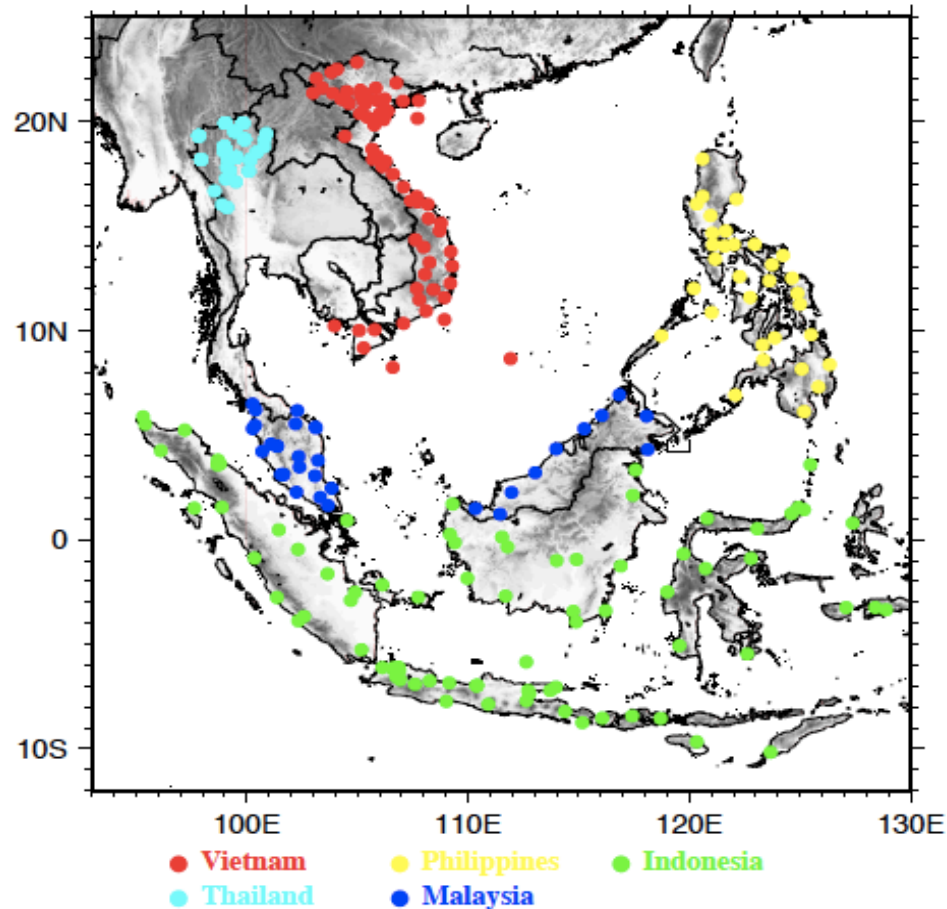
Which climate variables?

- Temperature, rainfall, humidity, wind speed and direction, radiation, etc.
- Derived variables, such as: extreme indices, heat stress, heat waves, tropical cyclone-induced rainfall, heavy rainfall days, etc.

Example of daily data ascii format

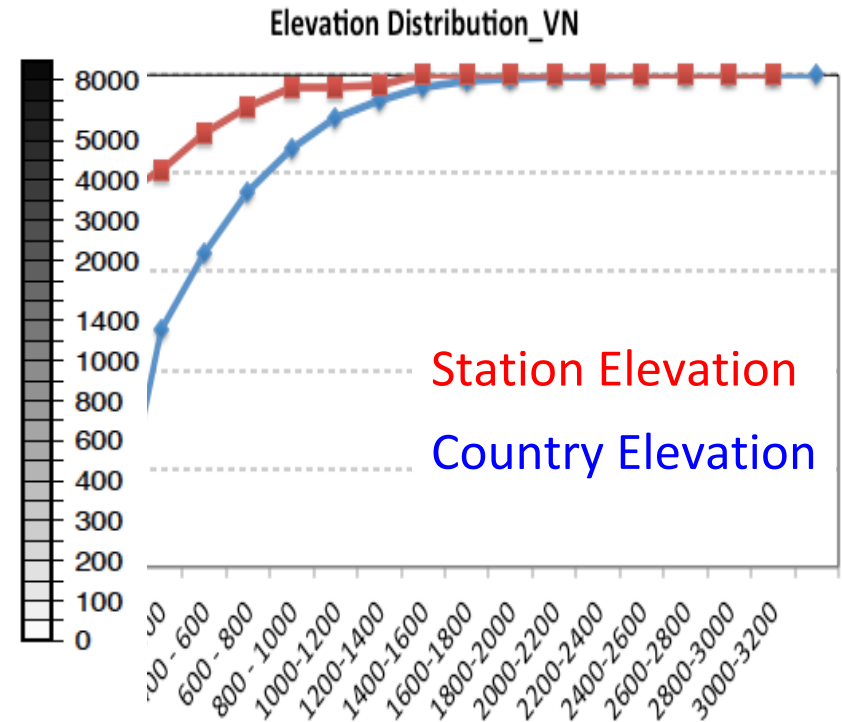
```
VIETTRI
 105.417  21.300  17.000  3
1961
 1  0.0  2.1  0.0  0.0  0.0  0.0  0.0  6.2  4.7  0.3  1.0  0.0
 2  0.0  0.0  0.0  0.0  0.0  0.0  0.0  0.1  7.2  0.0  0.0  1.3
 3  0.9  0.2  0.0  0.0  10.3  0.0  20.7  0.0  0.0  15.2  2.8  0.1
 4  0.0  0.7  0.1  0.0  0.0  133.8  0.0  1.3  24.3  24.2  0.0  0.5
 5  0.0  0.2  0.0  0.0  0.0  0.0  13.0  20.4  25.4  0.0  0.0  2.7
 6  0.0  0.0  0.2  0.1  0.1  0.0  11.7  4.2  5.4  0.0  0.0  0.0
 7  0.0  0.0  0.0  0.0  1.0  0.0  0.9  129.7  1.1  0.0  0.0  0.0
 8  0.0  0.0  0.0  0.0  0.0  2.6  3.5  5.6  17.5  0.0  18.8  0.0
 9  0.0  0.1  0.2  46.6  0.0  0.5  19.5  5.1  0.0  0.0  5.2  0.0
10  0.0  1.2  0.5  3.0  0.0  2.0  2.2  0.0  0.0  0.0  0.0  0.0
11  0.0  0.8  0.3  34.2  0.0  35.2  0.0  0.0  0.0  0.0  25.5  0.0
12  0.0  0.2  0.4  6.5  11.7  0.1  0.0  0.1  13.6  0.0  0.0  0.0
13  0.0  0.1  2.5  9.8  0.0  2.4  0.0  2.1  0.0  0.0  0.5  0.0
14  0.0  2.2  0.4  0.0  0.0  0.1  0.0  0.4  0.0  1.5  9.0  0.0
15  0.4  0.2  28.4  43.8  0.0  2.9  0.0  32.5  0.0  1.0  23.4  3.3
16  0.3  3.0  0.0  2.0  0.0  5.8  0.0  0.0  0.0  0.0  4.8  0.0
17  0.0  1.8  0.0  0.0  0.0  2.2  41.5  0.0  0.0  0.0  0.0  0.0
```

Station data: Gaps in time & space



E.g. data from 323 stations: daily rainfall, T2m, Tmax, Tmin

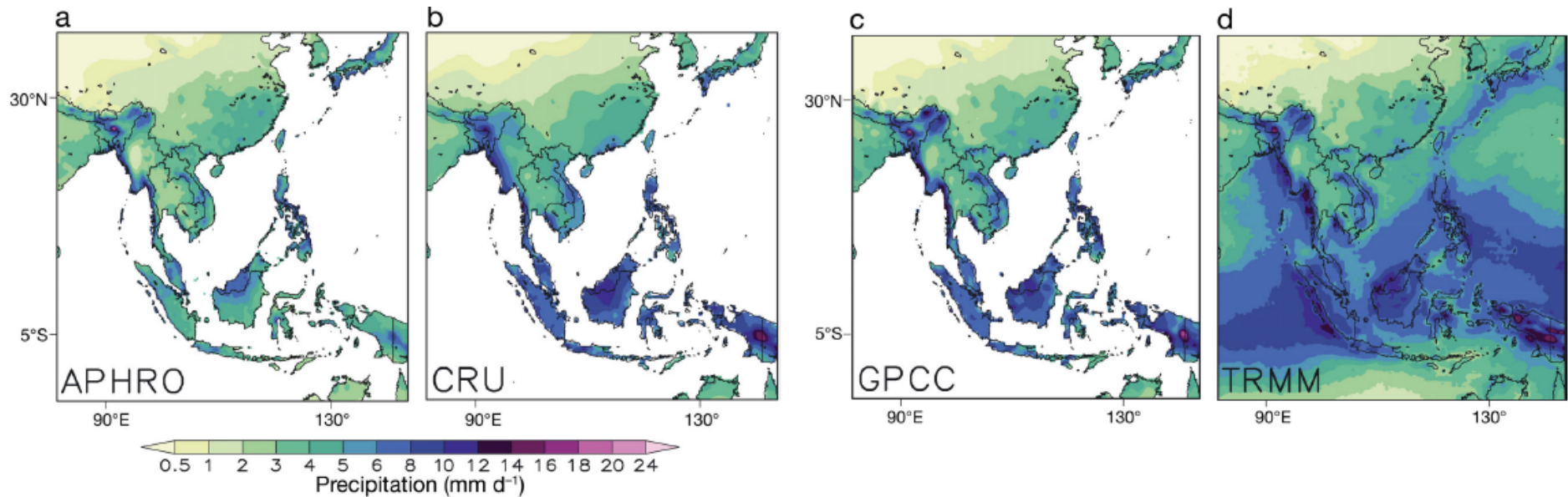
→ The need to build gridded datasets over the region



Under 400m:

- 50% of the total area of Vietnam
 - 80% stations
- Should have more station in high elevation area !?

Gridded data quality over the Southeast Asian region

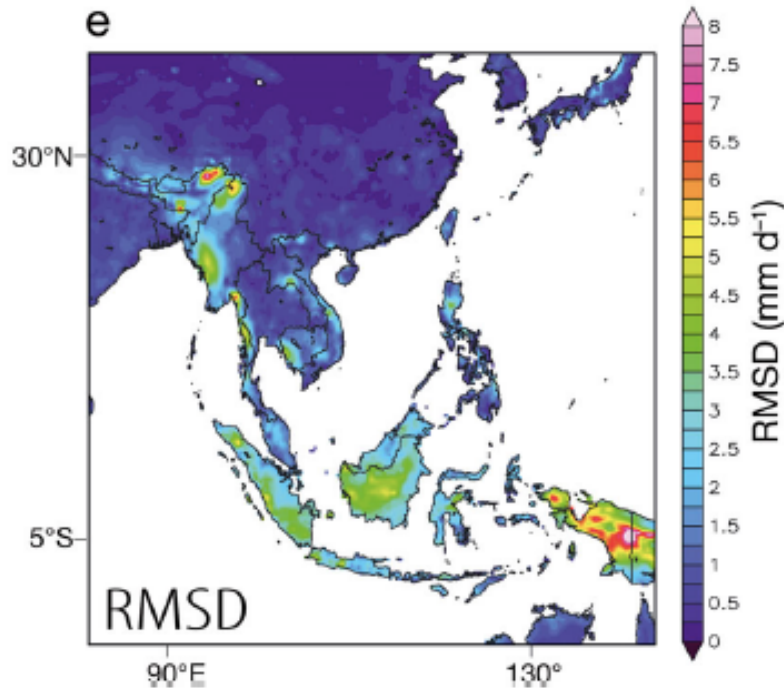


Annual mean total precipitation climatology over Southeast Asia

Root mean square difference between the 4 products

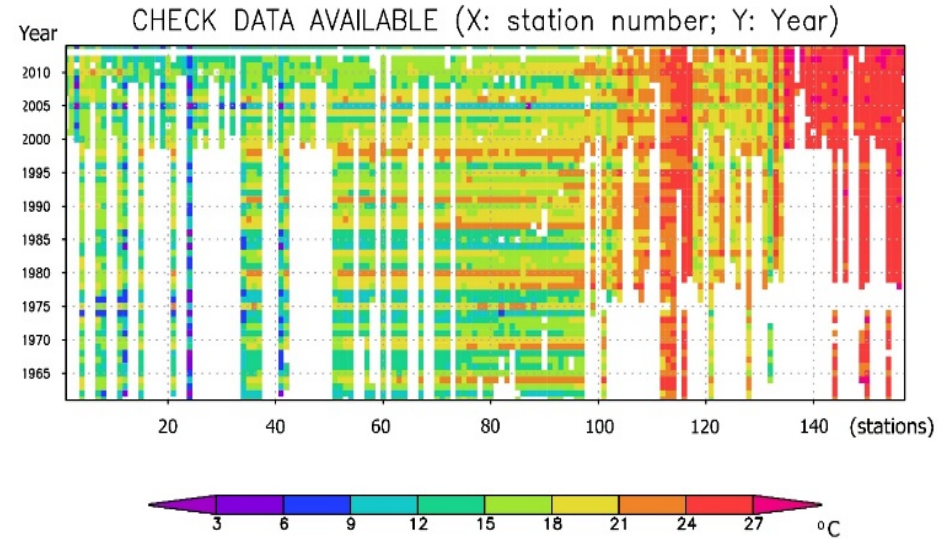
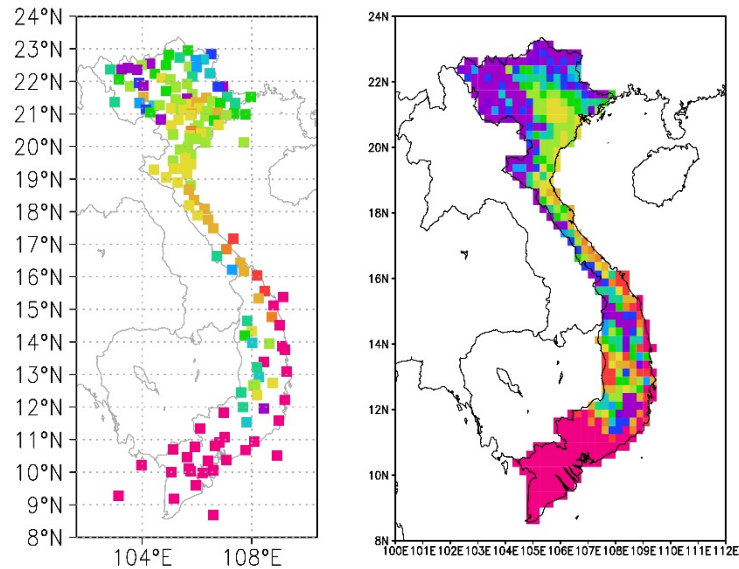
APHRO used ~50 stations from Vietnam
CRU, GPCC, TRMM used ~ 25 stations

(Juneng et al., Clim.Res. 2016)

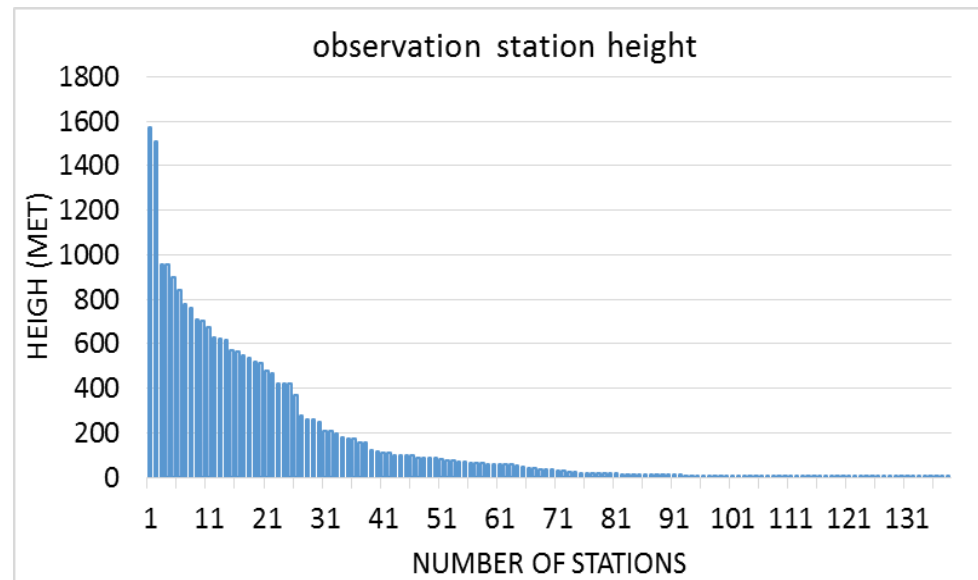


Example: Building a temperature gridded dataset (by Long Trinh Tuan, ECOMORE2's postdoc)

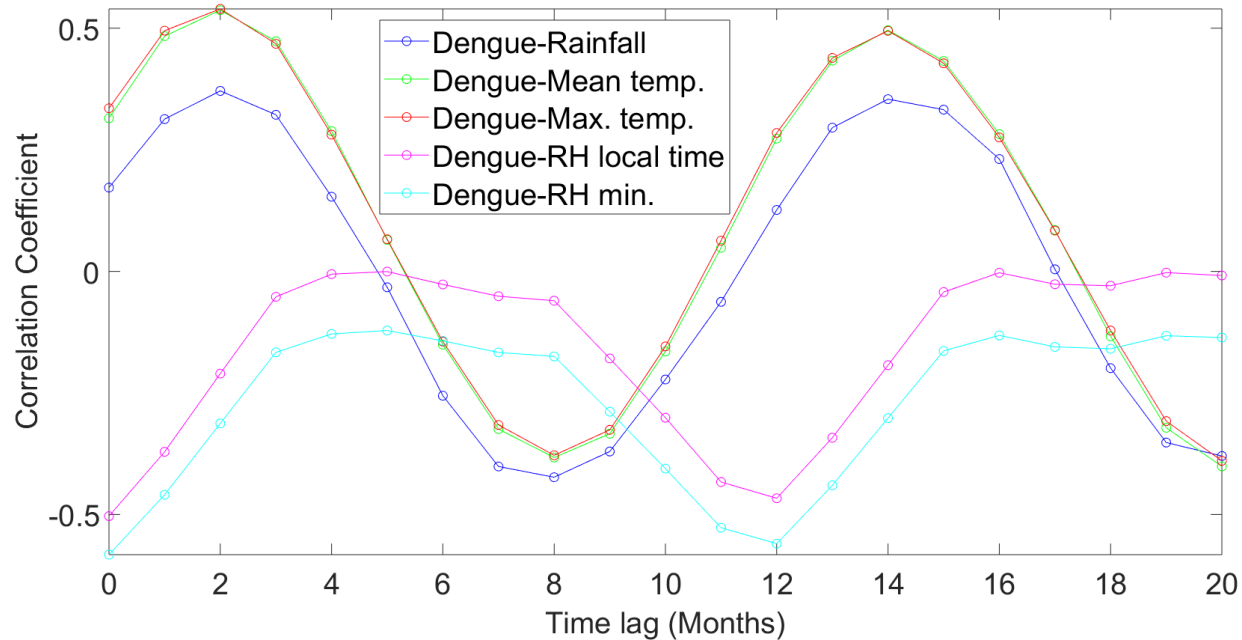
STATIONS



Multi-year mean of T2m in the periods of 1961-2014 (unit in °C)



Example: Investigate the relationship between climate data and dengue incidence (case study of Hanoi)
(by Long Trinh Tuan, ECOMORE2's postdoc)



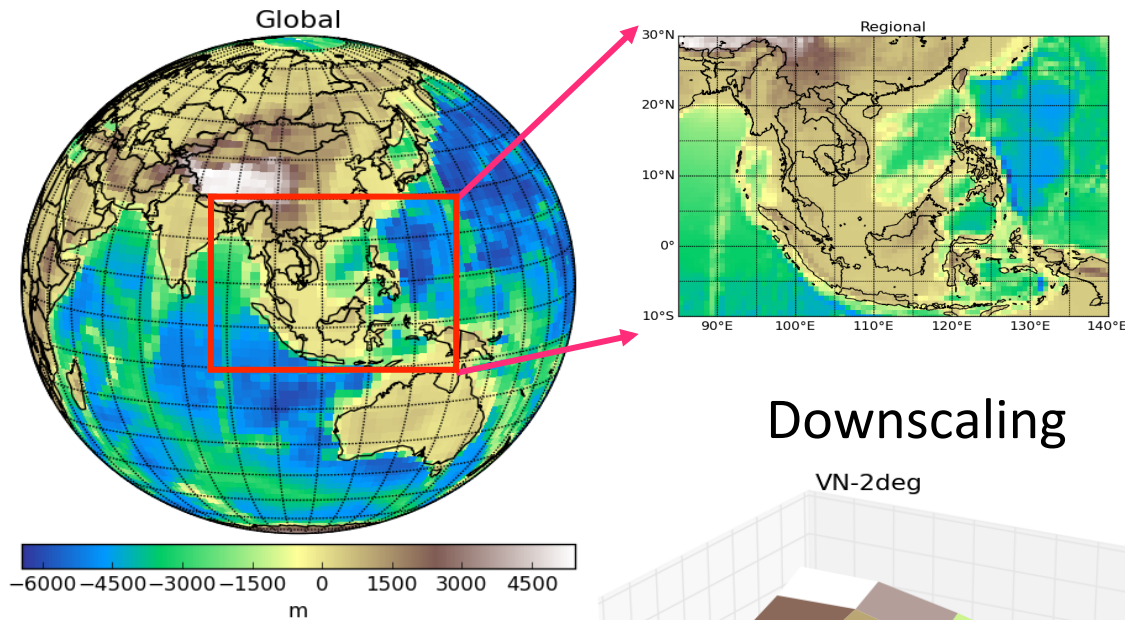
Lag-correlation between Dengue incidence and Rainfall (R), Mean temperature (Tm), maximum temperature (Tx) and Relative humidity (RH).

- 2-month lag with Tm, Tx and R

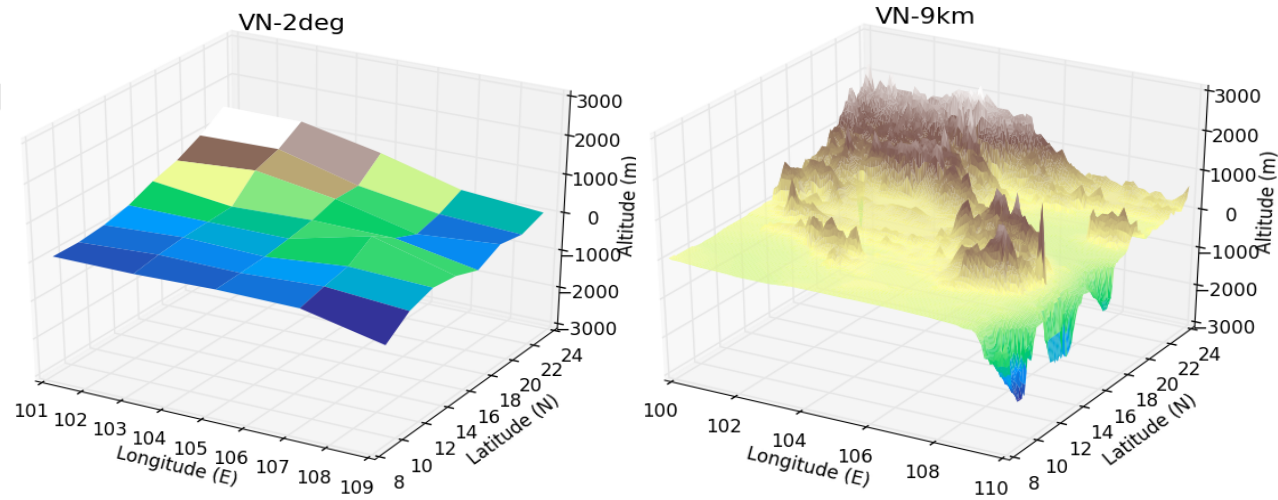
Model data

Model data: historical period and future period until 2100 with different GHG scenarios

- Global Climate Models (coarse resolution)
- Regional Climate Models (better resolution)

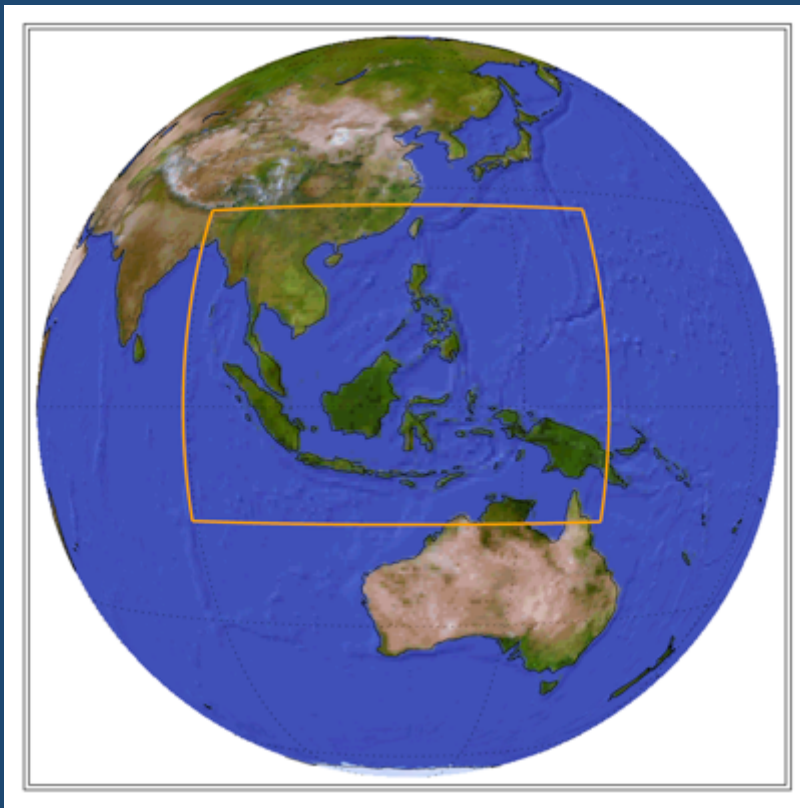


Downscaling



What is CORDEX & CORDEX-SEA?

Vision: to advance and coordinate the science and application of regional climate downscaling through global partnerships



- **14 regions:** e.g. South America, North America, Africa, Europe, East Asia, South Asia, Central Asia, etc.
- **CORDEX-SEA**
- Resolution: **25 km**

Members of CORDEX-SEA

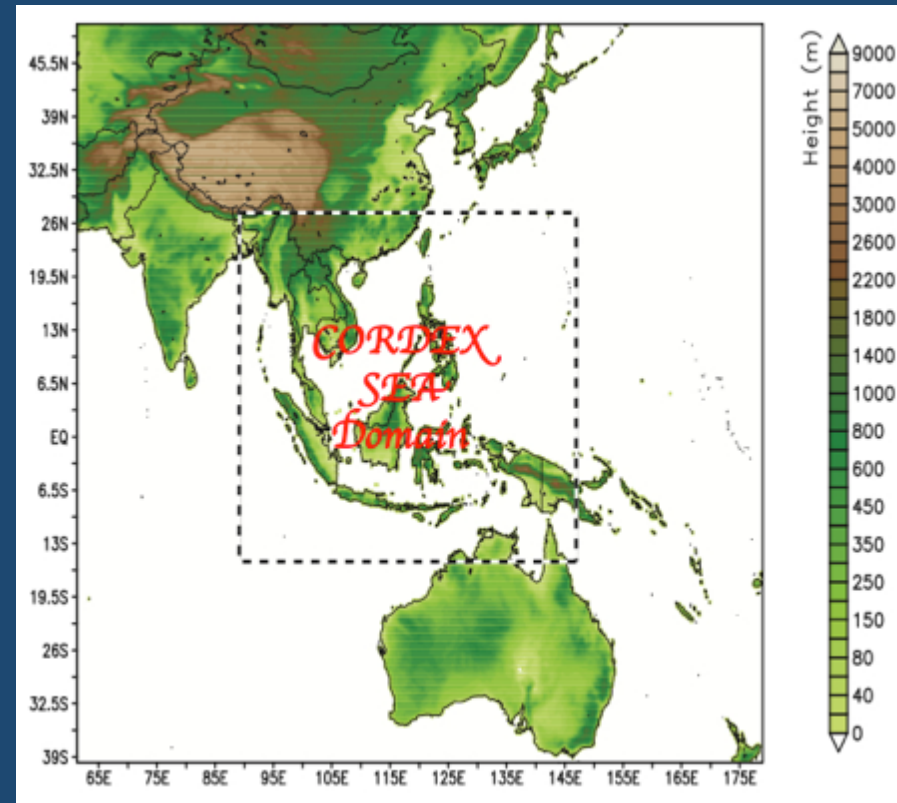
- Currently 17 institutions from 13 countries
 - 7 from the Southeast Asia region (Malaysia, Indonesia, Vietnam, Thailand, the Philippines, Cambodia, Lao PDR)
 - 6 from outside the region (Australia, United Kingdom, South Korea, HongKong SAR, Sweden, Germany)

First workshop in Hanoi, Aug 2012



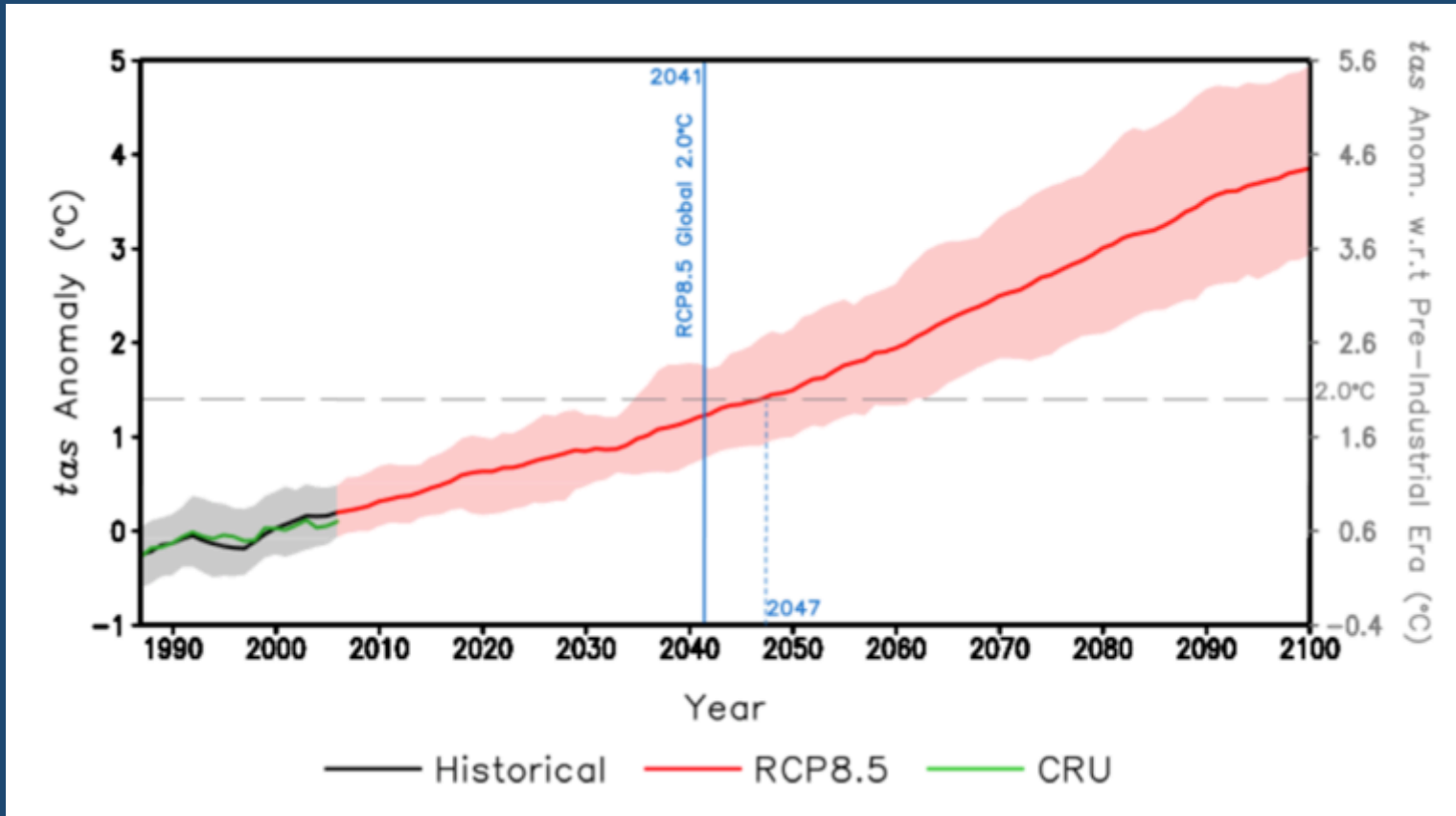
CORDEX-SEA activities

1. Generate historical and future climate data for the SEA region
 2. Sharing data (~ TB) & resources (www.rucore.ru.ac.th/SARCCIS)
1. Capacity building
 2. Aims at increasing the number of publications from the SEA region
 - Juneng et al., 2016; Ngo-Duc et al., 2017; Faye et al., 2017
 - Tangang et al., 2018; Trinh et al., 2019; Tangang et al., 2019, etc.
 - IPCC AR6 (2021)



Future projections in SEA

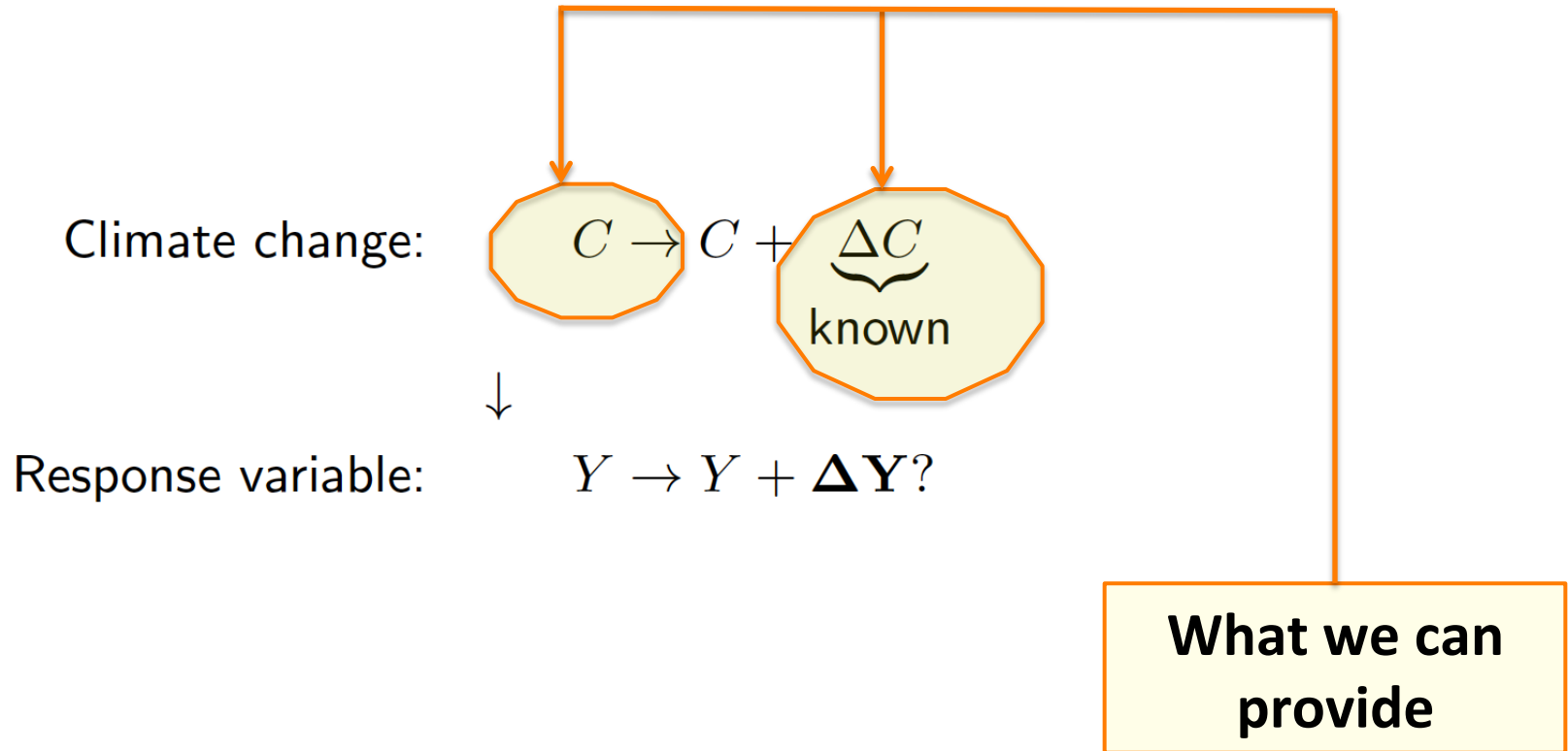
Tangang et al., 2018



Ensemble mean annual temperature anomalies (solid line) and its spread (shaded) averaged over Southeast Asia following the RCP8.5 scenario

The vertical lines indicate the years when global warming (solid line) and the warming over Southeast Asia (dashed line) reach 2°C (relative to pre-industrial level)

Climate change impact assessments



→ GEMMES project (funded by AFD, 2019-2022)

→ ECOMORE3?

Possible collaboration with the GEMMES project (AFD)

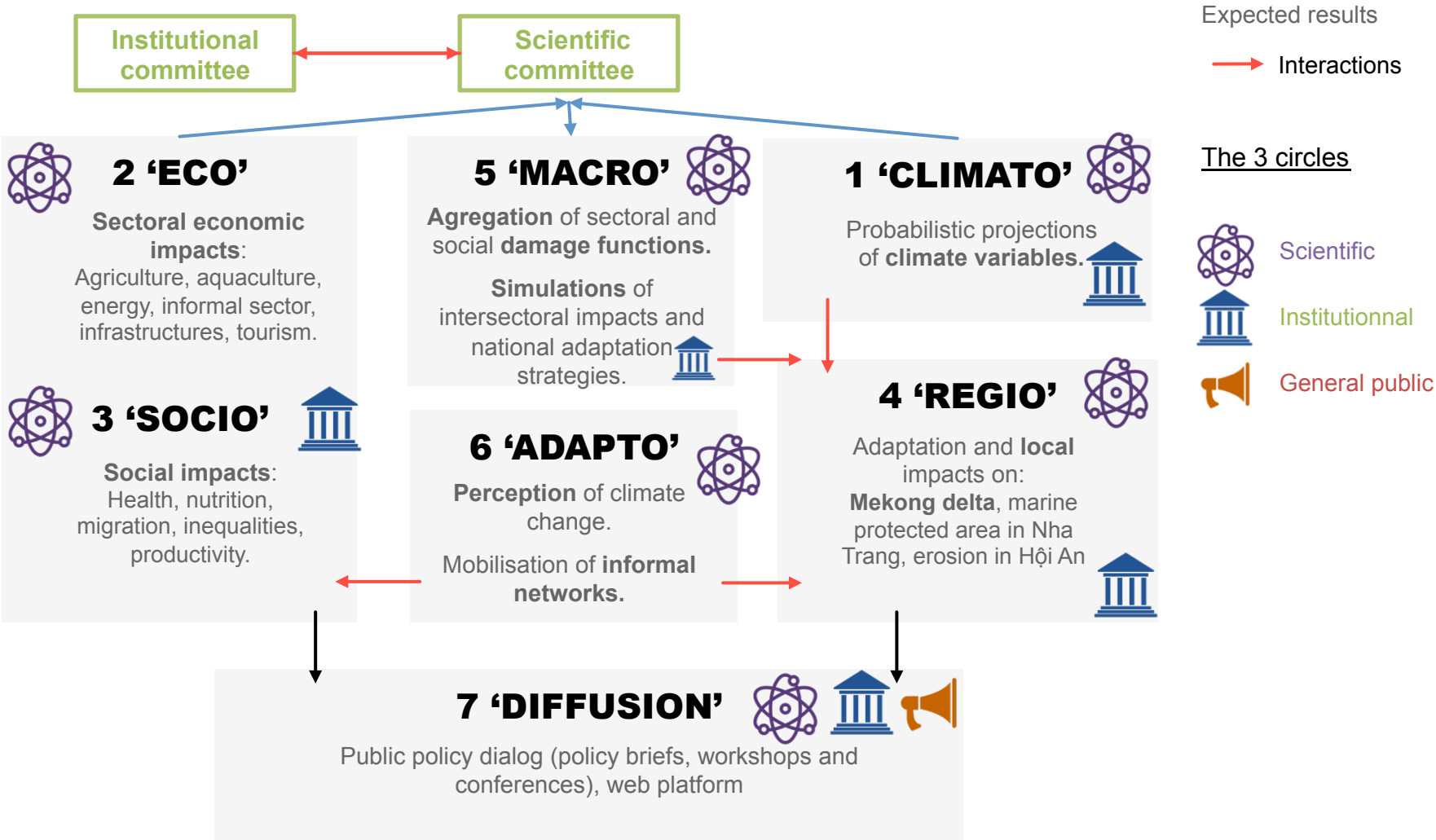
Integrated assessment of impacts and adaptation to
climate change

- just started in September 2019

THANK YOU!



Structure of GEMMES Vietnam Detail of the work packages



A platform is considered to archive & display the data and results ...