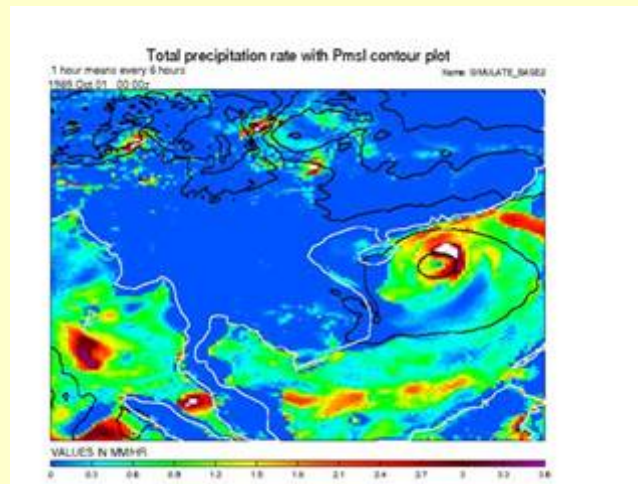




Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century



Suppakorn Chinvanno



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Topics

- Climate change scenarios development
- Future Climate Projection in Mainland Southeast Asia:
Climate change scenario for 21st century



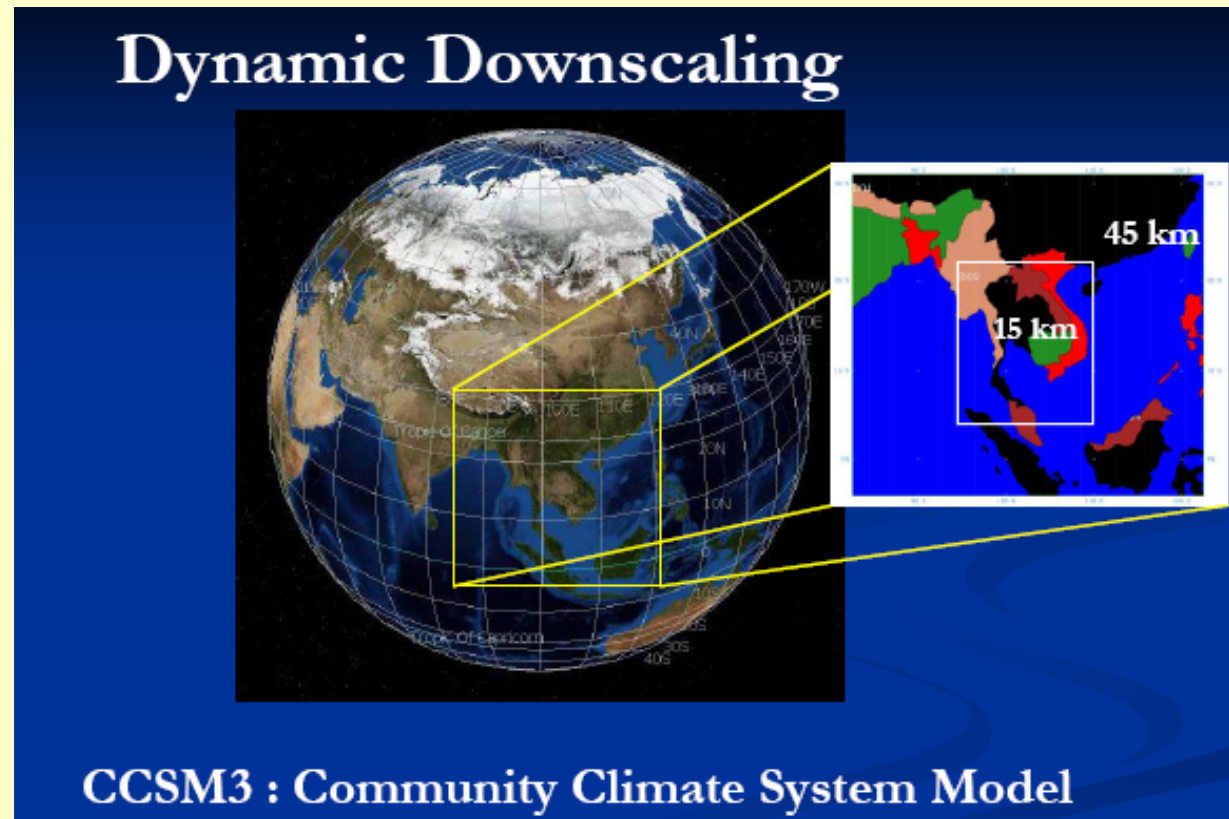
Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Climate change scenarios development in Thailand

Multiple plausible futures to understand climate change

Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

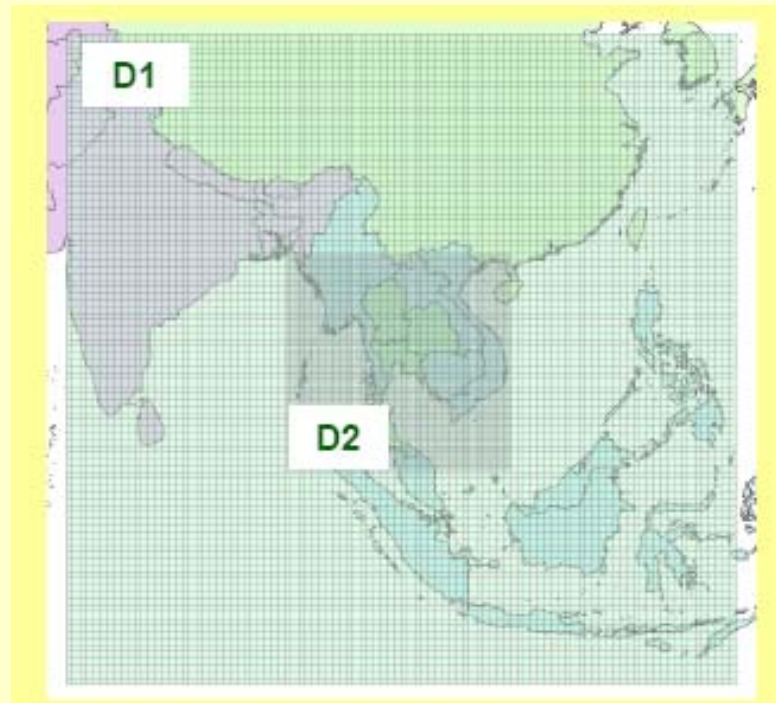
By Dr.Jiamjai Kreasuwan et al – Chiangmai University



Dynamic downscaling using MM5 and CCSM3 A2 & A1B – 2010-2039

Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

By Dr.Kasemsan Manomaiphibul et al – JGSEE

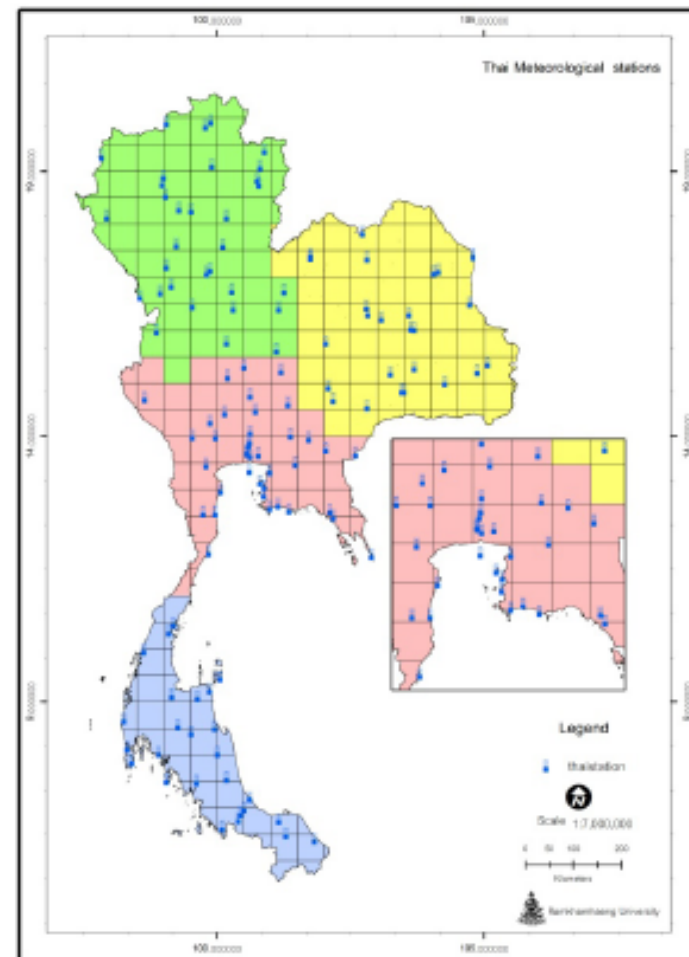


Dynamic downscaling (60km and 20km)
using RegCM3 RCM and ECHAM5 GCM – 2030-2070

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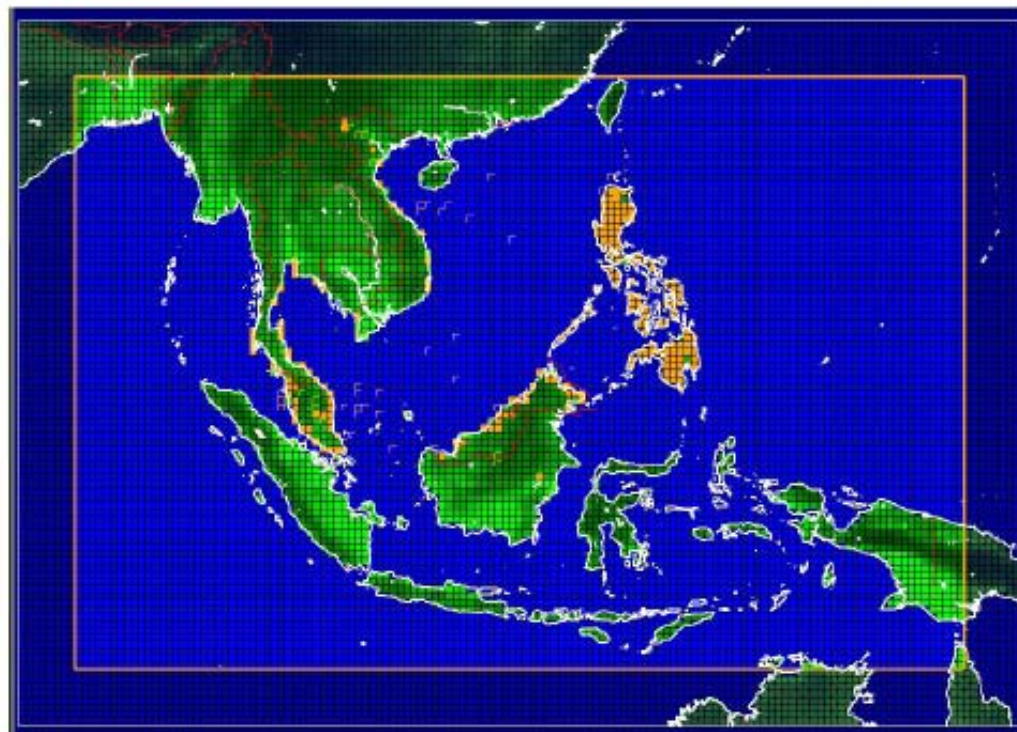
By Dr.Kansri Boonprakob et al – Ramkumhaeng University

Statistical downscaling
(50km) using GDFL-R30 GCM
A2 & B2 – 2010-2039



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

By Mr.Boonlert et al – Thai Meteorological Department



Dynamic downscaling (50km) using PRECIS RCM and ECHAM4 A2
– 1960-2100

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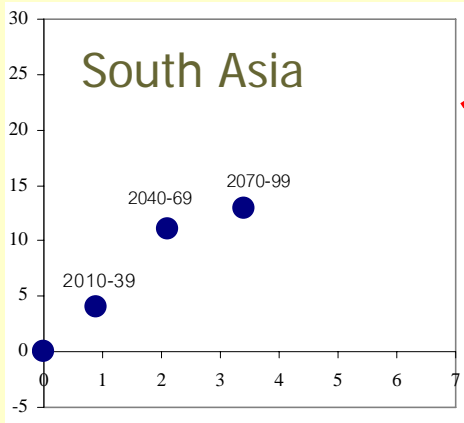
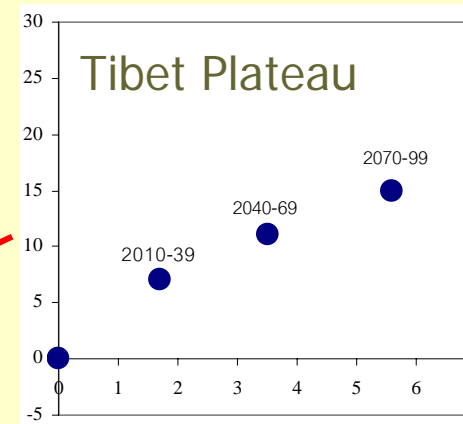
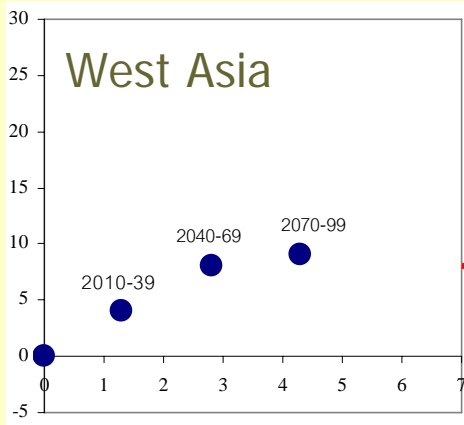
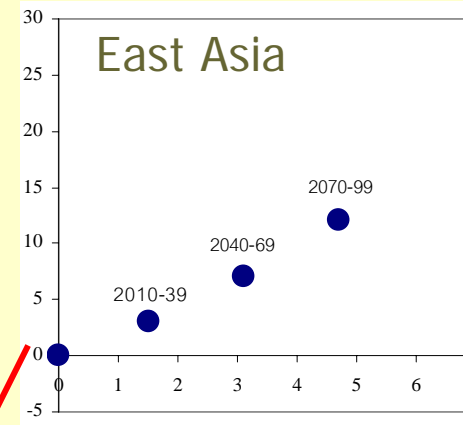
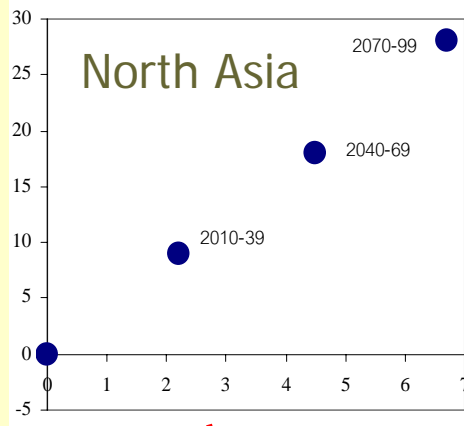
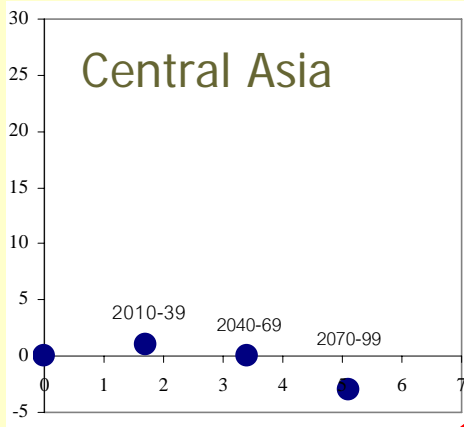
Putting climate change into right context of Southeast Asia region

Issues

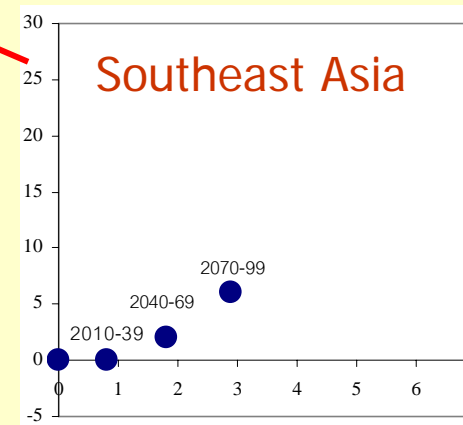
- Confusion on “Climate” and “Change” - mixed up between climate VS weather / change VS variability
- Over emphasize on the temperature increasing – global mean temperature
- Climate change is not uniform across space and time - overlook multiple dimensions of climate change in various aspects:
 - Seasonality – season shifting
 - Distribution pattern – rainfall pattern
 - Fluctuation from year to year
 - Extreme weather event – hot year / wet year – change frequency / magnitude

Different systems have different concern on the climate change

Annual Precipitation Change (%)



Changes in mean temperature and precipitation are relative less than other regions in Asia



Average Temperature Change (°C)



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

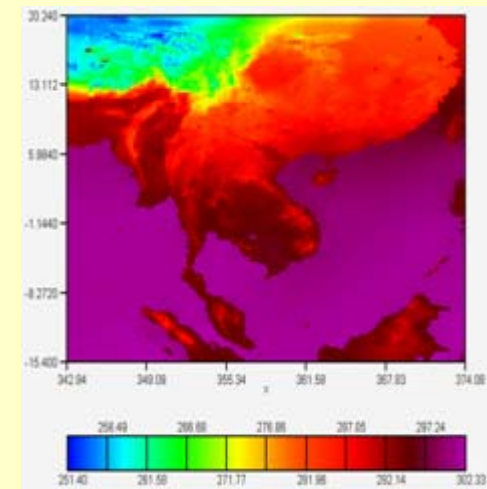
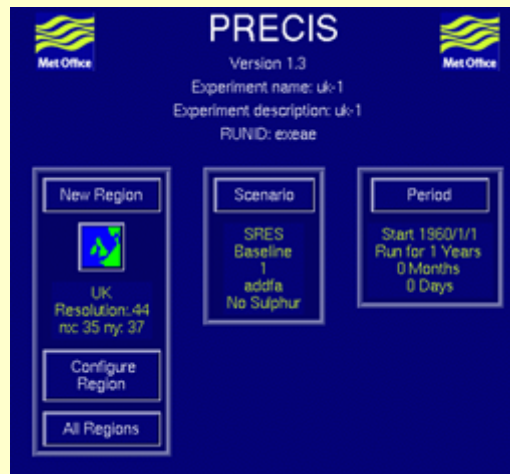
Future Climate Projection in Mainland Southeast Asia:
Climate change scenario for 21st century

By SEA START RC

Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

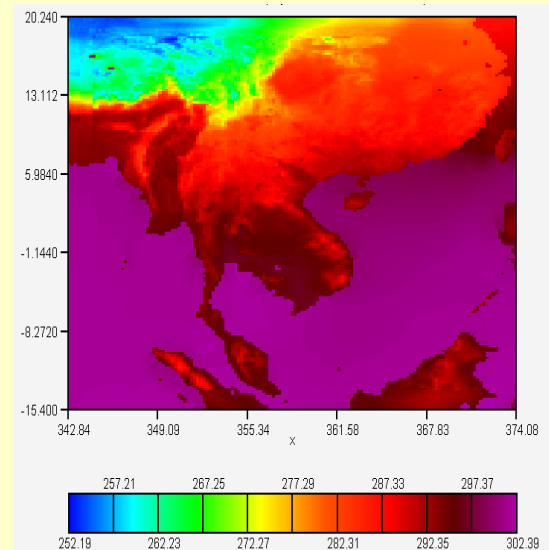
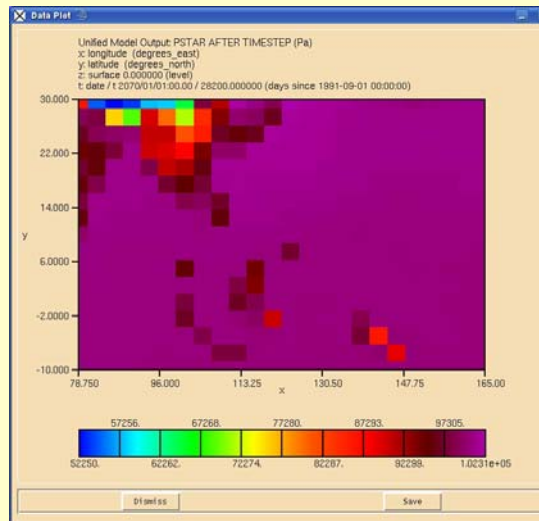
Method

Dynamic downscaling of climate simulation using PRECIS regional climate model. Simulation is performed on multiple personal computers in parallel



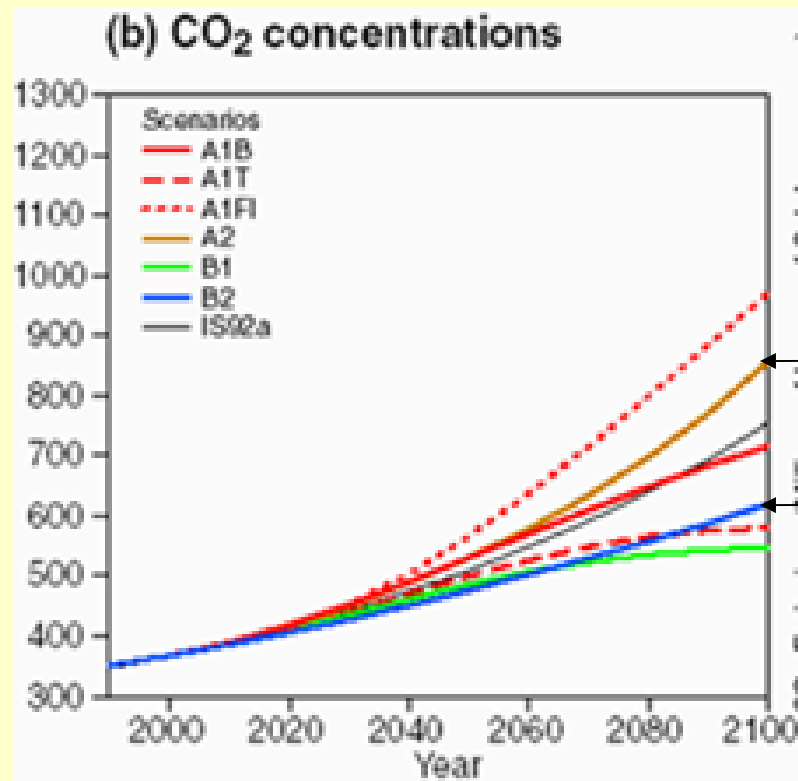
Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

- Dynamic downscaling using ECHAM4 GCM A2 and B2
 (ECMWF Atmospheric General Circulation Model coupled with
 University of Hamburg Ocean Circulation Model)
- Global resolution: $\sim 2.8^\circ$
- Regional resolution: $.22^\circ$ and rescale to 20x20km
- Temporal resolution: Daily
- Timeframe - Baseline 1970-1999 / Future 2010-2100
- Coverage
 - Lat. $0-35^\circ\text{N}$
 - Lon. $90^\circ-112^\circ\text{E}$



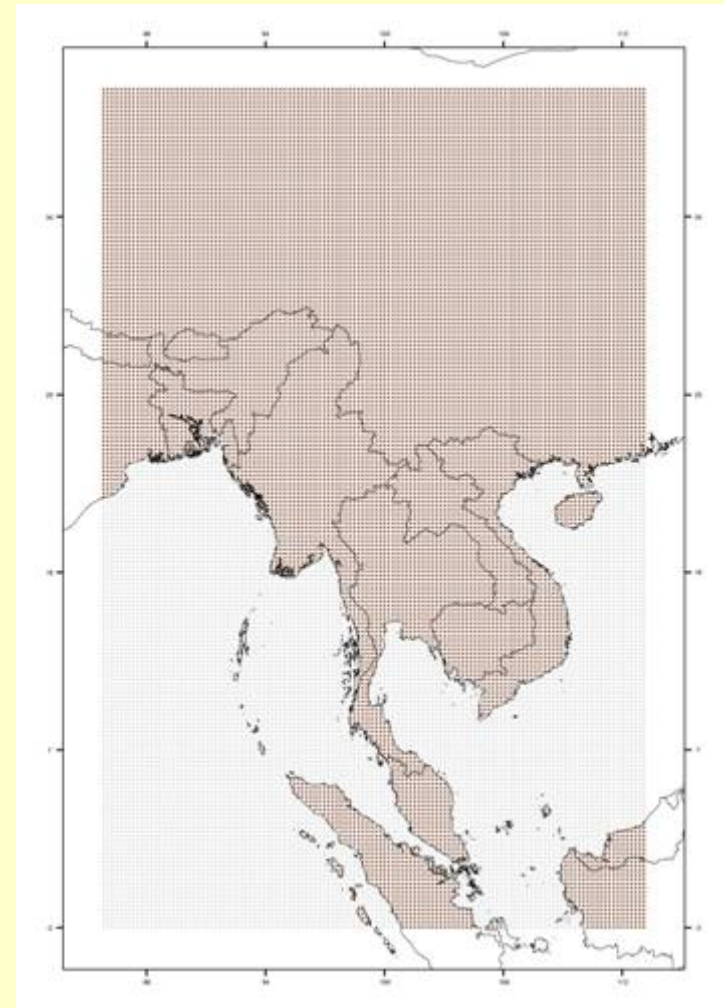
Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Domain coverage and GHG scenarios:



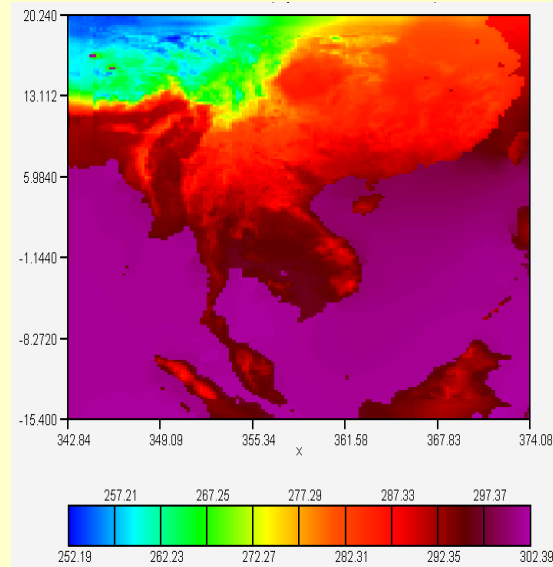
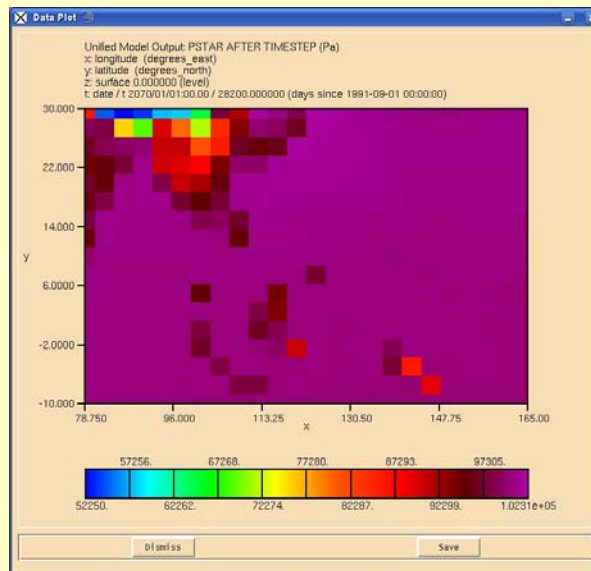
A2

B2



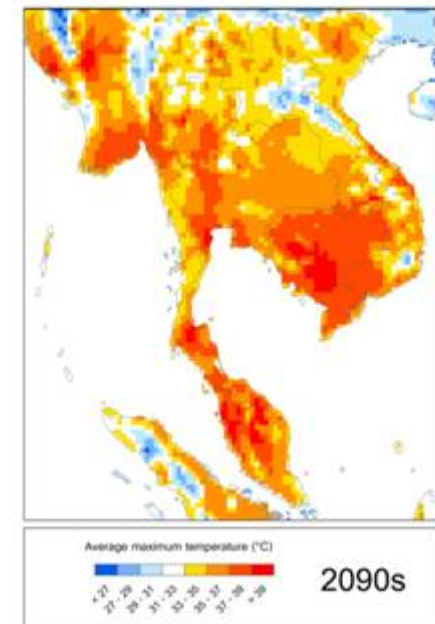
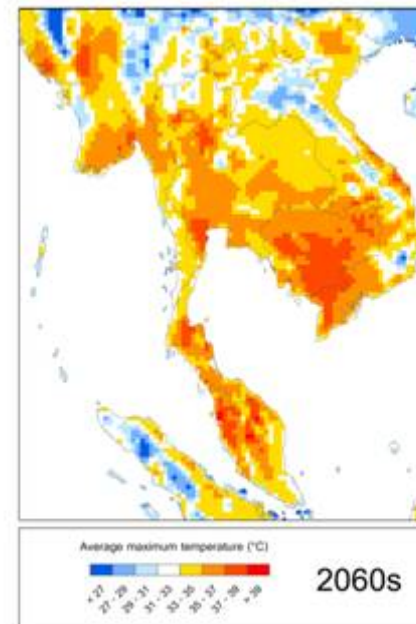
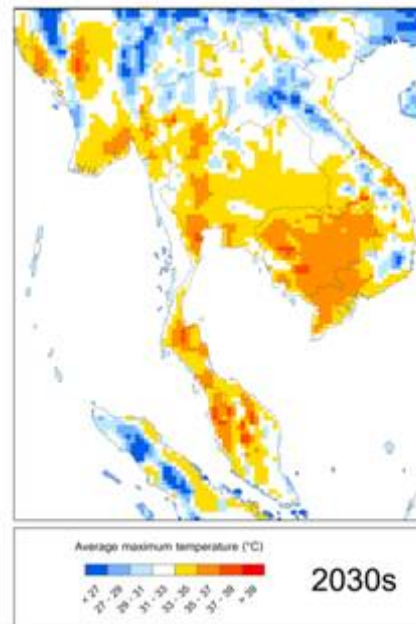
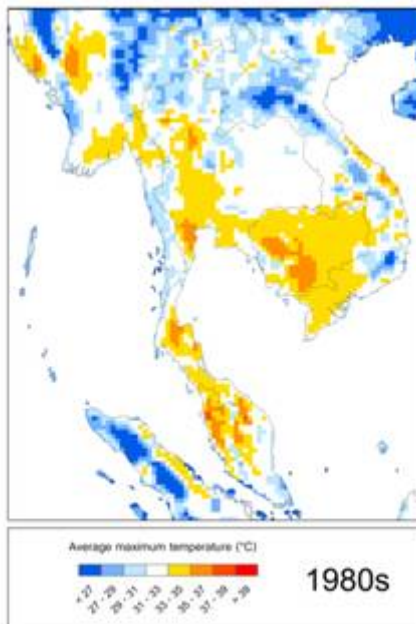
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Summary downscale ECHAM 4 GCM – SRES scenario A2



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

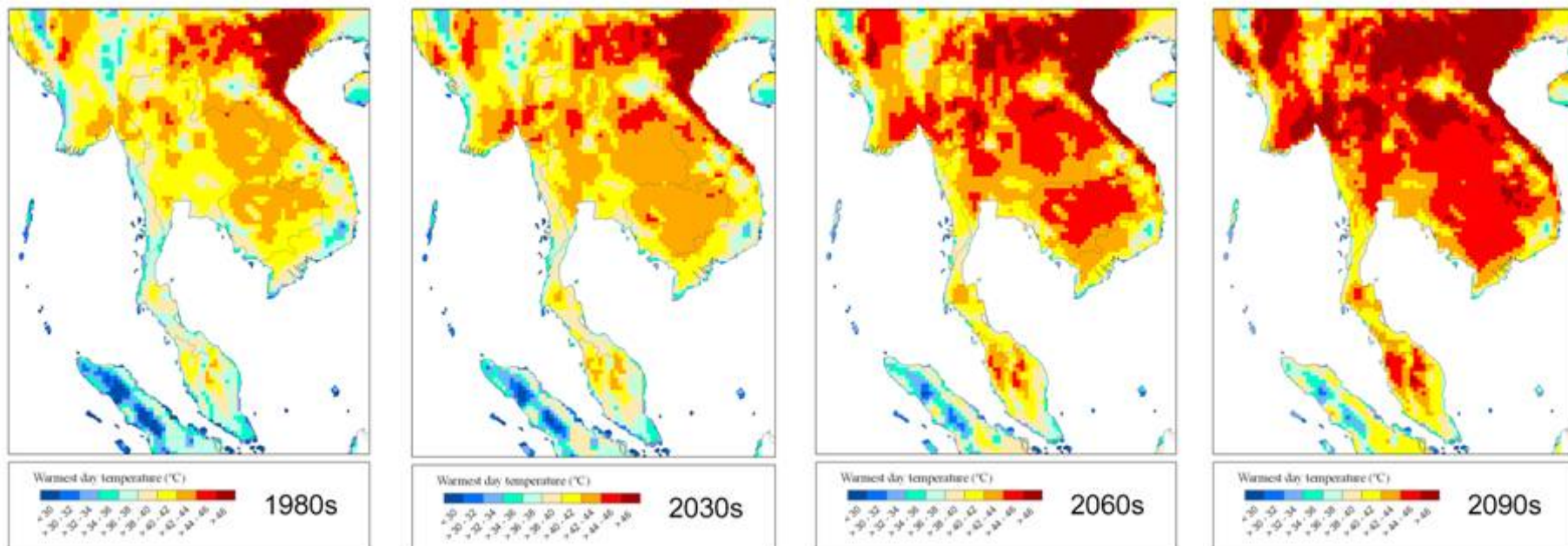
Average daily maximum temperature (°C)



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

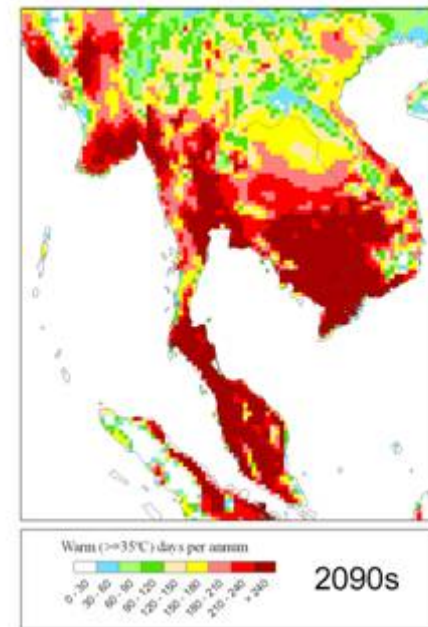
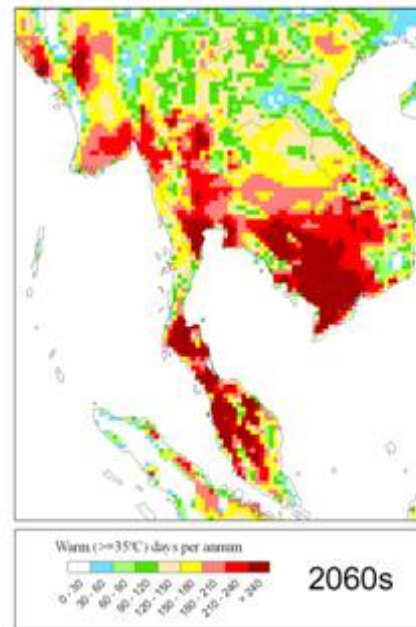
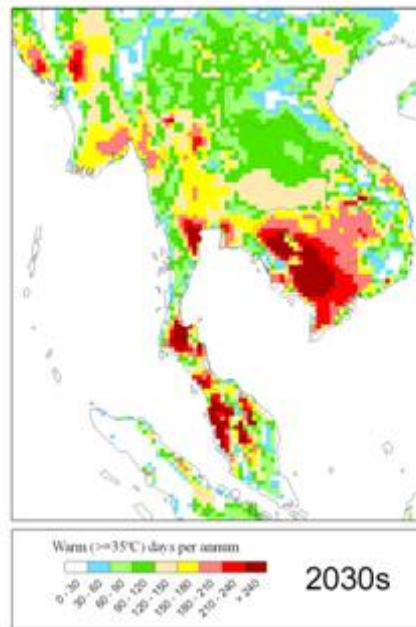
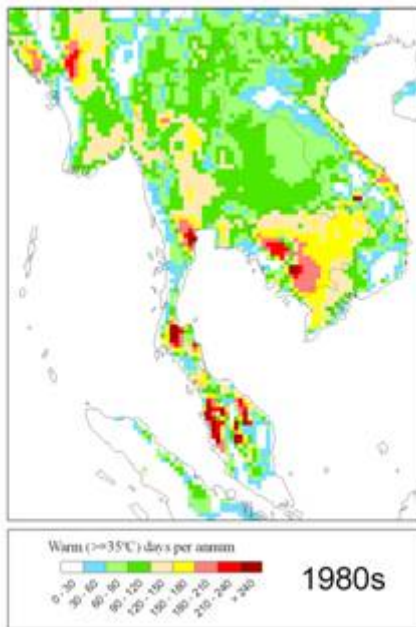
Average annual maximum temperature (°C)

Hottest day of the year



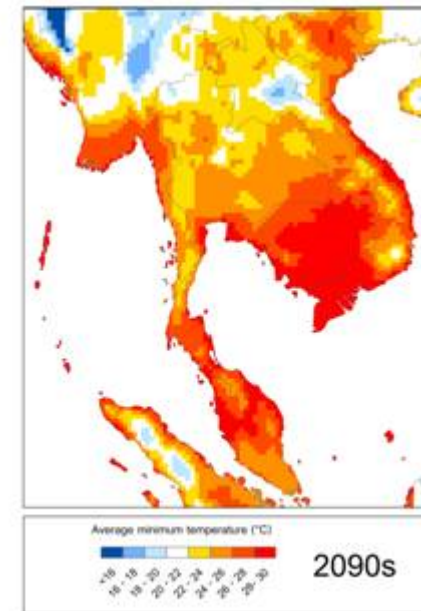
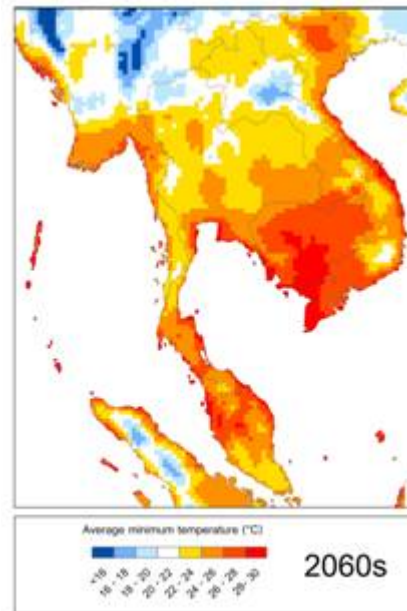
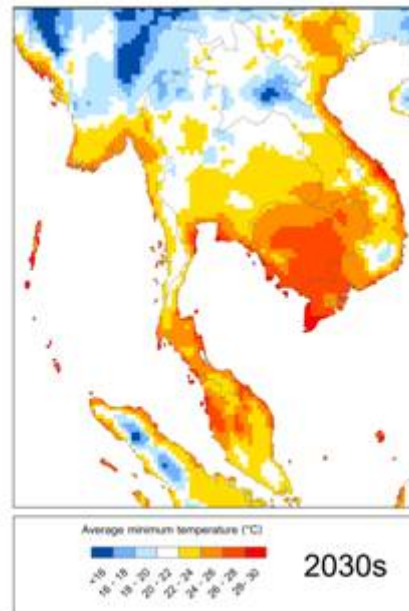
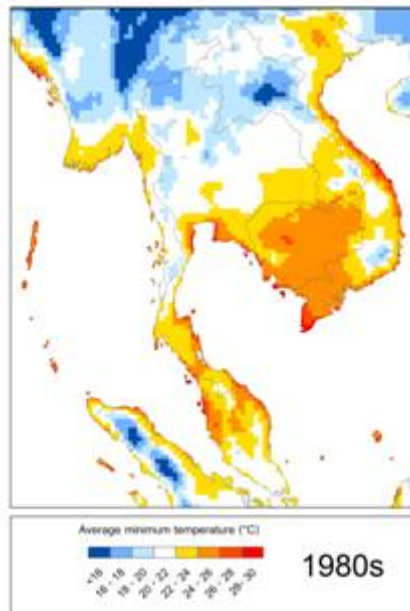
Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Number of hot days in a year ($\geq 35^\circ\text{C}$)



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

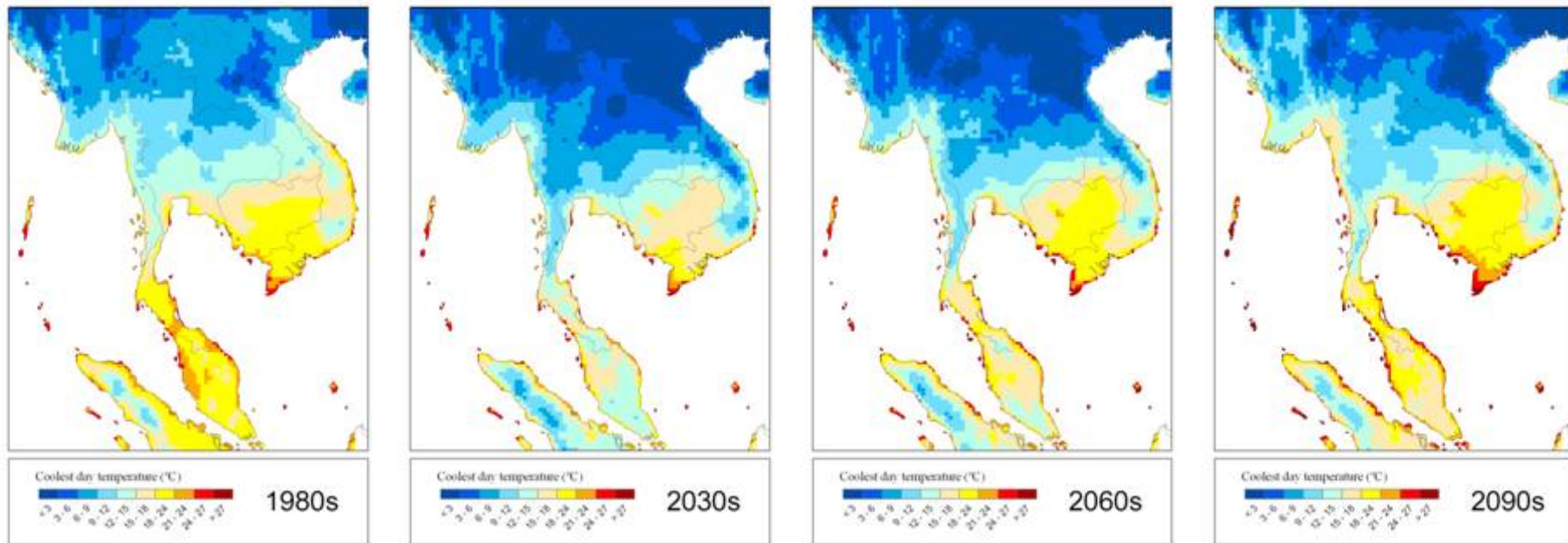
Average daily minimum temperature (°C)



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

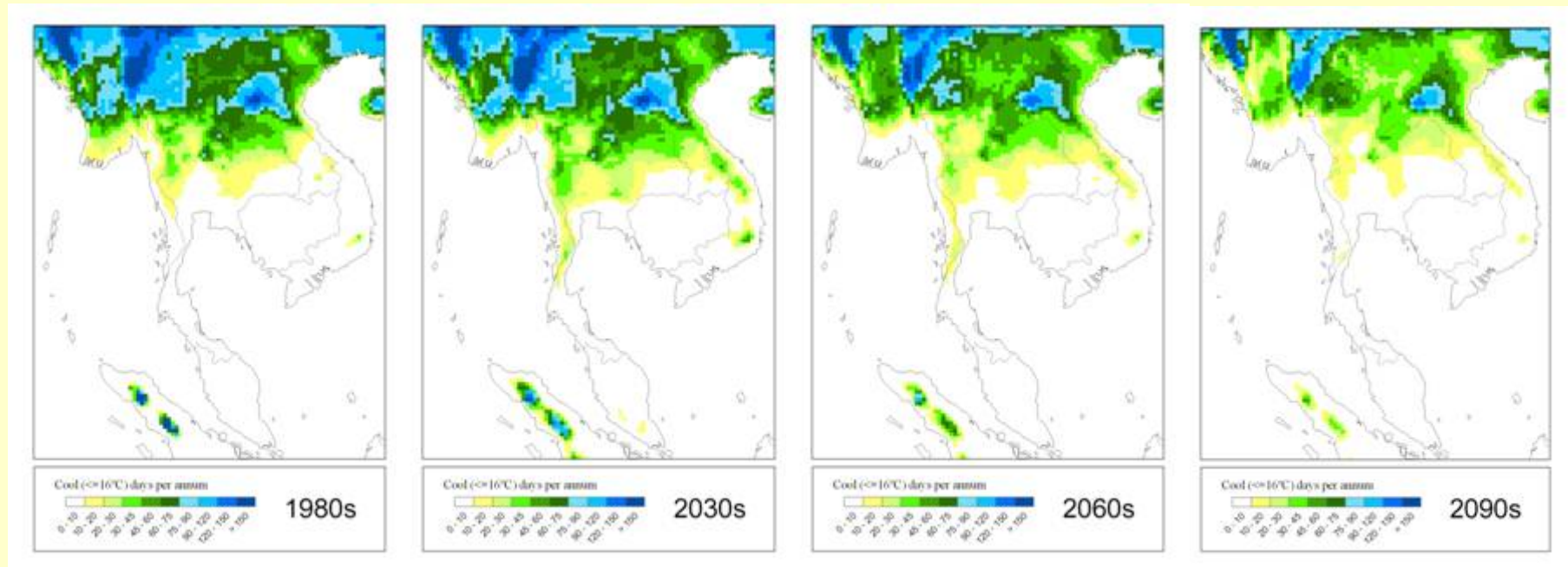
Average annual minimum temperature (°C)

Coollest day of the year



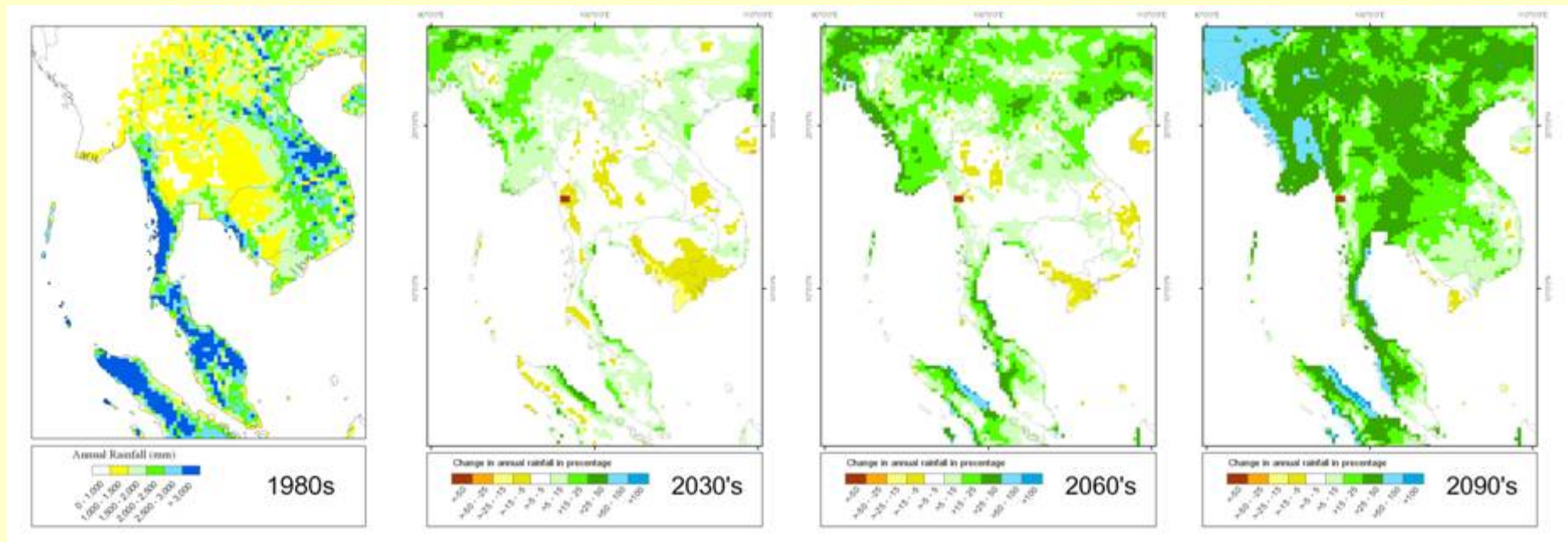
Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Number of cool day in a year ($\leq 16^\circ\text{C}$)



Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Change in annual precipitation compare to 1980's (%)



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Summary – key messages at a glance

Warmer and wetter

- Regional tends to be slightly warmer, but the hot area will be much wider
- Hot period of the year will be much longer
- Summertime will expand into winter
- Higher precipitation, increasing intensity as the length of rainy season tend to be more or less the same

Different systems have different concern on the climate change

Future Climate Projection in Mainland Southeast Asia: Climate change scenario for 21st century

Conform to the IPCC AR4

Phenomenon ^a and direction of trend	Likelihood that trend occurred in late 20th century (typically post 1960)	Likelihood of a human contribution to observed trend ^b	Likelihood of future trends based on projections for 21st century using SRES scenarios
Warmer and fewer cold days and nights over most land areas	<i>Very likely^c</i>	<i>Likely^d</i>	<i>Virtually certain^d</i>
Warmer and more frequent hot days and nights over most land areas	<i>Very likely^e</i>	<i>Likely (nights)^d</i>	<i>Virtually certain^d</i>
Warm spells / heat waves. Frequency increases over most land areas	<i>Likely</i>	<i>More likely than not^f</i>	<i>Very likely</i>
Heavy precipitation events. Frequency (or proportion of total rainfall from heavy falls) increases over most areas	<i>Likely</i>	<i>More likely than not^f</i>	<i>Very likely</i>
Area affected by droughts increases	<i>Likely in many regions since 1970s</i>	<i>More likely than not</i>	<i>Likely</i>
Intense tropical cyclone activity increases	<i>Likely in some regions since 1970</i>	<i>More likely than not^f</i>	<i>Likely</i>
Increased incidence of extreme high sea level (excludes tsunamis) ^g	<i>Likely</i>	<i>More likely than not^{f,h}</i>	<i>Likelyⁱ</i>



Thank You



<http://www.start.or.th>

<http://www.sea-climatechange.org>