

Climate Change Impacts on Urban Sector

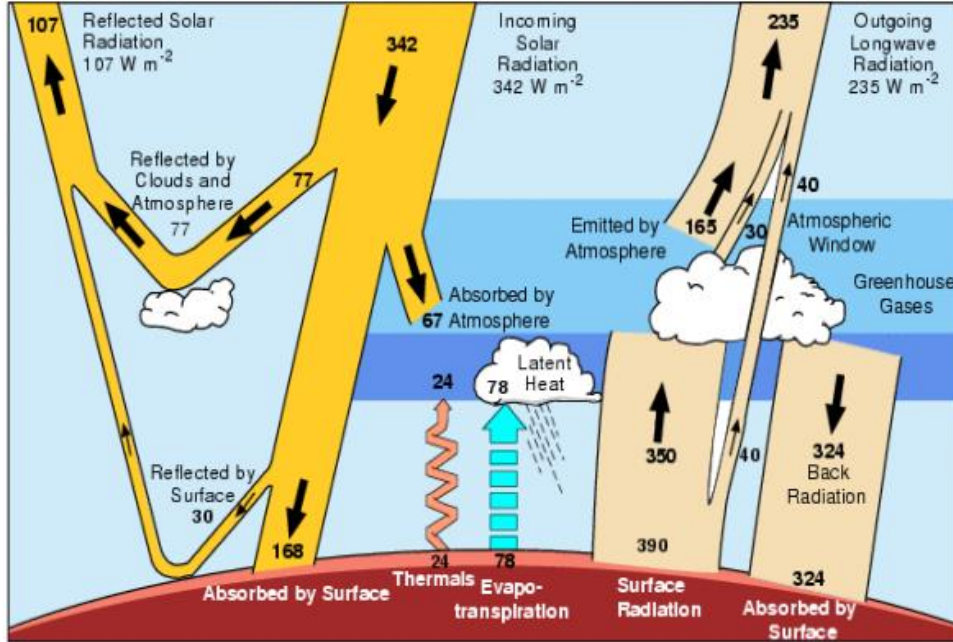
A vibrant, futuristic cityscape with numerous tall, modern buildings of various architectural styles. The buildings are interspersed with greenery, including trees and rooftop gardens. The sky is a bright, clear blue with scattered white clouds. The overall scene is bright and optimistic, suggesting a sustainable urban environment.

Mar 29, 2024

Climate Center
Thai Meteorological Department

The Green House Effect

Global Average Energy Balance

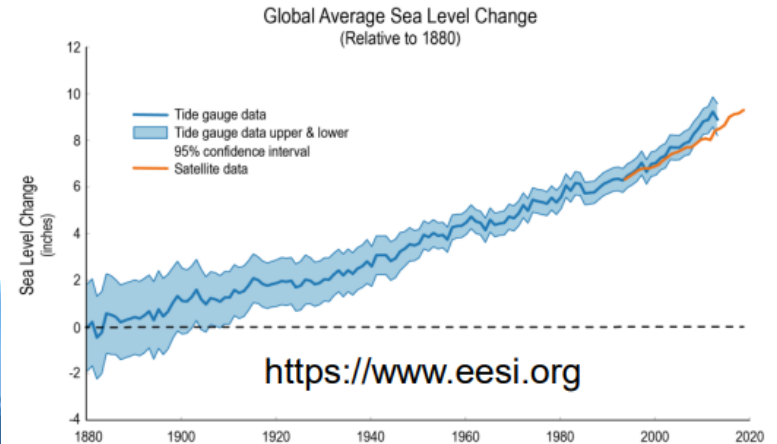
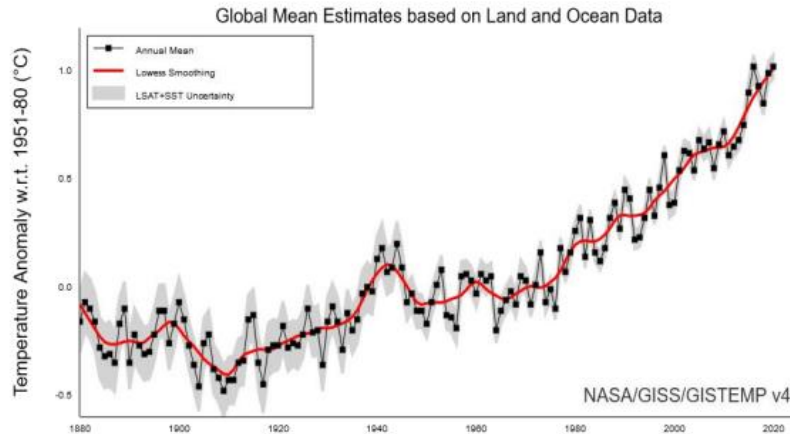


- ✓ The Earth is warm; it gives off infrared radiation. Some of this is absorbed by the atmosphere.
- ✓ The atmosphere re-radiates as much energy as it absorbs. Some of this radiation warms up the Earth, keeping it at a comfortable temperature.
- ✓ With no atmosphere, the temperature of the Earth would be 33°C cooler than it is now.

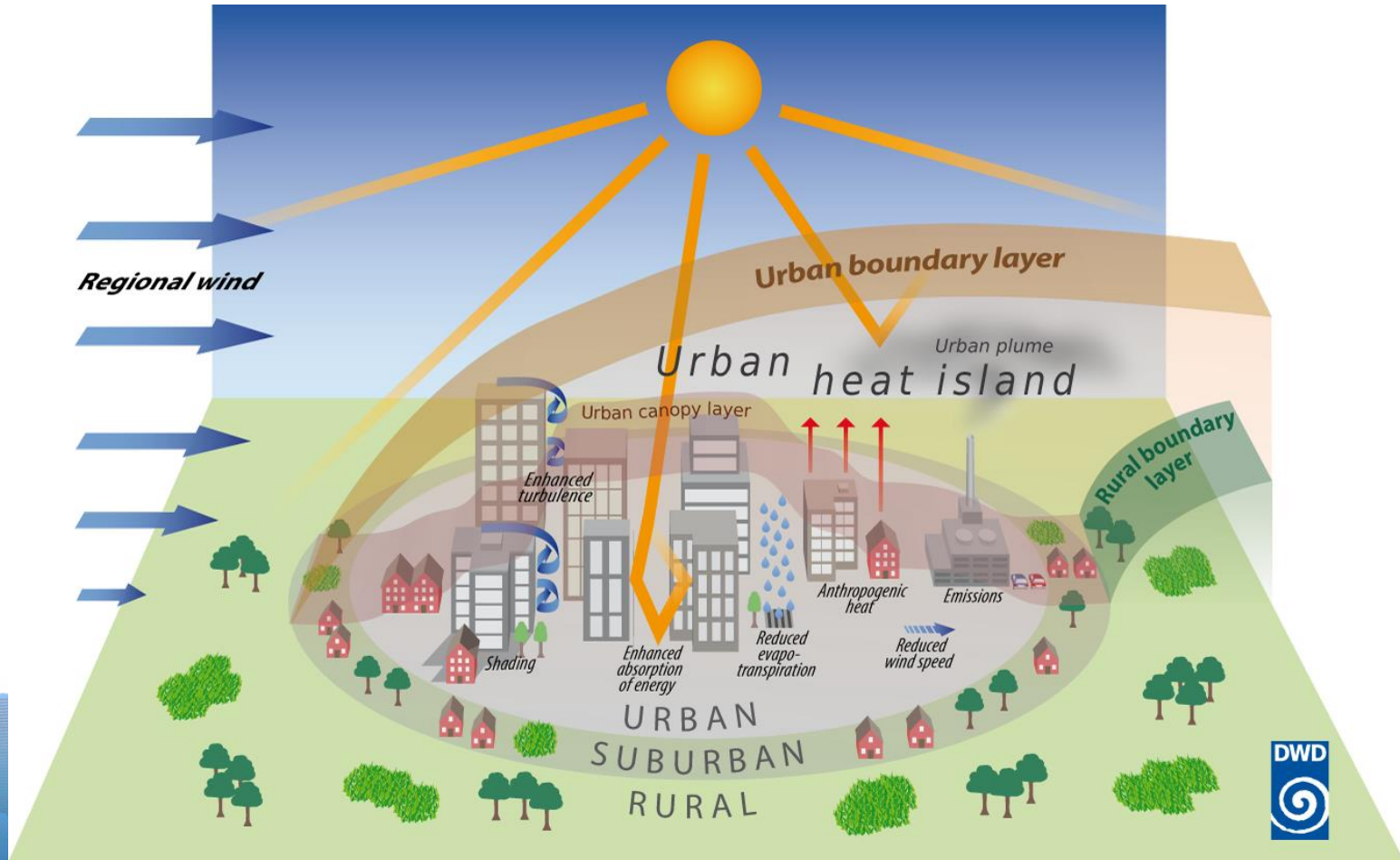
What is climate change?

Climate change describes a change in the average conditions: such as temperature and rainfall in a region over a long period of time.

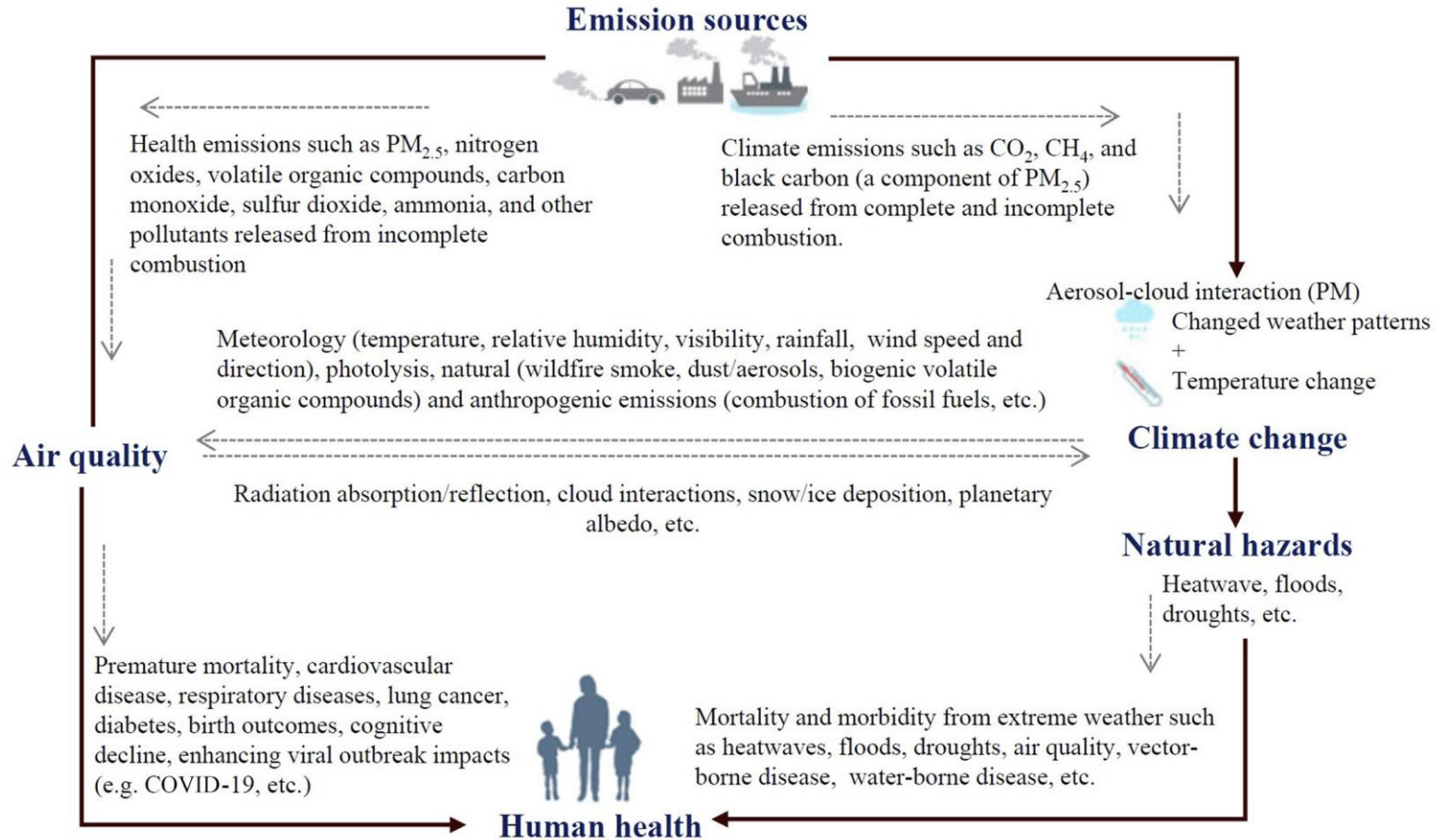
- Increasing Earth's average temperature
- Rising sea levels
- Shrinking mountain glaciers
- Ice melting at a faster rate than usual in Greenland, Antarctica and the Arctic

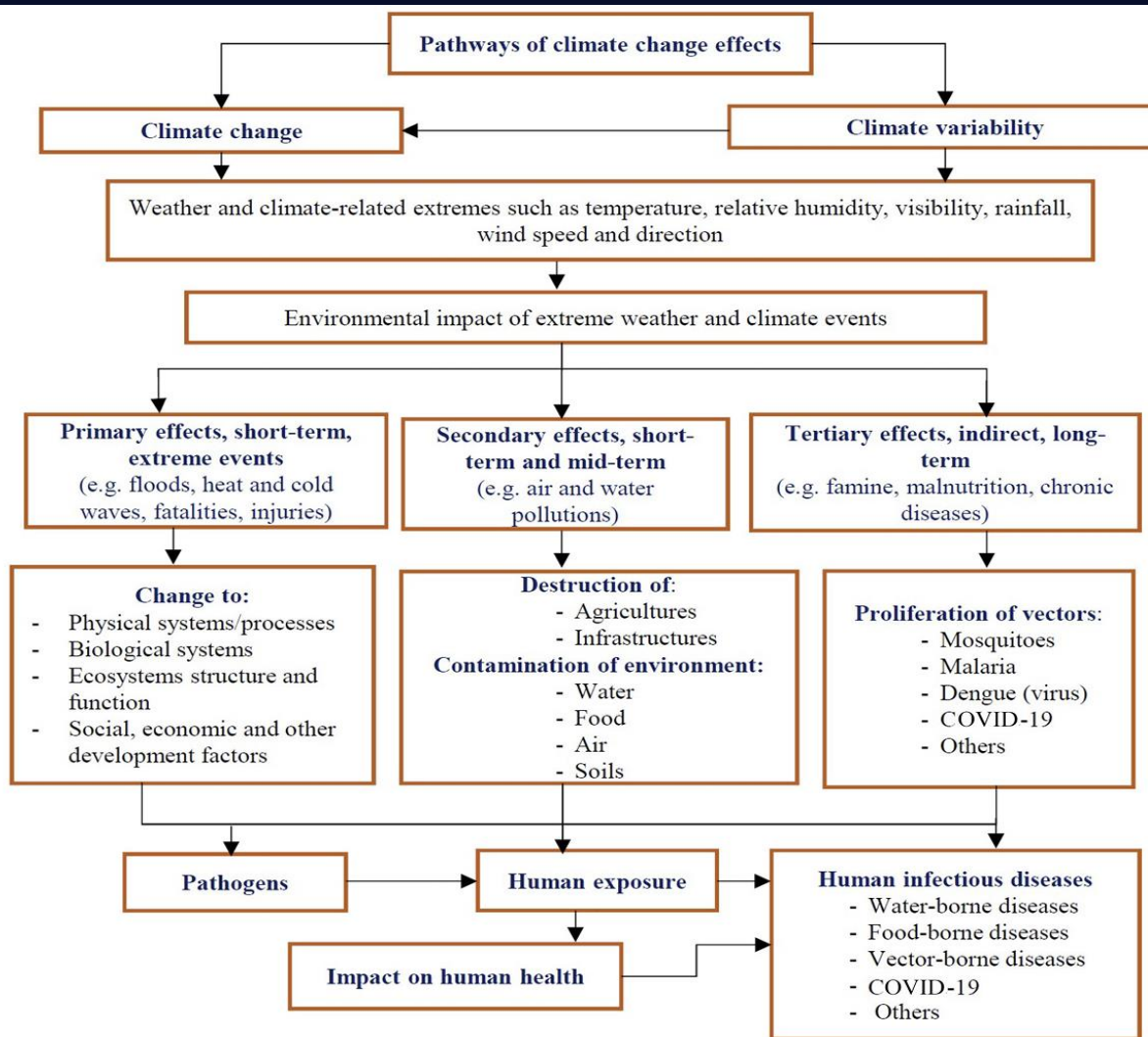


The urban climate and its influencing factors

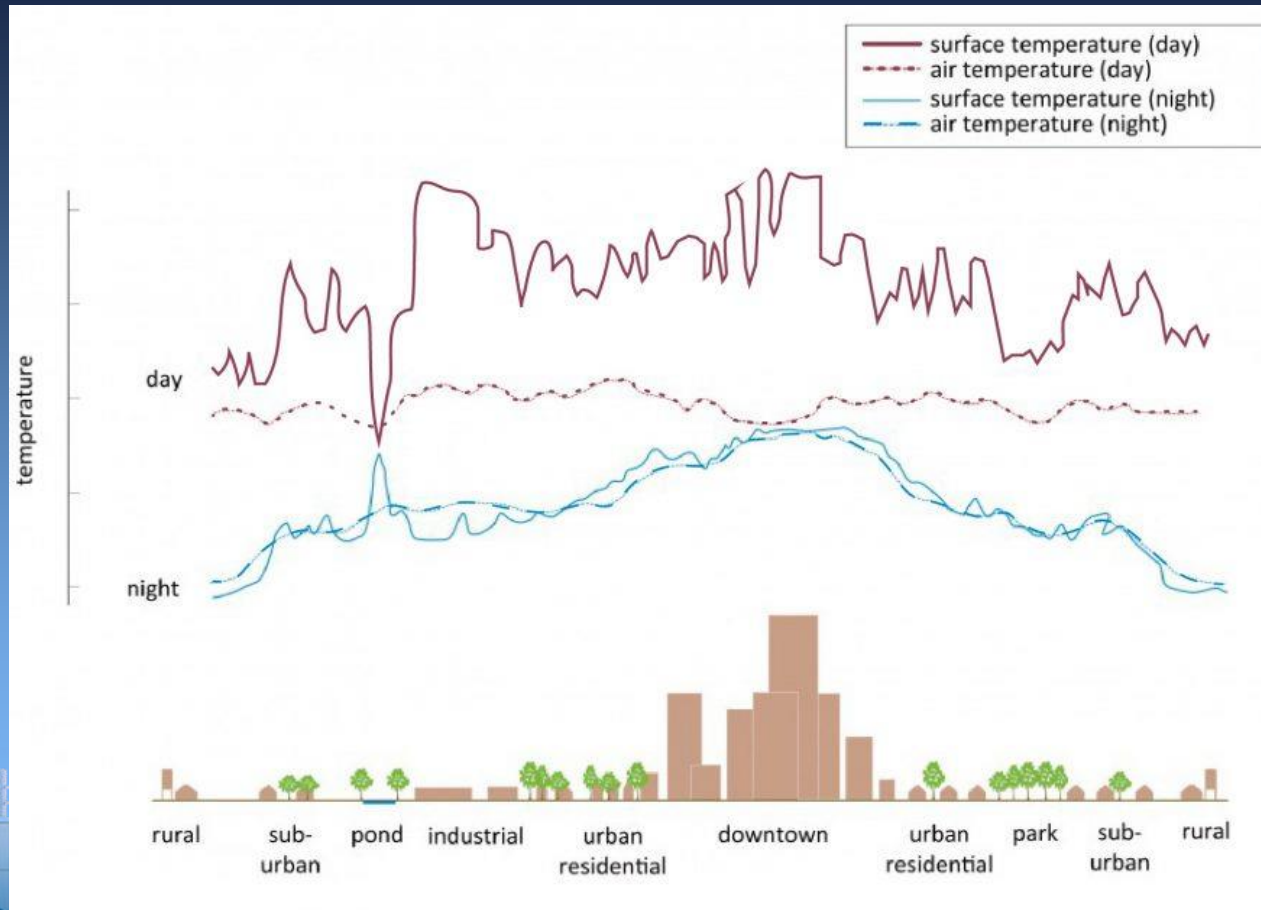


A simple schematic diagram showing the interconnections between air pollution, climate and human health.





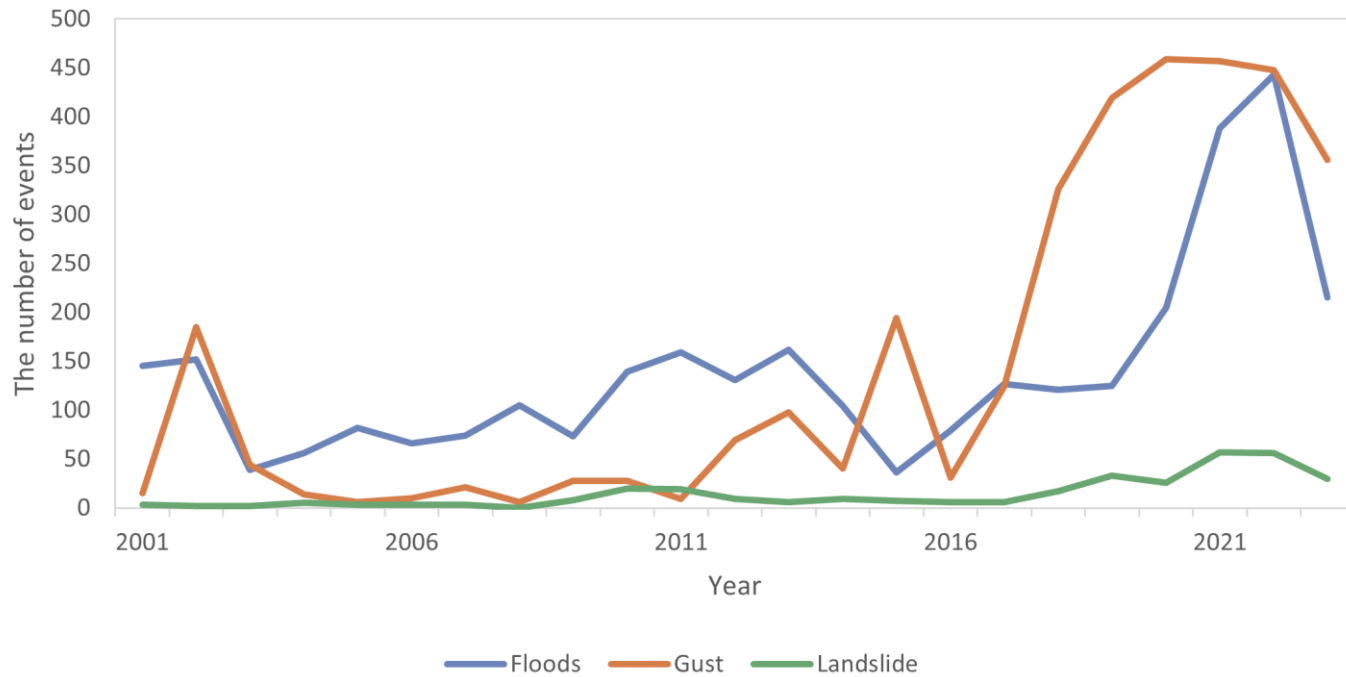
Air and surface temperature during the day and night

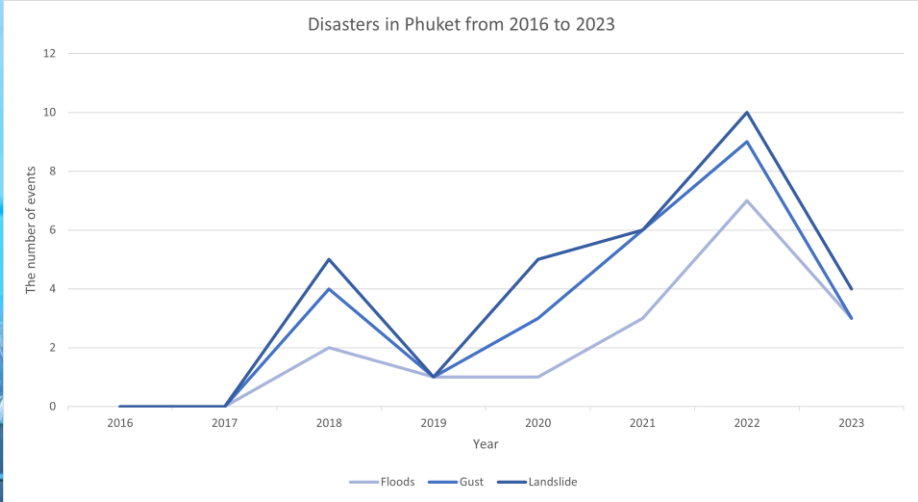
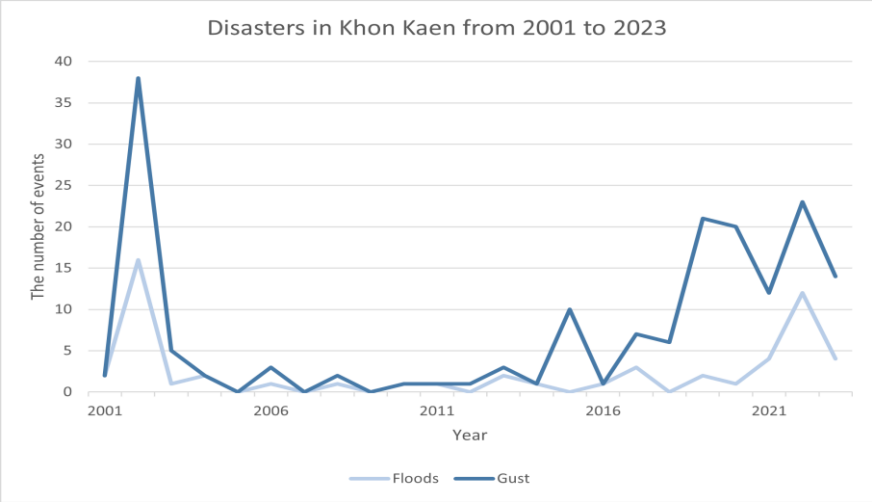
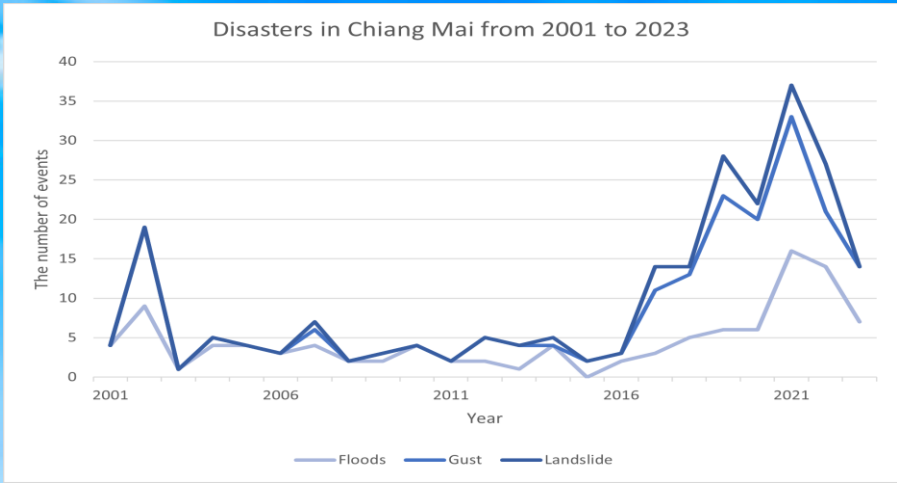


Source : <https://urbangreenbluegrids.com/thema/heat/>

Natural Hazard in Thailand

Disasters in Thailand from 2001 to 2023





Climate Projection Data

SSP Narrative

Shared Socio-economic Pathways



Social and economic development patterns

Emission Scenarios

Representative Concentration Pathways



Changes in greenhouse gas emissions, land use patterns, and other climate drivers

GCM/ESM

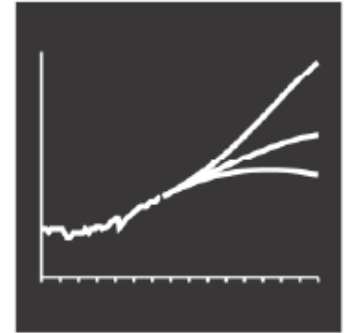
Climate Models



Modelling global climate change

Climate Data

Available on [ClimateData.ca](https://climatedata.ca)



Climate projections based on different emissions scenarios

Determine



Input



Output



Climate Projection Data

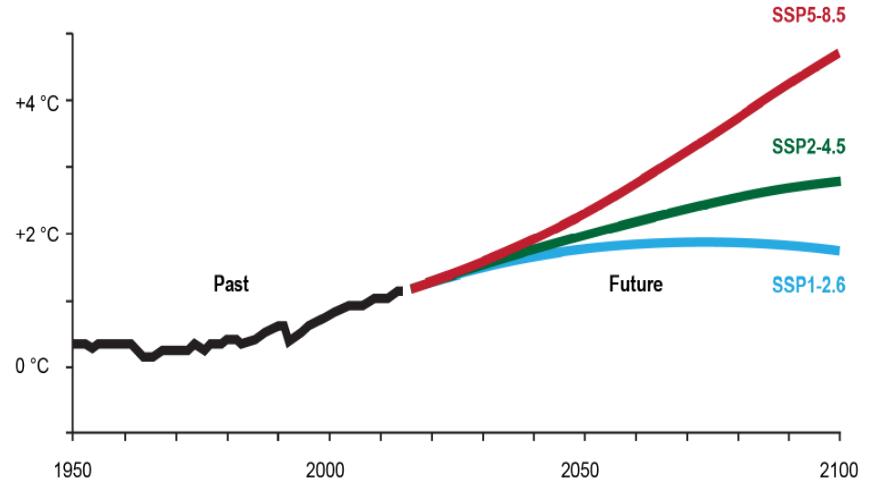
SSP126: This scenario is compatible with the 2°C target. This scenario assumes climate protection measures being taken.

SSP245: This scenario represents the medium pathway of future greenhouse gas emissions. This scenario assumes that climate protection measures are being taken.

SSP370: This scenario is in the upper-middle part of the full range of scenarios. It was newly introduced after the RCP scenarios, closing the gap between RCP6.0 and RCP8.5.

SSP585: This scenario represents the upper boundary of the range of scenarios. It can be understood as an update of the CMIP5 scenario RCP8.5, now combined with socioeconomic reasons.

Global Surface Temperature Change



Climate Projection Data

Climate Variables	Products	frequency	Analysis
Precipitation	History/present/future	Day/monthly	Trend,Yearly,Decadal
Temperature	History/present/future	Day/monthly	Trend,Yearly,Decadal
Wind (Speed, Direction)	History/present/future	Day/monthly	Trend,Yearly,Decadal
Humidity	History/present/future	Day/monthly	Trend,Yearly,Decadal

Decadal Annual Precipitation

1951-1960

1961-1970

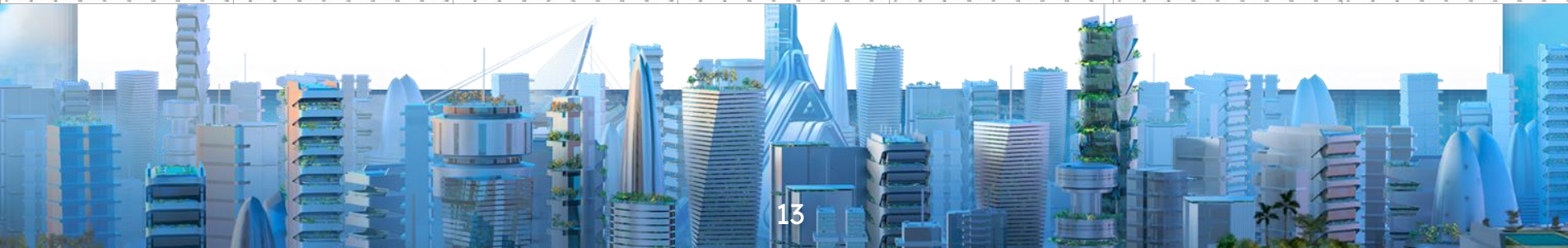
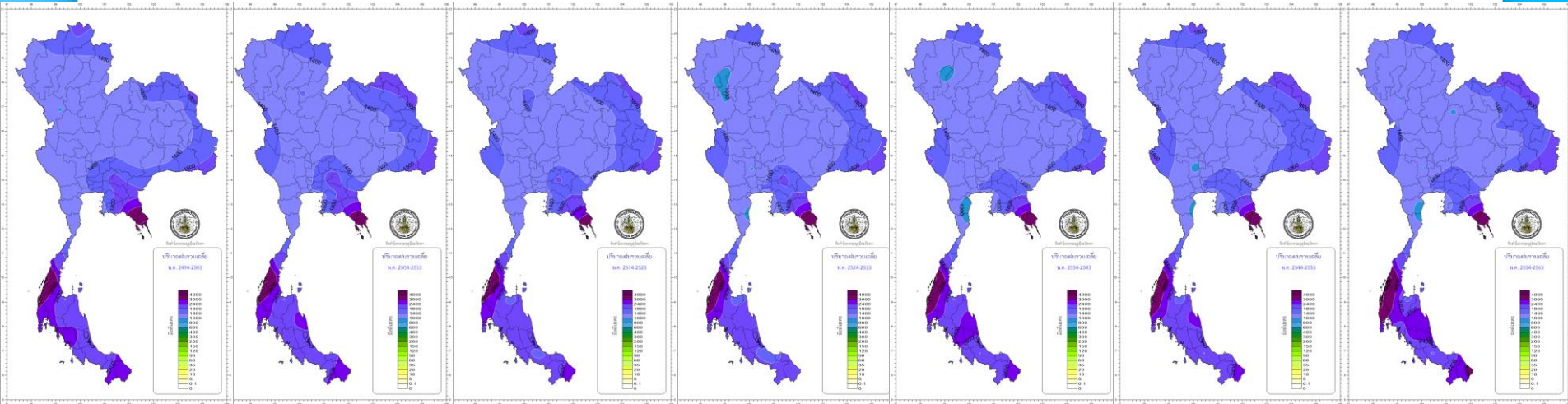
1971-1980

1981-1990

1991-2000

2001-2010

2011-2020



Decadal Mean Maximum Temperature

1951-1960

1961-1970

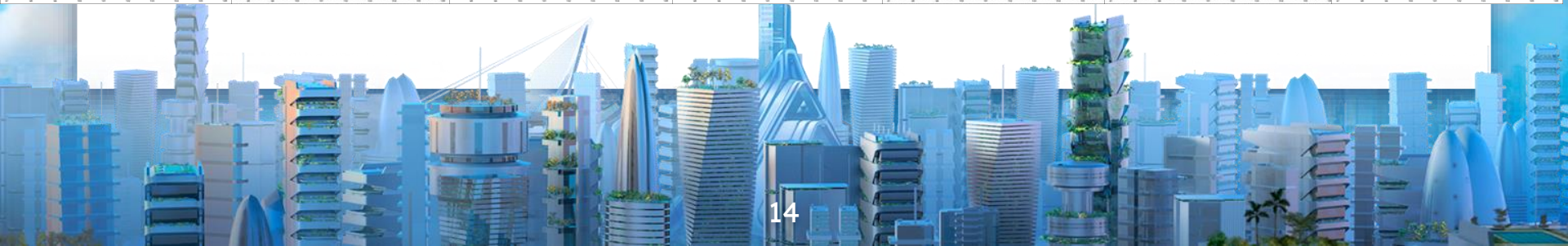
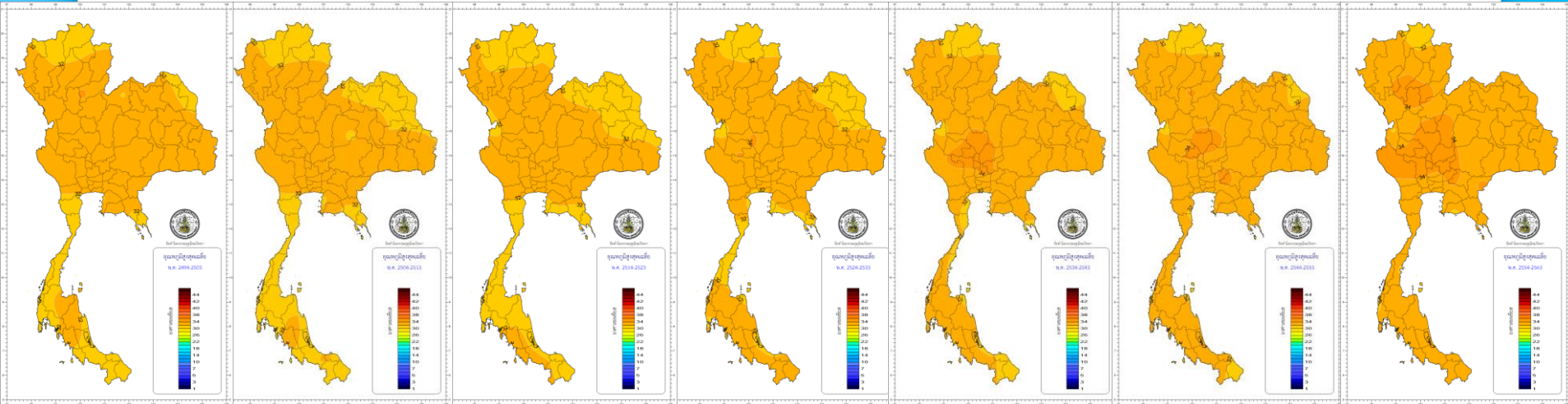
1971-1980

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Decadal Mean Minimum Temperature

1951-1960

1961-1970

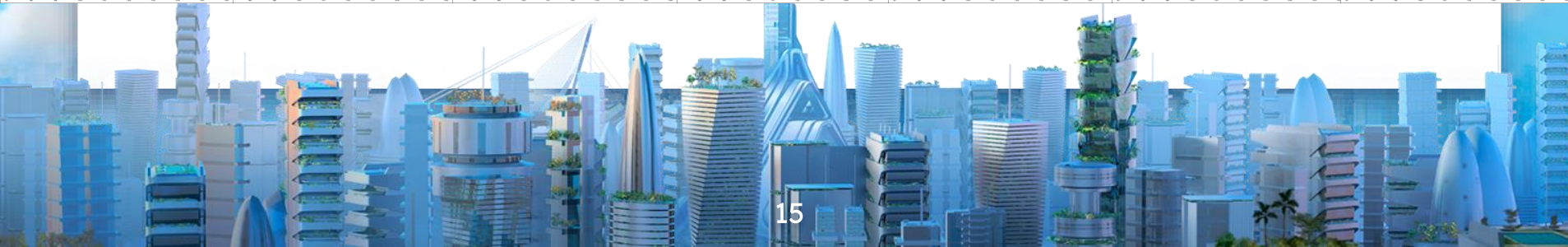
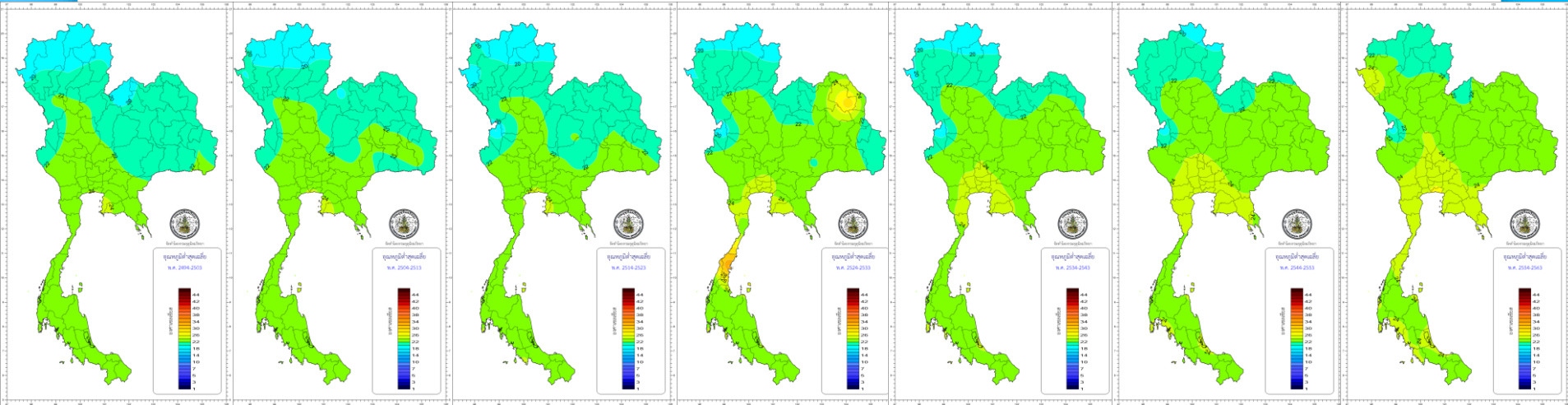
1971-1980

1981-1990

1991-2000

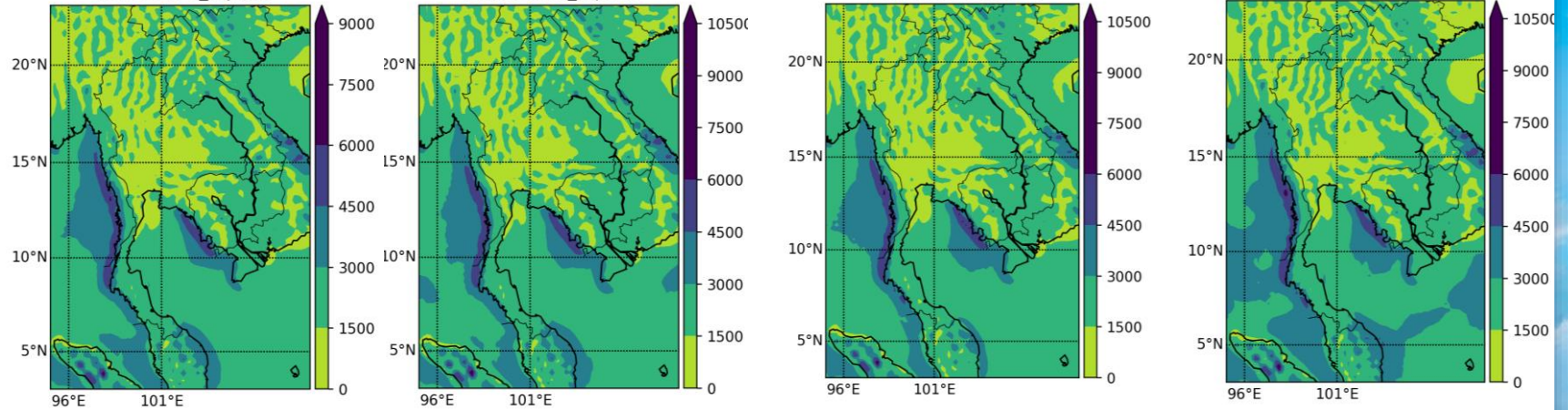
2001-2010

2011-2020



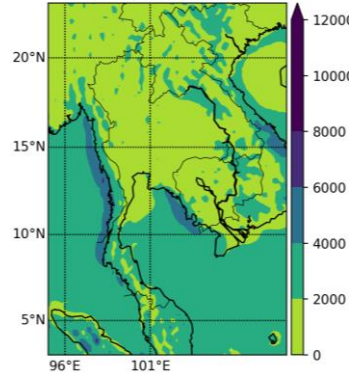
Climate Projection; Mean Precipitation(Past), SSP5.8.5

Yearly Mean Precipitation for 1950-1969 Period y Mean Precipitation for 1970-1989 Period Yearly Mean Precipitation for 1990-2009 Period Yearly Mean Precipitation for 2010-2014 Period
MRI-ESM2-0_ssp585 MRI-ESM2-0_ssp585 MRI-ESM2-0_ssp585 MRI-ESM2-0_ssp585

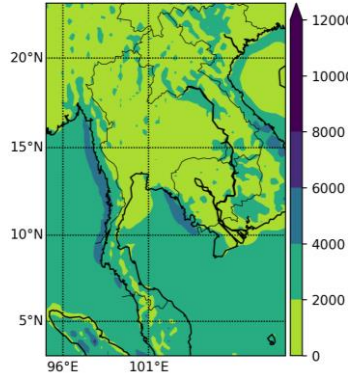


Climate Projection; Mean Precipitation(Future), SSP5.8.5

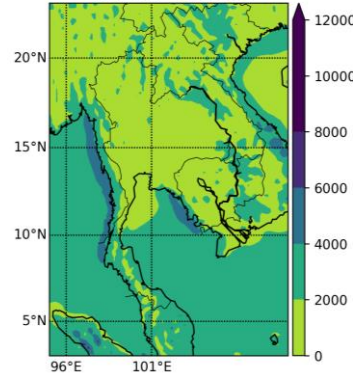
early Mean Precipitation for 2015-2034 Period
MRI-ESM2-0_ssp585



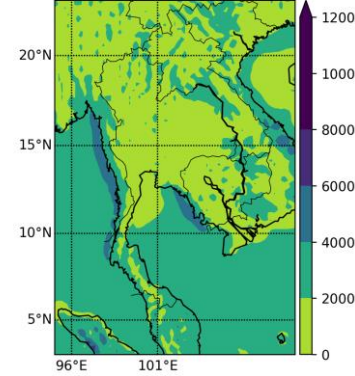
early Mean Precipitation for 2035-2050 Period
MRI-ESM2-0_ssp585



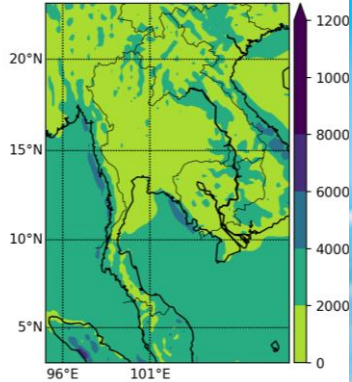
early Mean Precipitation for 2051-2070 Period
MRI-ESM2-0_ssp585



early Mean Precipitation for 2071-2089 Period
MRI-ESM2-0_ssp585

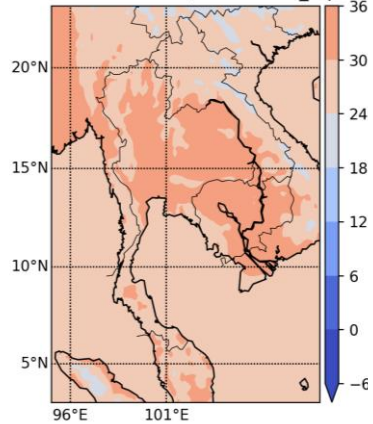


early Mean Precipitation for 2091-2099 Period
MRI-ESM2-0_ssp585

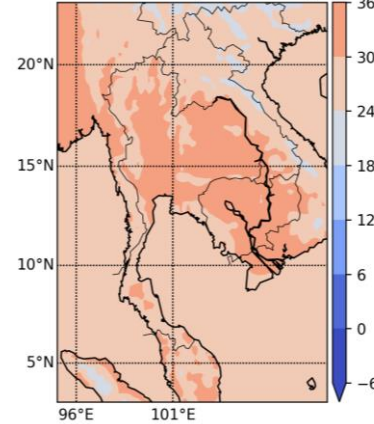


Climate Projection; Mean Maximum Temperature (Past), SSP5.8.5

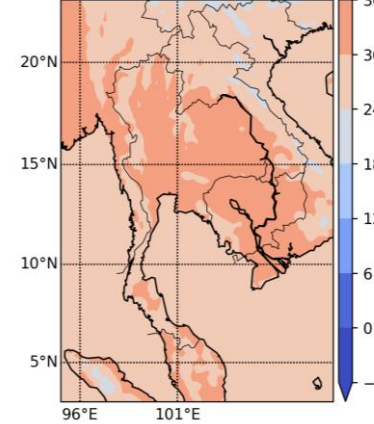
Yearly Mean Maximum Temperature
for 1950-1969 Period (MRI-ESM2-0_ssp585)



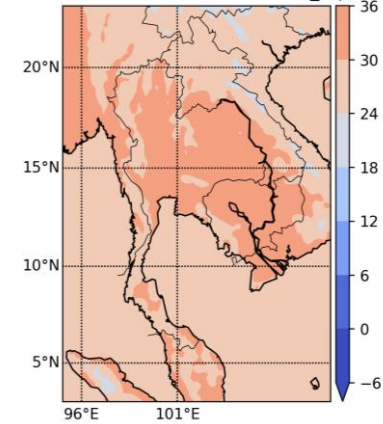
Yearly Mean Maximum Temperature
for 1970-1989 Period (MRI-ESM2-0_ssp585)



Yearly Mean Maximum Temperature
for 1990-2009 Period (MRI-ESM2-0_ssp585)

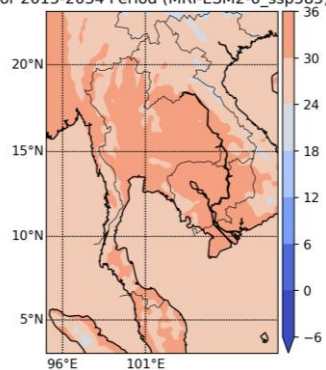


Yearly Mean Maximum Temperature
for 2010-2014 Period (MRI-ESM2-0_ssp585)

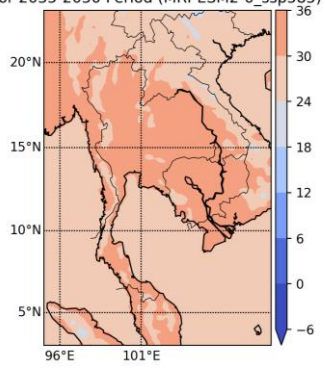


Climate Projection; Mean Maximum Temperature (Future), SSP5.8.5

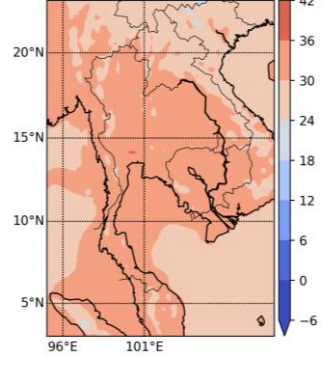
Yearly Mean Maximum Temperature
for 2015-2034 Period (MRI-ESM2-0_ssp585)



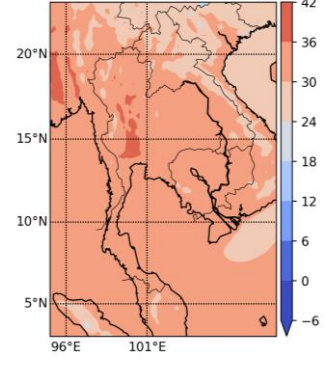
Yearly Mean Maximum Temperature
for 2035-2050 Period (MRI-ESM2-0_ssp585)



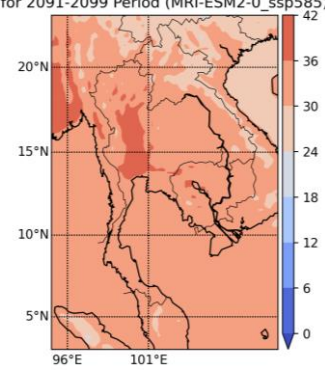
Yearly Mean Maximum Temperature
for 2051-2070 Period (MRI-ESM2-0_ssp585)



Yearly Mean Maximum Temperature
for 2071-2090 Period (MRI-ESM2-0_ssp585)

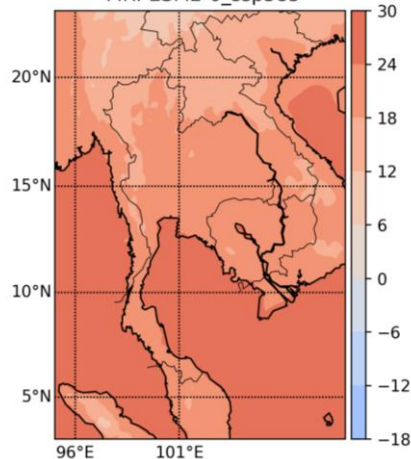


Yearly Mean Maximum Temperature
for 2091-2099 Period (MRI-ESM2-0_ssp585)

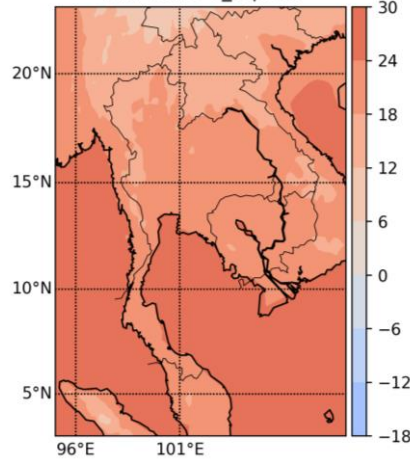


Climate Projection; Mean Minimum Temperature (Past), SSP5.8.5

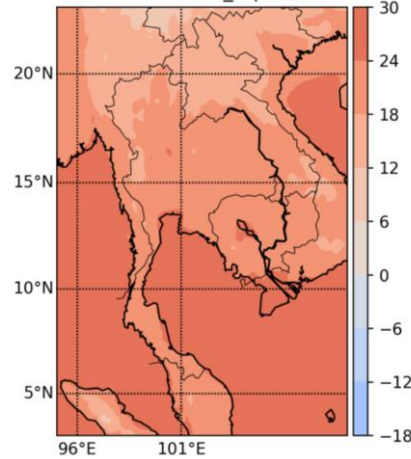
Mean Minimum Temperature for 1950-1969
MRI-ESM2-0_ssp585



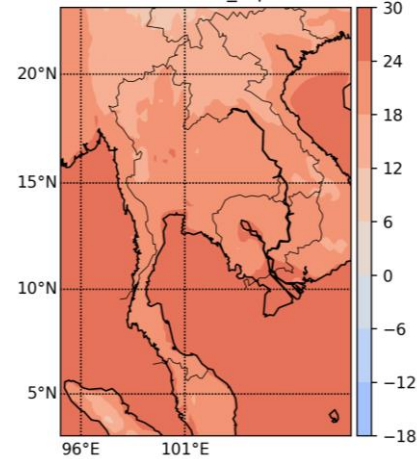
Mean Minimum Temperature for 1970-1989
MRI-ESM2-0_ssp585



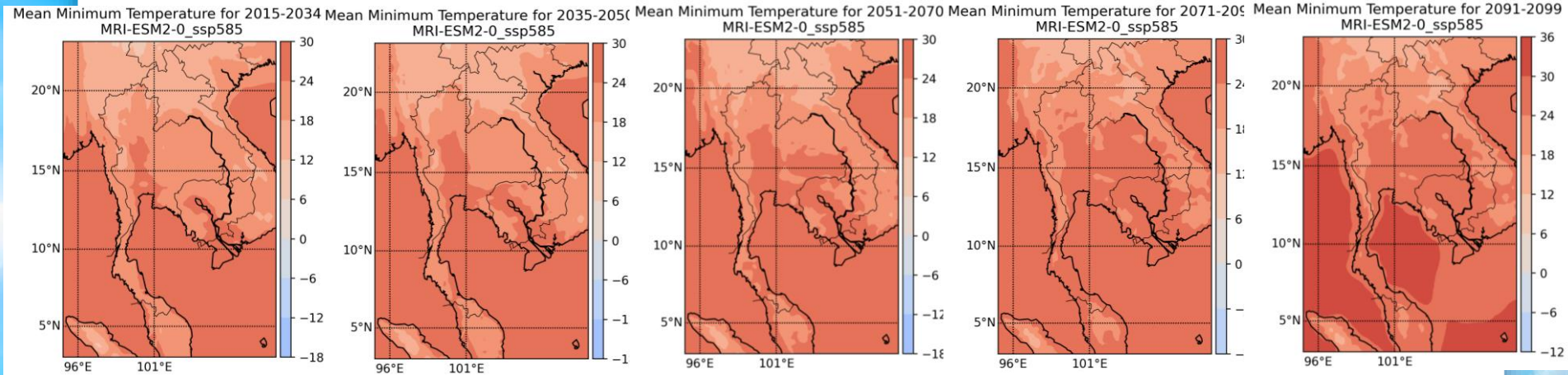
Mean Minimum Temperature for 1990-2009
MRI-ESM2-0_ssp585



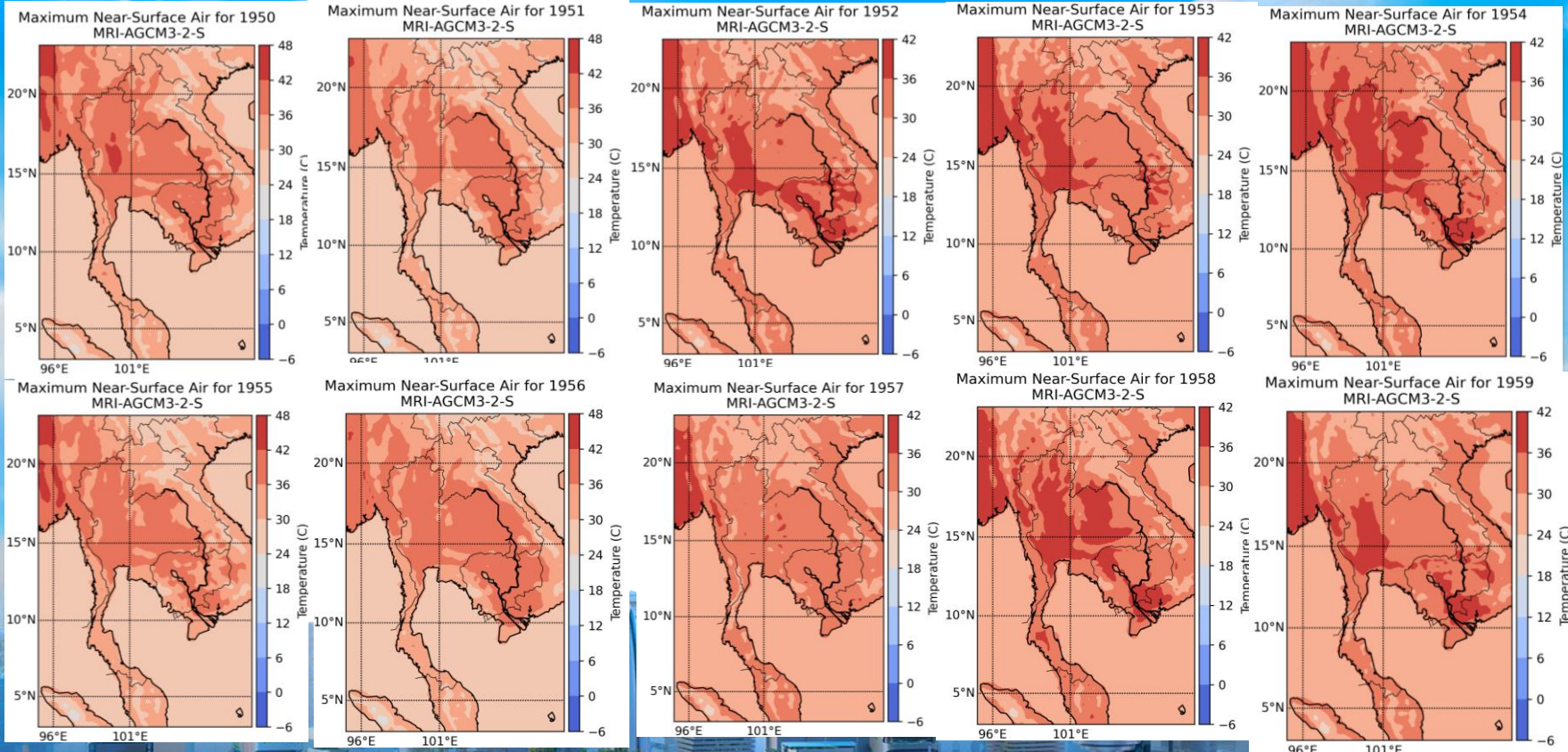
Mean Minimum Temperature for 2010-2014
MRI-ESM2-0_ssp585



Climate Projection; Mean Minimum Temperature (Future), SSP5.8.5

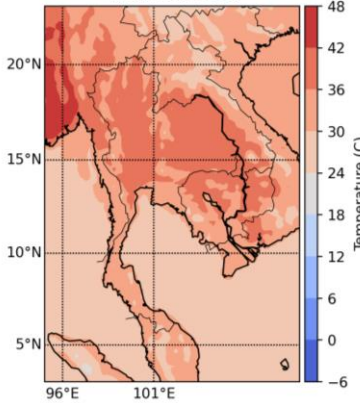


Climate Projection; Tmax(Past), SSP5.8.5

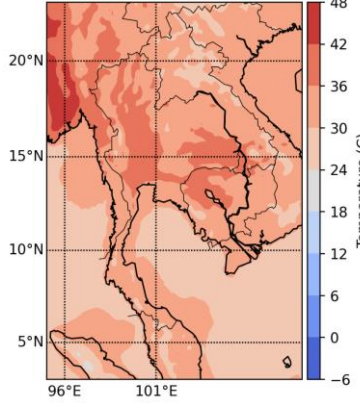


Climate Projection; Tmax(Future), SSP5.8.5

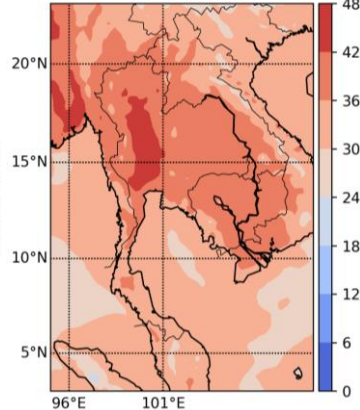
Maximum Near-Surface Air for 2035
MRI-AGCM3-2-S



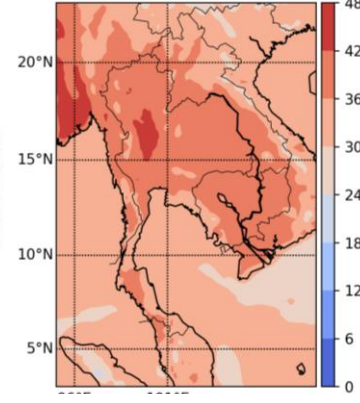
Maximum Near-Surface Air for 2036
MRI-AGCM3-2-S



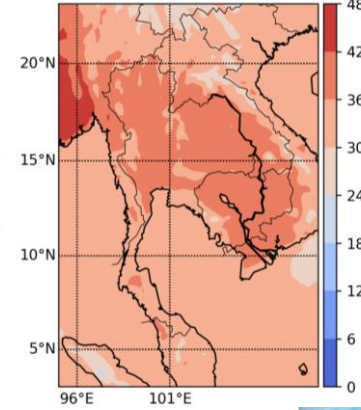
Maximum Near-Surface Air for 2037
MRI-AGCM3-2-S



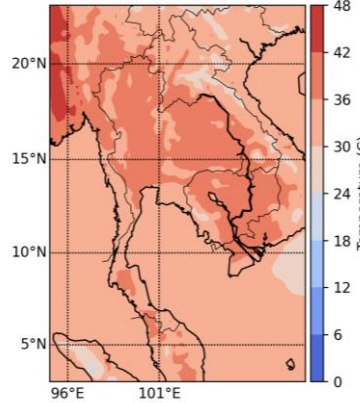
Maximum Near-Surface Air for 2038
MRI-AGCM3-2-S



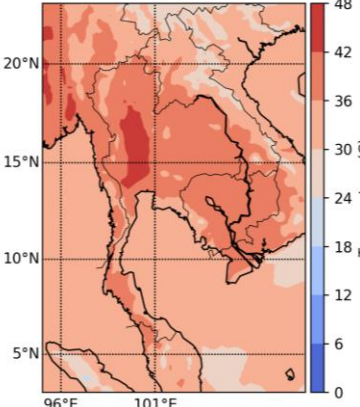
Maximum Near-Surface Air for 2039
MRI-AGCM3-2-S



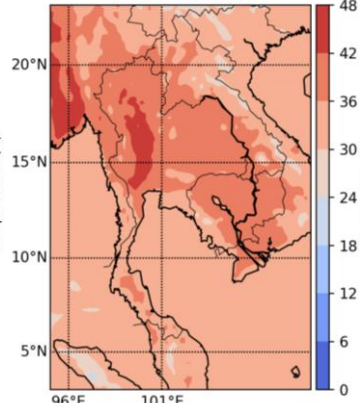
Maximum Near-Surface Air for 2040
MRI-AGCM3-2-S



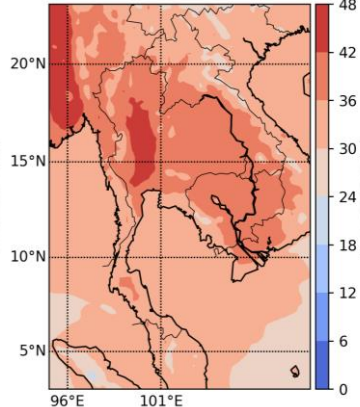
Maximum Near-Surface Air for 2041
MRI-AGCM3-2-S



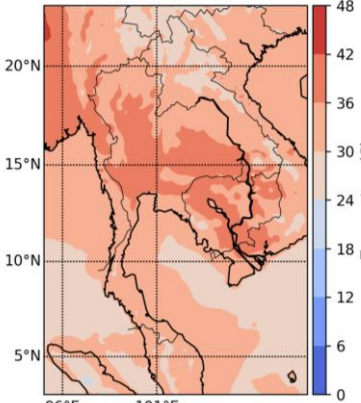
Maximum Near-Surface Air for 2043
MRI-AGCM3-2-S



Maximum Near-Surface Air for 2042
MRI-AGCM3-2-S

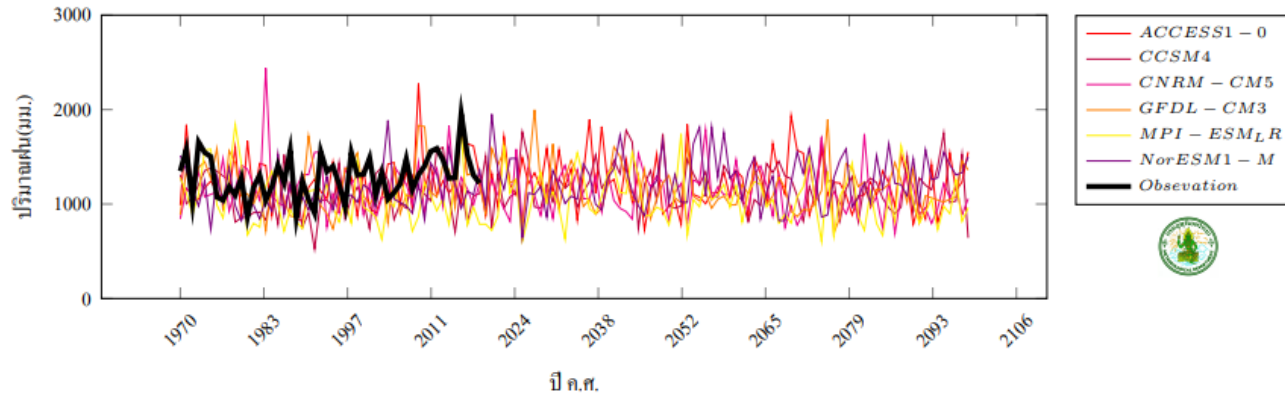


Maximum Near-Surface Air for 2044
MRI-AGCM3-2-S



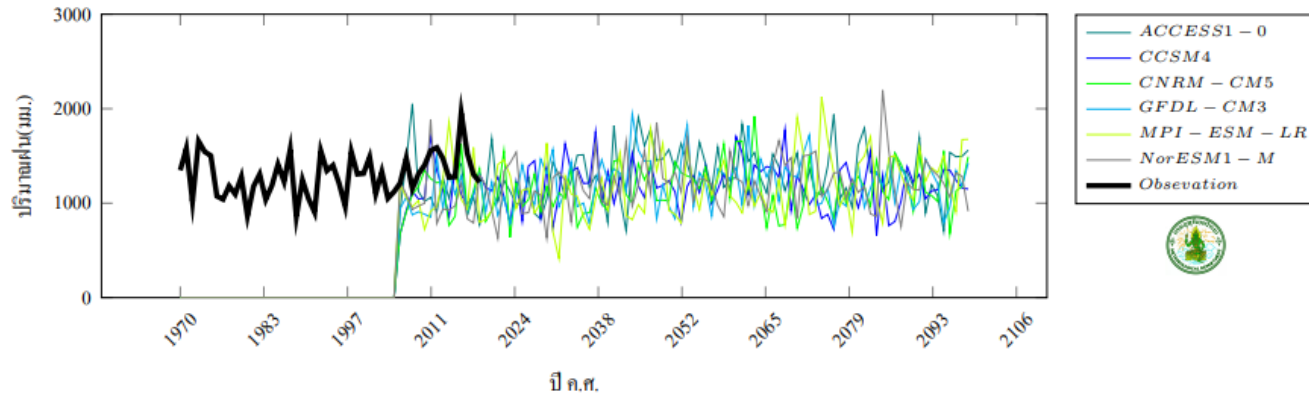
ก) ปริมาณฝนคาดการณ์ตามเส้นตัวแทนความเข้มข้นแก๊สคาร์บอนไดออกไซด์หรือ Representative Concentration Pathways 8.5(RCP8.5)

ณ สถานีอุตุณิยมวิทยาภูเก็ต ปี ค.ศ 1970-2099



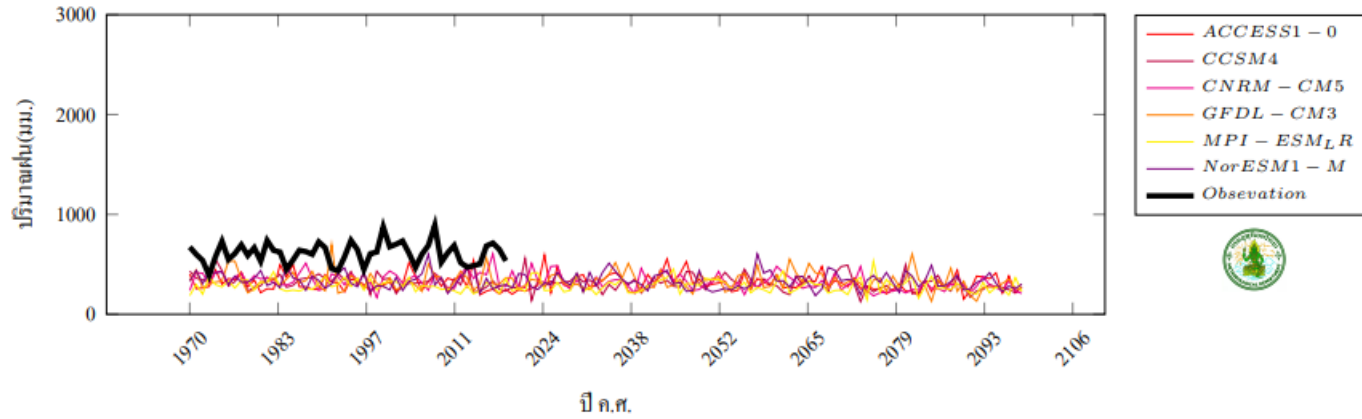
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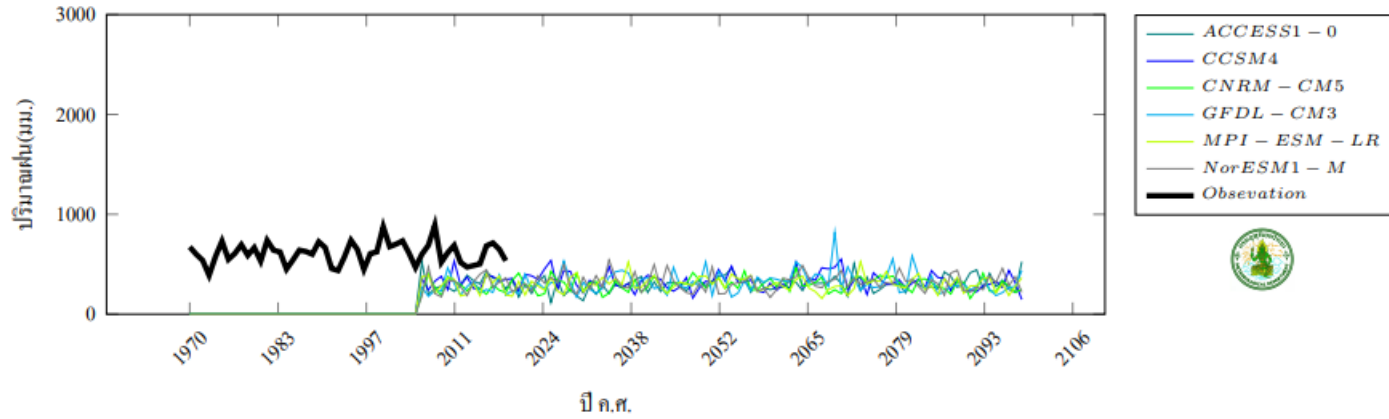
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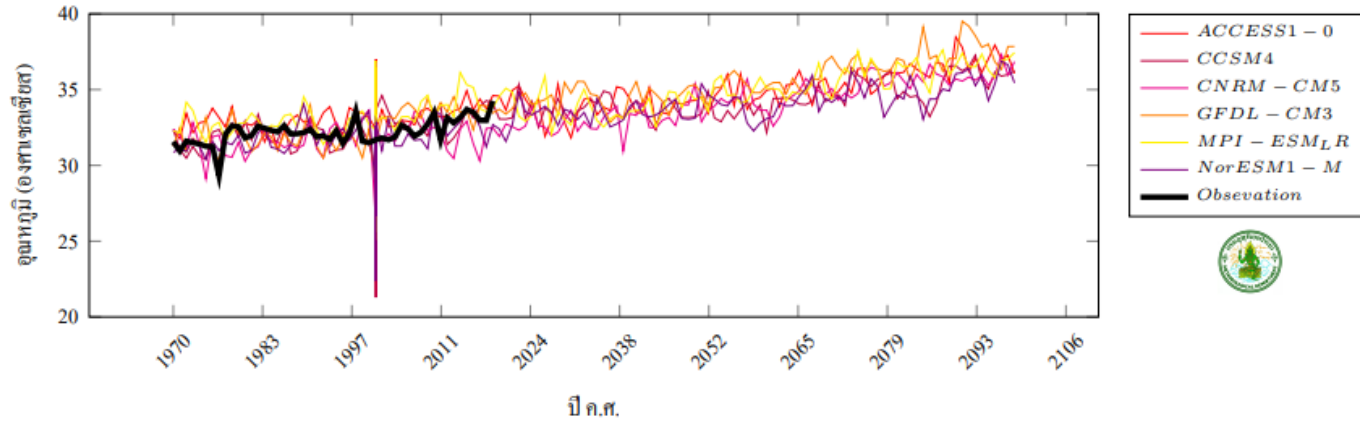
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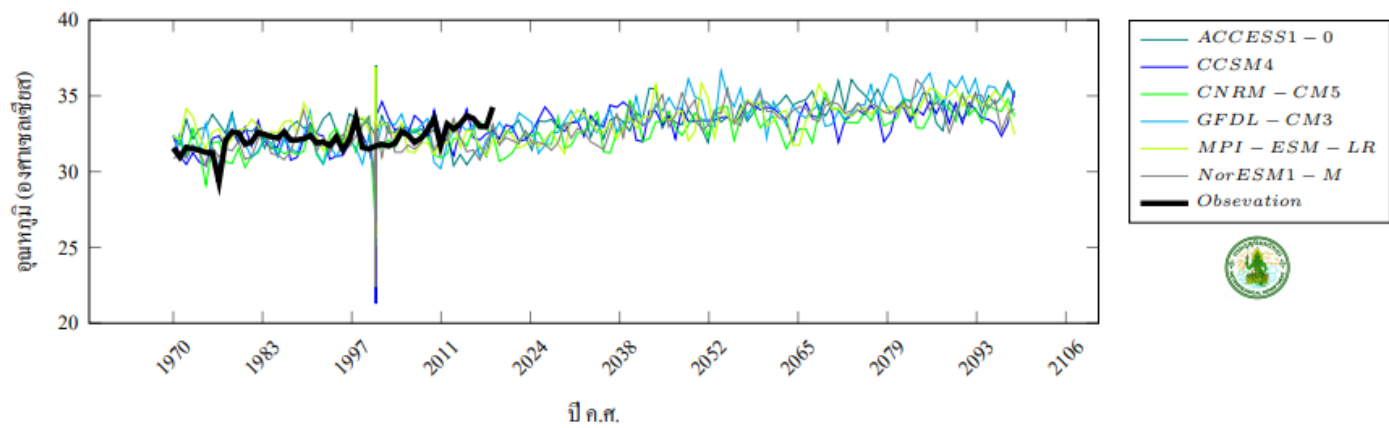
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ณ สถานีอุตุนิยมวิทยาเชียงใหม่ ปี ค.ศ 1970-2099



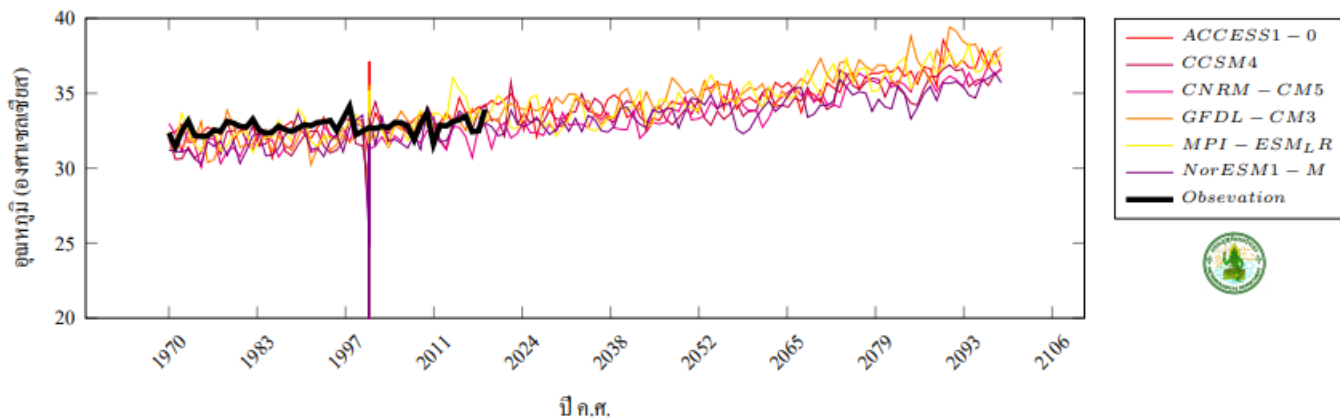
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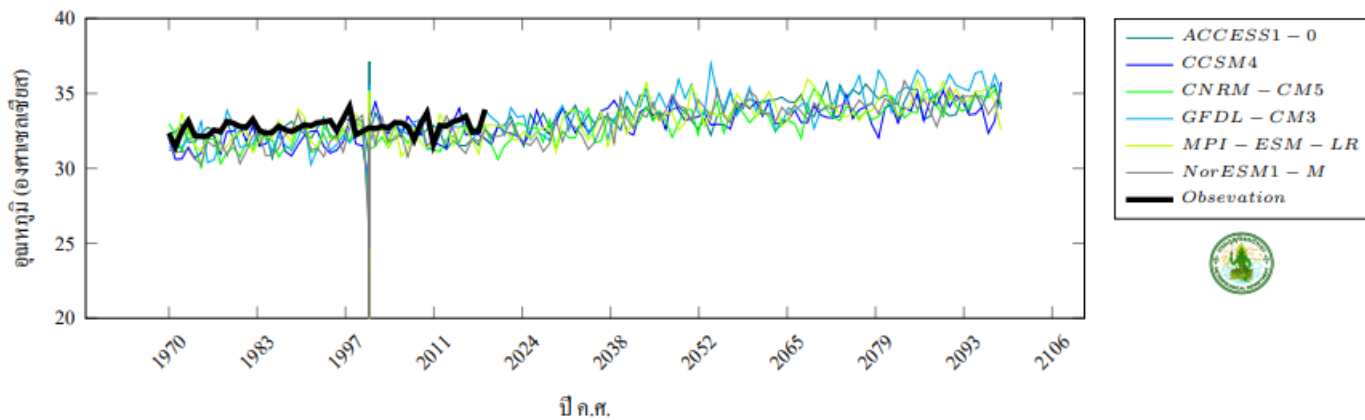
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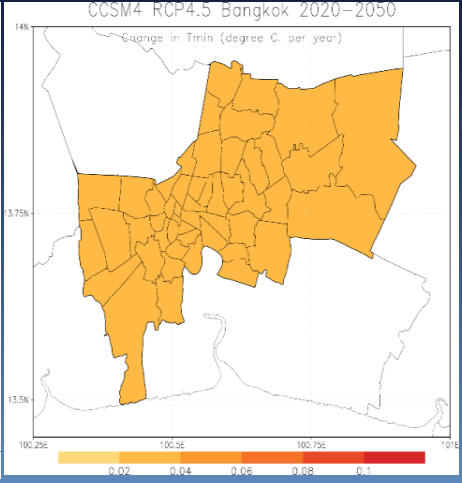
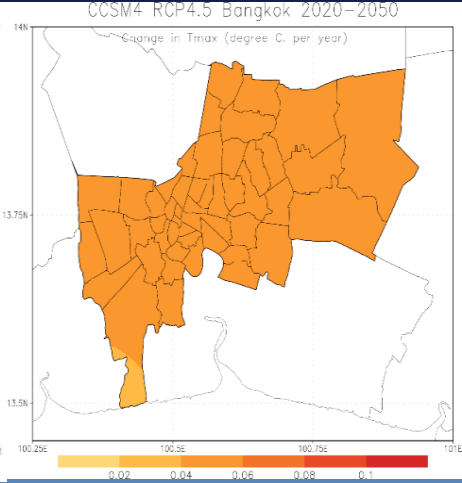
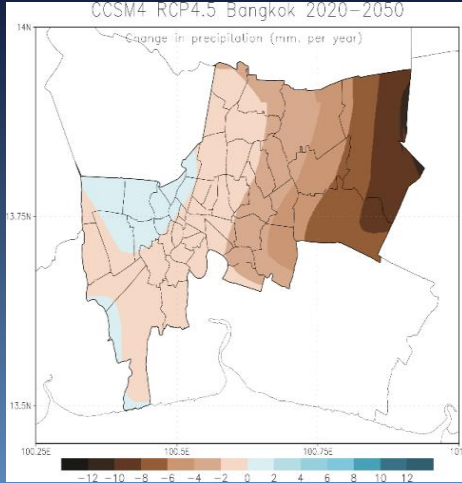
ข) อุณหภูมิสูงสุดคาดการณ์ตามเส้นตัวแทนความเข้มข้นแก๊สคาร์บอนไดออกไซด์หรือ Representative Concentration Pathways 4.5(RCP4.5)

ณ สถานีอุตุณิยมหาวิทยาลัยขอนแก่น ปี ค.ศ 1970-2099

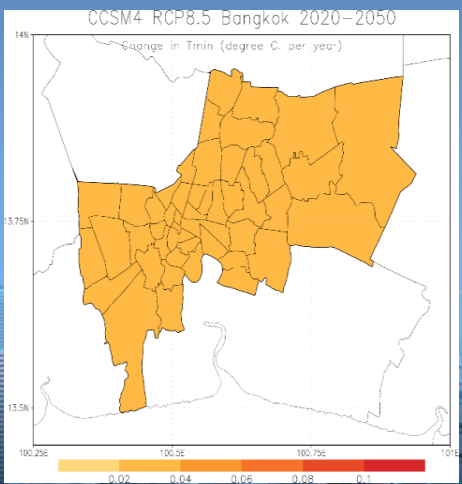
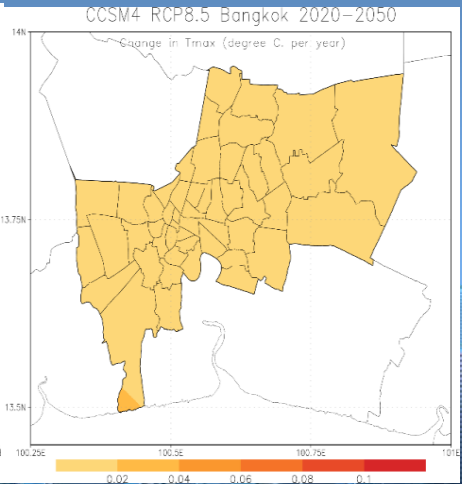
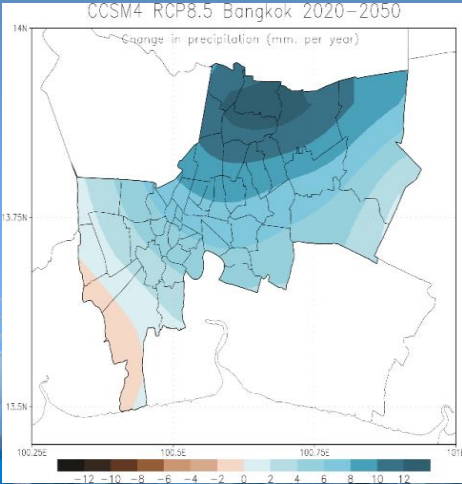


CMIP5
CCSM4

Bangkok



RCP4.5

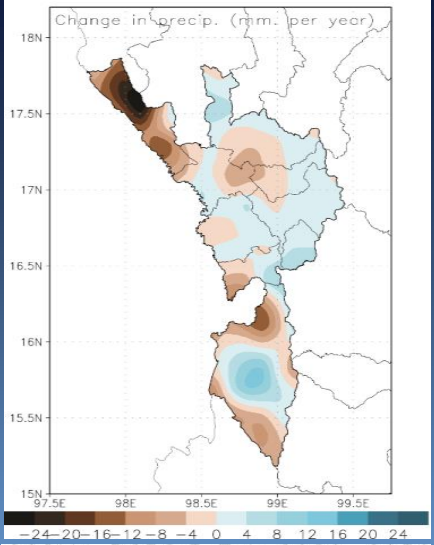


RCP8.5

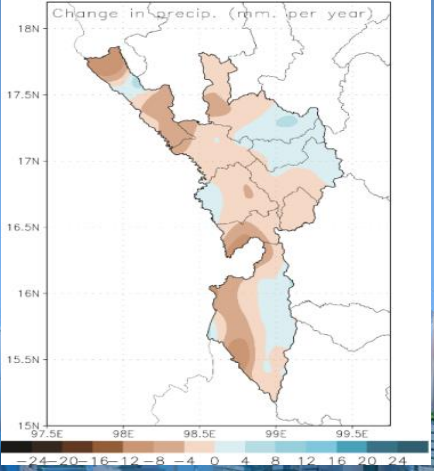
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CCSM4

Tak

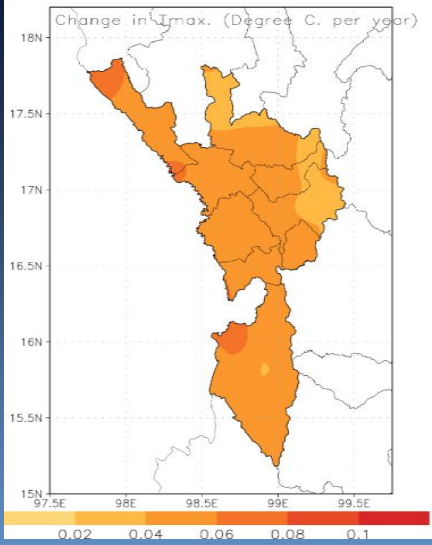
CCSM4 RCP4.5 Tak 2020-2050



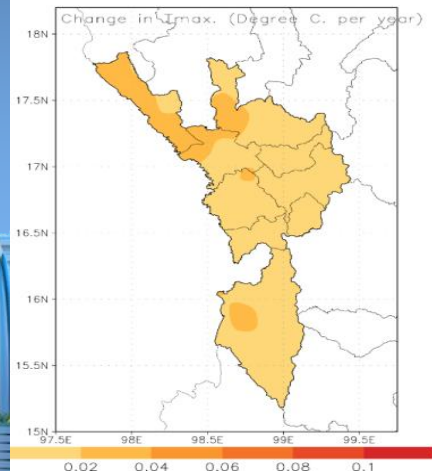
CCSM4 RCP8.5 Tak 2020-2050



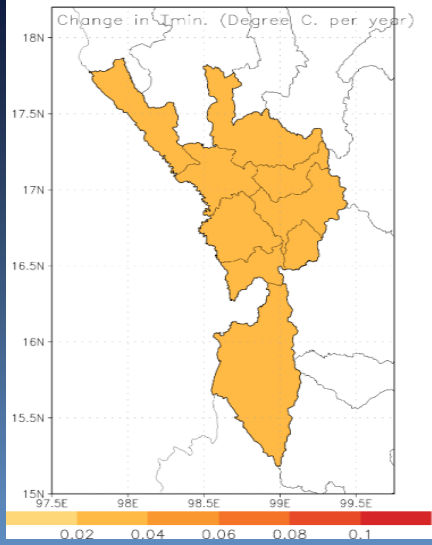
CCSM4 RCP4.5 Tak 2020-2050



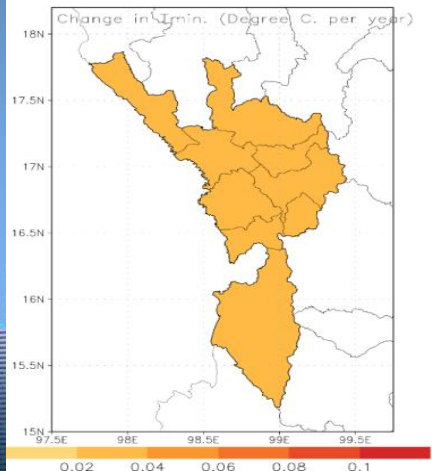
CCSM4 RCP8.5 Tak 2020-2050



CCSM4 RCP4.5 Tak 2020-2050



CCSM4 RCP8.5 Tak 2020-2050



RCP4.5

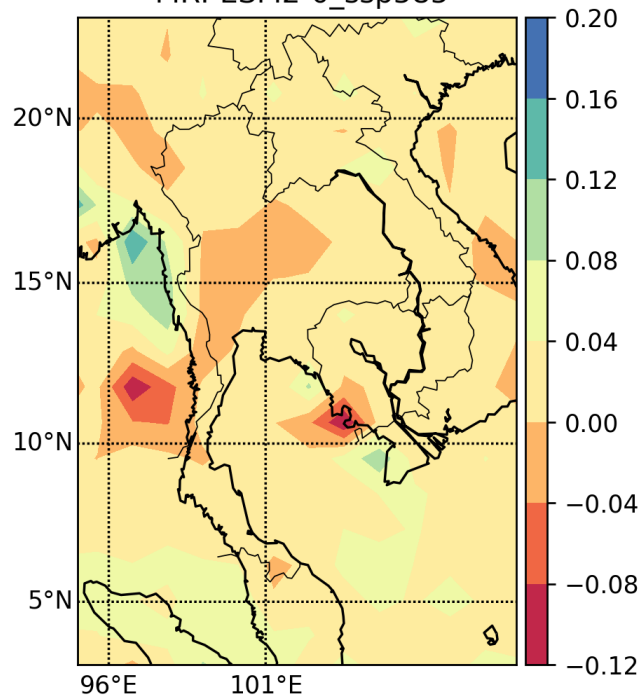
RCP8.5

Climate Indices

Parameter	Index	Impact	Sector
Rainfall	R95TOT, R99pTOT, RxTOT, R10mm, Rx1day, CDD, CWD, R35mm, R90mm	Flood, Drought	Agriculture, Health, Urban
Temperature	TN90p, TX90p, TXm, TNx, DTR, TXge35, TXx, SU, Heat index, TX95t	Heat	Health, Urban, Agriculture
Rainfall, Rh, Temperature	SPI, Heat Index	Heat	Agriculture, Health

Climate Projection; Climate Index (Future)

Consecutive wet days for 2015-2100
MRI-ESM2-0_ssp585



Consecutive dry days for 2015-2100
MRI-ESM2-0_ssp585

