



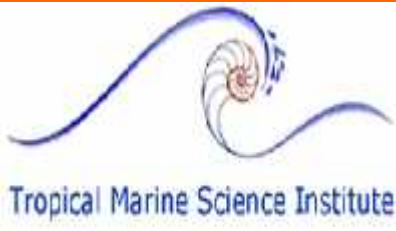
Future Climate Projections for Southeast Asia: What does high resolution modelling tell us?

Dr. Sri Raghavan

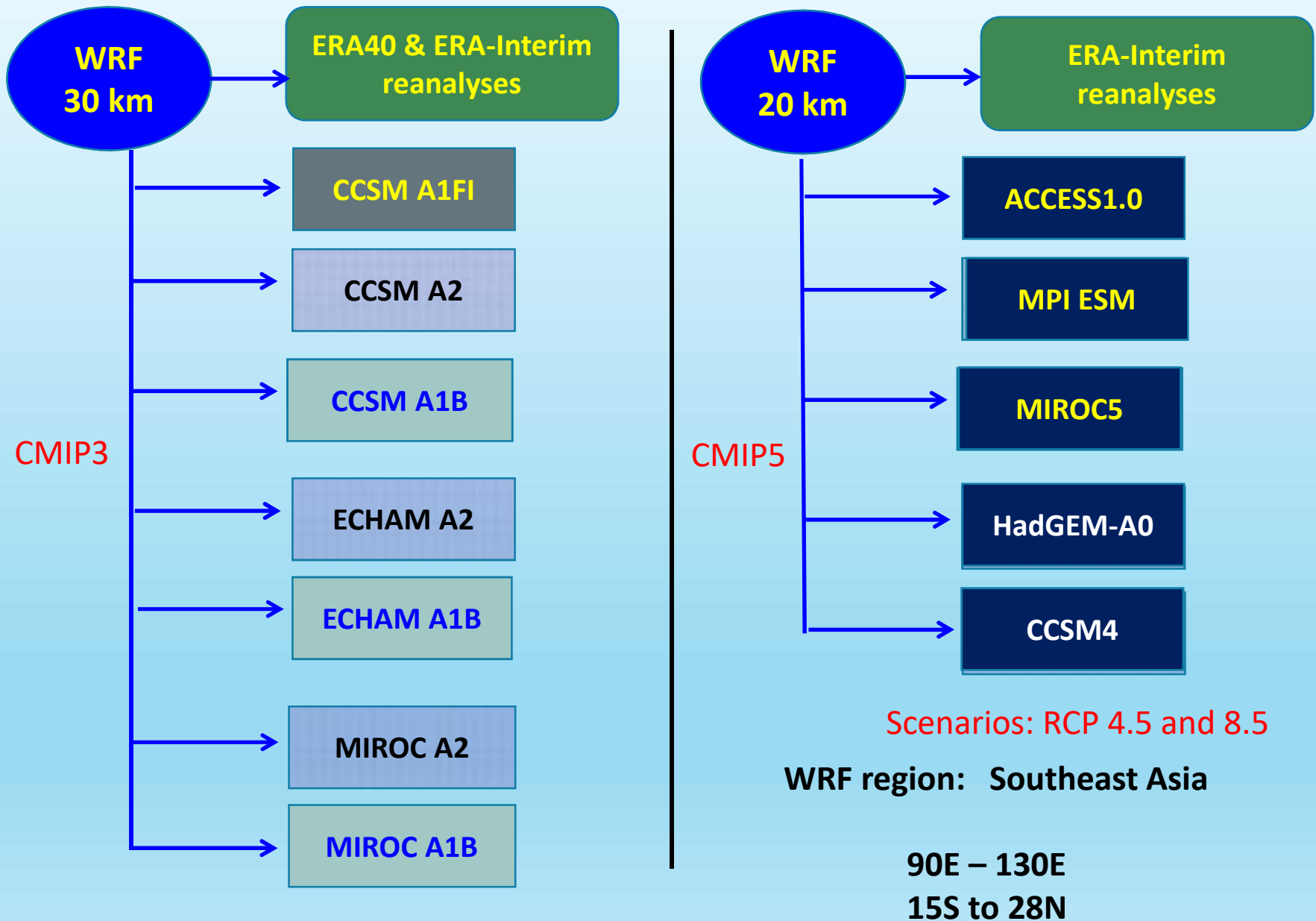
**Tropical Marine Science Institute
(TMSI)**

Dr. Jina Hur, Mr. Liu Jiandong

Dr. Nguyen Ngoc Son and Dr. Liong Shie-Yui

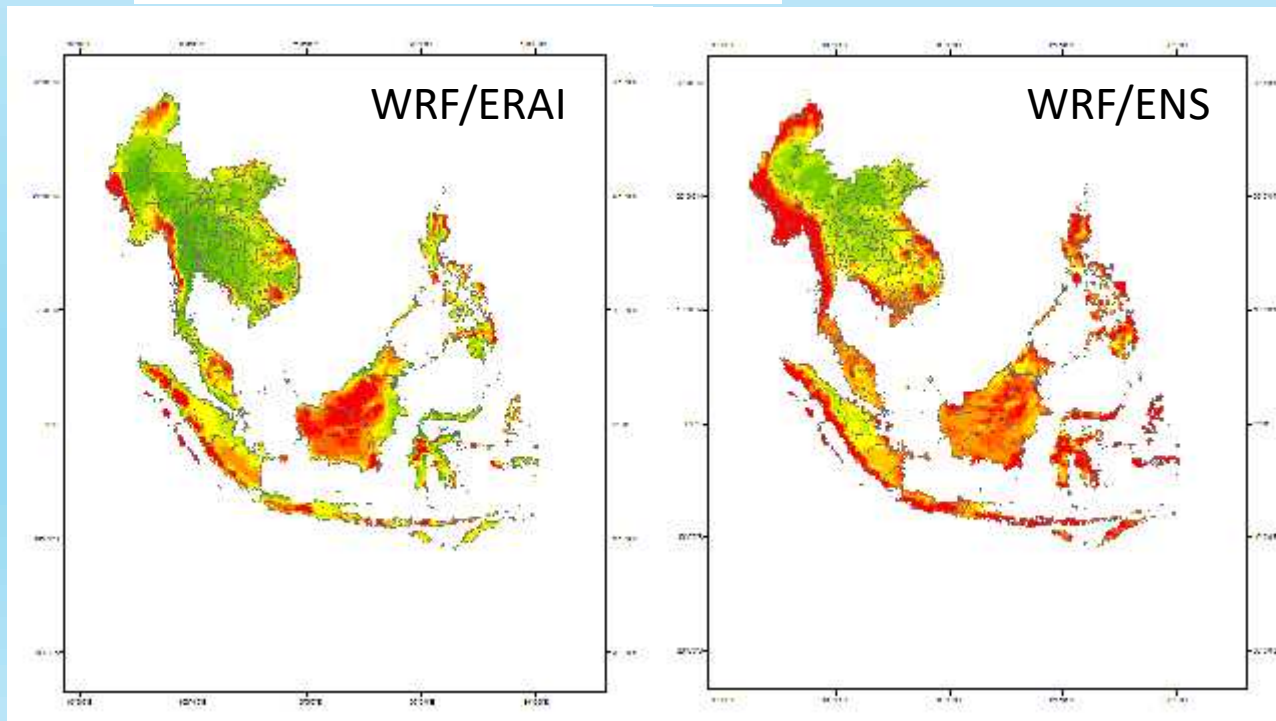
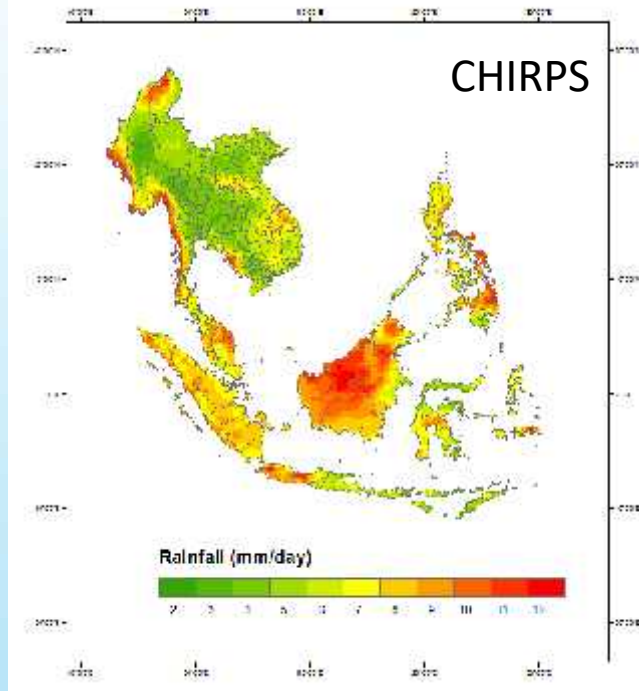


TMSI's Climate Downscaling work



ANNUAL
Mean Rainfall
1986-2005
(mm/day)

20 km
simulations

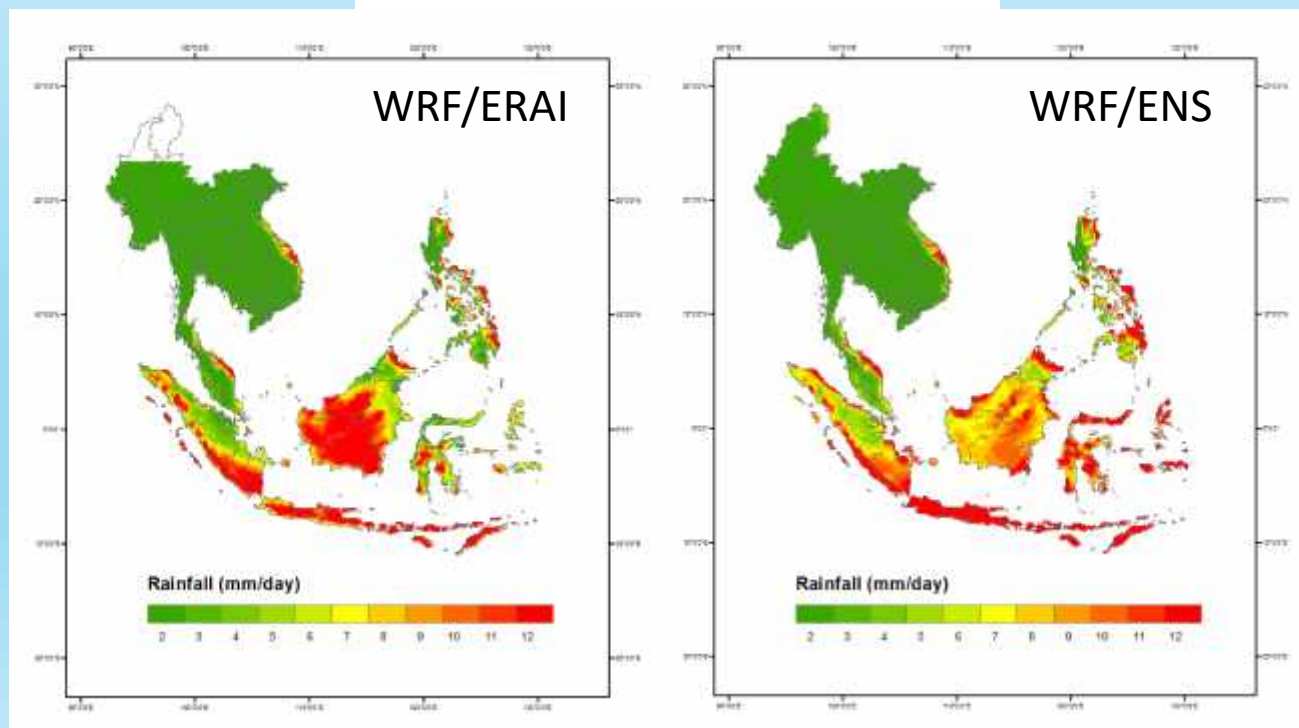
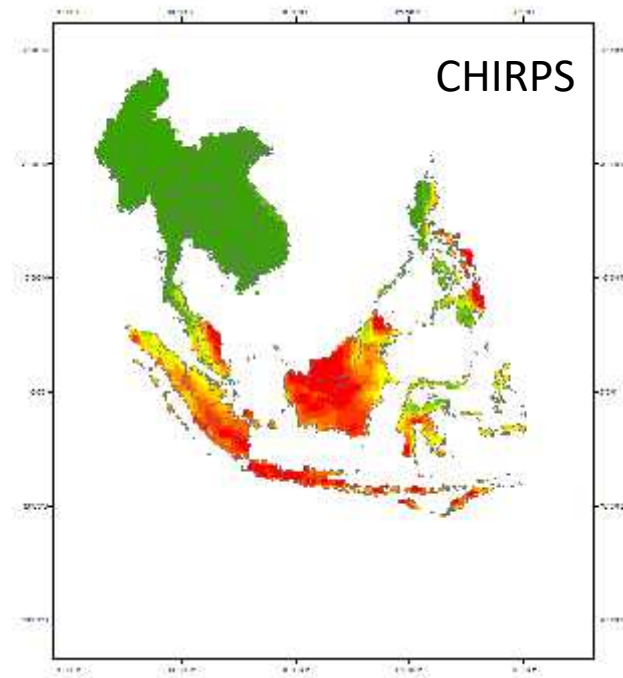


ENS – ensemble
of GCMs

MPI ECHAM6
CSIRO ACCESS
NIES MIROC5

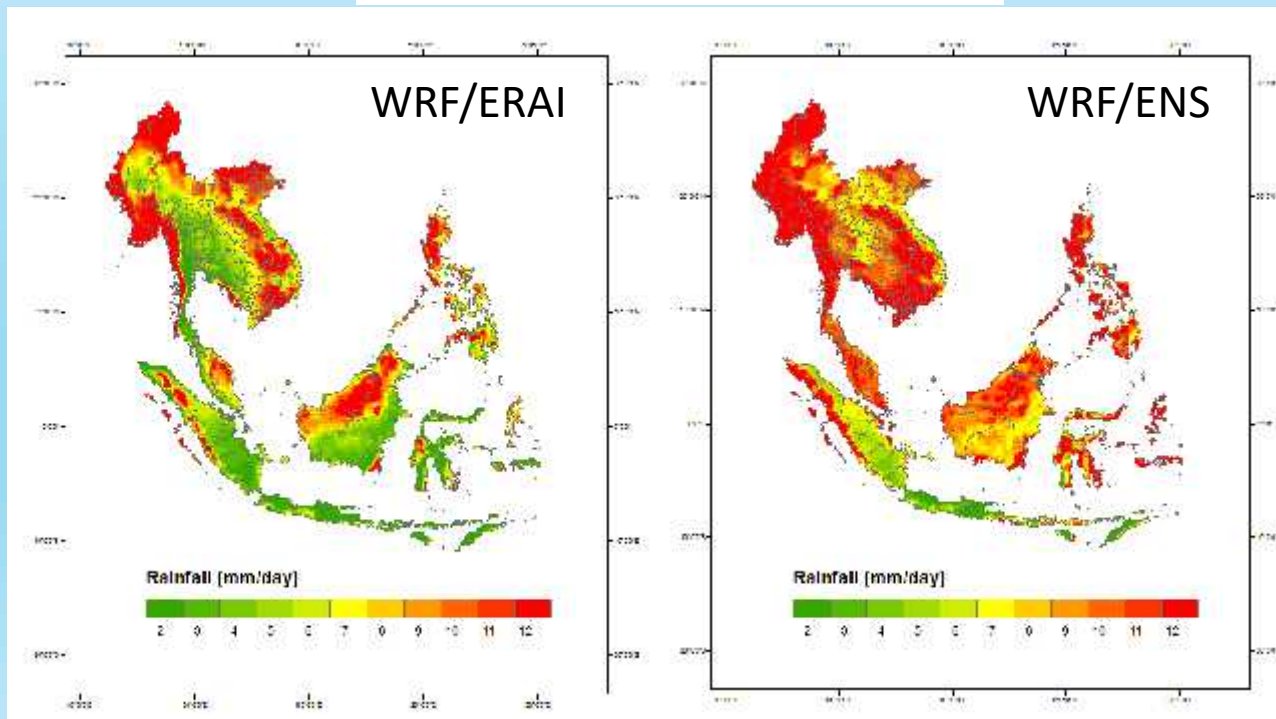
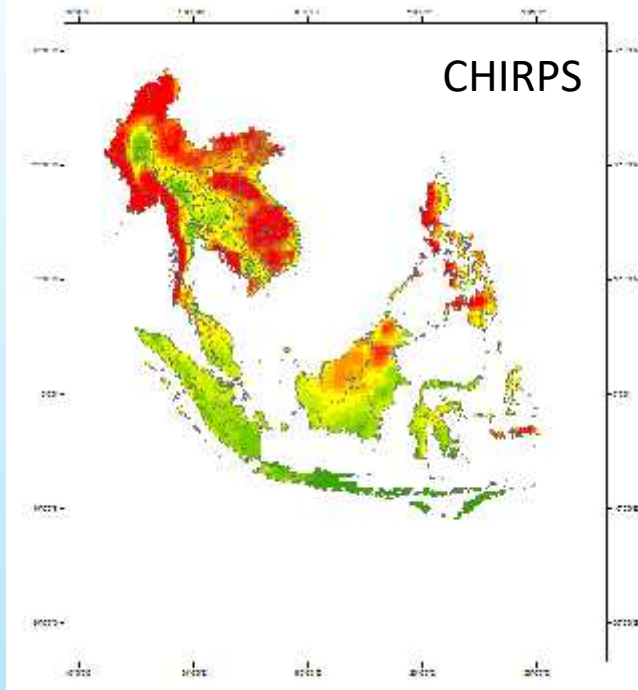
DJF

Mean Rainfall
1986-2005
(mm/day)

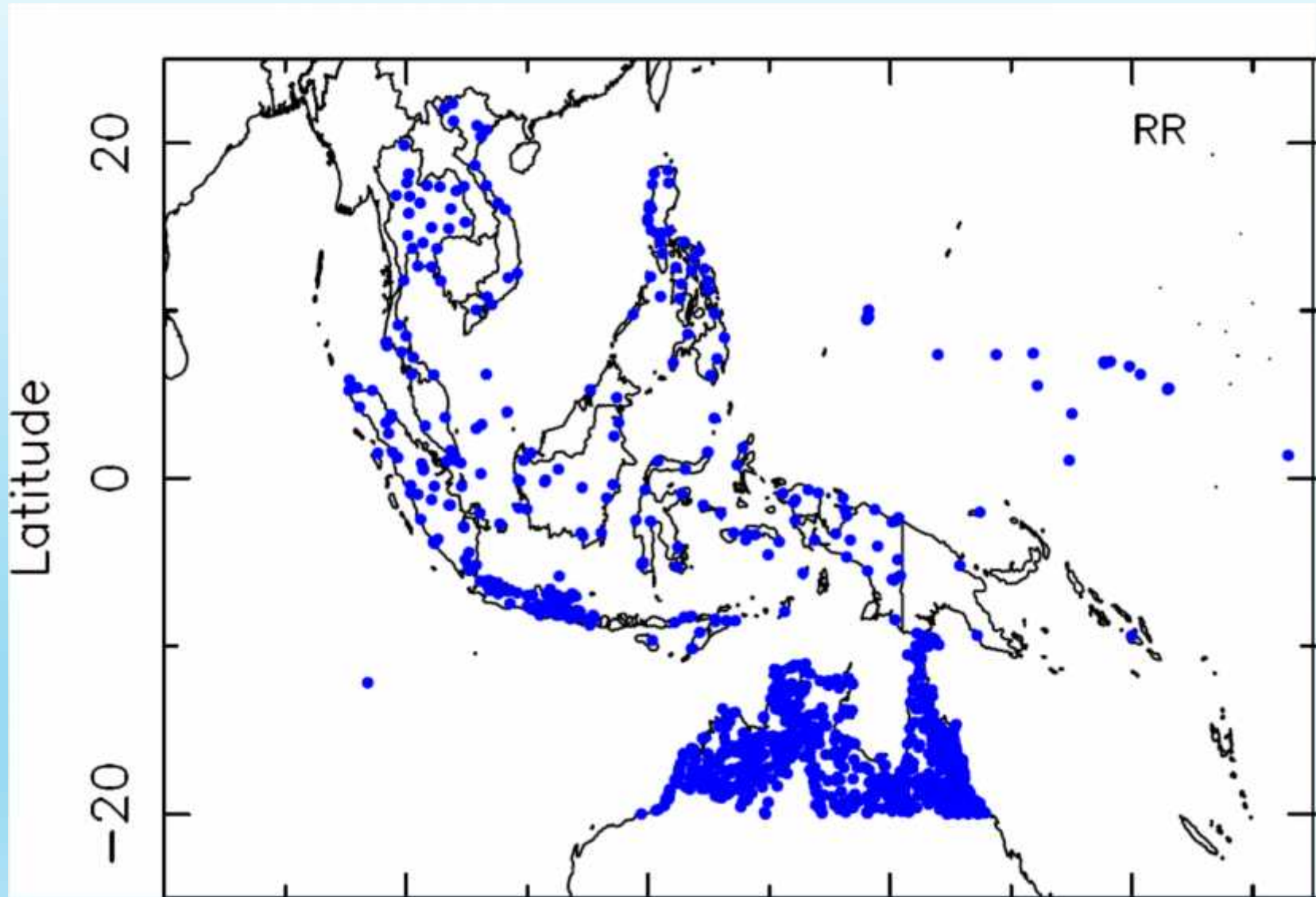


JJA

Mean Rainfall
1986-2005
(mm/day)

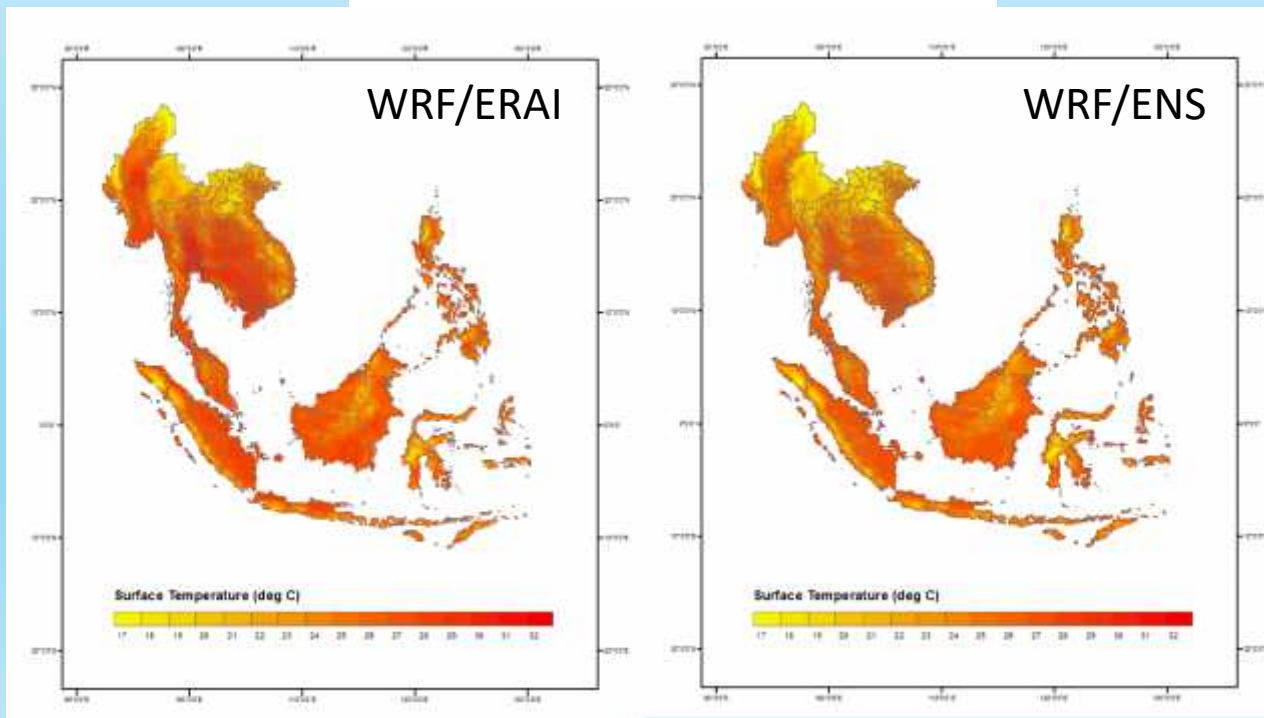
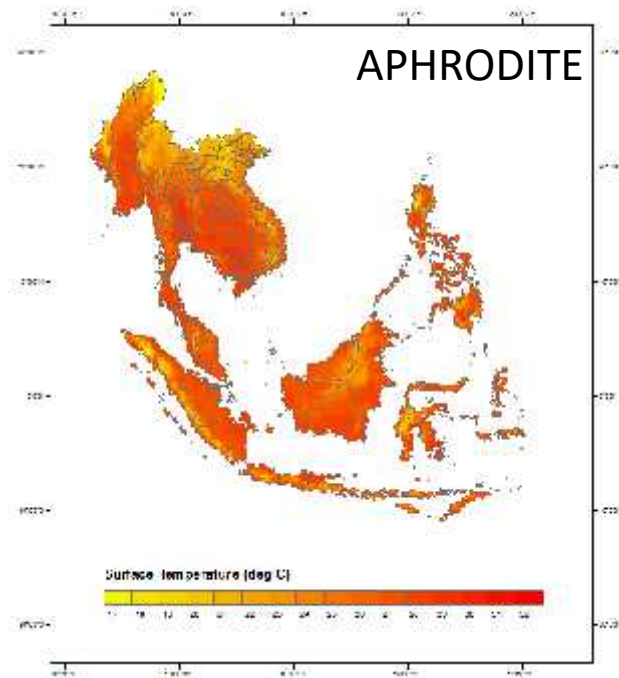


Gauge/Observations Coverage



ANNUAL

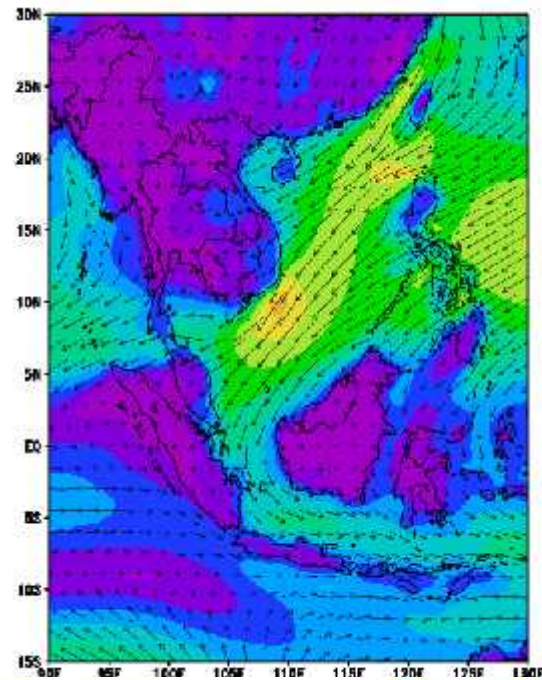
Mean Temperature
1986-2005
(°C)



DJF

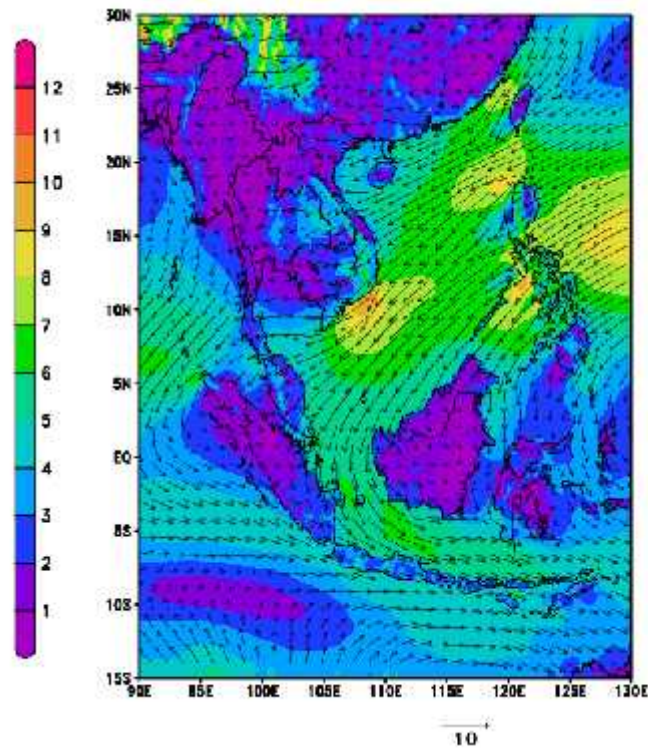
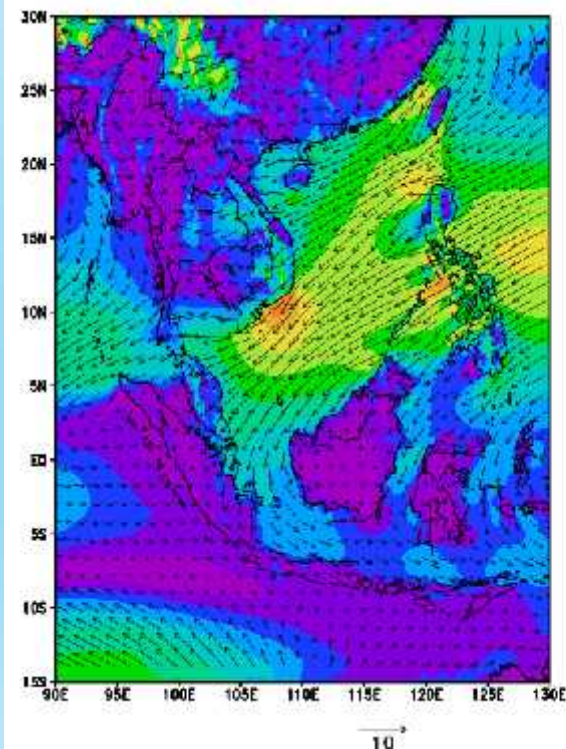
Northeast Monsoon
Surface Winds (m/s)
1986-2005

WRF/ERA1



ERA1

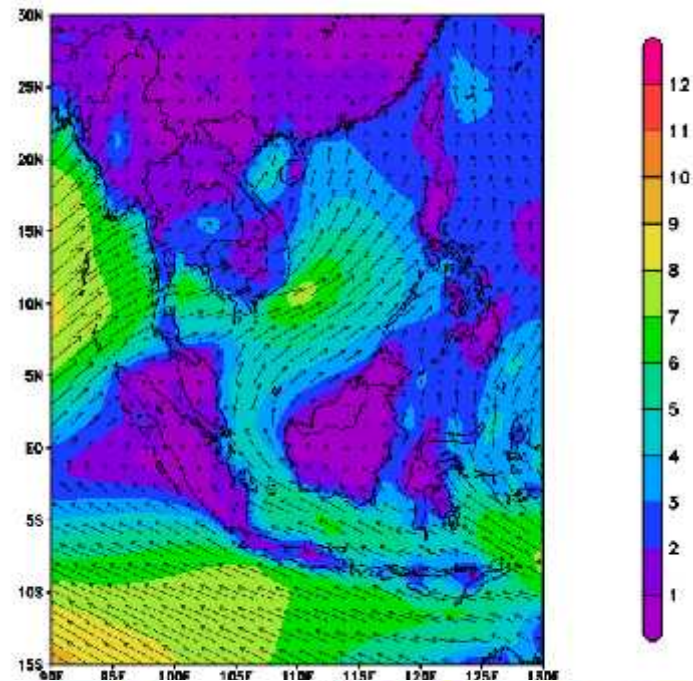
WRF/GCMs



JJA

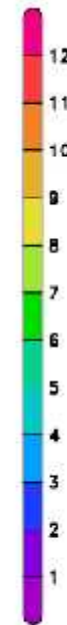
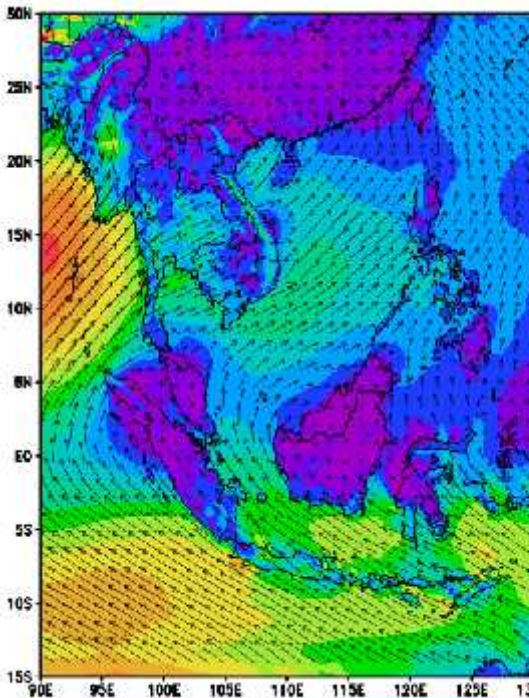
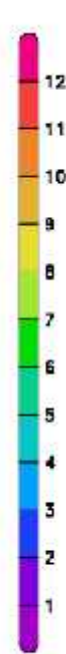
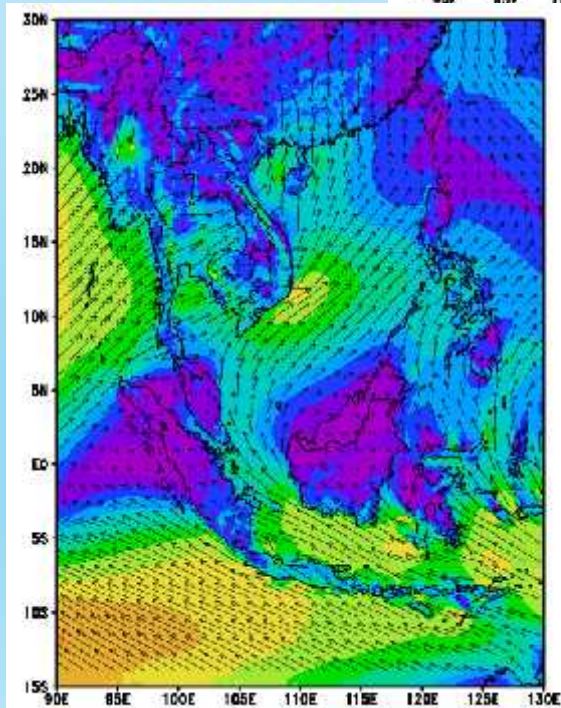
Southwest Monsoon
Surface Winds (m/s)
1986-2005

WRF/ERA-Interim



ERA-Interim

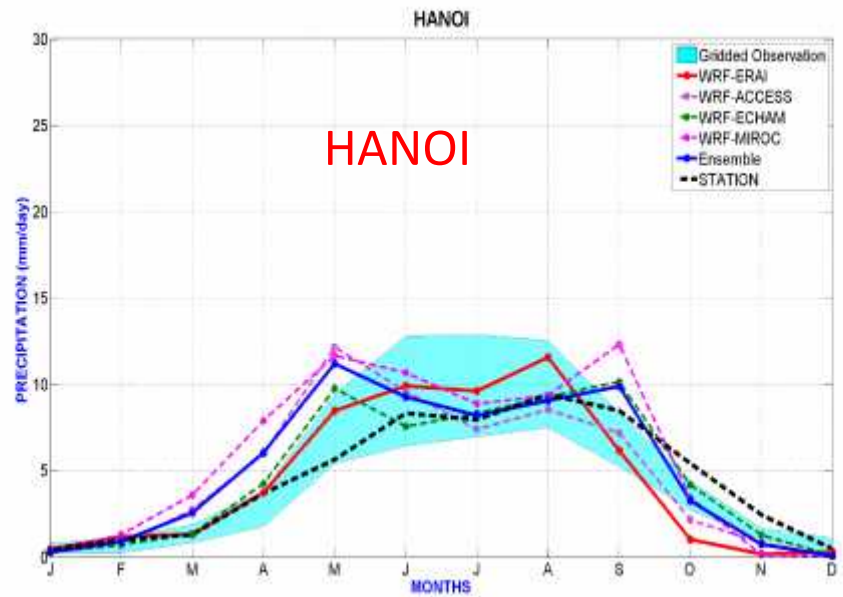
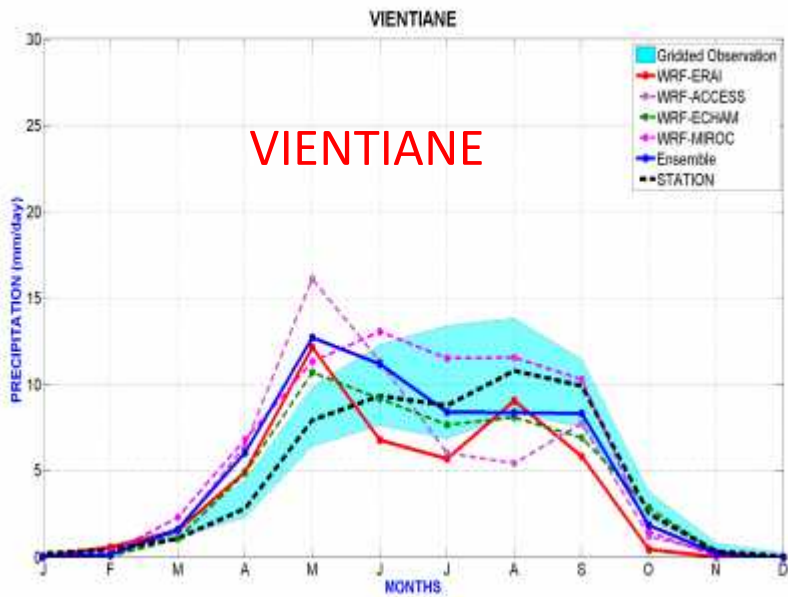
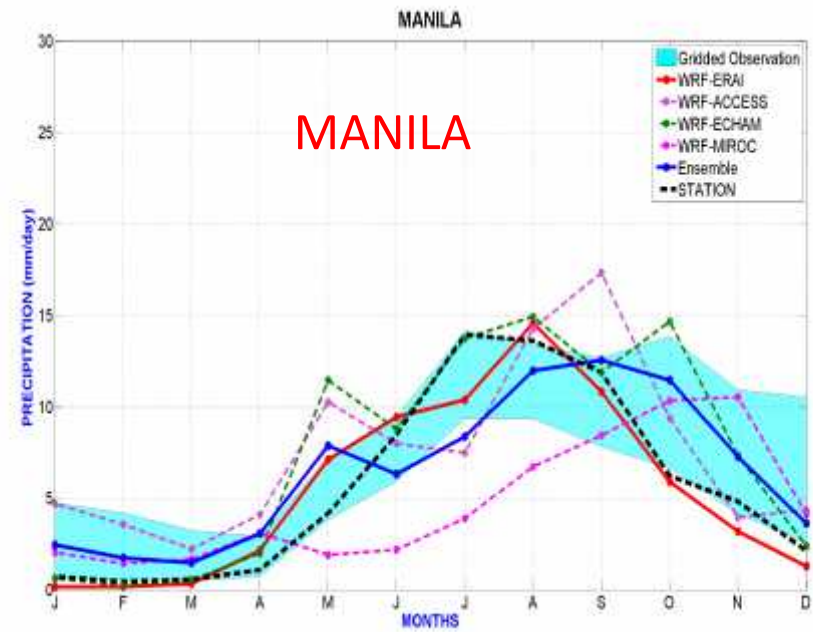
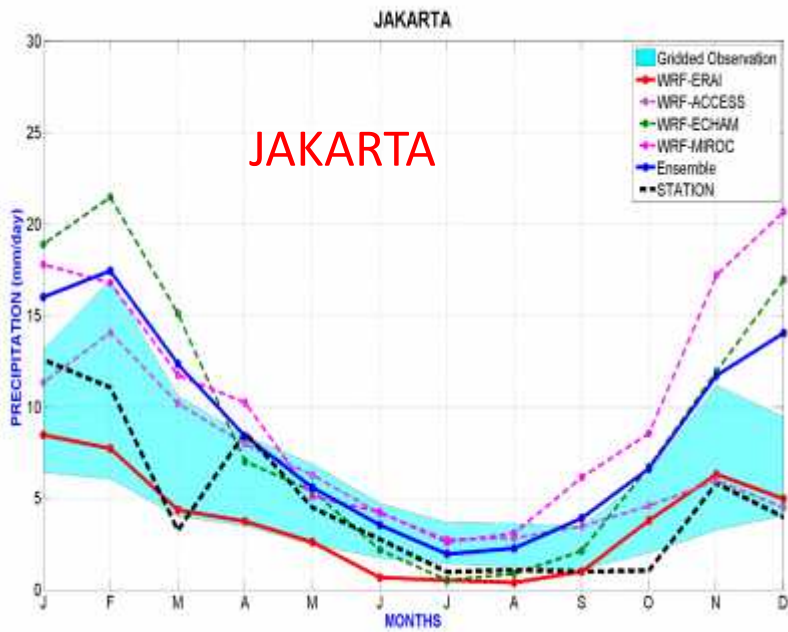
WRF/GCMs



10

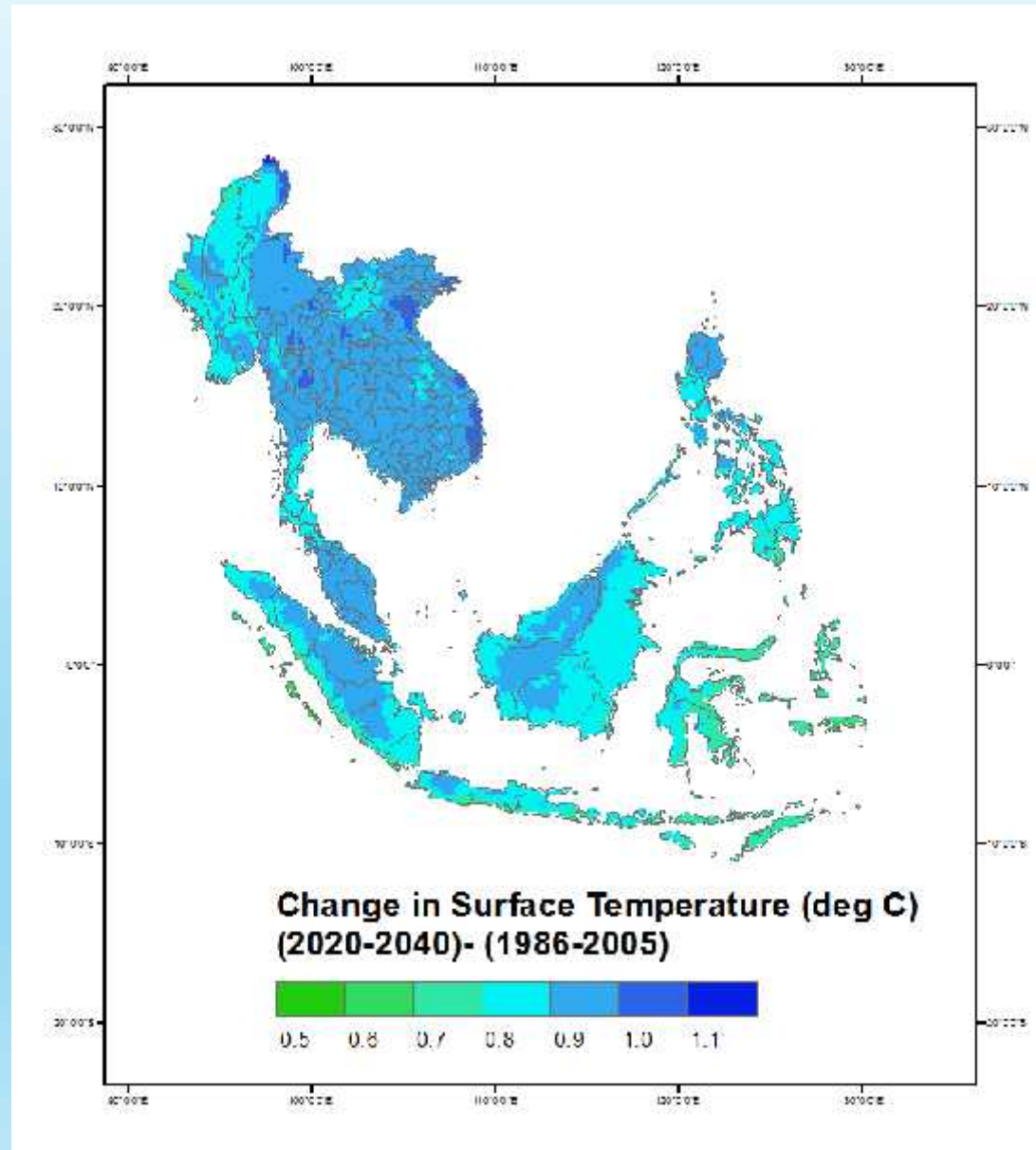
10

Annual Cycle of Precipitation



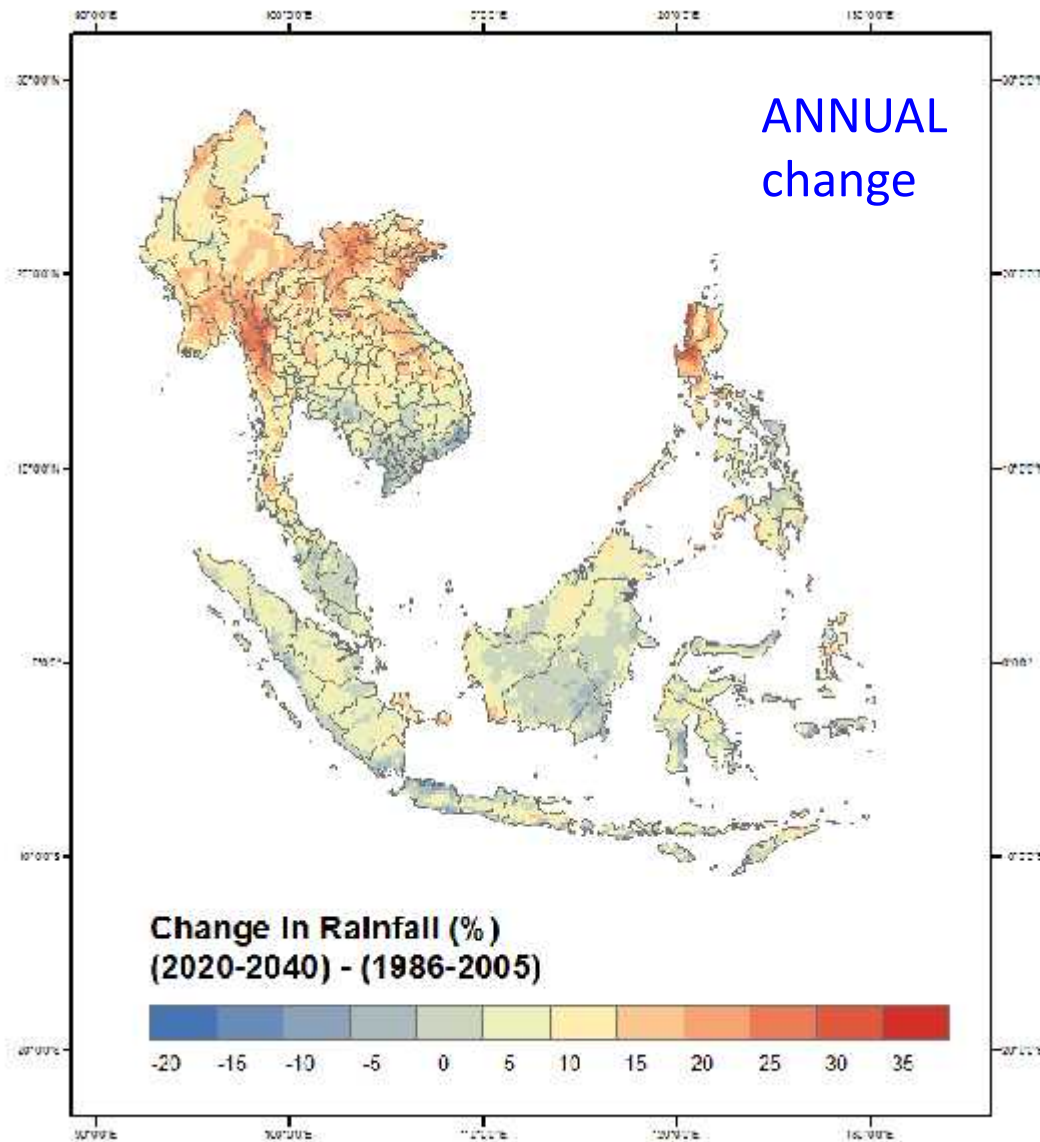
WRF Multi Model Ensemble

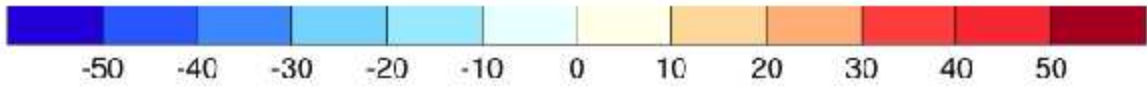
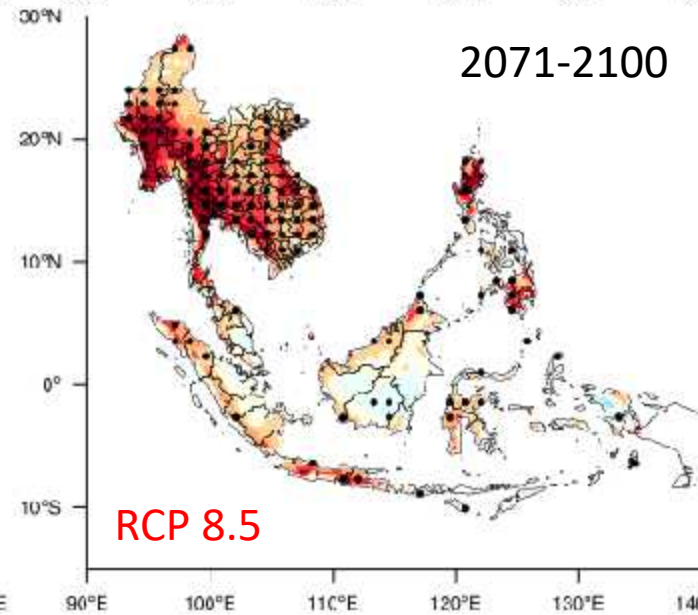
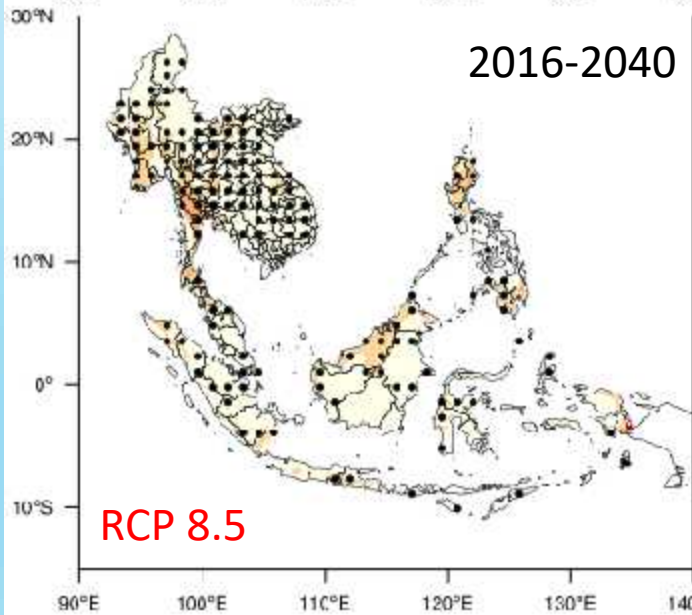
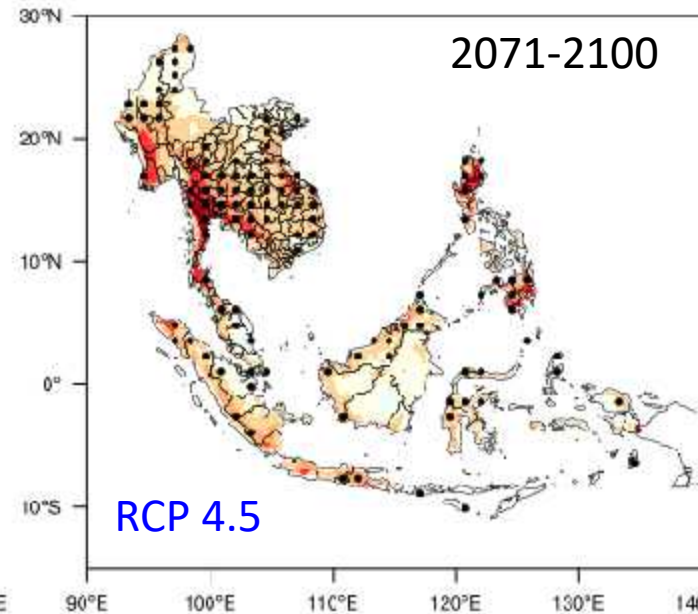
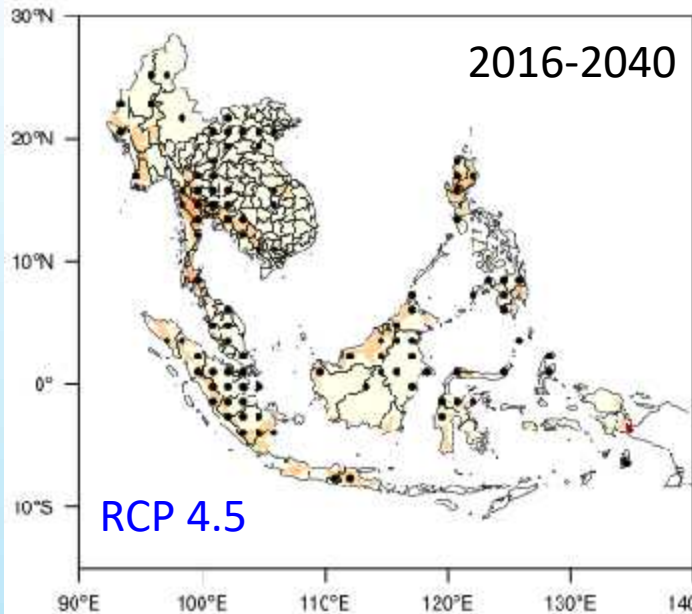
2020-2040 vs 1986-2005: RCP 4.5



WRF Multi Model Ensemble

2020-2040 vs 1986-2005: RCP 4.5





Summary

- **WRF model is able to reproduce the regional climate reasonably well.**
- **Multi-Model ensemble show some uncertainties, yet capture the mean state of the climate of the region**
- **That SEAsia will be affected largely by temperature increases is certain.**
- **Rainfall trends are mixed and still uncertain. Seasonal (monsoonal changes) are nevertheless significant**
- **Further downscaling is progress @ 10 km and 5 km. With additional fine tuning and physics improvements, downscaling of selected GCMs will be performed.**