

<b>Thesis Title</b>	Effects of Global Warming on Regional Climate Changes over Thailand	
<b>Author</b>	Ms. Supanee Maijandee	
<b>Degree</b>	Doctor of Philosophy ( Applied Physics)	
<b>Thesis Advisory Committee</b>	Dr.Siramas Komonjinda	Chairperson
	Assoc. Prof. Dr. Jiemjai Kreasuwun	Member
	Dr.Wonchai Promnopas	Member

### **Abstract**

The possible changes of extreme rainfall and temperature indices in Thailand in the future 2020-2029 relative to the reference period 1990-1999 were investigated using daily data simulated from MM5 regional climate model (MM5-RCM). The bias-correction process was performed on the simulated rainfall and temperature to minimize the model biases prior to indices calculation. The valuation reveals that the bias correction leads to the improved rainfall and temperature data. Bias-corrected annual rainfalls agree well with the observation during the reference period 1990-1999. There is no significant difference in the distribution between the observed data and bias-corrected simulated outputs. Most bias comes from an overestimation of rainfall. The spatial pattern of bias-corrected simulated temperature is in agreement with the observation with

correlation coefficient of 0.62-0.93 and 0.60-0.97 for maximum and minimum temperatures, respectively. The projected changes of rainfall indices suggest that in the future most areas of northern, western, and northeastern Thailand may become wetter in the wet season and drier during the dry season. Central and eastern Thailand will probably become drier in the wet season while during the dry season, rainfall likely becomes more intense, rainy days probably become more scattered with higher number of heavy rainfall days. The wetter conditions are overall estimated in southern Thailand. The wet spell (CWD) is likely to decrease in Southern Andaman Sea and increase in east-southern region. The dry spell (CDD) is expected to be shorter throughout this region for all season. The projections of temperature indices show that a significant increase in temperature extremes is found in all warm extreme indices including the number of hot summer days (SUnn), the maximum daytime and nighttime temperatures (TxX and TnX), and the frequency of hot days and warm nights (Tx90P and Tn90P) in all seasons throughout the country. All temperature indices projections suggest that, in the future, the frequency and intensity of extreme temperature events will possibly increase significantly in most areas of Thailand. The faster changes in the TnX than those in TxX cause a decrease of the DTR throughout the country during the cool and rainy season. The increase of most indices is obvious during the cool season except for the Tn90P and DTR indices where the greatest increases are expected during the rainy season.

**Keywords:** extreme indices, projected climate change, MM5-RCM, bias-correction