

Variations In Rainfall In Vietnam Under The Global Warming

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Recently, global warming due to intensifying greenhouse effect could cause profound climate change. It is becoming a serious problem in the world that must be accepted. Although the warming effect caused by emission of greenhouse gases has some uncertainties as in all climate observations, several observations indicated that the earth is warmer now than in the past century. Located in the South East Asia (SEA), with more than 3200 km coastal line next to the western Pacific Ocean, Vietnam has been known as one of the most affected countries in the world due to climate change. In the recent decade, Northern Vietnam has been facing terrible weather regime disturbances, while more storms and floods come in the rainy season, more drought and water shortage often occur in the dry season. The variation of rainfall has become further complicated.

In order to address the changes in rainfall in Vietnam, this study has two main purposes. The first purpose is to investigate the behaviour of rainfall in the past to find out the happened trend as well as annual variation and second is to examine the future variation of rainfall in Northern regions of Vietnam.

To examine the behaviour of climate change in the past, the observation data of Northern Vietnam has been used to make the analysis. Rainfall data of 11 provinces in Northern Vietnam was collected with different time series ranging from 1950-2010. This research also used the updated dataset of 5th phase of climate model inter-comparison project (CMIP5). Meteorological data reproduced from 17 simulation models of CMIP5 follow 3 different scenarios: Historical, RCP4.5, RCP8.5 have been used for comparison with the observation data and investigate inter-annual and seasonal variation of rainfall. The first term of the research focused on comparing the observed data with the simulated data from Historical scenario to examine the reproducibility of CMIP5 models. The second term is, using regenerated data of RCP4.5 and RCP8.5 scenarios, to investigate inter-annual and seasonal variation of temperature and rainfall.

Results of the research have shown a significant decrease of total rainfall amounts during roughly 5 decades from 1960-2010. Observed rainfall data of 11 provinces show annual rainfall ranging from 1,453-2,480mm.yr-1. While the total rainfall in rainy season (JJA - Jun, July, August) accounted for 38.7-64.2% of the year, dry season (DJF - December, January, February) only accounted for 0.6-9.4% of the total. The average rainfall of the area from 1960-2010 is 1,677 mm.yr-1. Among 17 models in Historical scenario, 9 models show the same significant decrease trend with the observed data. Both observation data and most of the CMIP5 models show the largest rainfall in Jun, July and August and the lowest rainfall in December, January and February. Correlation coefficients of seasonal variation shown of all models are varying from 0.84-0.97 with 16 models higher than 0.9.

Initial results of the research using RCP4.5 and RCP8.5 scenarios also shows in the coming future, there will be large inter-annual variation of total amount of rainfall. There might be an increase in rainfall in Northern Vietnam in the end of 21st century with the increments mostly happen the rainy months. In dry season, the variation of rainfall is unclear and unpredictable.

Keywords: rainfall, Vietnam, CMIP5, global warming, climate change

