Temperature Changes in Southeast Asia: 1973-2008

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ABSTRACT

This paper studied the monthly seasonally-adjusted surface temperature patterns in Southeast Asia from 1973 to 2008. The study area comprised 40 regions of 10° by 10° grid-boxes in latitudes 25°S to 25°N and longitudes 75°E to 160°E. The data were fitted with a second-order auto-regressive process to reduce auto-correlations at lags 1 and 2 months. Factor analysis was used to account for spatial correlation between grid-boxes, giving six contiguous layer regions that extended beyond the original study area to form larger regions. Exploration extended from latitudes 35°S to 25°N and longitudes 65°E to 160°E. Multivariate linear regression models were then fitted to data within these larger regions. Temperatures were found to have increased in all regions, with the increases ranging from 0.091 to 0.240°C per decade.

Keywords: Southeast Asia, Climate change, Time series analysis, Spatial correlation, Auto-correlations, Factor analysis, Multivariate linear regression model

INTRODUCTION

Climate change research is of considerable current interest. Questions on its general patterns, the mechanisms involved, reliable predictions and the effects of our current and future choices, remain at least partly unanswered.

For statistical predictions, the starting point is an analysis of the historic patterns, with reduction of their dimensionality. The available historic data of surface temperatures are of a high dimension, because both location and time coordinates play a role. Once dimensionality has been reduced, parsimonious model fitting may become possible and facilitate predictions. Natural ways to reduce the data include averaging over locations and averaging over time. Both approaches have been used, as seen from this review of prior research highlights.

Various methodologies have been used to study climate change, including mechanism-based computer simulation models or statistical techniques, as well as their combinations. For example, using annual averages, Jones et al. (1999) studied the surface air temperatures in both the southern and northern hemispheres.