Identifying Climate Change and Variability in the Philippines and Indochina Peninsula:
The Maritime Continent

Introduction

Environmental conditions on Southeast Asia shape the daily activities of the communities within this region. The communities are not only dependent on rainfall for agriculture but also subject to discomfort caused by high temperatures and humidity. This research project aimed to understand the normal climate and its change/variability through the region. This was done through the analysis of rainfall amounts and temperatures as well as the atmospheric conditions important for the paths of the typhoons and ocean conditions such as temperature and salinity. The hypothesis posed was that the regional climate of Southeast Asia has been continuously changing since the early part of the 20th century with temperatures of the atmosphere and sea continuously increasing. A normal climate, that is the long-term mean or climatology, was established and used to determine how climate has changed over the years and how climate varies year after year.

Methods

A Mac Mini, with two 2.4GHz Intel Core 2 Duo CPUs and 4GB of ram with 64MB of swap space, was linked to a Linux-based cluster consisting of 32 computers, 256 GB of memory, and 4TB of storage space and was utilized during the research. The computer was used to operate and use the open access software called GrADS, which was used to make calculations and display the processed information.

The following flow chart displays the steps taken in this research:

1. Characterization of the long-term mean climate, or climatology, of the region for the period 1981-2010.
2. Identification of changes in the 20th century climate with respect to the normal climate for the period 1981-2010.
3. Calculation of the linear trends in atmospheric and oceanic variables (i.e., rainfall, sea surface temperature—SSTs) through the least squares method.
4. Calculation of year-to-year variability of the distinct climate variables via standard deviations.
5. Identification of the impact of global phenomena, such as the global warming SSTs and El Niño (ENSO), on the regional climate via the least squares method.

Findings

Conclusions

Based on the analysis of the data the initial hypothesis stating that the regional climate of the Southeast Asia region has been continuously changing in the 20th century holds true. The project is part of a study on climate variability and change on a region of the world particularly dependent on agriculture, both for economic and social reasons. The findings of this research can have multiple applications, such as for agricultural planning and also for environmental conversation. Another region of the world could be researched using the same methodology utilized during this study.