

## Chapter 5

### Conclusions and Discussions

This chapter includes conclusions from results, discussions, recommendations and suggestions for further research, and limitations of the study.

#### 5.1 Conclusions and discussions

This study investigated the trends of monthly surface temperature in South East Asia from 1973-2008. There were 25 regions of 432 months which including both land and sea surface temperatures. The monthly average temperature varies from 9.30°C to 31.74°C. Since there were seasonally pattern in these monthly temperatures data, the data were seasonally adjusted to remove the variation of monthly surface temperatures by subtracting the monthly averages of raw surface temperature and then adding back the overall mean temperatures.

Then the data was filtered with an AR(2) process to remove the autocorrelation between temperatures. A simple linear regression model was used to investigate the trend. The temperature data in each region becomes various with time and the trend steady increase about 0.08°C - 0.48°C in past three decades. However, in long period the trend not just steady increase or decrease over time. The temperature trend exhibit up and down.

The spline linear regression model with two knots at months 144 and 288 (3 periods each of the same duration in years) was fit to these data. The first period is from 1973 to 1984. The second period is from 1985 to 1996 and the last period is from 1997 to

2008. There were clearly three different patterns of temperature trends, first the temperatures shown the increasing trend for the three periods. Second the temperatures trend increased in the first period, drop in the second period and then increased again in the last period. Third the temperatures trend decreased in the first period, increased in the second period and then decreased again in the last period. However, most of the regions have increased trend in the past three decades. The trend increased ranging from  $0.01^{\circ}\text{C}$  - $0.36^{\circ}\text{C}$ . These results consist with the report of Cruz et al. (2007) the temperatures in Southeast Asia rose by  $0.10^{\circ}\text{C}$  - $0.30^{\circ}\text{C}$  per decade between 1951 and 2000. Averaged over the Asia Pacific Network region, annual mean maximum and minimum temperatures have increased by  $0.17^{\circ}\text{C}/\text{decade}$  and  $0.24^{\circ}\text{C}/\text{decade}$  since the mid-1950-2007, respectively (Choi et al, 2009). In this study the highest increase rates are greater than the warming rate of the global mean surface temperature with  $0.13 \pm 0.03^{\circ}\text{C}/\text{decade}$  over the 50-year period from 1956 to 2005 (IPCC, 2007).

## **5.2 Limitations**

This study is focusing on the tendency of temperature from secondary data without considering the factors concerned. The world hot condition may have various factors that concerned with, likewise, the monthly temperature averages for  $5^{\circ}$  by  $5^{\circ}$  latitude-longitude grid boxes are wide area may not be a representative for specific area.

### **5.3 Recommendation for further study**

This analysis, the data were removed only the autocorrelation but did not take account of the spatial correlation. For further analysis the spatial correlation should be considered and extend to the larger area of study.

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