

## CHAPTER V

### CONCLUSIONS

#### 5.1 Conclusion

From the study of time variation of aerosol in Bangkok by using AOT, Angstrom exponent, aerosol volume size distribution and PM-10 data, it could be concluded as following;

1. The time variation of aerosol in Bangkok had been corresponded to the climatic seasons, when the aerosols had been highly loading in summer and winter seasons with relatively low in rainy season. The same result was found at other AERONET sites in Thailand. But the atmospheric columns over each place would be composed of the difference aerosol particles because of the difference on sources of aerosols.
2. Angstrom exponent values showed that the fine mode particles had dominant in summer and winter seasons. For aerosol volume size distribution, it had been obtaining two modal aerosol particles and dominant by fine mode particles (radius less than  $0.6 \mu\text{m}$ , cutoff of particle radius between two modals). Especially, in summer season the volume of some fine particle sizes were higher than  $0.08 \mu\text{m}^3/\mu\text{m}^2$ .
3. The analysis of AOT and back-Trajectory was revealed that there was the injection of aerosols from eastern China into Thailand during 20-28 October 2003.
4. Most of aerosols had been highly loading in the summer season, due to high daytime air temperature was causing of heating convection with uplift of dust particle from a surface to the atmosphere. Especially whenever the daily average daytime air temperature was greater than 33 degrees Celsius, then most of AOT values were greater than 0.4. In winter season, most of the aerosols had been highly loading during the air temperature decreased due to the influence of high pressure area from the Republic of China covered the upper part of Thailand. In addition, it

was found that the variation period of AOT shown as a cycle mostly within every 4-7 days, which was corresponded to the variation of daily average daytime air temperature.

5. Most of the aerosol loading were relatively low in rainy season, when the southwest monsoon prevailed due to the removal of aerosols from the atmosphere by rain, especially, whenever the 3 hours accumulated rainfall or continuous rainfall amount was greater than 10 mm. In winter season, the northeast monsoon prevailed across a land surface, where was a low humidity, the removal of aerosols by rain were less, therefore, the aerosols still remained to be suspended in the atmosphere.
6. In the study of the relationship between AOT and PM10 data in Bangkok, it was found that there was weakly related, the correlation coefficient ( $r$ ) = 0.41.
7. In the analysis of PM10 time series, it was found that trend of the PM10 had been decreased from 1997 to minimum in 2001 and increased again to 2004 remarkable corresponding with the variation of the amount of fuel uses, which was the important source of aerosol in Bangkok. Cyclical variation of the PM10 had corresponded with the climatic season that the PM10 values were low in rainy season and relatively high values in winter and summer seasons.
8. This study would not be concluded about primary and secondary aerosols and also component of aerosol.

## 5.2 Recommendation

1. This was the study of time variation of the atmospheric aerosol loading couple with meteorological factor. In the further study about, other factors which will effect on the variation of aerosol such as location, environmental condition, especially, the economic and social condition should be considered. These environment factors **should** be involved in the analysis for the more accuracy of the variation of aerosol.
2. **The AERONET** data set in this study were less than 2 year during February 2003 – September 2004, of which some period data were missing due to stop observation and instrument calibrating periods, then that affected on the comparison analysis

- between times or sites. If the analysis will be conducted in the further study with more data set, it will get a more good result.
3. **Due** to the aerosols effect on the amount of solar radiation reaching Earth' surface. **In** the further study about the variation of aerosol and the radiation, especially in Bangkok with highly loading of aerosols, then it is very useful for more knowledge about the variation of amount of solar radiation reaching the surface in Bangkok with aerosol. In addition, airborne aerosols have been significantly affected on human health, then the result of time variation of aerosol in Bangkok could be used as a guideline to study the prediction of aerosol amount in the future, and also for planning to control the aerosol amount from any sources, especially in the period **that** the meteorological factors have been supporting in high aerosol loading.
  4. **For** Thailand, Thai Meteorological Department has been only collected solar radiation data using sun-photometer from 1998 to the present. In case of AOT, indicator for air pollution has not been used and studied in Bangkok yet. In spite of it **can** be used.
  5. **In** general, The proportion of AOT values of Chulalongkorn site in Bangkok are higher than any local sites in other areas such as Omkoi, Mukdahan, Pimai and Hua\_Hin sites, exception in the period that there were loading of aerosol from biomass burning. For the proportion of long-range transportation, the weather conditions will be the main factor to control this event that it should have been done in further study.
  6. For the result of this study, it was found that the variation of temperature will effect on aerosol variability. Unfortunately, this study has been used a short data period about 2 years, therefore, if it is longer data period then the result will be used on global change study definitely.
  7. In general, the main four types of tropospheric aerosols are included of sulfate, carbonaceous, sea salt and dust. From the result of this study in term of volume size distribution of aerosols in Bangkok. It was suggested that the aerosols in a fine mode particle might be sulfate and carbonaceous and meanwhile in coarse mode

might be dust. However, the further study on the analysis of chemical substance composition in some specific area of Thailand is needed to be planned and implemented as soon as possible for getting the required results.