Aerosol Impact on cloud properties in Pakistan

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This study investigates aerosol impact on various properties of clouds over different cities of Pakistan using Moderate Resolution Imaging Spectroradiometer (MODIS) data during the period (2001-2011). The relationship between AOD and other cloud parameters, namely water vapor (WV), cloud fraction (CF), cloud optical thickness (COT), cloud liquid water path (CLWP), cloud top temperature (CTT), and cloud top pressure (CTP) were analyzed. On smaller temporal scales, latitudinal variations of both WV and AOD produce high correlations (> 0.8) in some regions and moderate (> 0.6) in the other regions. An increasing trend in CF with AOD was found over urban region in the period of observations. The CF values were higher for Lahore than the other selected regions during the whole period.

The correlation between AOD and CWPL was found to be positive during autumn and winter seasons, while negative correlation was observed during the other seasons for all the selected regions. COT showed negative correlation with AOD at all locations except Karachi during spring and summer seasons. AOD showed a positive correlation with CTP and CTT for spring season and a negative correlation was observed for summer for the all investigated regions. Furthermore, in warm clouds AOD and CTP were negatively correlated for all regions except Peshawar, whereas AOD and CTT were positively correlated for all regions except Karachi. In cold clouds the relationships between AOD and CTP, and AOD and CTT were negative except Karachi. Thus meteorological parameters, geographical conditions, as well as warm and cold clouds are the causative factors for AOD and CTP, and AOD and CTT variations.

References

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