



Aerosols and water vapor dynamics over the Kingdom of Saudi Arabia

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The Kingdom of Saudi Arabia contains a vast desert area and the home of some of the largest deserts worldwide. This nature subjects the area to numerous dust storms. This is in addition to local emissions transported from industrial activities. The Arabian Peninsula dust storms have a major impact on air quality and affects dust cycle around the world. The nature of dust also affects air, ground traffics, and human health. Aerosols play a pivotal role in global climate change through their effects on the hydrological cycle and solar energy budget. Recently there have been some trials to study the nature of dust over the kingdom using satellite remote sensing and modeling to investigate the impact of aerosols of natural and anthropogenic origins from both local emissions and long-range transport on the air quality and atmospheric composition, yet a lot more needs to be done. In this study, data obtained from the Moderate Resolution Imaging Spectroradiometer (MODIS) on board of Terra and Aqua satellites are used to analyze aerosols properties over the thirteen provinces of the Kingdom of Saudi Arabia from April 2003 to January 2012. This analysis will help to characterize aerosol and cloud properties, and the seasonal hydrological factors to establish the relative contributions of aerosols derived from different regions to the different Saudi provinces and their impacts on local atmospheric composition and air quality. During this period, we have examined possible nature and anthropogenic/natural aerosols/dust sources. The analysis is based on important parameters including the aerosol optical depth (AOD), fine mode fraction (FMF), cloud properties including cloud top temperature (CTT), cloud top pressure (CTP) and the water vapor column. Correlation between water vapor and AOD was observed over three provinces which could be a result of pollution aerosols rather than dust and is, hence, acting as cloud condensation nuclei (CCN). Increasing anomalous aerosols pattern over 2010-2012 is also observed.

Acknowledgement

The authors would like to acknowledge the support provided by the King Abdel Aziz City for Science & Technology (KACST) for funding this work under grant No. (MT-110-010). The support provided by the Deanship of Research at King Fahd University of Petroleum & Minerals (KFUPM) is gratefully acknowledged.