

NUMERICAL SIMULATION STUDY ON THE OZONE EPISODES IN HONG KONG

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In this study, the synoptic patterns that are conducive to occurrence of O₃ episodes in Hong Kong territory are categorized by inspection of the weather charts over the period from 1999 to 2003. The synoptic patterns associated with tropical cyclones originated in the North Pacific Ocean and the South China Sea are found to be the most optimal weather conditions for the occurrence of ozone episodes in Hong Kong. A high-resolution version of regional, multi-scale photochemical air quality model (PATH), developed by Hong Kong Environmental Protection Department (HKEPD) in 2000, has been employed to investigate the evolutions of one type of ozone episodes related to tropical cyclones. A non-hydrostatic meteorological model (MM5) was applied with four dimensional data assimilation (FDDA) to provide necessary meteorological fields to air quality model (SAQM). An integrated process rate analysis is used to examine the relative contributions of individual physical and chemistry processes in the formation of ozone episodes for obtaining a better understanding the mechanisms of photochemical smog events in Hong Kong. Results show that about 30% of the net change of ozone concentration is due to the local chemical production in the lower atmosphere boundary layer and about 70% is contributed by inter-regional transport from southern China into Hong Kong. And also it's found that both chemistry and vertical transport have a significant influence on the ground-level concentration of ozone. The results indicate that the chemical regime for ozone formation seems to be VOC-limited in Hong Kong.