



Impact of Different East Asian Summer Monsoon Circulations on Aerosol-Induced Climatic Effects

Lixia Ju (1,2) and Zhiwei Han (3)

(1) Climate Change Research Center, Institute of Atmospheric physics, Chinese Academy of Sciences, Beijing, China (julx@mail.iap.ac.cn), (2) Nansen-Zhu International Research Centre, Institute of Atmospheric physics, Chinese Academy of Sciences, Beijing, China, (3) Key Laboratory of Regional Climate-Environment for East Asia, Institute of Atmospheric physics, Chinese Academy of Sciences, Beijing, China

Abstract: The different spatial distributions of aerosol-induced direct radiative forcing and climatic effects in a weak (2003) and a strong (2006) East Asian summer monsoon (EASM) circulation were simulated using a high-resolution regional climate model (RegCM3). Results showed that the atmospheric circulations of summer monsoon have direct relations with transport of aerosols and their climatic effects. Both the top-of-the-atmosphere (TOA) and the surface-negative radiative forcing of aerosols were stronger in weak EASM circulations. The main difference in aerosol-induced negative forcing in two summers varied between 2 and 14 Wm^2 from the Sichuan Basin to North China, where a maximum in aerosol-induced negative forcing was also noticed in the EASM-dominated areas. The spatial difference in the simulated aerosol optical depth (AOD) in two summers generally showed the similar pictures. Surface cooling effects induced by aerosols were spatially more uniform in weak EASM circulations and cooler by about 1–4.5°C. A preliminary analysis here indicated that a weaker low-level wind speed not conducive to the transport and diffusion of aerosols could make more contributions to the differences in the two circulations.