



The adjoint sensitivity of heavy rainfall to initial conditions in debris flow areas in China

Feifan Zhou

Institute of Atmospheric Physics, Chinese Academy of Sciences, Laboratory of Cloud-Precipitation Physics and Severe Storms, Beijing, China (zhouff04@163.com)

By studying three heavy rainfall events that were accompanied by debris flows in southwestern China, we find that 24-h accumulated rainfall is most sensitive to the initial temperature. The sensitivities to wind, surface pressure, and specific humidity are generally smaller. Moreover, the upper levels of the atmosphere are identified as the sensitive levels, and the sensitive areas are the areas with heavy rainfall. These results suggest that local temperature perturbations in the upper levels are a signal of short-term heavy rainfall in southwestern China. A validation experiment is carried out to justify the sensitivity results. The possible reasons are discussed and analyzed.