



Numerical Simulation of the Influence Mechanism of Land Surface Aridification in East Asian Summer Monsoon Transition Region on Monsoon Precipitation in the Region

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The East Asian monsoon-affected transition zone is a climatic zone that transitions from a humid monsoon climate to a dry continental climate. The region has low vegetation coverage, fragile ecological environment, high summer precipitation variability, sensitivity to climate change response and human activities, and global aridification. The most prominent area. The most direct manifestation of land surface aridification is the intensification of desertification, soil drying, and vegetation degradation, resulting in significant changes in land surface characteristic parameters, which in turn have an impact on summer precipitation. In order to study the influence of land surface aridification in summer transition zone on summer precipitation in China, this paper uses the regional climate model RegCM 4.6 and horizontal resolution of $0.75^\circ \times 0.75^\circ$ and vertical resolution of 37 layers for a total of 31 years (1987). From January to December 2017, the European Center Reanalysis Data (EC-interim) conducted a simulation study. A numerical experiment was designed to investigate the effects of land surface aridification on summer precipitation in the marginal zone affected by summer monsoon in China. The results show that the aridification of land surface can cause the total precipitation in the transition zone affected by the East Asian monsoon to decrease, and the rainless day increases. It is most prominent in the eastern and eastern parts of the northwest and northeast. The aridification of the land makes the frequency of precipitation of different magnitudes change significantly. The number of light rains decreased, the frequency of heavy rain, heavy rain and heavy rain increased significantly, and the medium-large rain decreased slightly. The aridification caused the average area of light rain to decrease, and the average area of other magnitude precipitation increased slightly, especially The area of mega-storms has increased by more than 25%. At the same time, in terms of the influence mechanism of land surface aridification on the summer precipitation in the transition zone affected by the summer monsoon, first, the temperature rise directly causes the elevation of the atmospheric convective boundary layer, which makes the atmospheric wet static energy decrease, and the second is the aridification. As the surface landscape gradient increases, the horizontal gradient of land surface turbulence increases, and the probability of strong convective precipitation increases.