

Application of pseudo global warming method and dynamic downscaling for typhoons approaching to Japan

TANIGUCHI, Kenji^{1*} ; HOSOI, Mari²

¹Faculty of Environmental Design, Kanazawa University, ²School of Environmental Design, Kanazawa University

Results of global warming experiments indicate that an intensity of typhoon will be magnified in future climate. In this study, reproductive simulation of typhoons which approach to Japan are made. At the same time, pseudo global warming conditions are composed of a reanalysis product and multiple global warming experiments. Then, numerical simulations using the pseudo global warming conditions were conducted for each actual typhoon and variations of typhoons in future climate were investigated by comparing the reproductive simulation and the runs with pseudo global warming conditions. Results of a typhoon in summer showed significant variations in tracks. When a track deflects eastward, a typhoon goes over the ocean and its center pressure remarkably decreases. In addition, wind speed around the typhoon increases very much. Geopotential height in lower troposphere showed lower anomaly over the Pacific Ocean. Decreasing Pacific high is thought to be a cause of the change in typhoon tracks. In another typhoon in summer, although variations in tracks and center pressure were smaller, total precipitation in the typhoon increased in future. However, another typhoon in summer showed decreasing precipitation with small variation in tracks and center pressure. Results for another typhoon in autumn showed smaller variation in tracks and center pressures, and total precipitation increases in results of future climate. Such characteristics in future variations were found in other typhoons in autumn. On the other hand, hourly precipitations were not necessarily increased in future climate both in summer and autumn. These results indicate that extremely strong rainfall does not necessarily occur in short time, but modestly strong rainfall continues longer time. Even if no significant variation in center pressure, or intensity is similar to current climate, precipitation will increase in future climate.

Keywords: global warming, typhoon, numerical weather prediction, downscaling