Research on Tropical Cyclone Hazard Scale Threshold Setting for Comprehensive Emergency Response of China

Jian Li and Weihua Fang

Beijing Normal University, Faculty of Geographical Science, Academy of Disaster Reduction and Emergency Management, Ministry of Civil Affairs & Ministry of Education, Beijing, China (jian.li@mail.bnu.edu.cn)

Tropical cyclone (TC) disaster causes much economic loss every year, which is mainly caused by wind, precipitation, storm surge, wave, etc. induced by TC. A threshold system of TC hazard indices that triggers disaster contingency plan is important for identifying, strengthening and organizing resources and capacities so as to reach a proper level of preparedness for timely and effective response to a potential TC disaster. The threshold should be different in different regions and different administrative levels, for the intensity, frequency, and disaster coping capacity is different. In this study, a 4-level threshold system corresponding to TC disaster contingency plan of coastal areas in China based on TC hazard indices is built. The hazard indices include central pressure (P_0), maximum wind speed (MWS) of landing points of historical tropical cyclones that affected China from China meteorological administration (CMA) tropical cyclone best-track database (1949-2014). Based on the dataset, forward speed (V_t) and radius of maximum wind (RMW) are calculated and also used as hazard indices. For tropical cyclone induced hazards, wind, storm surge, and wave hazard indices based on simulated historical wind field, surge, significant wave height, and wave period induced by tropical cyclone, and precipitation hazard index based on observed historical total precipitation induced by tropical cyclone are also included. Generalized Pareto distribution is used for intensity-frequency analysis of historical TC hazard indices. The analysis result, existing vulnerability curves, and expert experience are all considered to quantify the threshold. At last, a 4-level threshold system of TC hazard indices on country, province, city, and county level of China is built.