Geophysical Research Abstracts
Vol. 20, EGU2018-14500-3, 2018
EGU General Assembly 2018

Development of the Randomforest Model for Tropical Cyclone Formation using the NCEP FNL Operational Global Analysis Data

Hyeong Seok Kim and Hyeong-Seog Kim

Ocean Science and Technology School, Korea Maritime and Ocean University, South Korea (hyeongseog@kmou.ac.kr)

The tropical cyclone is one of devastating natural disasters and cause huge losses of life and property due to strong gust of wind, storm surge and heavy rainfalls. The tropical cyclones usually develop over the open ocean and approach to the coastal area in a few days after their formation. Thus, the prediction of tropical cyclone formation, as well as its track and intensity, is important to prepare the possible disasters from the tropical cyclones. In this study, we developed the prediction model for tropical cyclone formation using a randomforest technique that is one of machine learning algorithms. In this study, the tropical cyclone formation is defined as the development of tropical depression (TD) from the tropical disturbance. We used the NCEP FNL data set for 2007 to 2013 for analyzing and selecting predictors for TD formation. At first, we detected the tropical disturbances using the 700-hPa vorticity and divided them into two groups that were developing into TD or decay. We analyzed environmental factors related to the phase for the TD development from tropical disturbances; vertical wind shear, upper-level divergence, low-level moisture convergence and relative vorticity, relative humidity, and surface wind speed. As the results, the environmental parameters show clear distinguished changes during 48 hours before the formation of TD or extinction of tropical disturbance. Using the environmental parameters and temporal/spatial information of the tropical disturbances, the empirical prediction model was developed using a randomforest technique. The randomforest model was trained using the data of 2007 to 2013 and validated using data of 2014 to 2015. The results of training show the relative vorticity at 850 hPa was the most crucial predictor and the upper-level divergences, the day of the year, latitude, and longitude of tropical disturbance were also utilized as important predictors in the randomforest model. The validation results of this model show that the hit rate and false alarm rate for the TD formation were 0.969 and 0.173, respectively. The results suggest that the randomforest model developed in this study has good skill in the prediction of tropical cyclone formation.