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A Study of Typhoon Intensity Change by Data Mining Technique

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The western North Pacific is the area of the most frequent typhoons strikes over the world. Each year, about 6-10 typhoons of Category 4 or 5 in the Saffir-Simpson hurricane scale emerging in the western North Pacific. These severe typhoons not only bring drastic impact for the coastal area through powerful winds and torrential rain, but also stir the ocean surface and cause upper ocean response along its passage. The ocean response plays one of the most important roles in air-sea interaction. The primary purpose of this study is employing a data mining technique in retrieving passible influence parameters on typhoon intensity change. The possible influence parameters include sea surface temperature, atmospheric water vapour, rain rate, sea surface height anomaly, and air-sea temperature difference. The sea surface temperature data is derived from the Microwave Imager (TMI) and the Advanced Microwave Scanning Radiometer. The atmospheric water vapour and rain rate data are from TMI. The sea surface height anomaly is a blended data accessed from satellite altimetry, and the air temperature data is from National Centre for Environmental Prediction. Totally 14 Category-5 typhoons occurred between 2003 and 2007 in the western North Pacific are analyzed in this study, which decision tree algorithm is applied as the data mining technique. The results show that air-sea temperature difference and sea surface temperature intensify the typhoon most. Due to higher sea surface temperature can provide more heat potential to the atmosphere, and the larger temperature difference between sea and air can also provide more heat energy to the atmosphere, once a typhoon passes over the ocean where sea surface temperature is higher than air temperature, about 88% of typhoon intensity is enhanced. This data mining model is further validated by using the data of super typhoon JANGMI (2008). It shows 82.3% of accuracy prediction and 85.7% for precision.