

Is It Possible to Predict Typhoon Track Using Wind Field Observation by Wind Profiler and Dual Doppler Radars?

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The damage from the typhoons is considered a severe weather phenomenon which is highly dependent on the intensity and moving speed. In Korean peninsula there are 3.8 typhoons are passed directly or indirectly every year.

In this study, to predict the typhoon path by the ground-based meteorological observation instruments: weather radar and wind profiler, statistical analysis was performed on 10 typhoons that occurred during three years from 2010 to 2012. We analyzed the relationships between the path of the typhoon and distribution patterns of UV components observed from the wind profiler (Boseong, 127.21°E, 34.76°N).

As a result, the typhoons passing through Korean peninsula from south to north directly (Meari, Muipa) were shown a narrow linear distribution of the V wind component, while the variability of U wind component was high from -30 to 30 m s⁻¹. The curve-shaped path of the typhoons (Malou, Dianmu, and Tembin) were shown a circle-shaped data distribution for U and V wind components on the scatterplot. The weakly circle-shaped path of the typhoons (Kompasu, Khanun) which it has intermediate characteristics for a linear and curve-shaped path was shown a convex arched-shaped distribution.

In the analysis of the relationship between each wind component and the typhoon path confirmed that V components played an important role in the path of the typhoon. To predict the typhoon track before landing, we analyzed wind components at each altitude using a variational dual-Doppler radar wind field analysis.

This study will be one of the useful methods for predicting the typhoon track and understanding the features of internal dynamics of the typhoon using the ground-based meteorological observation instruments.

Keywords: dual-Doppler radar, wind profiler, Typhoon track prediction