

A comparison between SAR wind data and best track tropical cyclone data

*Udai Shimada¹, Masahiro Hayashi¹

1. Meteorological Research Institute

The advent of synthetic aperture radar (SAR) for observing very high wind speed is expected to significantly reduce uncertainty in the intensity estimation of tropical cyclones (TCs). With the aim of the future operational use of SAR wind products, SAR wind estimates are compared with best track analyses, and the cause of the discrepancy is examined. Results show large differences in the maximum wind (V_{max}) greater than 50 m/s between SAR and best track data (10-min sustained wind speed) from Japan Meteorological Agency (JMA). If SAR V_{max} is assumed as 1-min sustained wind speed and converted to 10-min sustained wind speed using Dvorak conversion tables, the bias of the converted SAR V_{max} to the JMA V_{max} decreases, and the root-mean-square error is 5.8 m/s. Further examinations show that both JMA and Joint Typhoon Warning Center tend to underestimate V_{max} for intensifying TCs and overestimate for steady-state and weakening TCs. Underestimated TCs are characterized by a small radius of maximum wind with “band” or “central dense overcast (CDO)” patterns in the Dvorak analysis. The underestimation is likely related to the CDO weak bias, known as one of the weaknesses in the Dvorak technique. For weakening TCs, Dvorak rules by which intensity is kept higher than one estimated from cloud patterns during the weakening stage may lead to overestimations. This study finds SAR wind useful for monitoring TC intensity and intensity changes. Additionally, the results suggest a need for a thorough review of the Dvorak technique based on SAR wind observations.

Keywords: Tropical cyclones, SAR wind