Update on Operational Analysis of the Tropical Cyclone at KMA

This paper reports the update on Operational Analysis of Tropical Cyclone at KMA. KMA added new algorithm to retrieve the radius of maximum wind (RMW) in web-based Satellite Image Analysis System. The validation between RMW and QuikSCAT wind speed has been performed by using seven typhoon cases in 2008.

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1. Introduction

Korea Meteorological Administration (KMA) analyzed tropical cyclones by using Automated Objective Dvorak Technique (AODT) since 2005. AODT is able to access easily through user-friendly web-based Satellite Image Analysis System, which has been developed by KMA for tropical cyclone analysis in 2006. Recently, KMA added new algorithm to get the radius of maximum wind (RMW) in web-based Satellite Image Analysis System. The validation between RMW and QuikSCAT wind speed has been performed by using typhoon cases in 2008 and got relatively reasonable results to use as operationally.

2. Maximum Wind Radius of Tropical Cyclone

RMW is able to derived directly using image-based simple linear regression relation between cloud top temperature and collocated reconnaissance Aircraft radius of maximum wind measurements. The more detailed information of RMW algorithm can be referred to AODT user guide and Kossin et al. (2007).

Figure 1 reveals a relationship between cloud top temperature (CTT) of infrared (IR) radiation imagery and QuikSCAT wind speed. There is a quick response when the CTT is below around -45°C. Mean CTT above the eyewall is calculated and finds the distance from TC center to -45°C isotherm if the mean CTT is less than -50°C. If it is warmer than -50°C then find the warmest temperature inside the storm-centered disk and measure the distance from TC center to the isotherm of average of the warmest temperature and two of the mean CTT above the eyewall. In both cases, the size of the eye is given by the directional mean of the distance which measure in two different cases. Second, applies extended best-track information to directly estimate the critical wind radius. The mean distance of -45°C isotherm from the typhoon center is calculated as estimated 15m/s wind mean radius of typhoon RAMMASUN (Fig. 2). The estimated wind radius is consistence to QuikSCAT wind data. The validation between calculated wind radius and QuikSCAT data shows in Table 1. The mean RMSE reveals 78 km in 130 samples for typhoon RAMMASUN case.
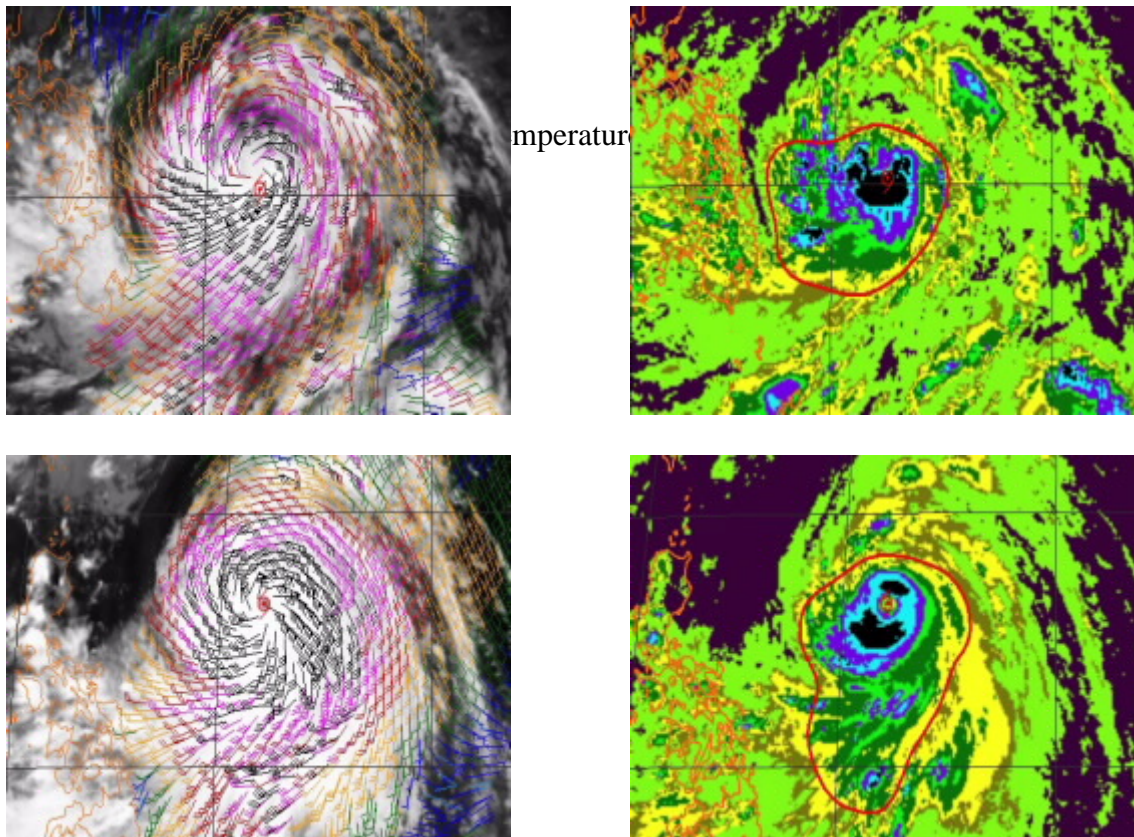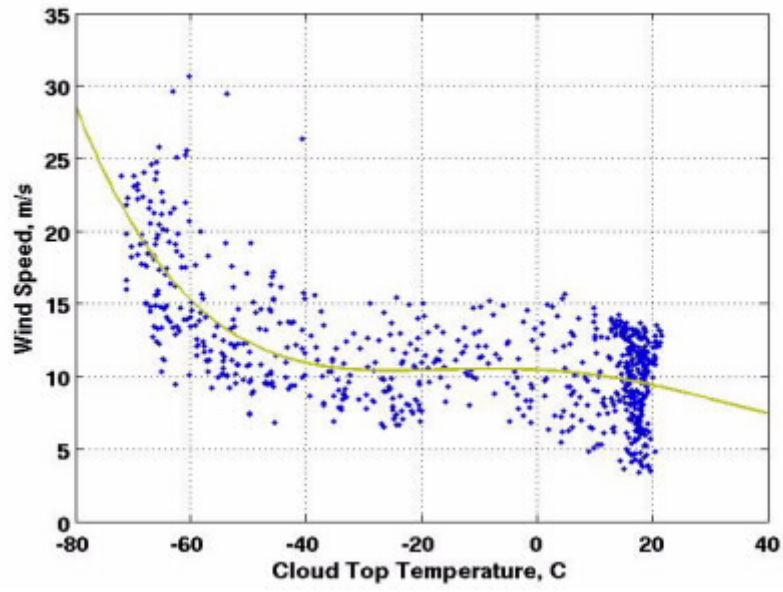
Fig. 2. The 15m/s wind radius of Typhoon RAMMASUN (right panel),
QuikSCAT data overlay IR imagery (left panel).

Table 1. The result of validation between 15m/s wind radius and QuikSCAT data

Name of TY	Time	No. of sample	Absolute Error	RMSE
RAMMASUN	05.07.21	20	54.700	65.981
	05.08.21	33	65.364	75.526
	05.09.09	31	52.581	64.176
	05.09.21	18	83.056	97.490
	05.10.09	28	78.036	89.051
	mean	130	66.747	78.445