Mean Features of Tropical Cyclone Circulation from QUIKSCAT Sea Surface Wind Observations

*Hirotaka Kamahori[1]

1. Meteorological Research Institute

The mean features of vorticity and divergence fields associated with tropical cyclones are evaluated as anomalies from environmental fields, in six tropical cyclone (TC) active basins (the western North Pacific, the eastern North Pacific, the north Atlantic, the north Indian Ocean, the south Indian Ocean, and the South Pacific), using satellite-derived daily sea surface wind observations. A common feature in all basins is that concentric cyclonic vorticity anomalies extend within a 5-degree radius from the TC center with maximum values of $1.5x10^{-4}$ to $2.0x10^{-4}$ s^{-1}. The vorticity field near the TC center is the most intense in the North and the South Indian Ocean, and the weakest in the South Pacific. In terms of horizontal size, the radius at the half maximum ranges from 1.8 to 2.4 degree for vorticity fields with the largest in the South Pacific, and the smallest in the eastern North Pacific. In a case of divergence fields, similar results are found with the largest size in the South Pacific and the smallest in the eastern North Pacific. The cyclonic vorticity anomalies in the inner area are surrounded by anti-cyclonic anomalies in all basins, indicating suppression of convective activity due to the tropical cyclones themselves at a large distance from the center. The anti-cyclonic vorticity have maximum values of around $1x10^{-5}$ s^{-1} and are distributed mainly on the equatorial side of the center. These structures with the cyclonic fields in the inner area and anti-cyclonic fields in the outer area are consistent with the previous study in precipitation fields.

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