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Global Scatterometer Observations of the Structure of Tropical Cyclone Wind Fields

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Abstract

A very large database containing 24 years of scatterometer passes is analyzed to investigate the surface wind fields within tropical cyclones. The analysis confirms the left–right asymmetry of the wind field with the strongest winds directly to the right of the tropical cyclone center (Northern Hemisphere). At values greater than 2 times the radius to maximum winds, the asymmetry is approximately equal to the storm velocity of forward movement. Observed wind inflow angle (i.e., storm motion not subtracted) is shown to vary both radially and azimuthally within the tropical cyclone. The smallest observed wind inflow angles are found in the left-front quadrant with the largest values in the right-rear quadrant. As the velocity of forward movement increases and the central pressure decreases, observed inflow angles ahead of the storm decrease and those behind the storm increase. In the right-rear quadrant, the observed inflow angle increases with radius from the storm center. In all other quadrants, the observed inflow angle is approximately constant as a function of radial distance.

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