AOGS 2006

Wavenumber-One Rainfall Asymmetry Observed in Typhoons and Its Relevance to Ambient Vertical Wind Shear

MITSURU UENO

Typhoon Research Department, MRI, Tsukuba, Japan

Recently the influences of vertical wind shear on tropical cyclone structure have been increasingly investigated. In the present study we explore the relationship between ambient vertical wind shear and rainfall asymmetries for the typhoons in 2004. For this study, vertical wind shear is defined as the vector difference between the average 200-hPa and the 850-hPa wind within a radius of 500 km from the cyclone center and calculated from the JMA global analysis data. On the other hand, wavenumber-one asymmetries of rainfall are determined by applying the first-order Fourier decomposition routine to the Radar-AMeDAS precipitation data and satellite-based rainfall estimates such as TMI and AMSR-E rain rates in a coordinate system relative to the storm motion. The Radar-AMeDAS data gives hourly precipitation estimated by ground-based C-band radar, calibrated with the AMeDAS (Automated Meteorological Data Acquisition System) rain gauge data. While the Radar-AMeDAS data is available only in the midlatitudes in and around Japan, the satellite data covers mainly ocean area in low-latitudes. So it is expected that the combination of two different sources of data provides a comprehensive dataset for rainfall asymmetries in typhoons. A preliminary analysis shows that the rainfall rate tends to be enhanced directly downshear with a leftward preference almost irrespective of the life cycle stage of tropical cyclone and shear condition in which the storm is embedded.