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On the Relationship between the Secondary Eyewall

Formation and Differential heating

Abstract

Secondary eyewall formation (SEF) and eyewall replacement cycle (ERC) are well documented phenomena in both observation and simulation. A mature tropical cyclone often passes through the processes and experiences weakening and reintensifying in strength. However, dynamical mechanism of SEF is complicated and has not reached a consensus yet.

An experiment for SEF of Typhoon Hagibis (2019) is conducted using the WRF model. The simulated typhoon passes through SEF twice with first ERC failed to accomplish. The inner eyewall weakens a little and maintains its strength until the second SEF established at 48 h of the simulation time. This study aims to analyze the relationship between SEF and differential heating.

The result shows that differential heating is not only responsible for the establishment of SEF, but also a crucial factor in maintaining outer eyewall structure. Differential heating could also be a precursor of BL unbalanced dynamics, which has been widely accepted as a key factor of SEF.

Keyword

Sawyer –Eliassen equation (SE equation)