



High-frequency Oscillations in Eyewalls of Tropical Cyclones

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Abstract:

High-frequency oscillations, with periods of about 2 hours, are first identified by applying wavelet analysis to observed minutely wind speeds around the eye and eyewall of tropical cyclones (TCs). Analysis of a model simulation of Typhoon Hagupit (2008) shows that the oscillations also occur in the intensity of TC, vertical motion, convergence activity and air density around the eyewall. Sequences of oscillations in these variables follow a certain order. In a typical cycle, the drop of density in the planetary boundary layer (PBL) is followed by an increase in the inward radial wind; this enhanced frictional convergence causes increase in density, followed by a decrease in the inward radial wind. The increase in convergence in the PBL causes increase of updraft at the top of the PBL, followed by high vertical velocity at high altitude of 8-10 km, then the increase of the maximum wind speed, and vice versa.

Key words: tropical cyclone, high-frequency oscillations, eyewall, intensity