

HyARC-SELIS Seminar (HyARC Seminar#158)

Date: September 5 (Thursday) 16:00-

Room: Meeting room (617) of Research Institutes Building

Speaker: Prof. Hung-Chi Kuo (National Taiwan University)

Structural and Intensity Changes of Concentric Eyewall Typhoons in the Western North Pacific Basin

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An objective method is developed to identify concentric eyewalls (CEs) for typhoons using passive microwave satellite imagery from 1997 to 2011 in the western North Pacific basin. Three CE types are identified: CE with an eyewall replacement cycle (ERC; 37 cases), CE with no replacement cycle (NRC; 17 cases), and CE is maintained for an extended period (CEM; 16 cases). The inner eyewall (outer eyewall) of the ERC (NRC) type dissipates within 20 h after CE formation. The CEM type has its CE structure maintained for more than 20 h (mean duration time is 31 h). Structural and intensity changes of CE typhoons are demonstrated using a T-Vmax diagram (where T is the brightness temperature and Vmax is the best track estimated intensity) for a time sequence of the intensity and convective activity (CA) relationship. While the intensity of typhoons in the ERC and CEM cases weakens after CE formation, the CA is maintained or increases. In contrast, the CA weakens in the NRC cases. The NRC (CEM) cases typically have fast (slow) northward translational speeds and encounter large (small) vertical shear and low (high) sea surface temperatures. The CEM cases have a relatively high intensity (63 m s^{-1}), and the moat size (61 km) and outer eyewall width (70 km) are approximately 50% larger than the other two categories. Both the internal dynamics and environmental conditions are important in the CEM cases, while the NRC cases are heavily influenced by the environment. The ERC cases may be dominated by the internal dynamics due to more uniform environmental conditions.