

# An Initiation Process of TD-type Disturbances under an Influence of Upper-Level Troughs

\*Yuya Hamaguchi<sup>1,2</sup>, Yukari Takayabu<sup>1</sup>

1. Atmosphere and Ocean Research Institute, The University of Tokyo, 2. Department of Earth and Planetary Science, The University of Tokyo

In this study, the initiation process of the summertime tropical depression-type disturbances (hereafter, TDDs) in the western and central Pacific is investigated. TDDs are widely known as westward-travelling synoptic-scale disturbances over the western Pacific (Takayabu and Nitta 1993). As Ritchie and Holland (1999) reported, roughly 50% of western Pacific tropical cyclones form in association with TDDs. In spite of their social importance in terms of tropical cyclogenesis over the western Pacific, their initiation process has not been fully understood.

At the same time, though TDDs are thought to be originated from lower-tropospheric eddies in association with convection in principle, several studies have indicated that some of TDDs are initiated by upper-tropospheric forcing (e.g. Tam and Li, 2006; Heta, 1991). Despite the plausibility of the upper-level contribution on the initiation of TDDs, little research has been conducted on the statistical properties of TDDs induced by upper-level activities.

From these perspectives, using CLAUSS brightness temperature and JRA-55 products, we statistically analyzed the relationship between TDDs' occurrences and the upper-level perturbations to understand the mechanism of the initiation process of TDDs.

As a result, it is revealed that about 30% of TDDs are generated under an influence of upper-level troughs (so called Mid-Pacific Trough), especially in the off-equatorial region near the date line. The initiation of such trough-related TDDs is associated with a preceding dynamical updraft at the back of the upper-level troughs. It enables convections to become deeper, which results in the development of low-level disturbances via the moisture-convection feedback. Furthermore, according to the composite figures on the trough-related TDDs, it is shown that their environments are much drier than those of other TDDs, which indicates that the upper-level troughs play important roles at the initial stage of their occurrence, especially in relatively drier conditions.

Keywords: TD-type disturbance, Upper-tropospheric trough, Extratropical forcing