

Differences in tropical cyclogenesis in North Pacific between the strong El Nino years 1997 and 2015 investigated by perpetual July experiments with NICAM

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This study investigates the difference in tropical cyclone characteristics between the strong El Nino years 1997 and 2015. Generally, in North Pacific, more intense tropical cyclones (TCs) are formed in El Nino years than in non-El Nino years. In fact, the number of intense TCs in 1997 and 2015 was larger than that of the average year. However, recent studies found that, characteristics of TCs are different between the these two years; Murakami et al. (2017) indicated that the Pacific Meridional Mode (PMM, Chiang and Vimont 2004) of SST caused the more probability of intense TCs in 2015. Yamada et al. (2017) conducted ensemble hindcast experiments in boreal summers of 1997 and 2015 using the Non-hydrostatic Icosahedral Atmospheric Model (NICAM), and found that the number of intense TCs in 2015 was much smaller than that in 1997. In this study, we conducted perpetual July experiments for 30 months by using the 56 km mesh NICAM to examine how tropical cyclogenesis (TC-genesis) behaves differently between 1997 and 2015. The result shows that the number of TC-genesis in 1997 is larger than that in 2015 over the western North Pacific, while the number in 1997 is smaller than that in 2015 over the eastern North Pacific. We analyze relationship between the average large-scale environmental fields and TC-genesis in the simulations. We found that the monsoon trough in 1997 extends more easterly than that in 2015 over the western North Pacific and that the North Pacific anticyclone in 1997 is weaker in the western North Pacific than that in 2015. Over the eastern North Pacific, the stronger North Pacific anticyclone in 1997 leads to larger vertical shear on the region favorable for TC-genesis.

Keywords: tropical cyclone, El Niño, Pacific Meridional Mode