Cao, X., R. Wu, Y. Dai, J. Xu, 2020: A comparison of the effects of an upper-level anticyclone and a lower-level cyclone on tropical cyclogenesis in idealized simulations. *J. Meteor. Soc. Japan*, **98**, 1005-1027. https://doi.org/10.2151/jmsj.2020-052

Plain Language Summary: The effects of an upper-level anticyclonic circulation and a lower-level cyclonic circulation on tropical cyclone (TC) genesis are examined by idealized simulations. The simulation results show that the upper-level anticyclonic circulation makes a negative contribution to TC genesis, whereas the lower-level cyclonic circulation makes a positive contribution. The upper-level anticyclonic circulation results in slower TC genesis due to a large vertical zonal wind shear that shifts the upper-level vortex eastward from its initial position, which is unfavorable for the vertical alignment and warm core maintenance of the vortex. The initial upper-level anticyclonic circulation is not necessary for TC genesis, and the strong upper-level anticyclonic circulation generally observed with a strong TC should be regarded as a result of deep convection. In contrast, strong lower-level winds due to the superposition of the large-scale lower-level cyclonic circulation and vortex induce large surface heat fluxes and vorticity, leading to strengthened convection and diabatic heating and a quick build-up of positive vorticity, resulting in rapid TC genesis.

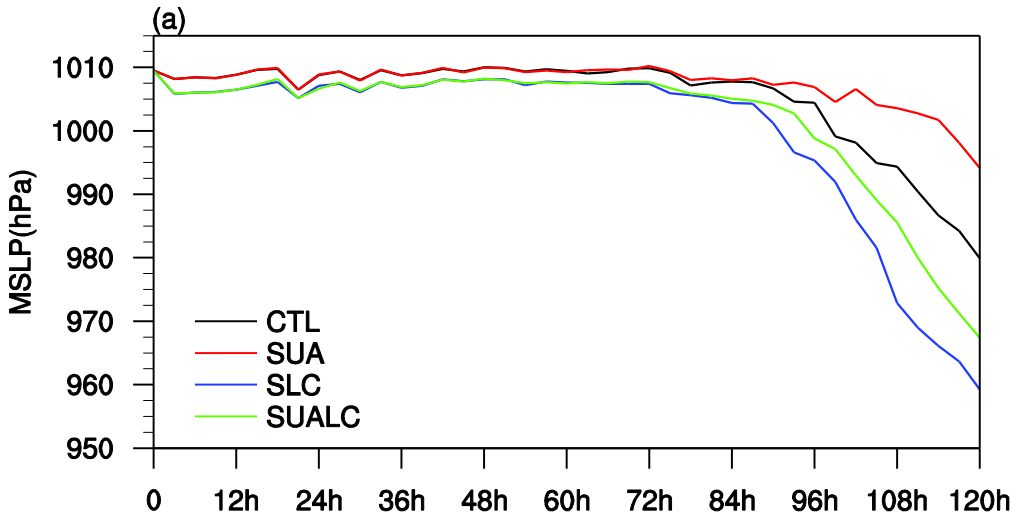

Figure 1. The time evolutions of the MSLP (hPa) in four experiments: CTL (black), SUA (red), SLC (blue), and SUALC (green). The abscissa represents time (h), and the ordinate corresponds to the intensity.

- The upper-level anticyclonic circulation makes a negative contribution to TC genesis, whereas the lower-level cyclonic circulation makes a positive contribution.
- The upper-level anticyclonic circulation results in slower TC genesis due to a large vertical zonal wind shear.
- Strong lower-level winds due to the superposition of the large-scale lower-level cyclonic circulation and vortex induce large surface heat fluxes and vorticity, resulting in rapid TC genesis.