Li, T.-H., and Y. Wang, 2021: The role of boundary layer dynamics in tropical cyclone intensification. Part II: Sensitivity to initial vortex structure. *J. Meteor. Soc. Japan*, **99**, https://doi.org/10.2151/jmsj.2021-028

Plain Language Summary: This study attempts to answer a question why the simulated tropical cyclone (TC) intensification rate depends on TC structure based on both a boundary layer model and a full-physics model. A new explanation has been given based on results from Part I. It is found that the positive indirect effect of surface friction and its related boundary layer dynamics depends strongly on TC structure but the direct dissipation effect of surface friction depends mainly on TC intensity but little on TC structure. As a result, the intensification rate of the simulated TC is sensitive to the initial TC structure. The TC vortex initially with a smaller radius of maximum wind (RMW) and/or with faster radial decay wind structure has a shorter initial spinup stage due to faster moistening of the inner core and intensifies more rapidly during the intensification stage.

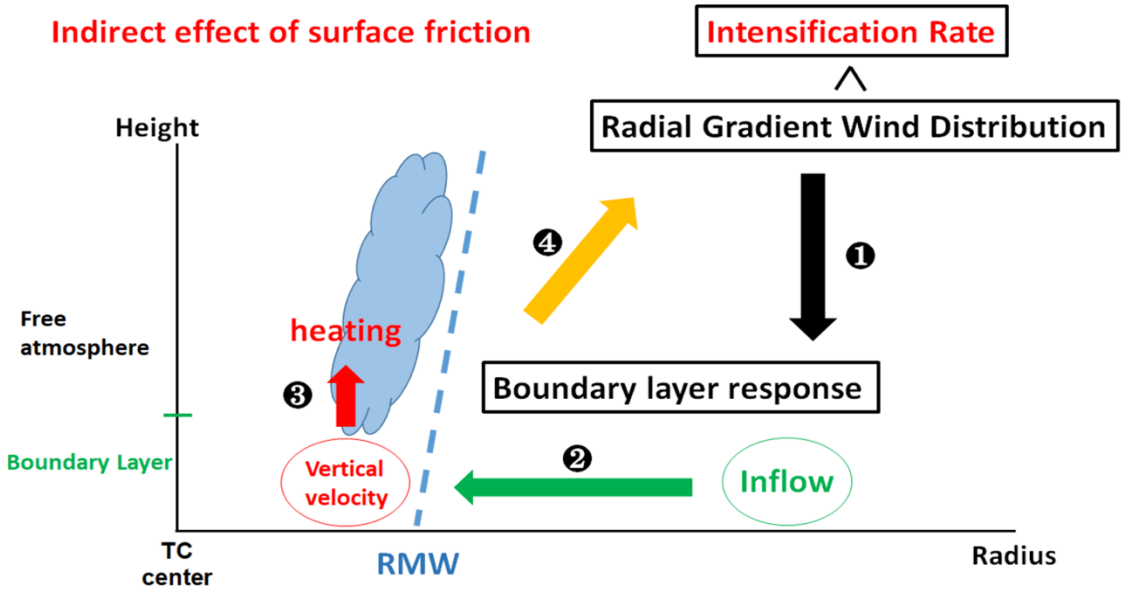

Figure 1. Schematic diagram showing the interactive processes among the free troposphere, inflow boundary layer and eyewall convection in determining the intensification rate of a TC. The key to the intensification rate of a TC is the strength and radial location of eyewall convection and thus diabatic heating largely controlled by the boundary layer response to the structure of the TC vortex above the boundary layer and the TC structure above the boundary layer in turn is modified by the radial-vertical distribution of diabatic heating in the eyewall through balanced dynamics.

- The intensification rate of the simulated TC is very sensitive to the radial structure of the initial TC vortex.
- This is because the direct and indirect effects of surface friction and the associated boundary layer dynamics have different sensitivities to the structure of the TC vortex.
- The direct negative effect of surface friction is mostly determined by the TC intensity, while the indirect positive effect is very sensitive to the structure of the TC vortex.