CORRIGENDUM

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This corrigendum is to report a known error in Wang et al. (2022) entitled "Tropical Cyclone Potential Size" (TC PS). The error is that the reported w_{cool} diagnosed from CM1 simulations (section 3) is about half of the true value, as a result of a mistake in the code of its calculation. Thus, the first sentence on p. 3018 should be corrected as "The value of w_{cool} is approximately 0.0027 m s^{-1} when SST = 300 K; it increases to ~0.006 m s^{-1} when SST = 280 K."

The incorrect value of w_{cool} was put into the TC PS model to compare with CM1 results (Figs. 10 and 11 of Wang et al. 2022). Thus, we need to evaluate the error induced in Figs. 10 and 11. The overall nice match of both r_a (outer radius of vanishing winds) and p_m (near surface pressure at radius of maximum wind r_m) in Figs. 10 and 11 suggests that the TC PS model is not strongly sensitive to w_{cool}; thus, the error is estimated to be small and does not affect the conclusion(s) drawn from Figs. 10 and 11. Because the first author is not able to access the original model output, we do not provide direct updates of Figs. 10 and 11 here. Instead, we demonstrate below the general weak sensitivity of the TC PS model to w_{cool} by a sensitivity test in which the range of w_{cool} tested is wider than the error itself.

In the TC PS model, w_{cool} is put into Chavas et al. (2015, hereafter C15) wind model for the p_m and r_m (for calculation of M_m, the absolute angular momentum at r_m) predicted by C15 model. First, we show C15 model predicted p_m is not very sensitive to w_{cool} (Fig. 1). The p_m only changes by ~5 hPa with a 6-times difference of w_{cool} (0.001 35 to 0.0081 m s^{-1}). Indeed, TC PS predictions are weakly sensitive to w_{cool}, as shown by Figs. 2 and 3. The effect of w_{cool} in affecting TC PS prediction by modulating M_m is small as M_m is by itself only a small portion (~10%) of M_a (absolute angular momentum at r_a), which is responsible for the "outflow work" in TC PS model.

Given that the TC PS model is only weakly sensitive to w_{cool}, the nice match of the TC PS prediction and CM1 results in Figs. 10 and 11 of Wang et al. (2022) should still hold with correct w_{cool}.

Another relevant calculation is the corresponding r_a (section 3) estimated from Emanuel (2004, hereafter E04) model by fitting to simulated r_4. The incorrect (too small) w_{cool} would increase r_a by doubling the $C_d V_{gm}/w_{\mathrm{cool}}$ factor in E04 model [Eq. (21) of Wang et al. 2022]. Coincidentally, though, doubling this factor appears reasonable in the tail of the wind profile because we included a surface gustiness of 5 m s^{-1} in CM1 [Eq. (30) of Wang et al. 2022], which would effectively increase surface drag. Thus, the original estimate of r_a in Wang et al. (2022) is still considered reasonable.

REFERENCES

Chavas, D. R., N. Lin, and K. A. Emanuel, 2015: A model for the complete radial structure of the tropical cyclone wind field. Part I: Comparison with observed structure. *J. Atmos. Sci.*, **72**, 3647–3662, https://doi.org/10.1175/JAS-D-15-0014.1.

Emanuel, K. A., 2004: Tropical cyclone energetics and structure. *Atmospheric Turbulence and Mesoscale Meteorology*, E. Fedorovich, R. Rotunno, and B. Stevens, Eds., Cambridge University Press, 165–192.

Wang, D., Y. Lin, and D. Chavas, 2022: Tropical cyclone potential size. *J. Atmos. Sci.*, **79**, 3001–3025, https://doi.org/10.1175/JAS-D-21-0325.1.

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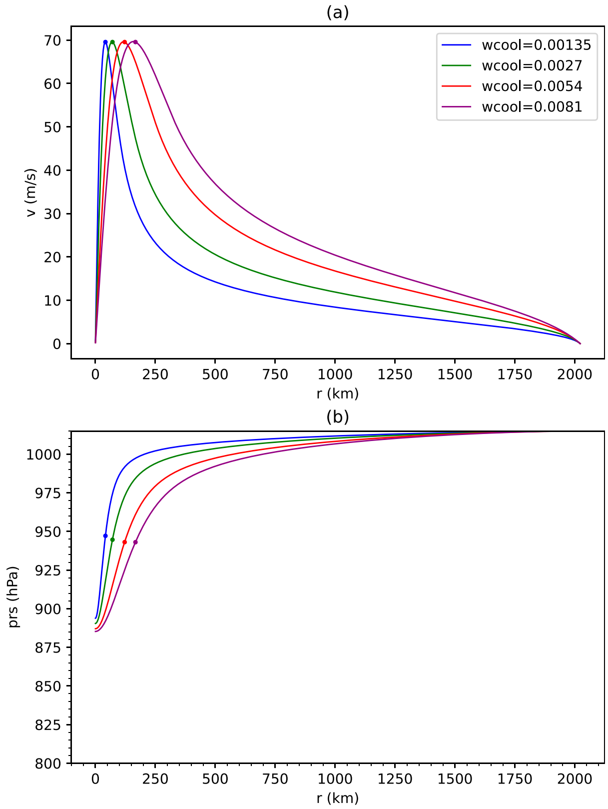

FIG. 1. This figure helps explain why quantitatively small changes of Figs. 10 and 11 in Wang et al. (2022) are expected if correct w_{cool} were used. (a) C15 model predicted wind profile (m s^{-1}) with different w_{cool} (m s^{-1}; see legends); (b) the corresponding surface pressure profile following gradient wind balance. The dots mark r_m and the corresponding tangential velocity in (a) and p_m in (b). Environment settings other than w_{cool} are the same as Fig. 4 of Wang et al. (2022). In the calculation of surface pressure by gradient wind balance, air density is simply approximated by ideal gas law ignoring water vapor.

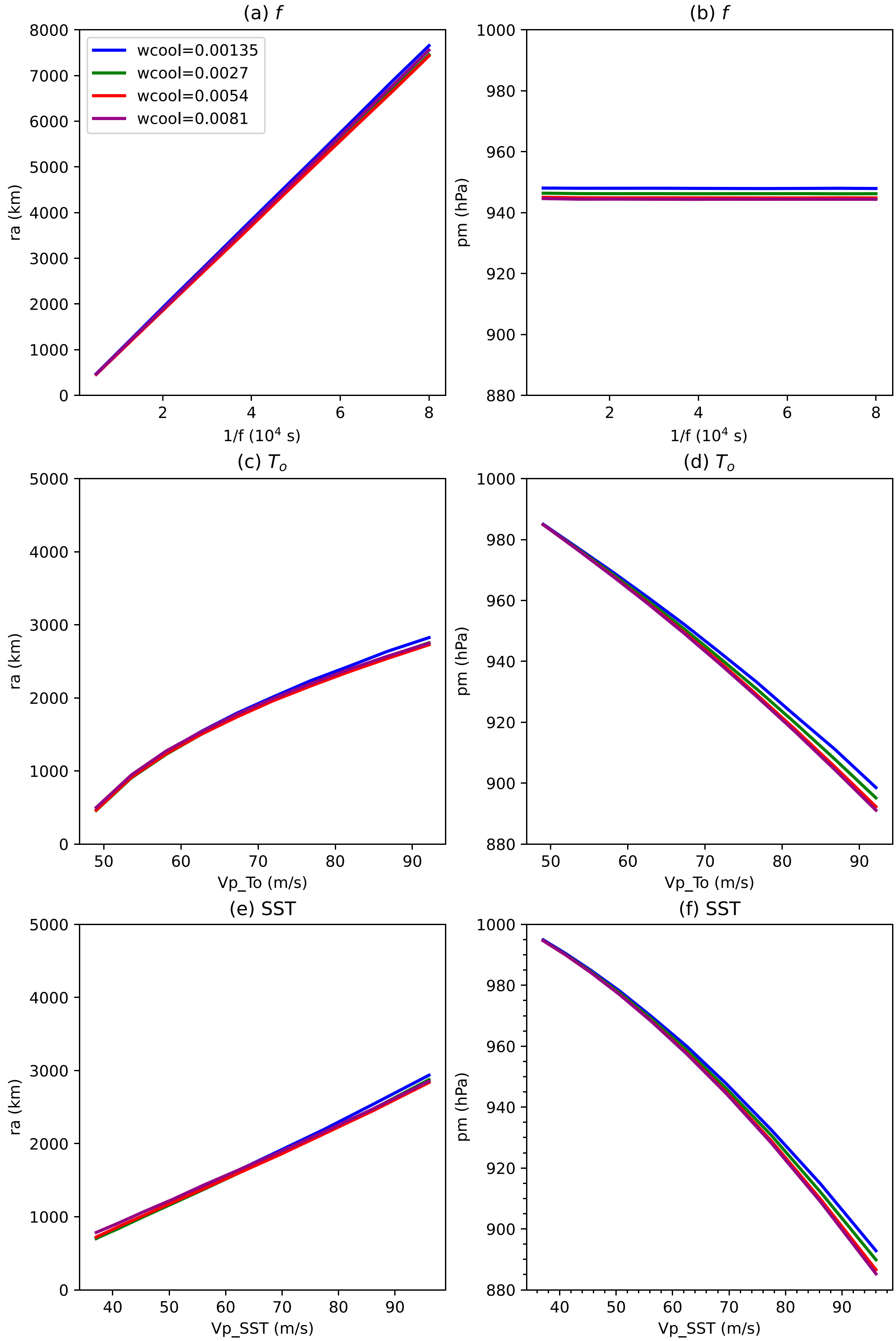

FIG. 2. This figure demonstrates why quantitatively small changes of Fig. 10 in Wang et al. (2022) are expected if correct w_{cool} were used. TC PS model prediction of (a),(c),(e) r_a (km) and (b),(d),(f) p_m (hPa) for a range of values of w_{cool} (m s^{-1}; see legends) and with variable (top) Coriolis parameter f, (middle) tropopause (outflow) temperature, and (bottom) sea surface temperature. Environment settings other than w_{cool} are the same as Fig. 5 of Wang et al. (2022), with the exception that $\eta = 0.4$, $r_o = 1.25r_a$ is used following section 3 of Wang et al. (2022), and outflow temperature spans from 160 to 240 K in (c) and (d). This figure follows Fig. 5 of Wang et al. (2022).

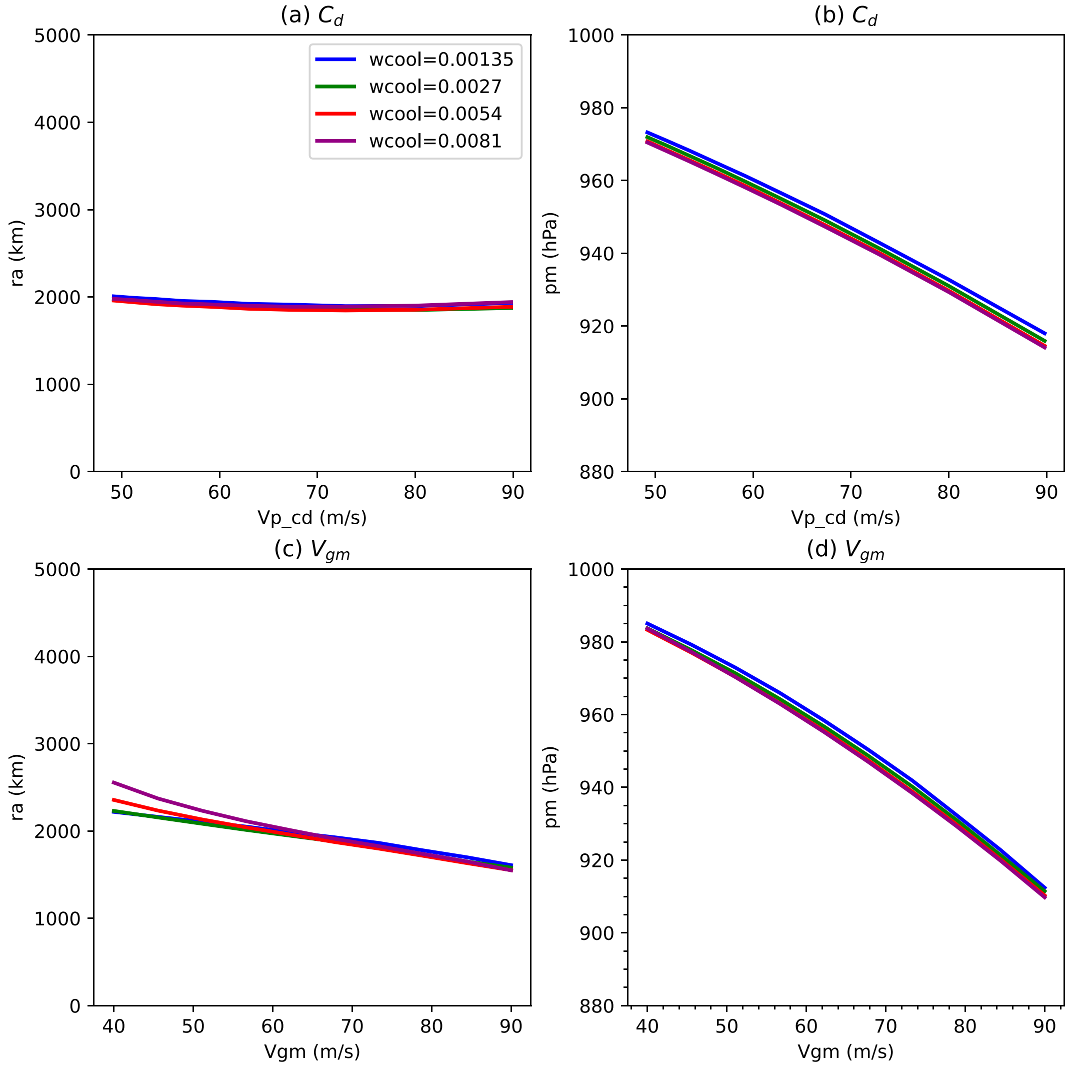

FIG. 3. This figure demonstrates why quantitatively small changes of Fig. 11 in Wang et al. (2022) are expected if correct w_{cool} were used. As in Fig. 2, but with variable (top) surface exchange coefficient for momentum C_d and (bottom) maximum gradient wind V_{gm}. Environment settings other than w_{cool} are the same as Fig. 6 of Wang et al. (2022), with the exception of $\eta = 0.4$, $r_o = 1.25r_a$. This figure follows Fig. 6 of Wang et al. (2022). The test with a varied exchange coefficient for enthalpy C_k is not included because it does not modulate V_p in our simulation setup and it is not varied in Figs. 11c and 11d of Wang et al. (2022).