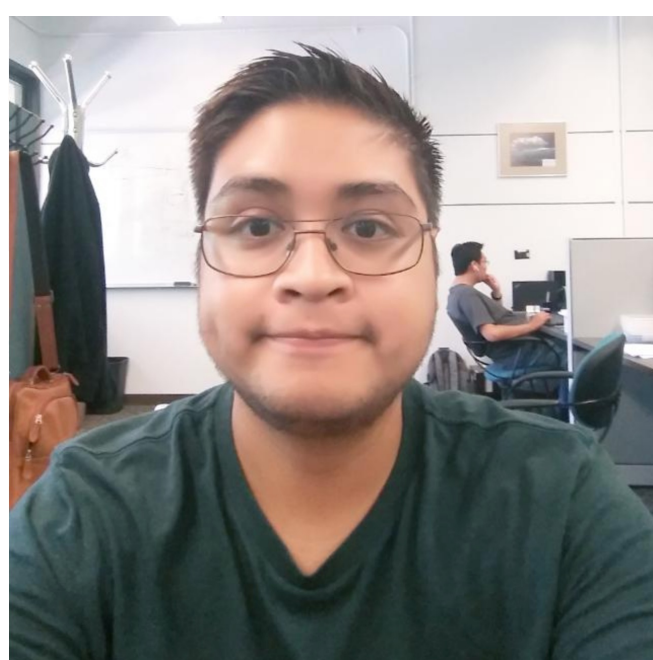
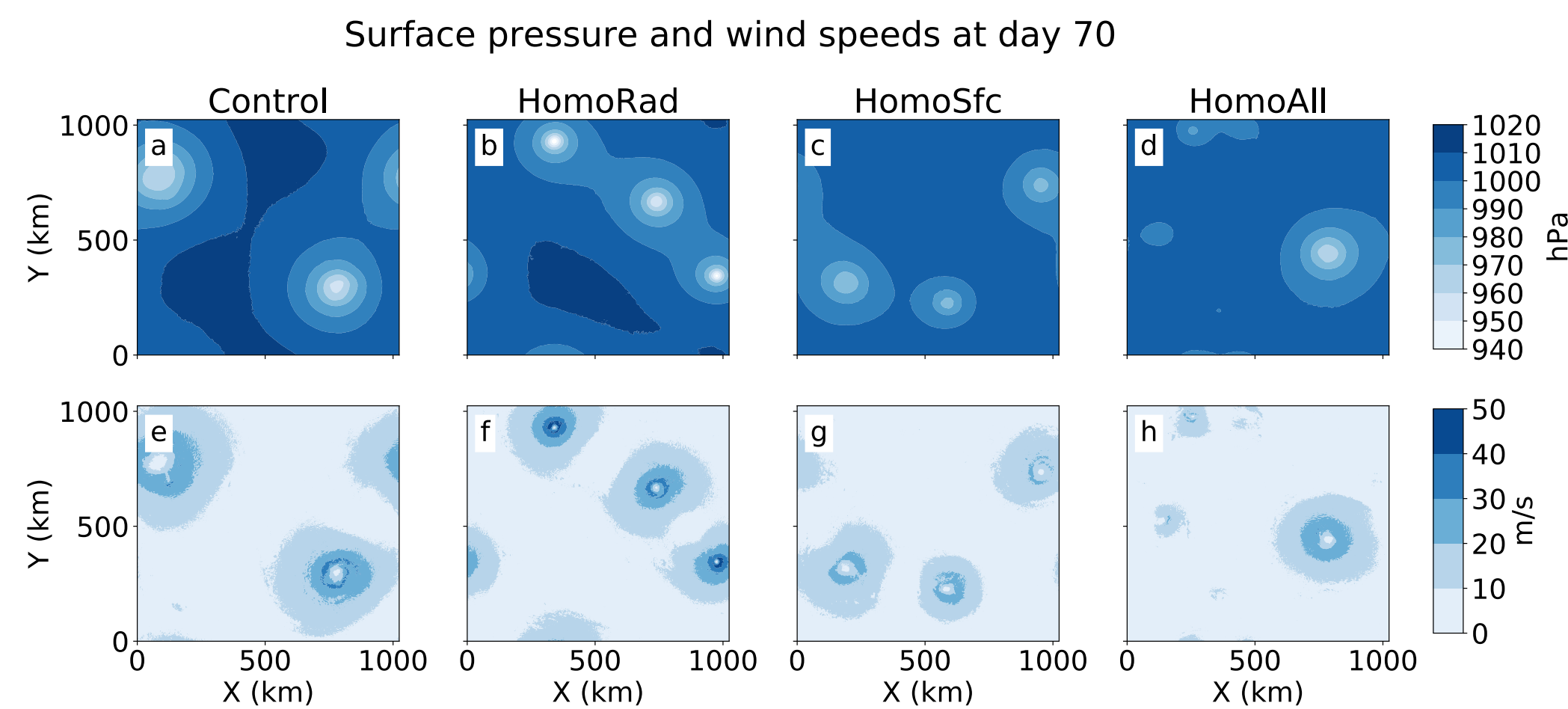


# The role and timescale of the moisture-entrainment-convection feedback in spontaneous tropical cyclone genesis

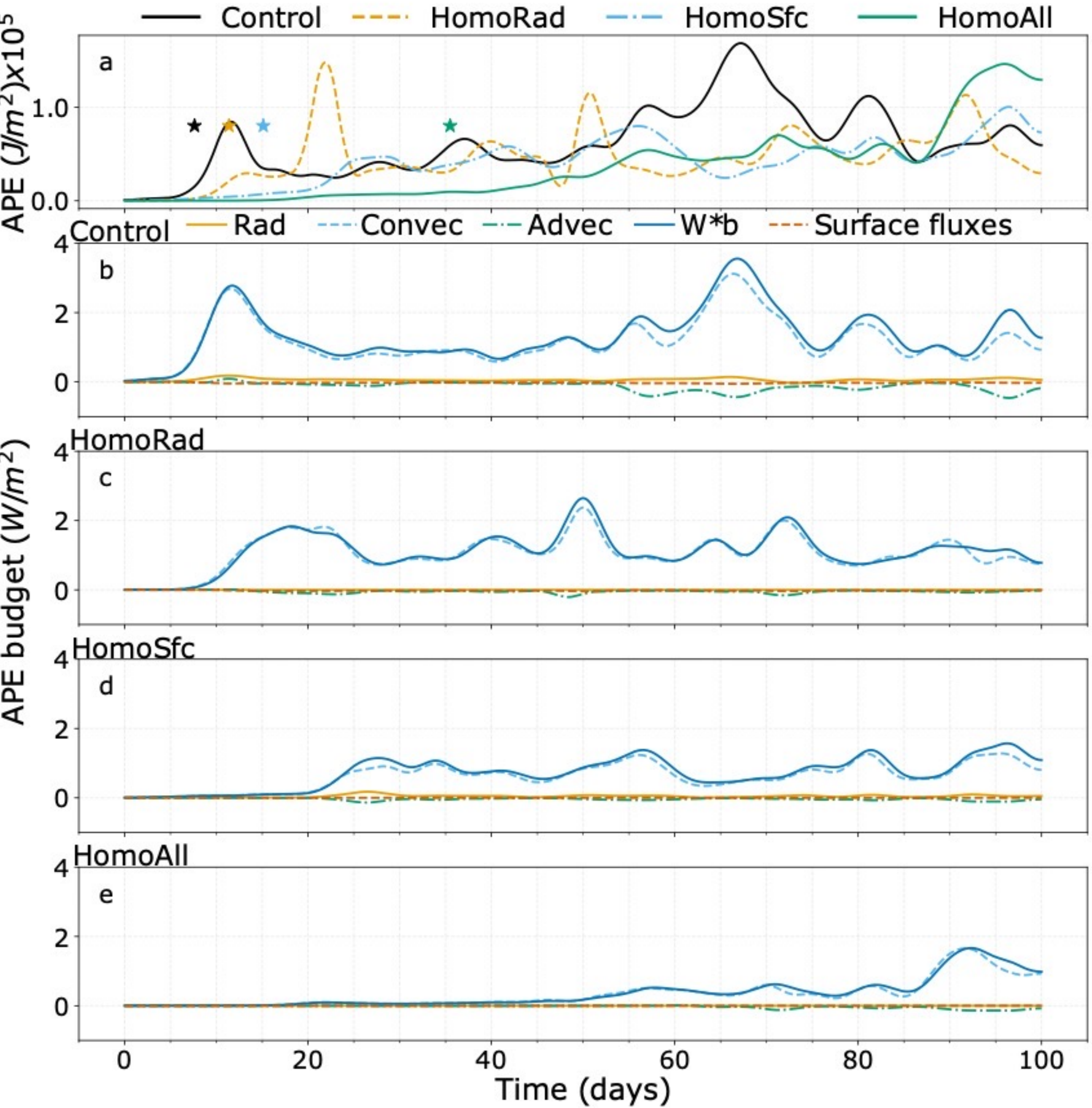


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1. Mechanism denial experiments show that tropical cyclones can self-emerge in the absence of both, radiative and Surface-flux feedbacks\*

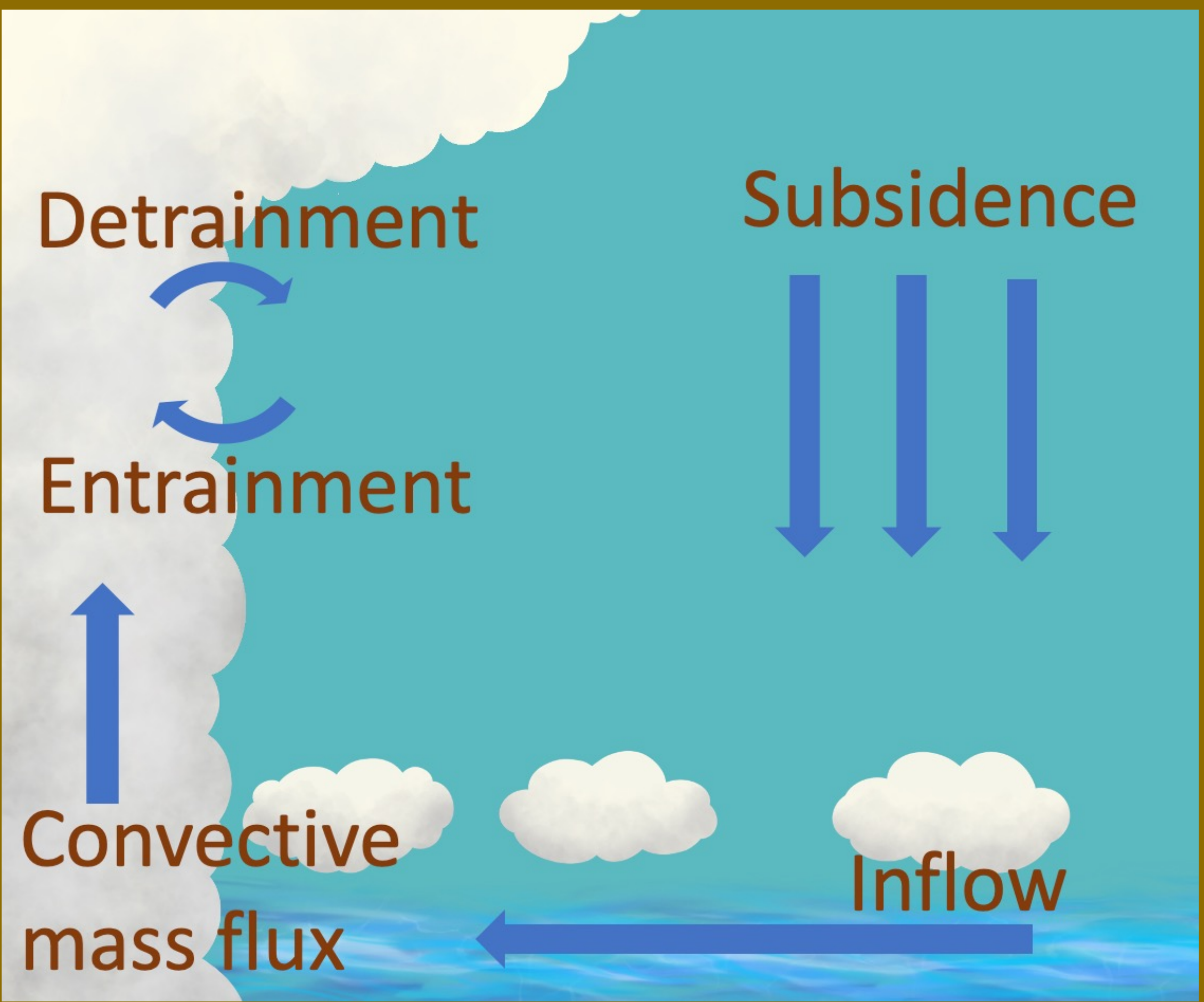
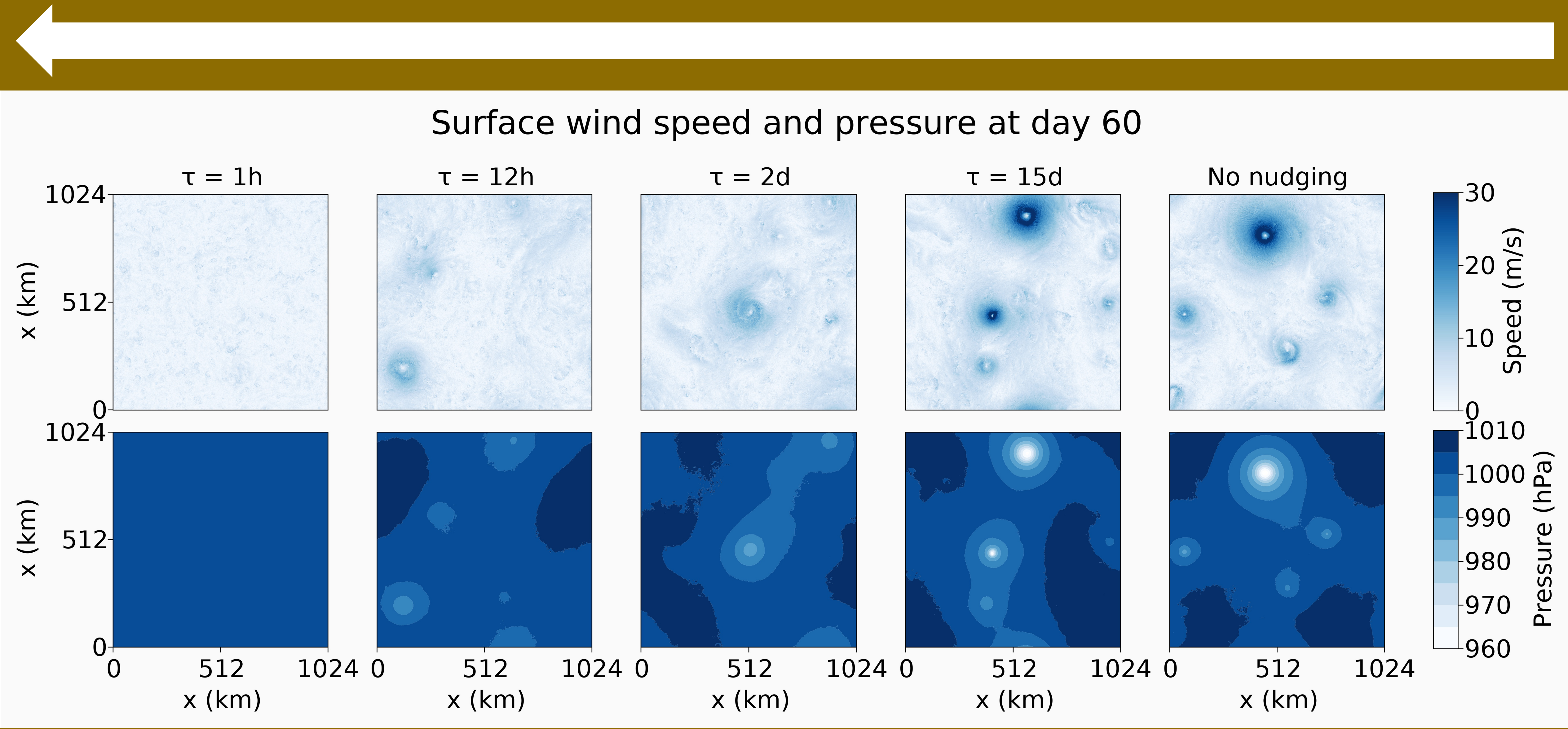
2. Radiative and surface-flux feedbacks do affect the timing and intensity of the simulated tropical cyclones



3. Increases in available potential energy lead by convective heating anomalies coincide with the spontaneous genesis of tropical cyclones

Spontaneous tropical cyclone genesis **does not need radiative or surface-flux feedbacks**. But in these conditions, tropical cyclones **require** feedbacks between moisture and convection to **emerge and intensify**.

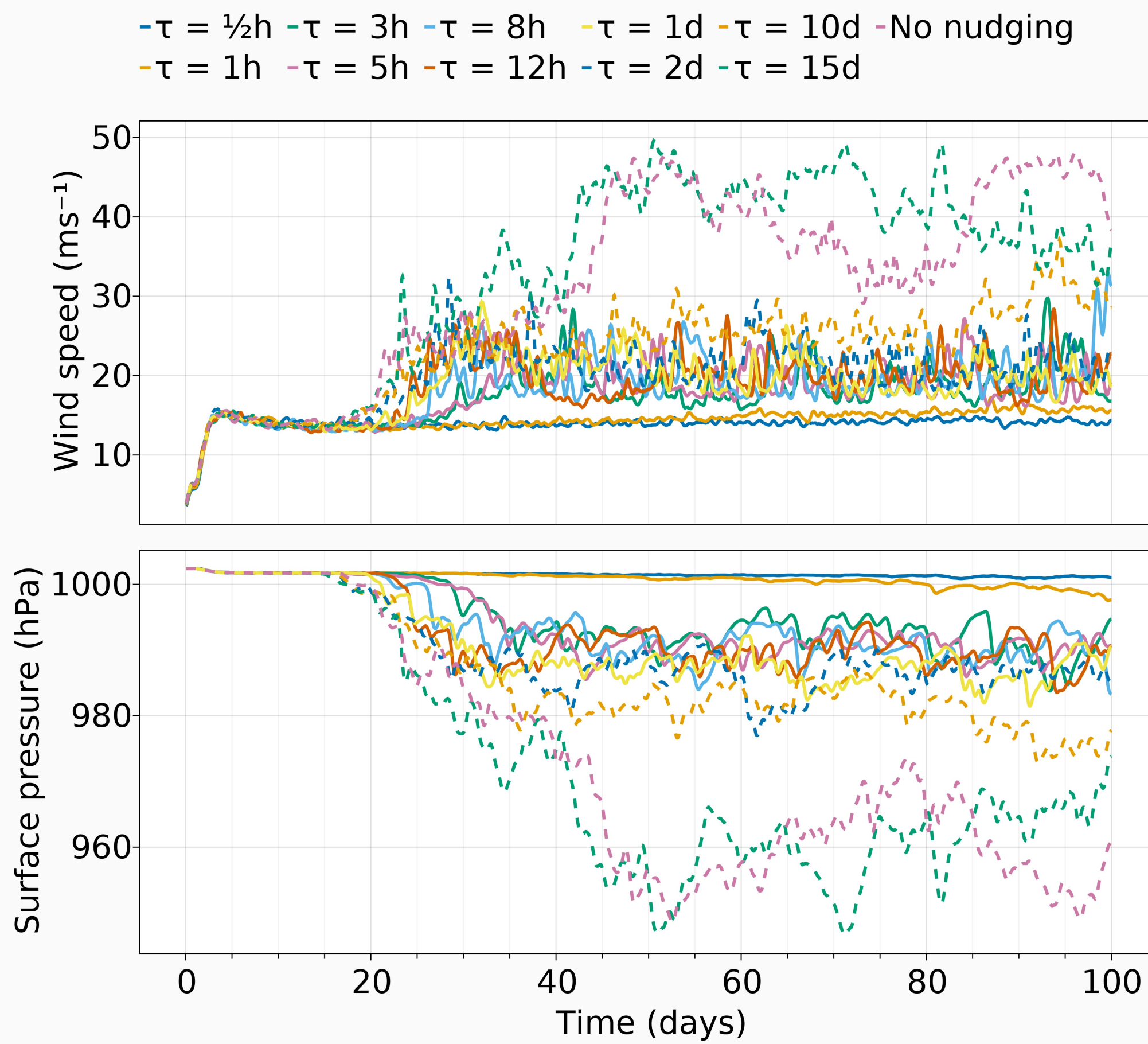
Weakening moisture-entrainment-convection feedback



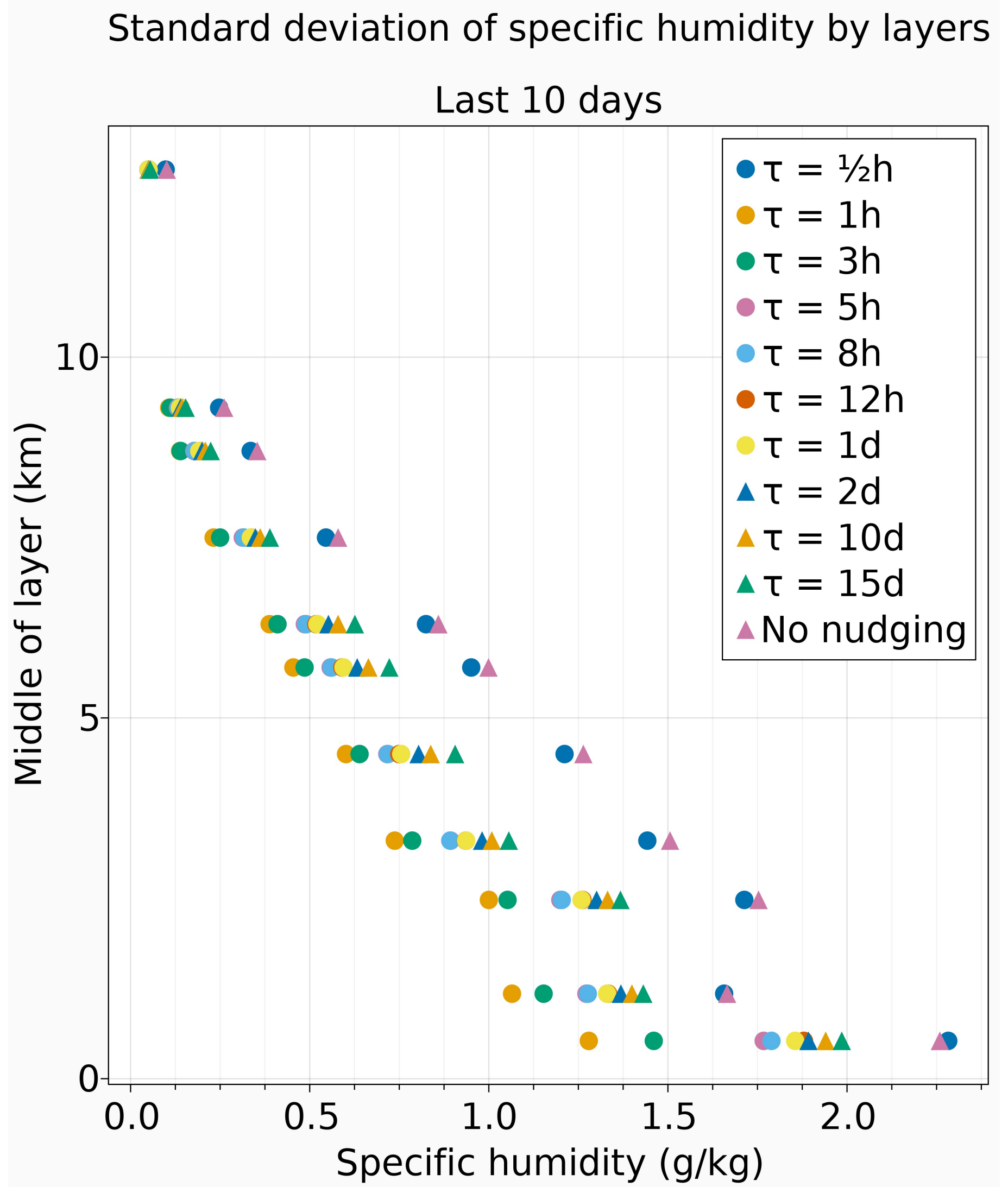
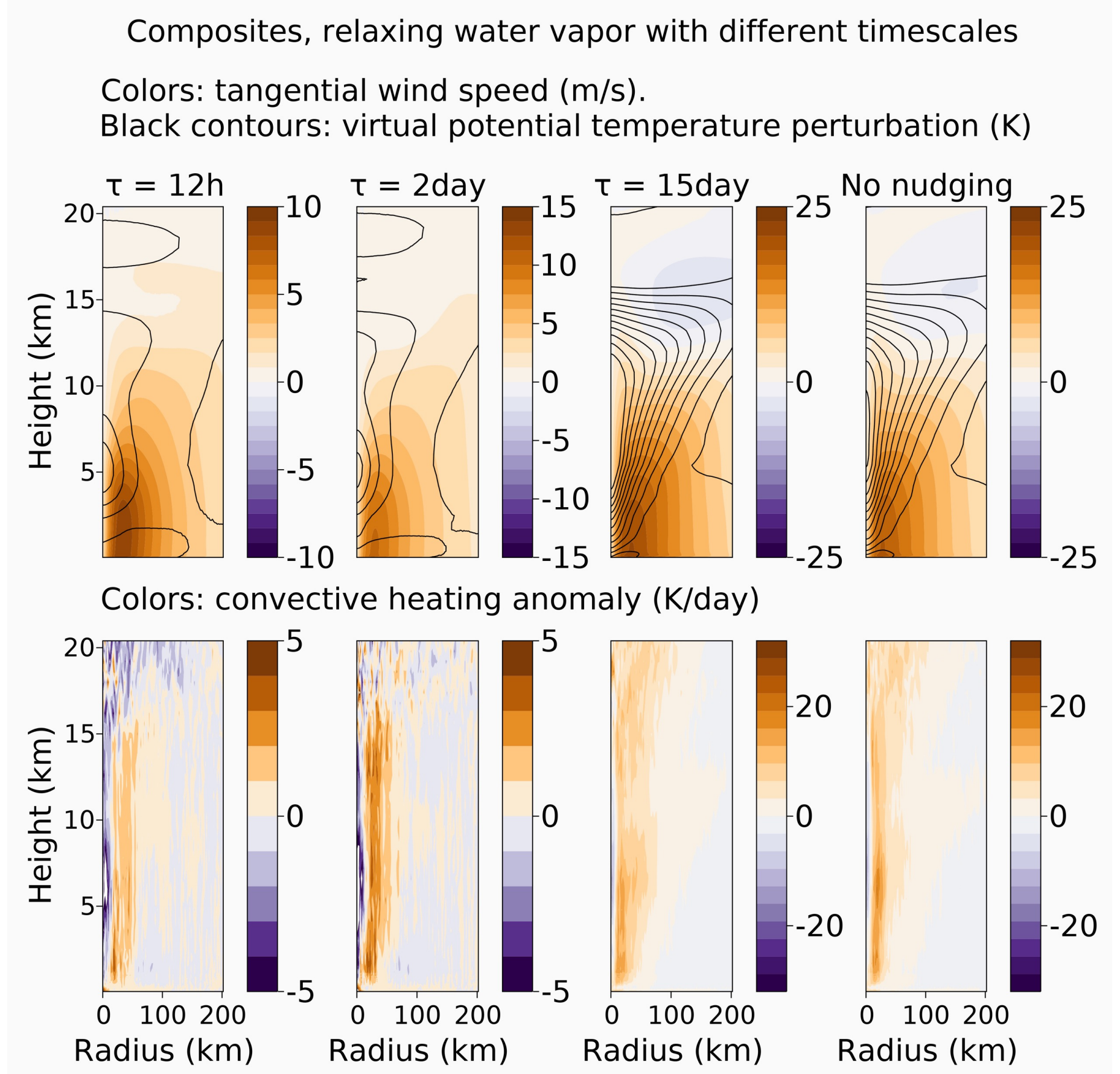
Two possible timescales may explain the impact in intensity and genesis:

$$\tau_1 = \frac{Length_{entrainment}}{Velocity_{convection}} \sim \frac{5km}{1 m/s} \sim 1.5 \text{ hours}$$

$$\tau_2 = \frac{Length_{troposphere}}{Velocity_{subsidence}} \sim \frac{15km}{0.01 m/s} \sim 17 \text{ days}$$



4. When we weaken the coupling between moisture and locations of convection, weaken the storms and finally prevent them from appearing!



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\*Ramírez Reyes, A. ., & Yang, D. (2021). Spontaneous Cyclogenesis without Radiative and Surface-Flux Feedbacks, *Journal of the Atmospheric Sciences* (published online ahead of print 2021). Retrieved Dec 9, 2021, from <https://journals.ametsoc.org/view/journals/atsc/aop/JAS-D-21-0098.1/JAS-D-21-0098.1.xml>