

This study presents a systematic evaluation of three convective parameterization schemes (ZM, TDK, and UNICON) using a single-column model, with particular emphasis on how variations in trigger and closure formulations influence the simulation of the summertime diurnal cycle of precipitation over China. The experimental design is well conceived, and the analysis follows a coherent physical progression, ranging from precipitation and cloud-base mass flux to diabatic heating and thermodynamic biases. The findings yield meaningful insights into the role of closure assumptions in shaping the diurnal cycle of precipitation (DCP) and offer practical guidance for potential model improvements. Overall, the manuscript is well suited for publication in ACP subject to minor revisions. Detailed comments and suggestions are provided below.

1. Although ERA5 can serve as a reference of observation, Liu et al. (2026) has pointed out the deficiencies of ERA5 in representing the diurnal cycle of precipitation and diabatic heating. The authors should add statement to warn the potential limits when using ERA5 as forcing and comparison.

2. In Figure 4, the launching-level frequency for CAM_TDK shows a distinct peak around 600 hPa, substantially higher than for ZM and UNICON. Could this be related to the TDK scheme's treatment of mid-level convection??

3. Line 100: "aiming to elucidating" → "aiming to elucidate".

4. Line 127: "shallow convection are treated with" → "shallow convection is treated with".

5. Lines 285–287: The attribution of stronger nocturnal convection in the CAM_TDK sensitivity run to daytime convective suppression could be further supported by referencing the reduction in PBL-contributed PCAPE. I suggest revising the sentence to: "...likely because the exclusion of

PCAPE contributed by PBL during the daytime (Figure 3f) suppresses convection, thereby favoring subsequent nocturnal development".

6. Heading of Section 5.1: The use of "Observation" for ERA5-derived Q1 and Q2 may be misleading, as ERA5 is a reanalysis product rather than direct observations. I recommend rephrasing the heading more accurately.

7. Please check and ensure that the headings follow a consistent capitalization style. E.g. Line 228, 318, 385, 422.

8. Line 508: "deteriorates the thermodynamic fields" → "deteriorate"