Atmospheric
Chemistry
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*Supplement of*

# Diurnal evolution of non-precipitating marine stratocumuli in a large-eddy simulation ensemble

**Yao-Sheng Chen et al.**

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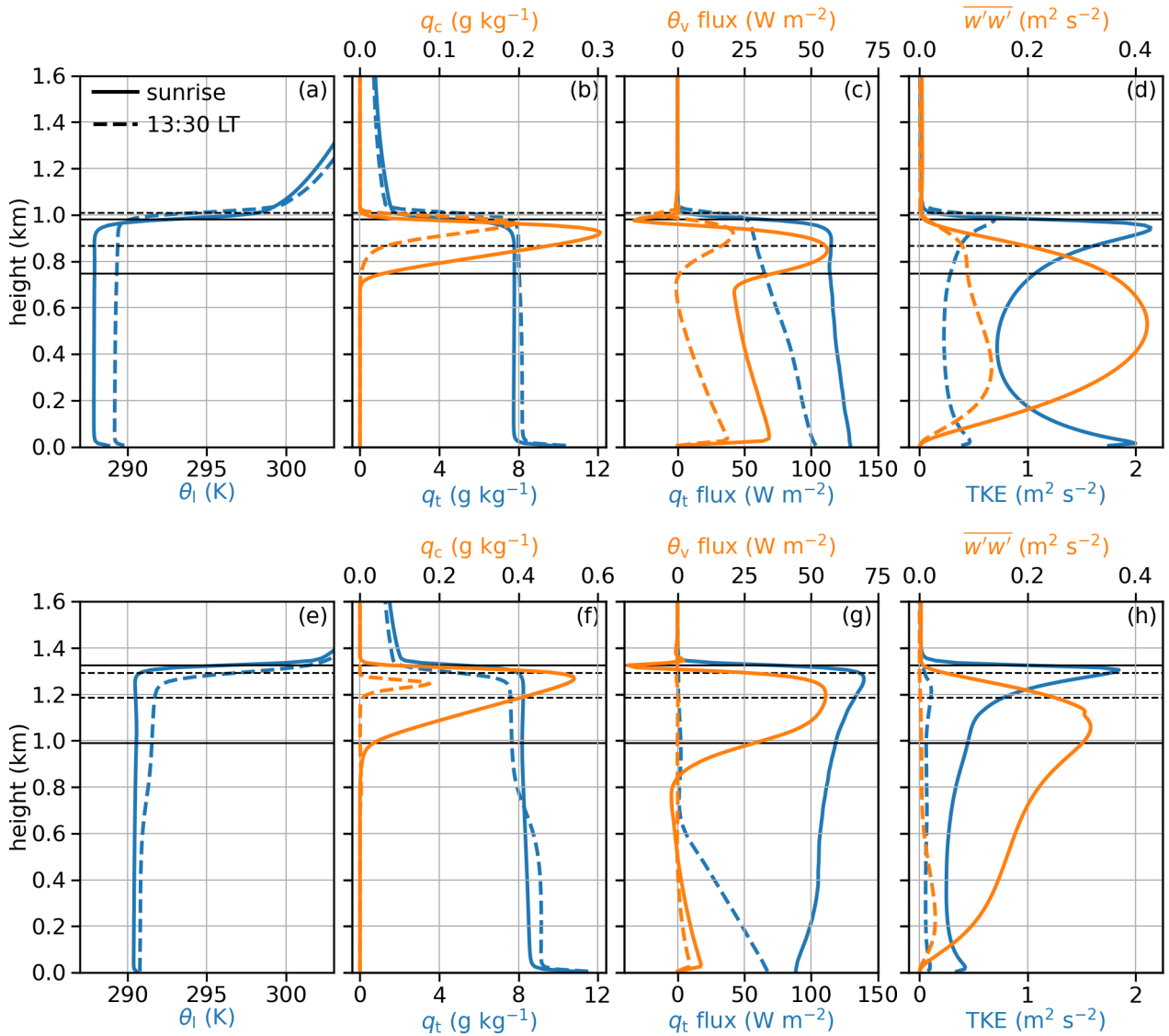
**Figure S1.** Profiles of liquid water potential temperature ($\theta_l$), total water mixing ratio ($q_t$), cloud water mixing ratio ($q_c$), $q_t$ flux, virtual potential temperature ($\theta_v$) flux, TKE, and variance of vertical velocity ($\overline{w'w'}$) for one case from the lo$\mathcal{D}$loL category (upper row) and one from the hi$\mathcal{D}$loL category (lower row) at sunrise (solid lines) and 13:30 LT (dashed lines). Horizontal back lines indicate $z_i$ and $\overline{z_{cb}}$.
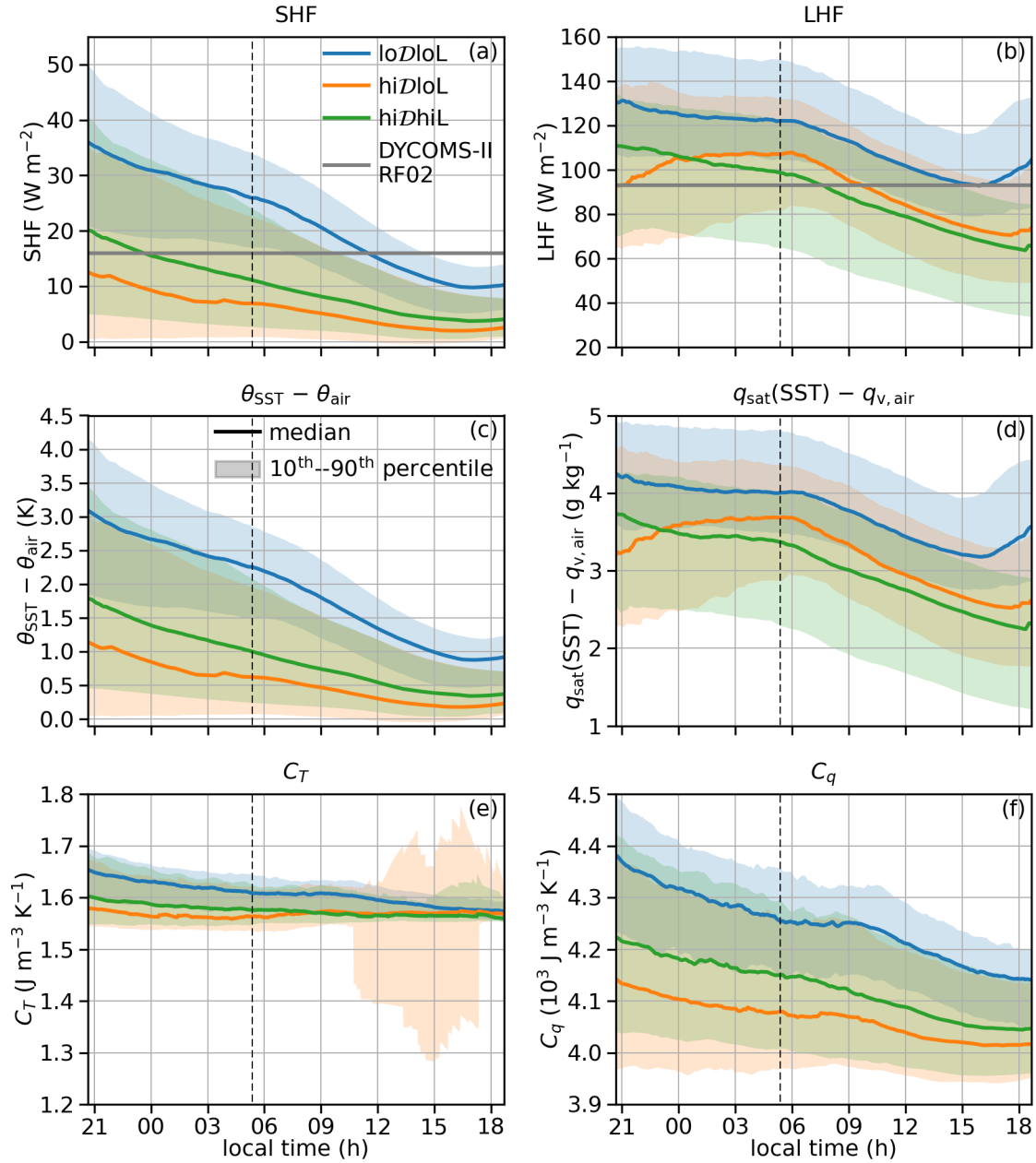
**Figure S2.** Time series of (a) surface sensible heat flux (SHF), (b) surface latent heat flux (LHF), (c) difference between potential temperature based on sea surface temperature ($\theta_{\mathrm{SST}}$) and lowest model level air potential temperature ($\theta_{\mathrm{air}}$), (d) difference between saturation mixing ratio at SST ($q_{\mathrm{sat}}(\mathrm{SST})$) and lowest model level water vapor mixing ratio ($q_{\mathrm{v,air}}$), (e) transfer coefficient for SHF ($C_T$), and (f) wind speed used for surface fluxes calculation ($U$) by category. The vertical dashed black lines indicate sunrise.
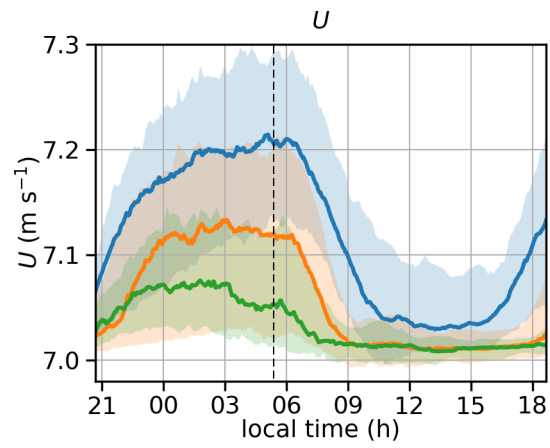
**Figure S3.** Same as Figure S2 but for the wind speed used for surface flux calculation ($U$). See Figure S2 for legends.
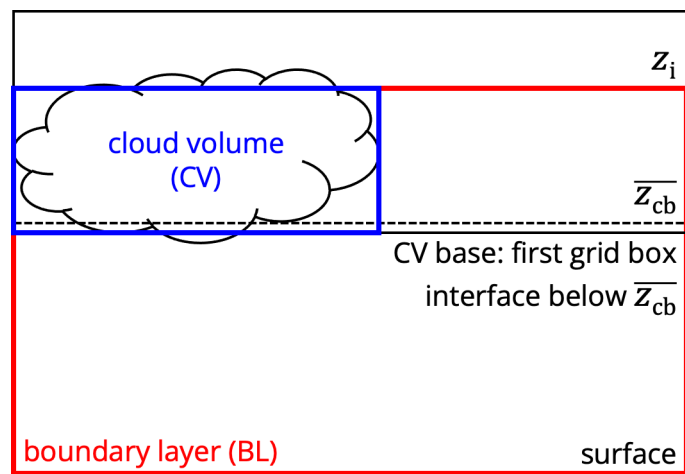
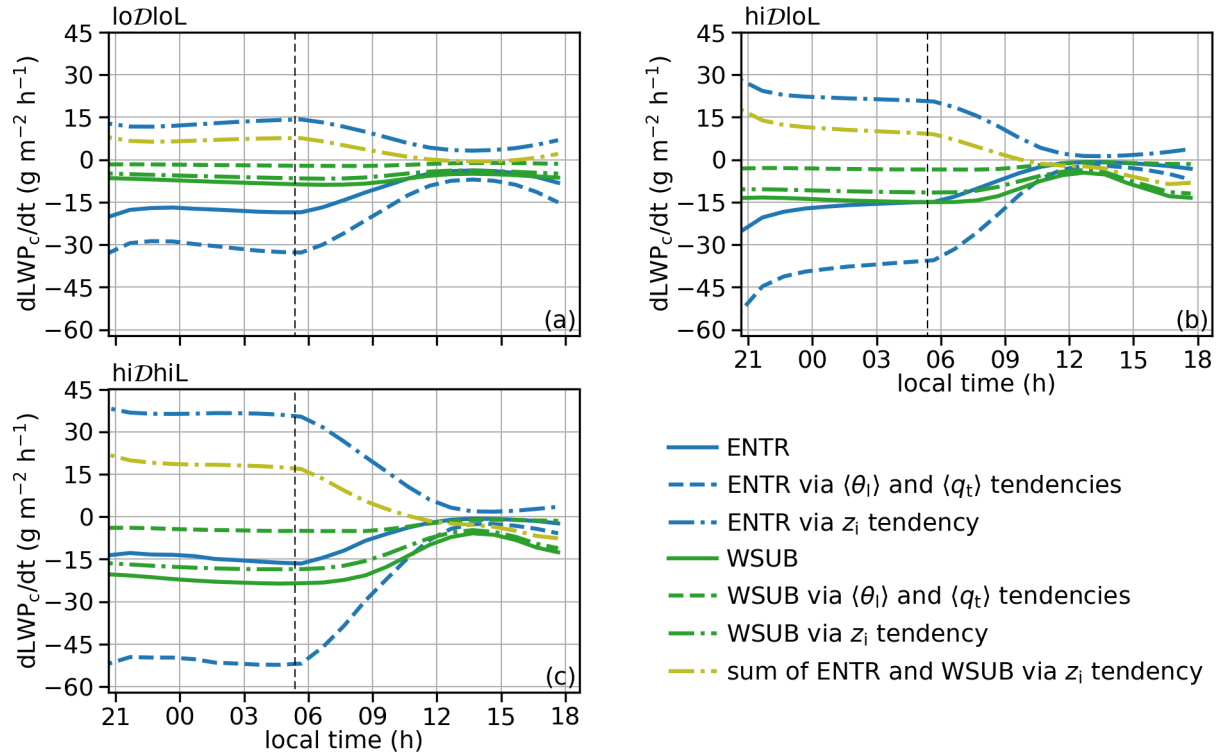**Figure S4.** A sketch showing the definition of a cloud volume for budget analysis.

**Figure S5.** LWP budget terms for ENTR and SUBS based on BL $\langle\theta_l\rangle$ and $\langle q_t\rangle$ budgets.
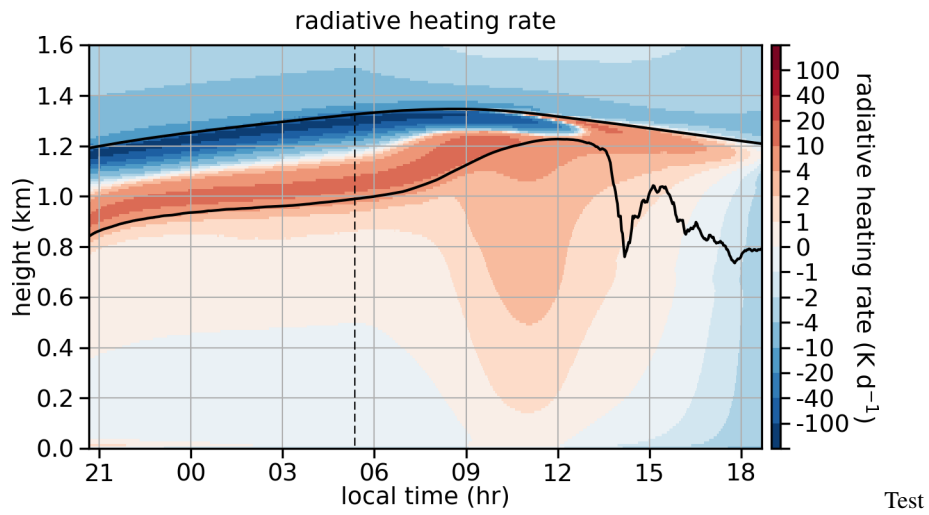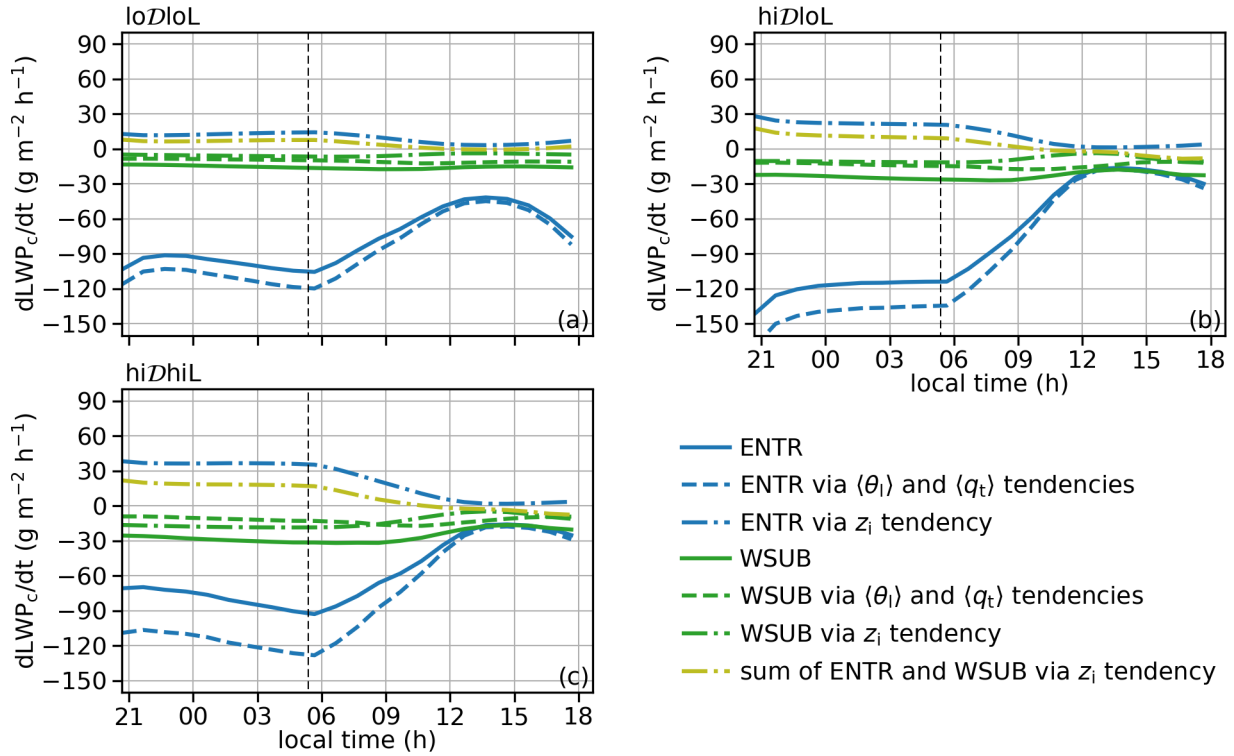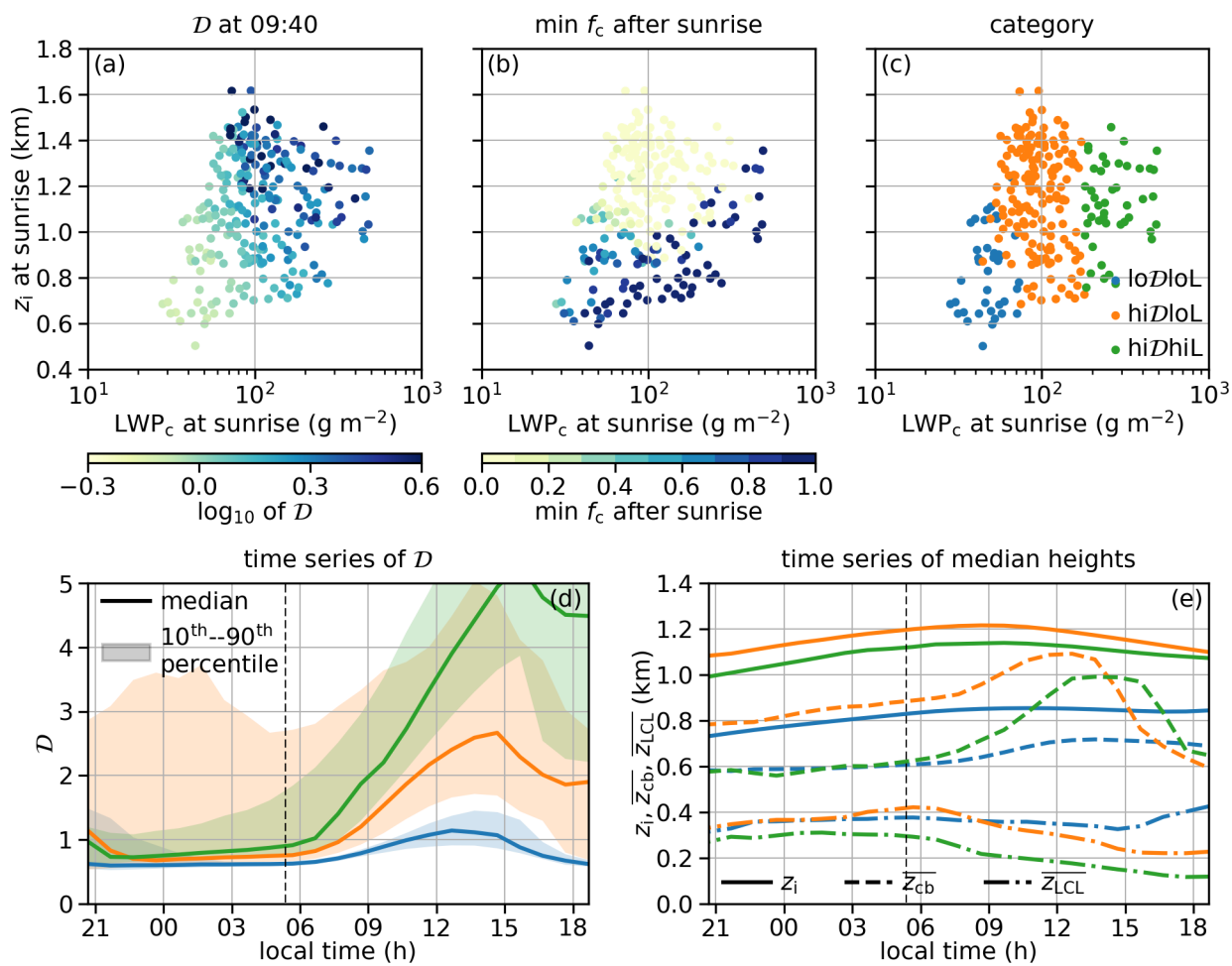
**Figure S6.** Evolution of radiative heating rate profile for the same hi$\mathcal{D}$loL case shown in the lower row of Figure S1. The black curves indicate $z_i$ and $\overline{z_{cb}}$. The vertical dashed black line indicates sunrise.

**Figure S7.** LWP budget terms for ENTR and SUBS based on CV $\langle\theta_l\rangle$ and $\langle q_t\rangle$ budgets.

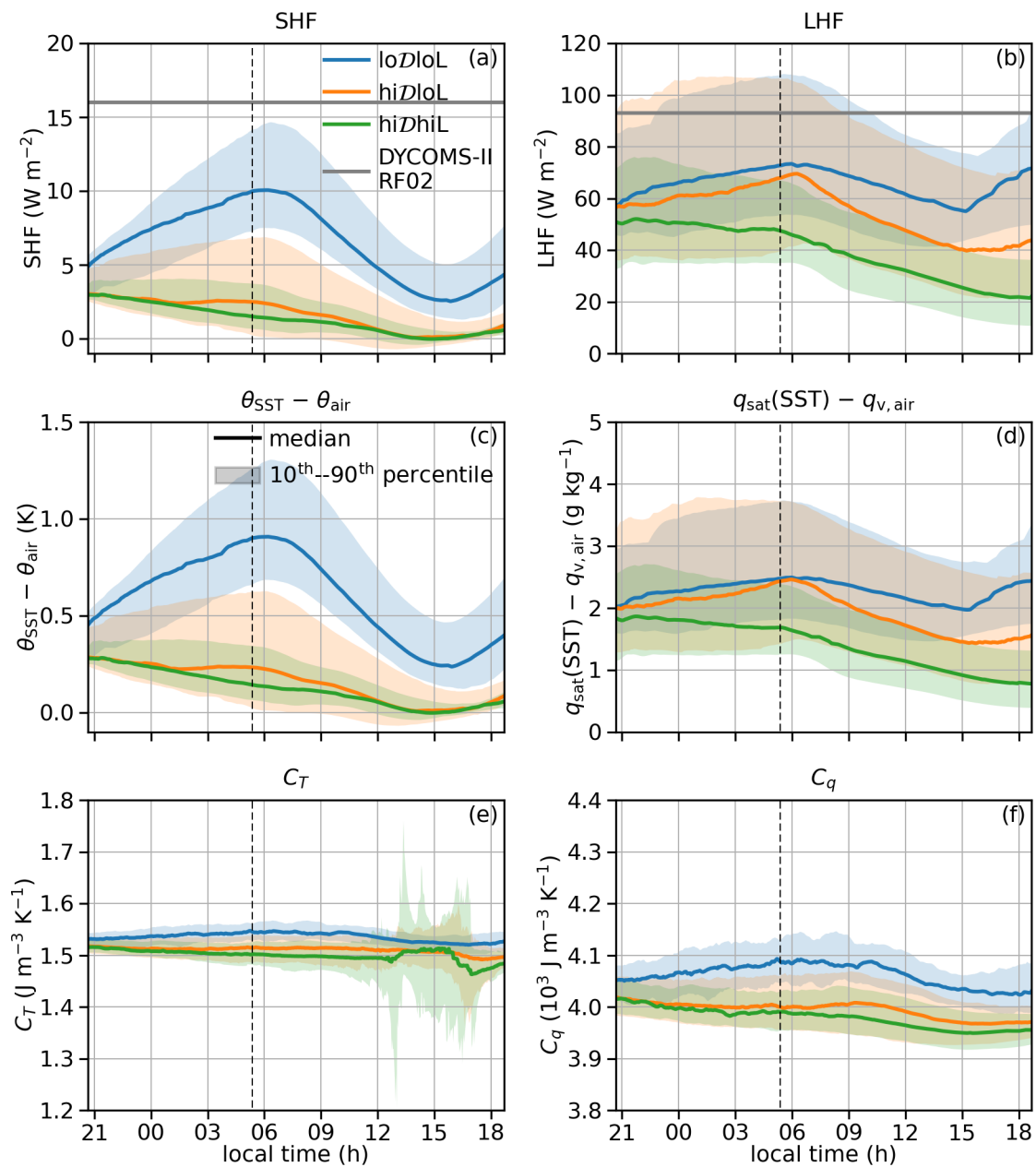**Figure S8.** Same as Figure 2 but for the SST0.5K+ set.

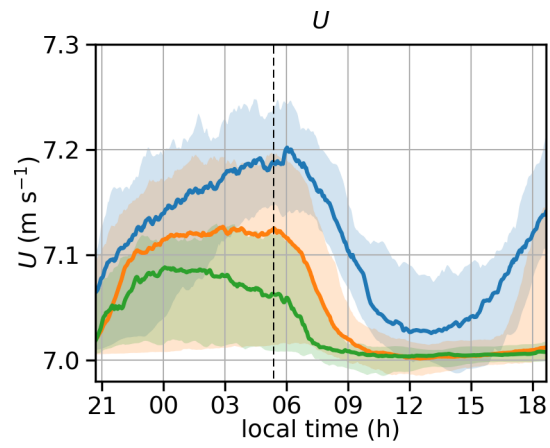**Figure S9.** Same as Figure S2 but for the SST0.5K+ set.

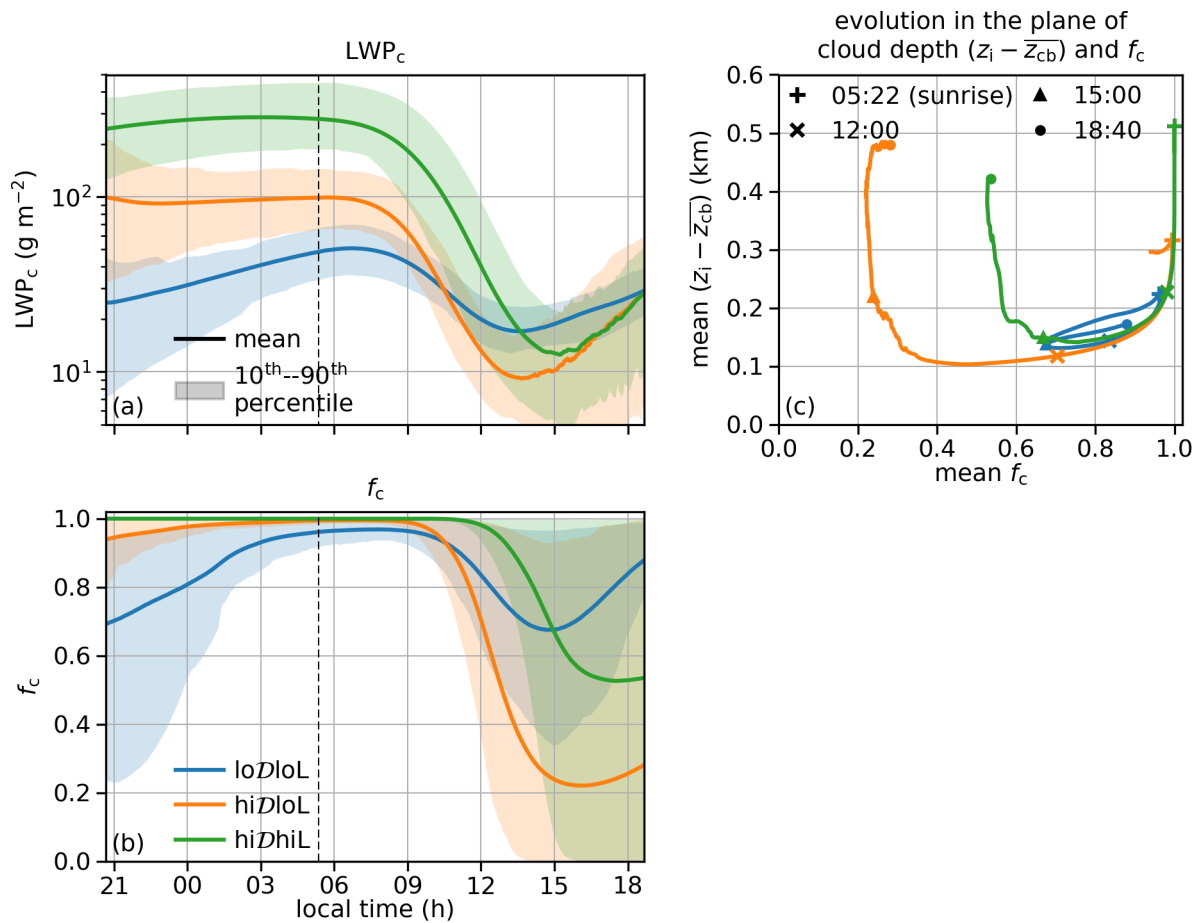**Figure S10.** Same as Figure S3 but for the SST0.5K+ set.

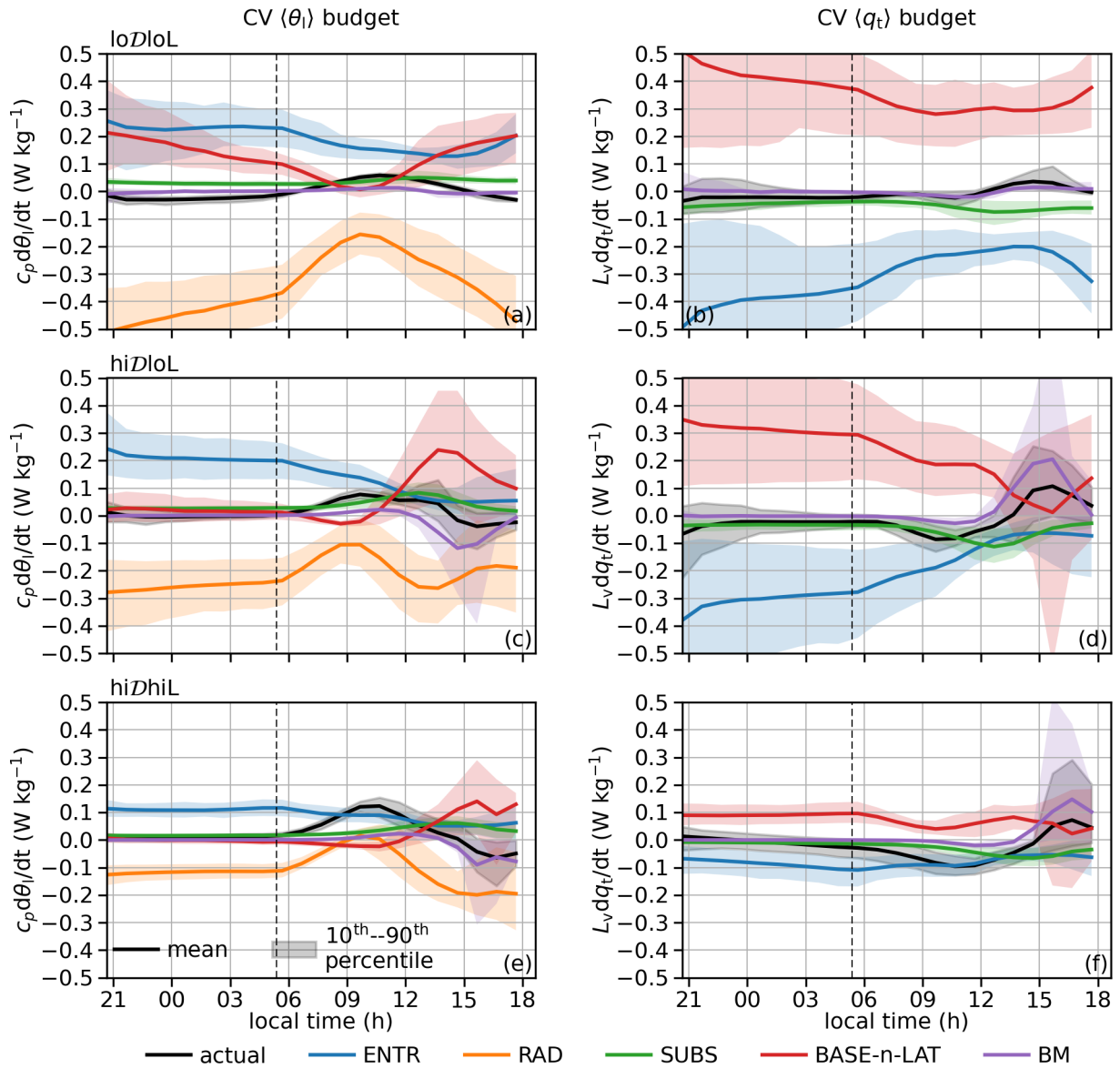**Figure S11.** Same as Figure 3 but for the SST0.5K+ set.

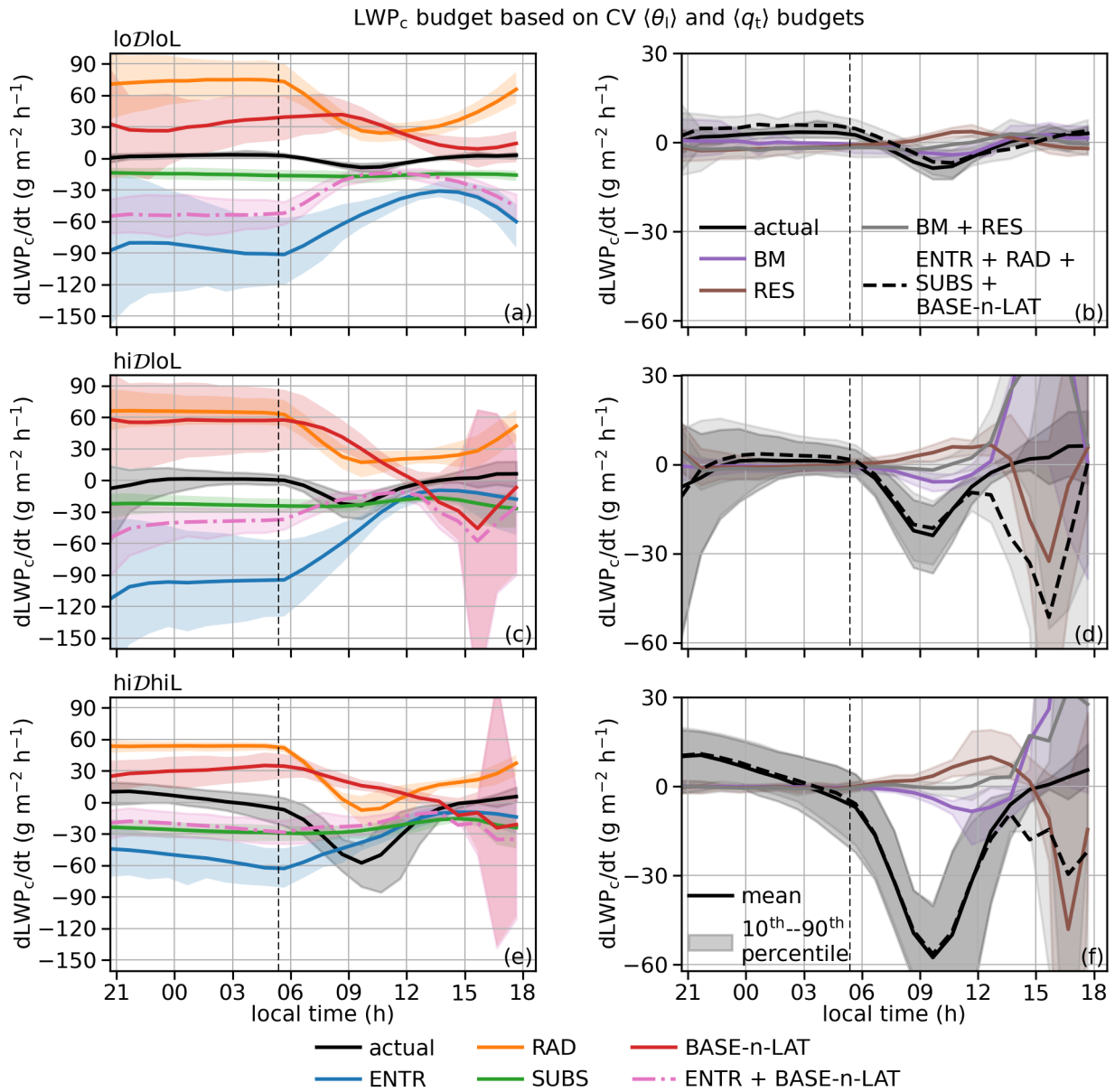**Figure S12.** Same as Figure 6 but for the SST0.5K+ set.

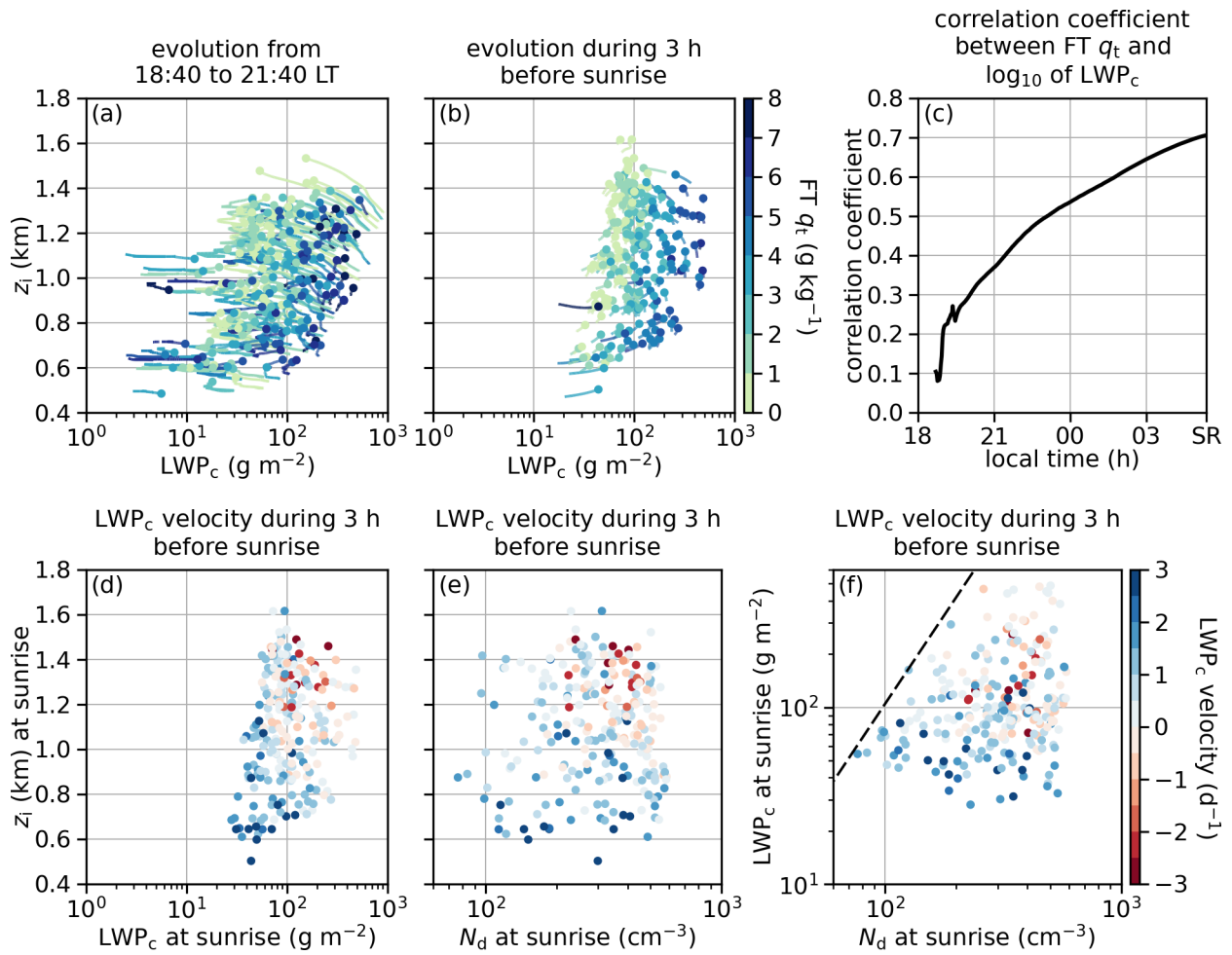**Figure S13.** Same as Figure 7 but for the SST0.5K+ set.
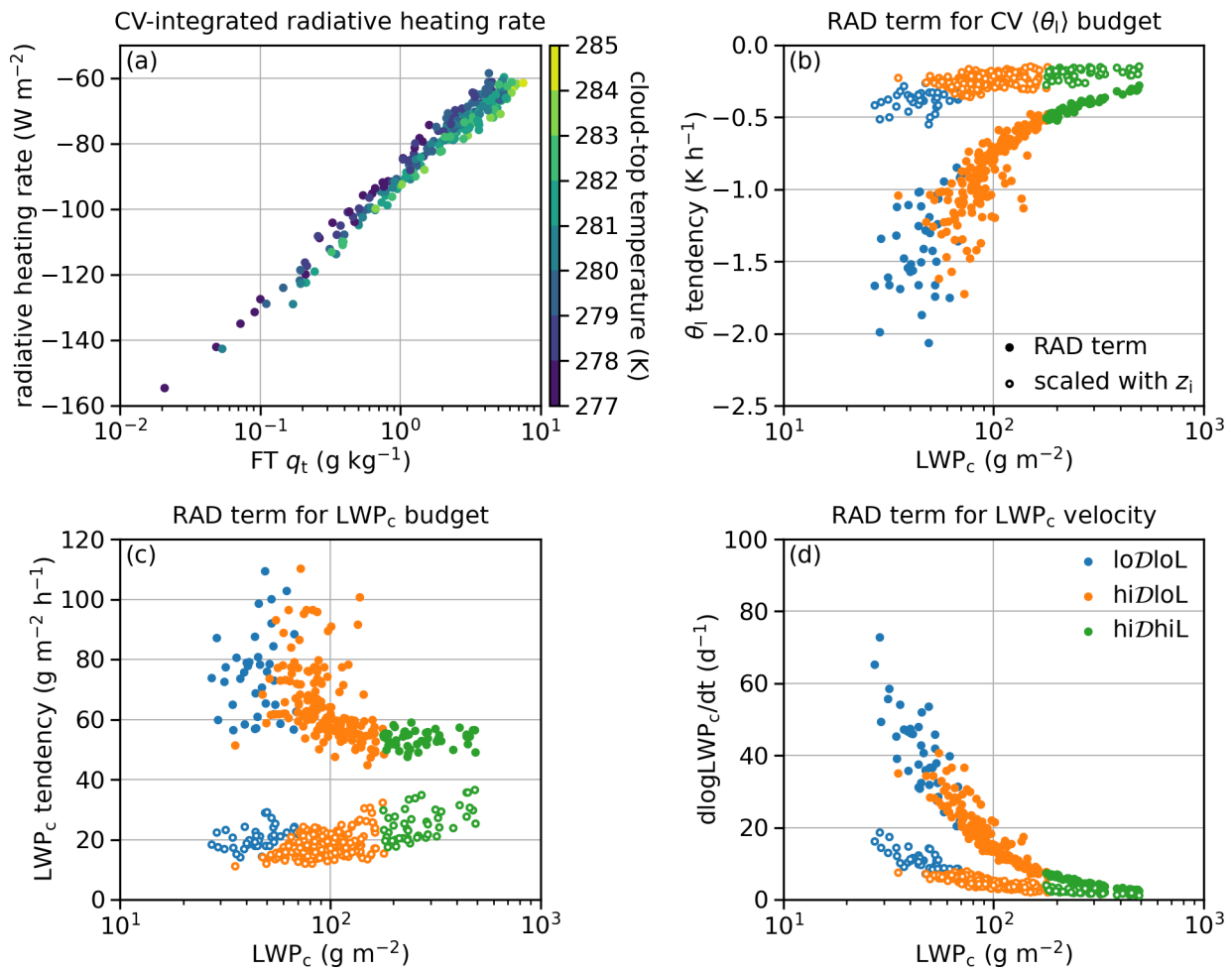
**Figure S14.** Same as Figure 8 but for the SST0.5K+ set.
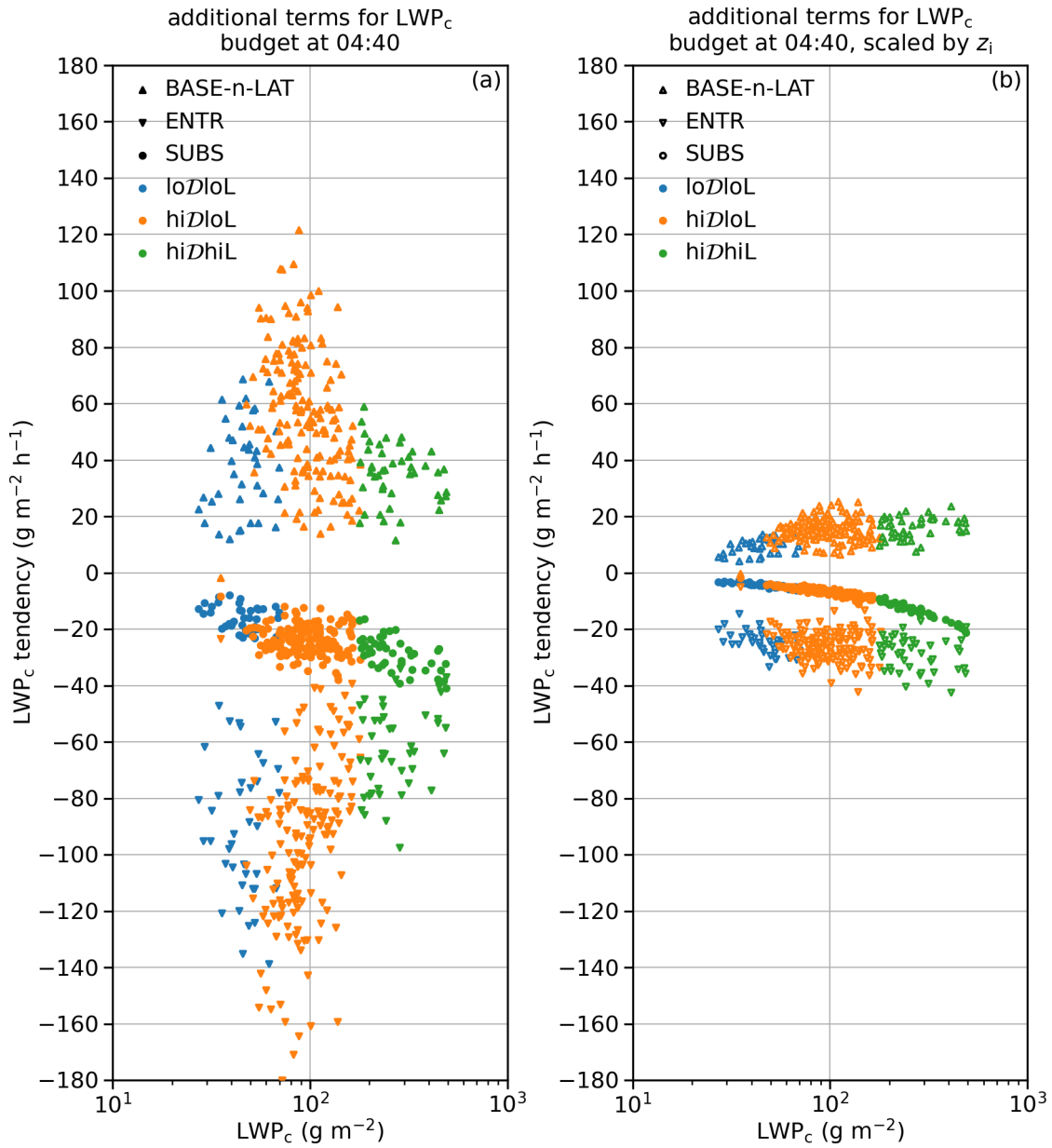
**Figure S15.** Same as Figure 9 but for the SST0.5K+ set.
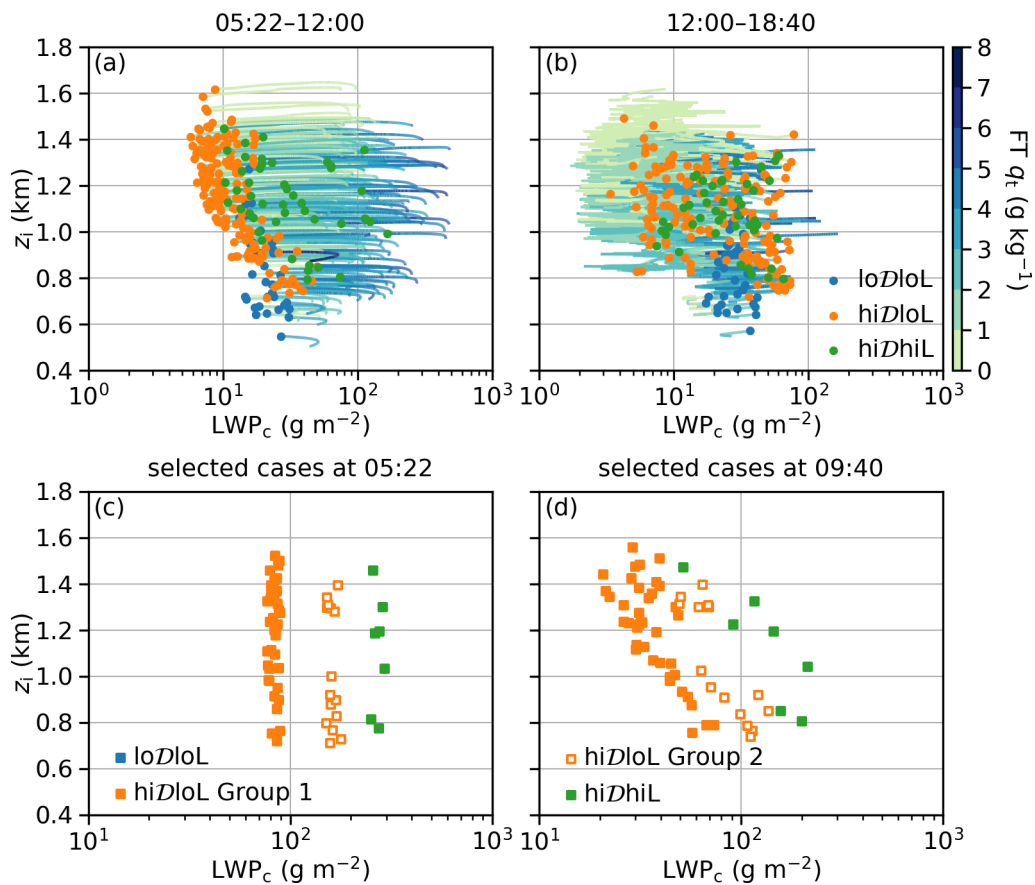
**Figure S16.** Same as Figure 10 but for the SST0.5K+ set.

**Figure S17.** Same as Figure 11 but for the SST0.5K+ set.