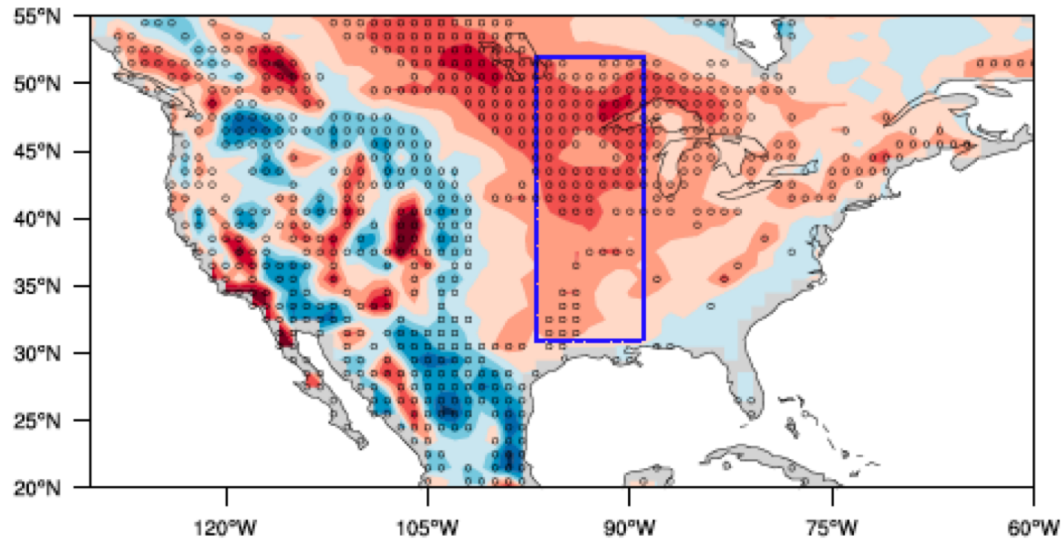# The connection between MCSs and SGP warm biases

Wenhao Dong and Yanluan Lin, Tsinghua University

Minghua Zhang, Stony Brook University

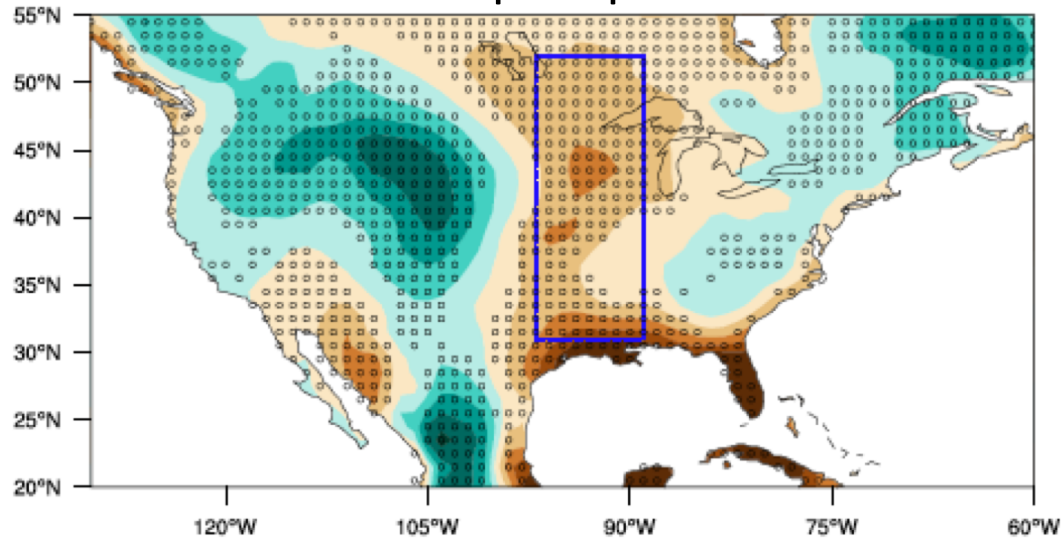# CMIP5 Model temperature biases
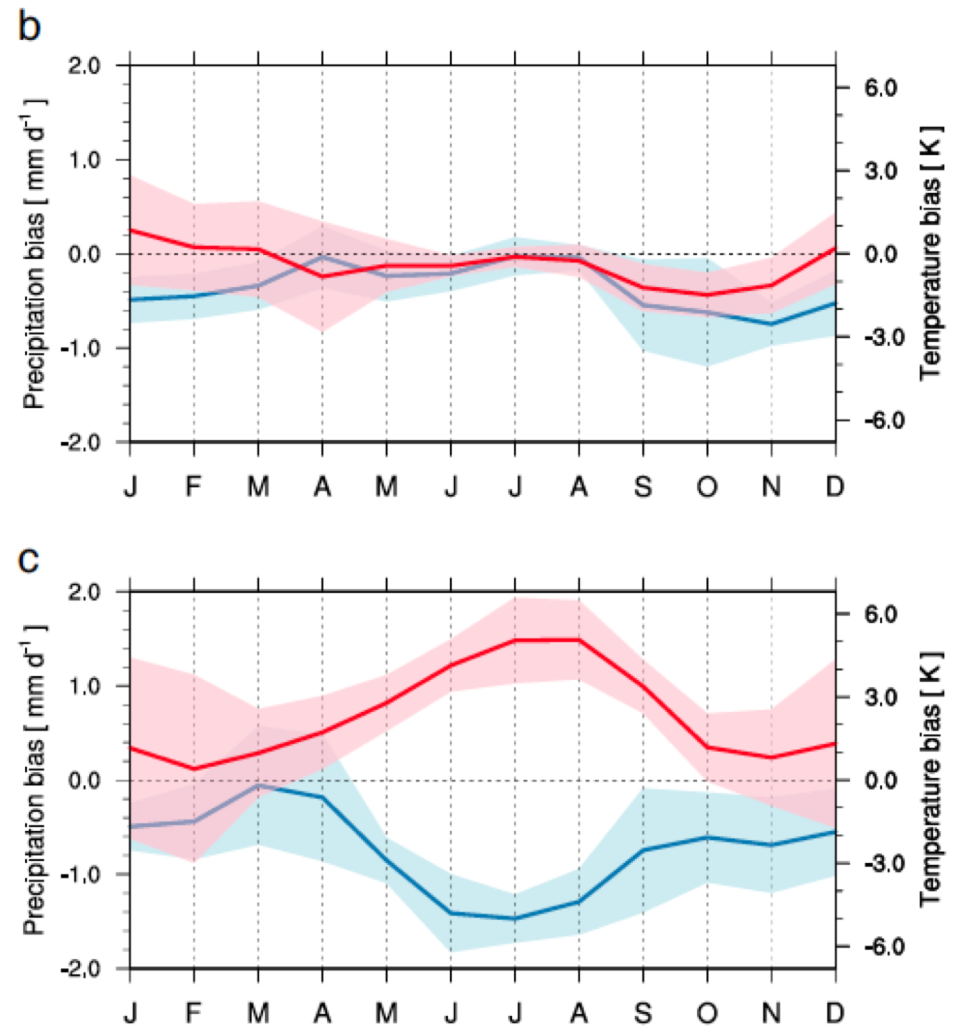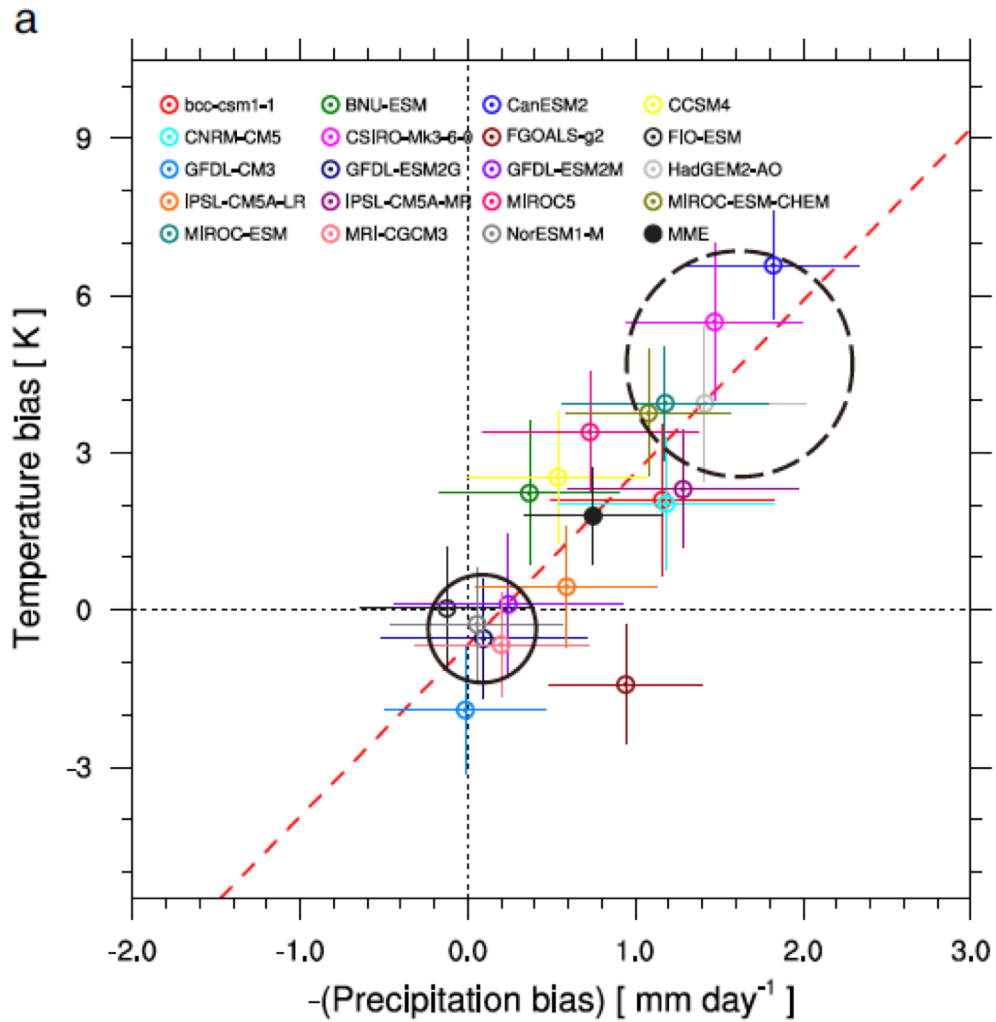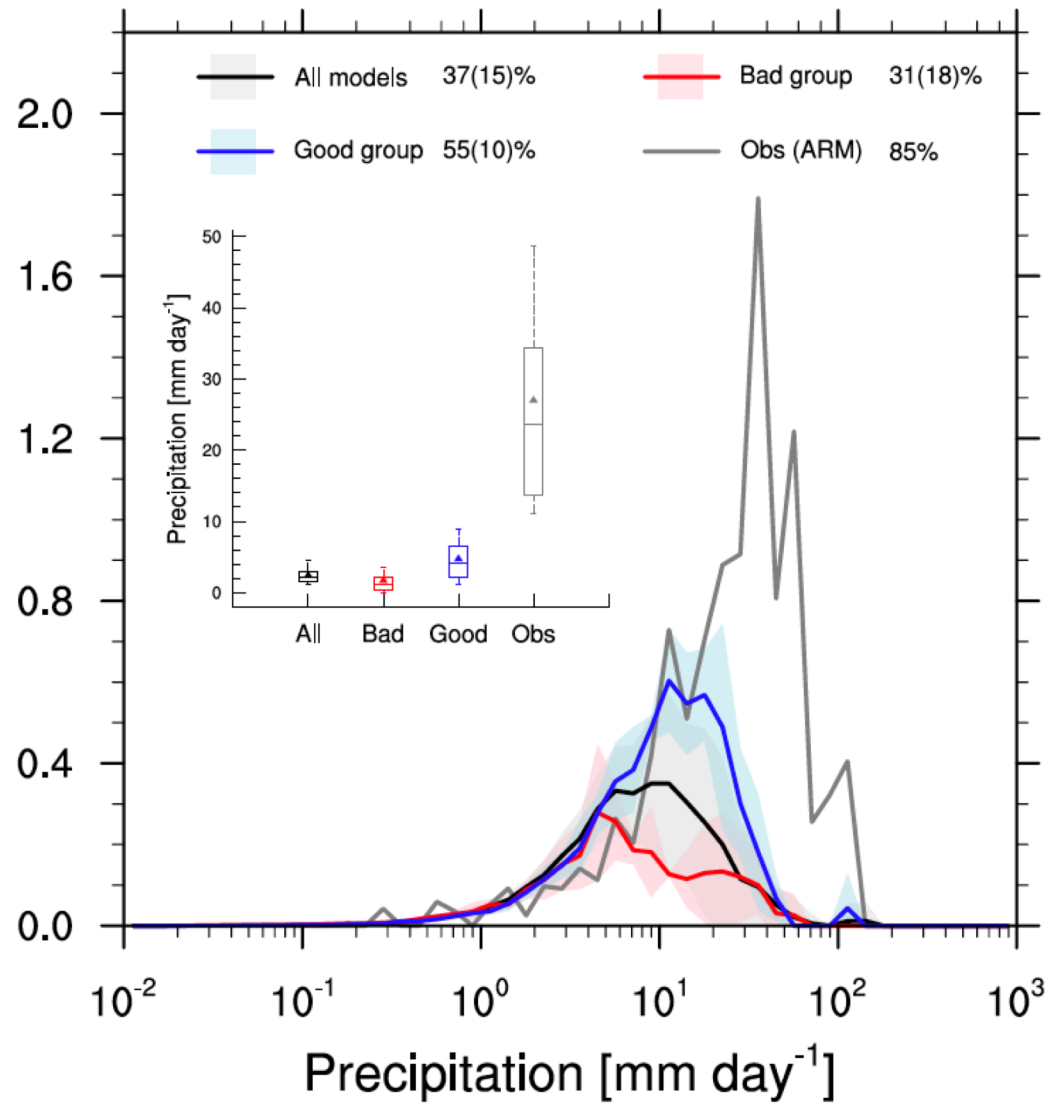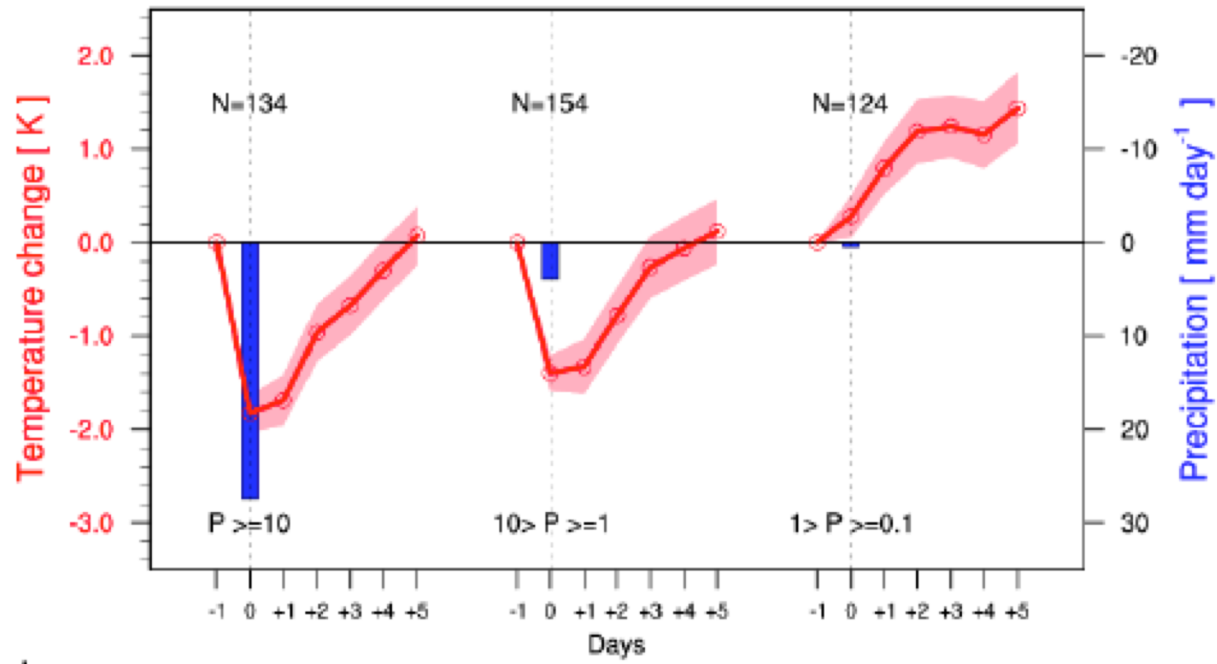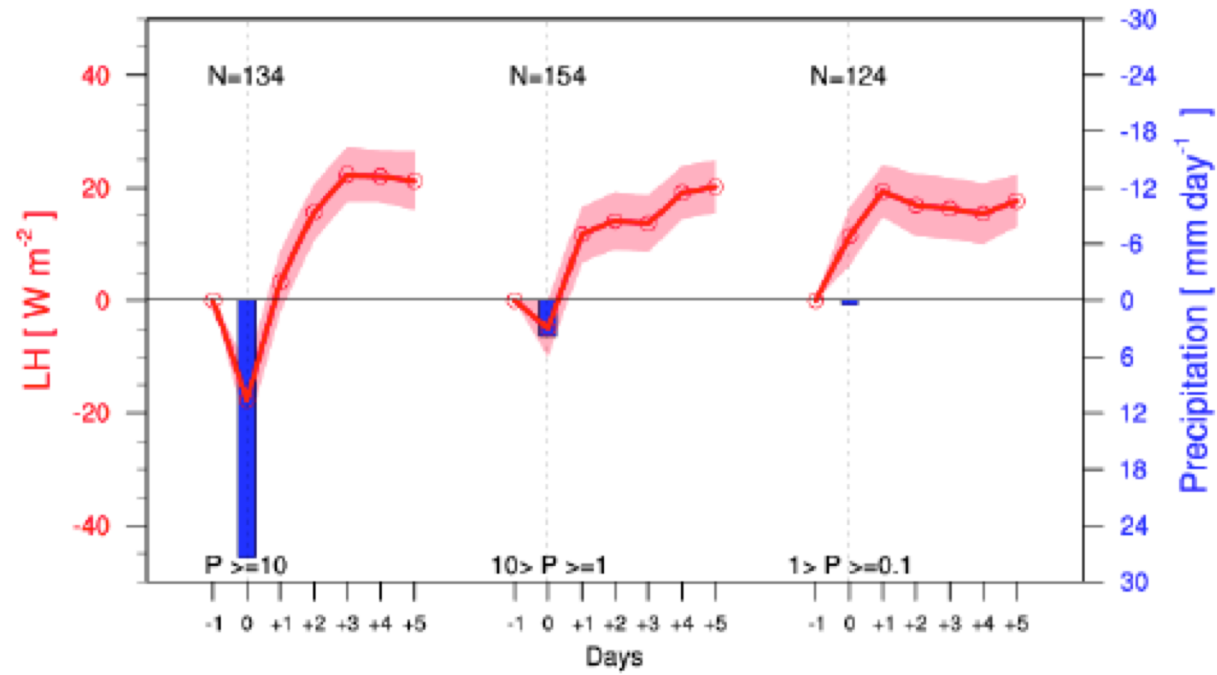

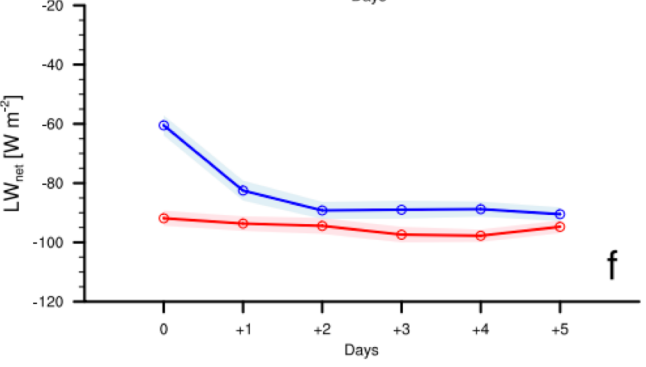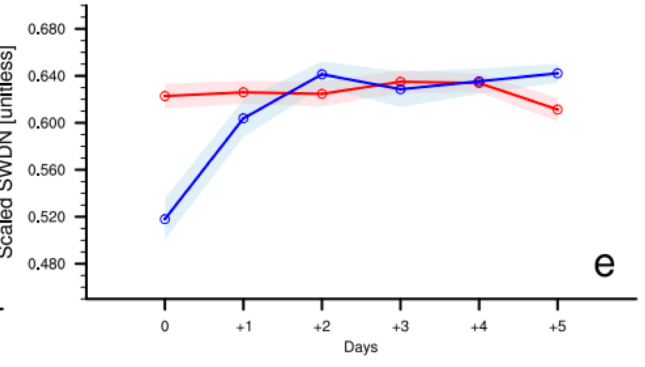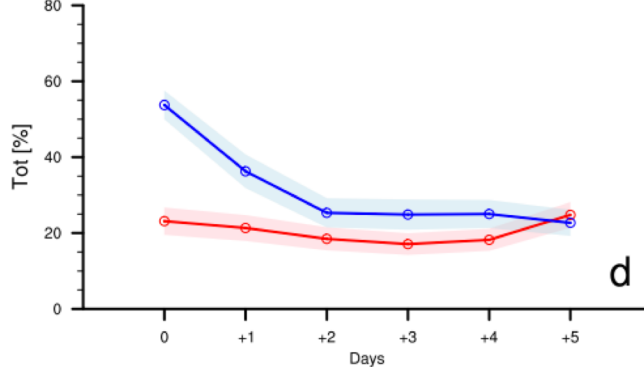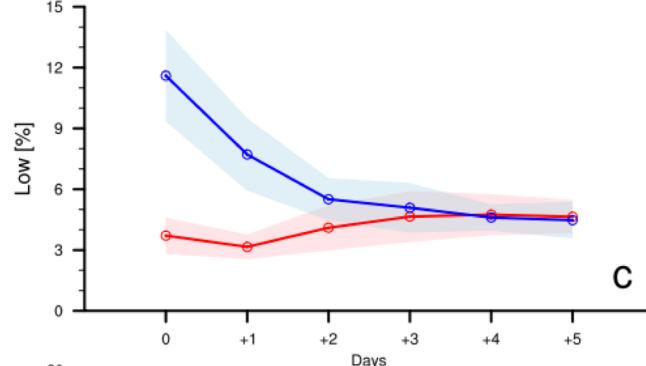# CMIP5 Model precipitation biases

(Lin et al. 2017 Nature Communications)

Frequency-intensity distribution of daily precipitation

a

N=134   N=154   N=124

Temperature change [K]

Precipitation [mm day⁻¹]

P >=10   10> P >=1   1> P >=0.1

-1 0 +1 +2 +3 +4 +5   -1 0 +1 +2 +3 +4 +5   -1 0 +1 +2 +3 +4 +5

Days

b

N=134   N=154   N=124

LH [W m⁻²]

Precipitation [mm day⁻¹]

P >=10   10> P >=1   1> P >=0.1

-1 0 +1 +2 +3 +4 +5   -1 0 +1 +2 +3 +4 +5   -1 0 +1 +2 +3 +4 +5

Days

Dry - precondition
Wet - precondition
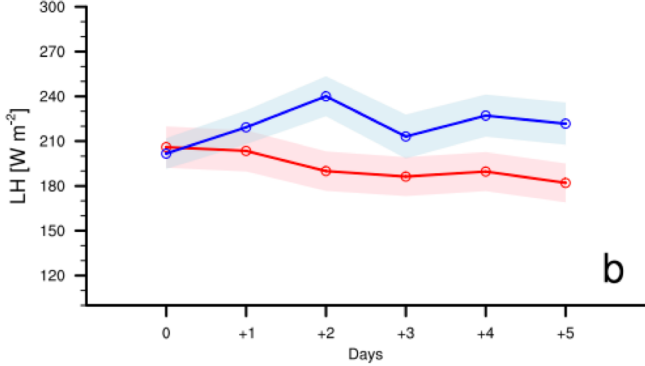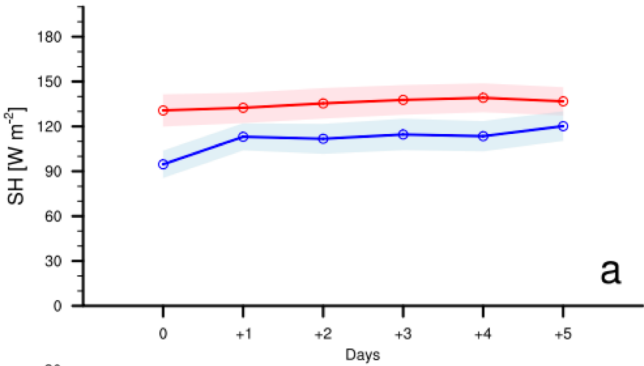
Diurnal variation of clouds
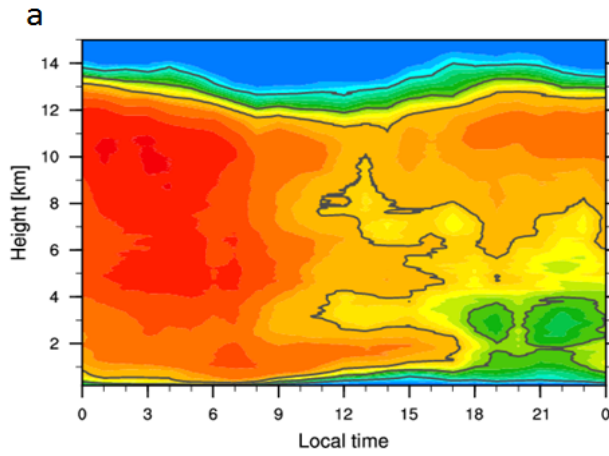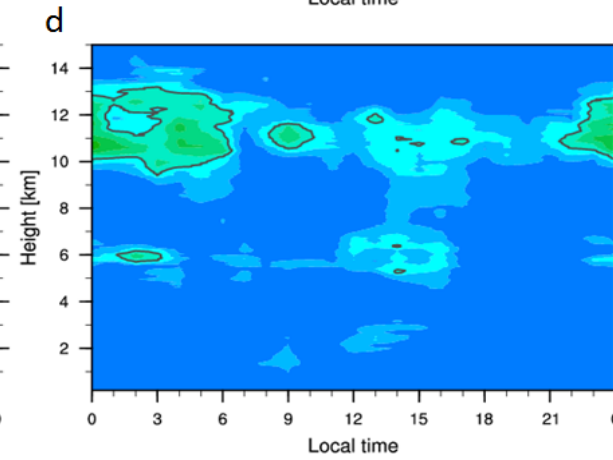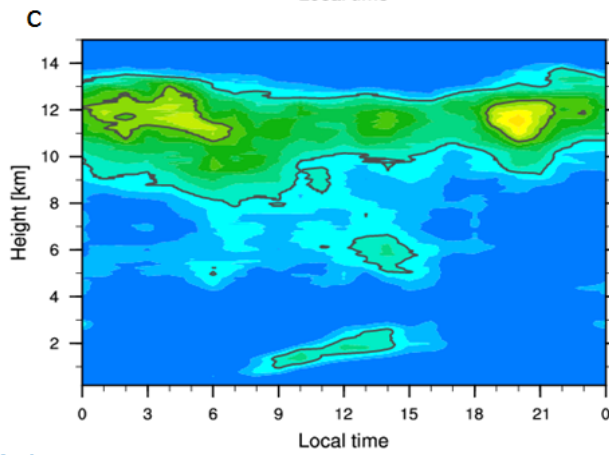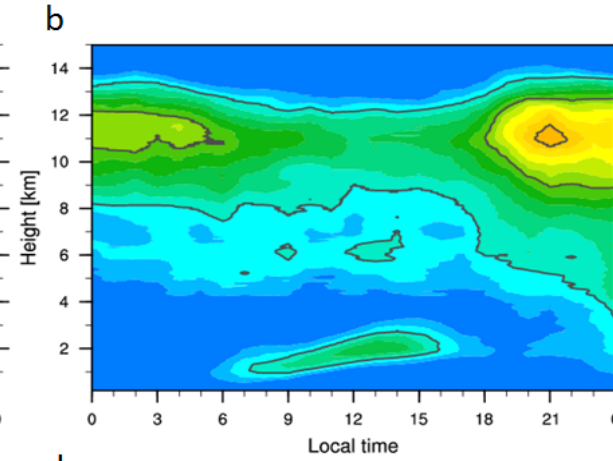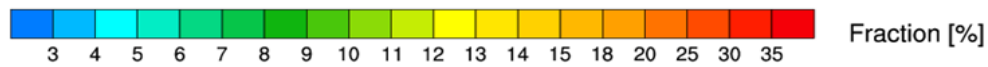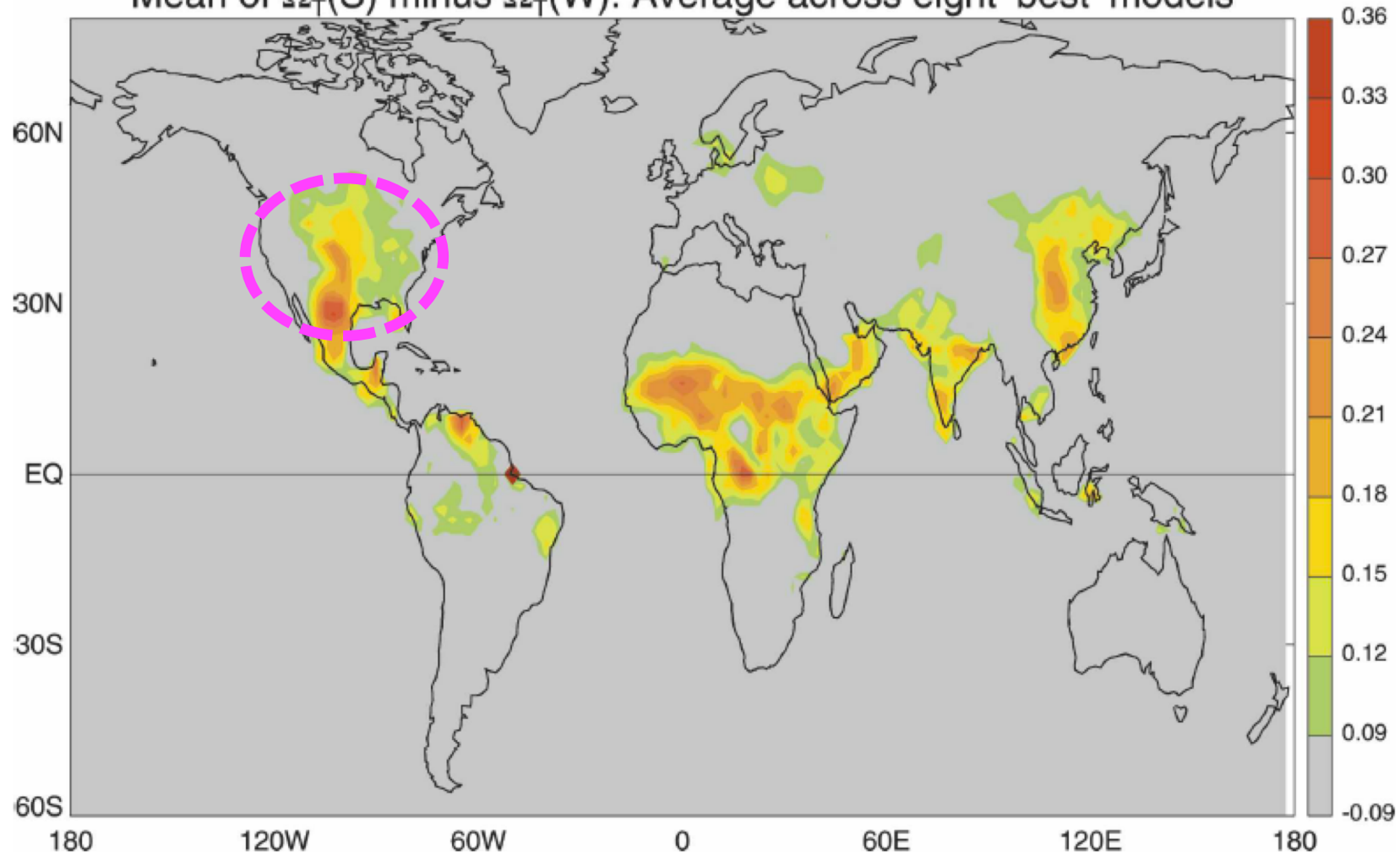

Wet days

Dry days

Wet - precondition

Dry - precondition

Mean of $\Omega_T(S)$ minus $\Omega_T(W)$: Average across eight 'best' models

(Koster et al. 2006)

The hypothesis

Heavy rain

In subsequent no-rain days

Less solar radiation & lower temperature

Light rain

In subsequent no-rain days

More solar radiation & Higher temperature

Summary

- Models underestimate precipitation over the SGP, especially strong precipitation from events such as MCS

- Precipitation events cool the surface

- Clouds following the precipitation events seem to play the largest role in the cooling in the subsequent days.