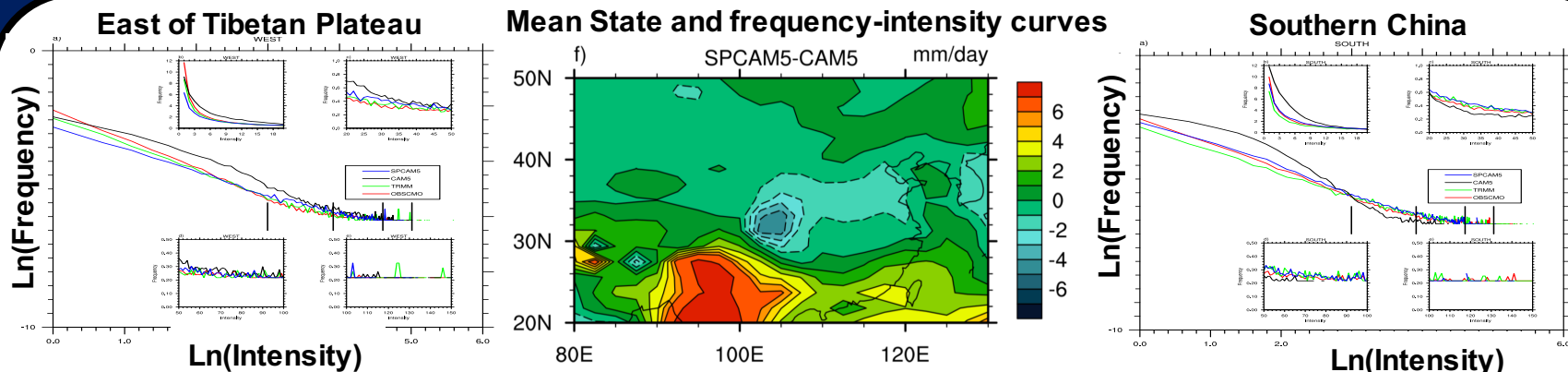


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 Comparing CAM5 and Superparameterized CAM5 simulations of summer precipitation characteristics over
 continental East Asia

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Changes in mean precipitation (precip) amount and frequency(freq)-intensity curves

Southern China: Mean precip increases, freq drops in the weak precip regime, but increases in the intense precip regime

East of Tibetan Plateau: Mean precip decreases, freq drops over the entire intensity spectrum

Major Differences in Diurnal cycles

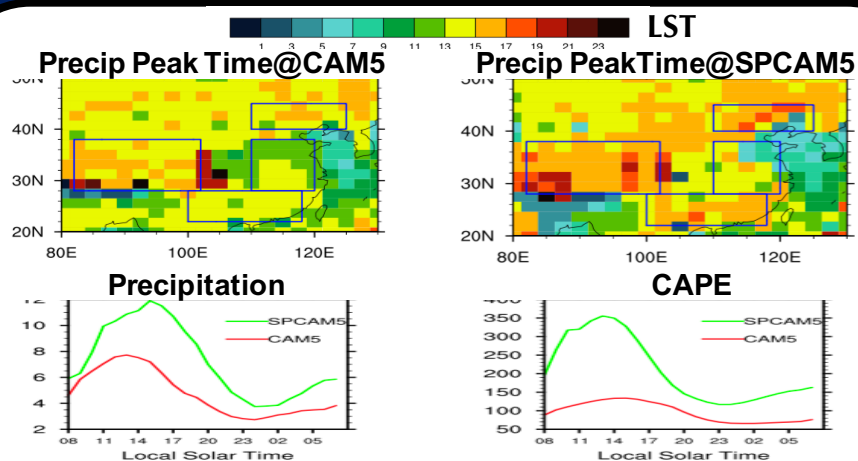
Map figures:

Delays in precipitation peak time from CAM5 to SPCAM5 at afternoon precipitation regimes, e.g. Southern China.

Line figures (over southern China):

CAM5: Precipitation peak in phase with the CAPE peak

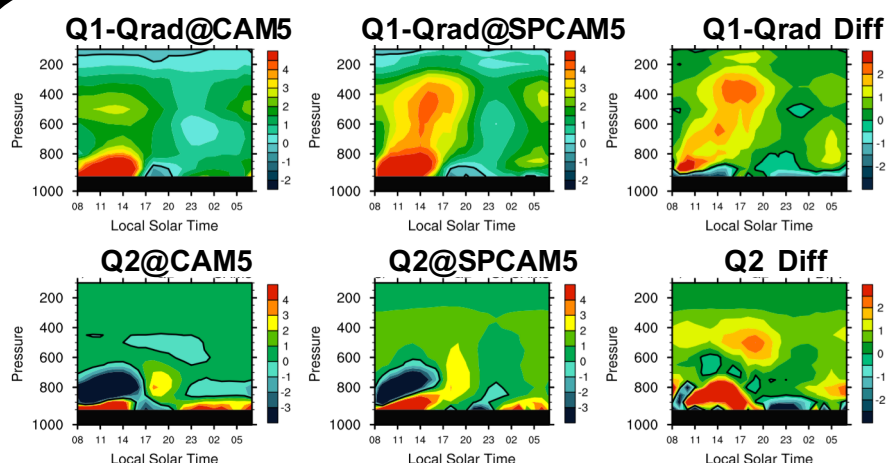
SPCAM5: Precipitation peak lags behind the CAPE peak



Comparing Heat and moisture budgets

(Top) Diurnal progression of Q1-Qrad (cross section); (Bottom) Diurnal progression of Q2 (cross section)

SPCAM5 shows a progressive increase in heating rates (top) and a more evident surface drying (bottom), which indicates more abundant shallow cumuli before intense convection starts. This signal is not so evident in conventional GCM like CAM5.



Conclusions on model differences

SPCAM has a more evident transition stage from shallow to deep convection, which delays the afternoon precipitation peak and enhances the intense precipitation, leading to more realistic frequency-intensity distributions and overall climate

Diurnal transition from shallow to deep convection

Inhibition of weak precip, increase of intense precip

Different frequency-intensity structure

Changes in mean state precipitation