Impact of the triggering function on the diurnal cycle of deep convection in SCM and GCM runs at ECMWF

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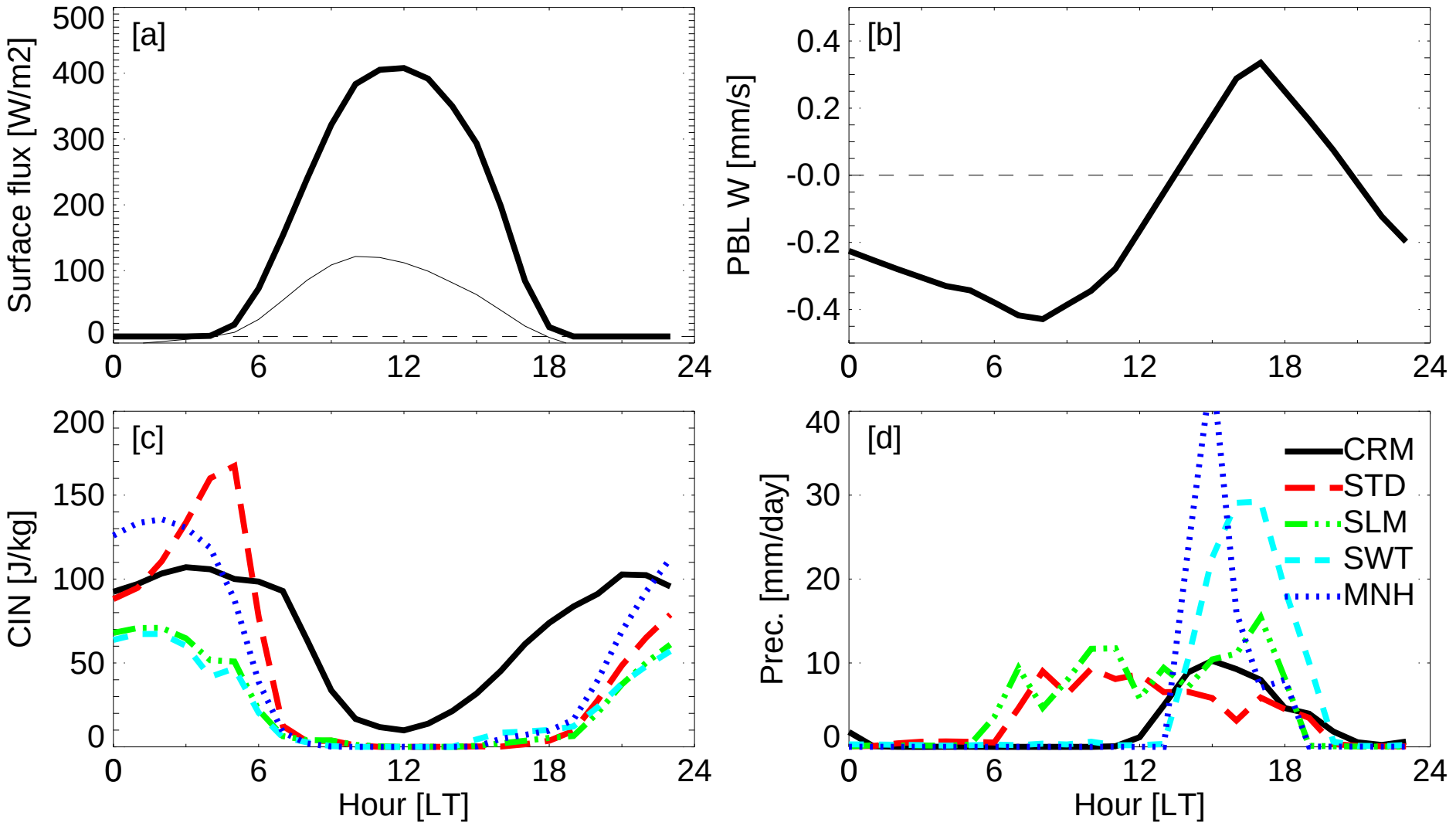
Short description of the convection schemes

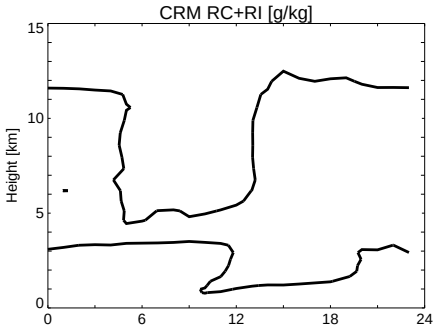
Name	Trigger	Entrainment coefficient
STD	cloud depth $>$ 200 hPa for surface parcel Tiedtke (1989), Jakob and Siebesma (2002)	$\epsilon = \epsilon_{\rm turb} + \epsilon_{\rm org}$ $\epsilon_{turb} = 4 \times 10^{-4}$ decreasing with height
SLM	cloud depth $>$ 200 hPa for mixed-layer parcel in the lowest 350 hPa	idem STD
SWT	cloud depth $>$ 200 hPa for mixed-layer parcel and positive buoyancy at cloud base	idem STD
MNH	cloud depth $>$ 200 hPa for mixed-layer parcel and positive buoyancy at cloud base Bechtold et al. (2001)	$\epsilon_{turb} = 1.3 \times 10^{-4}$ constant with height

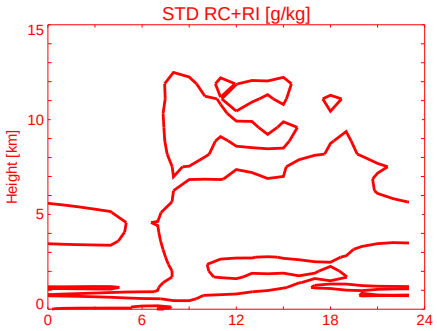
Idealized case study

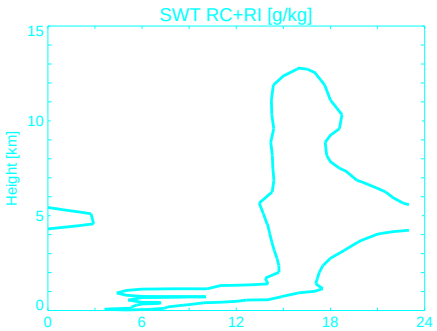


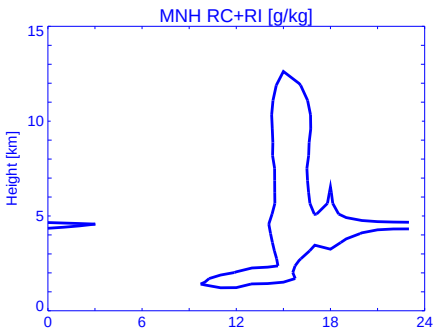
Idealized case study

Cloud

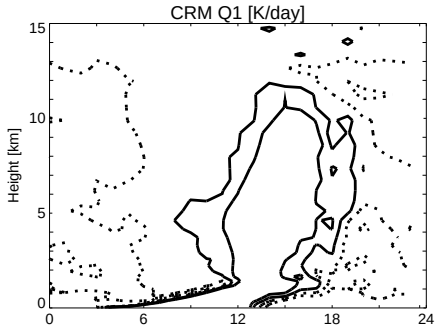


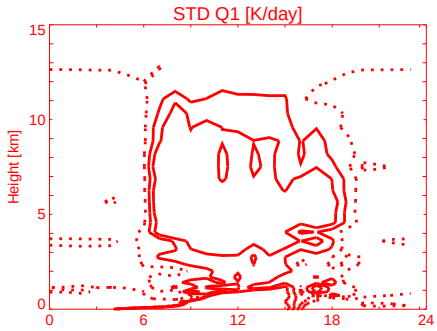


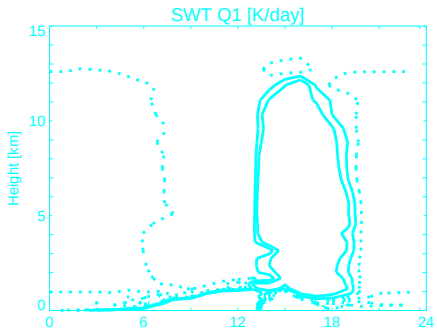


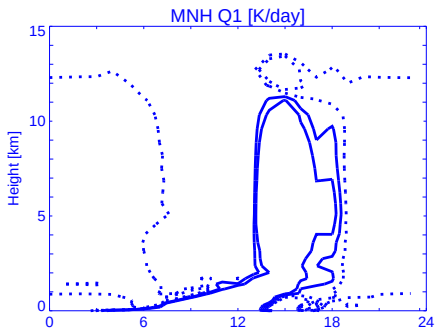


Q1

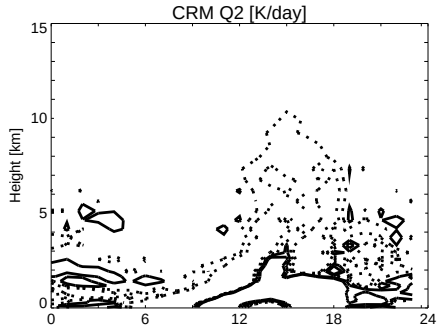


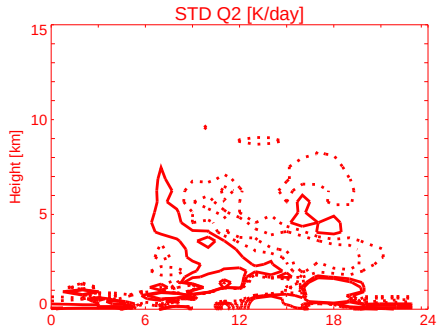


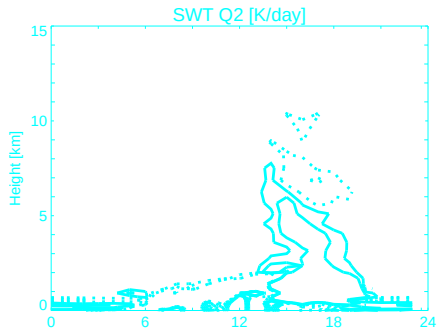


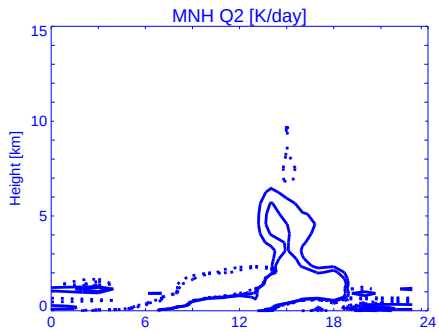


Q2

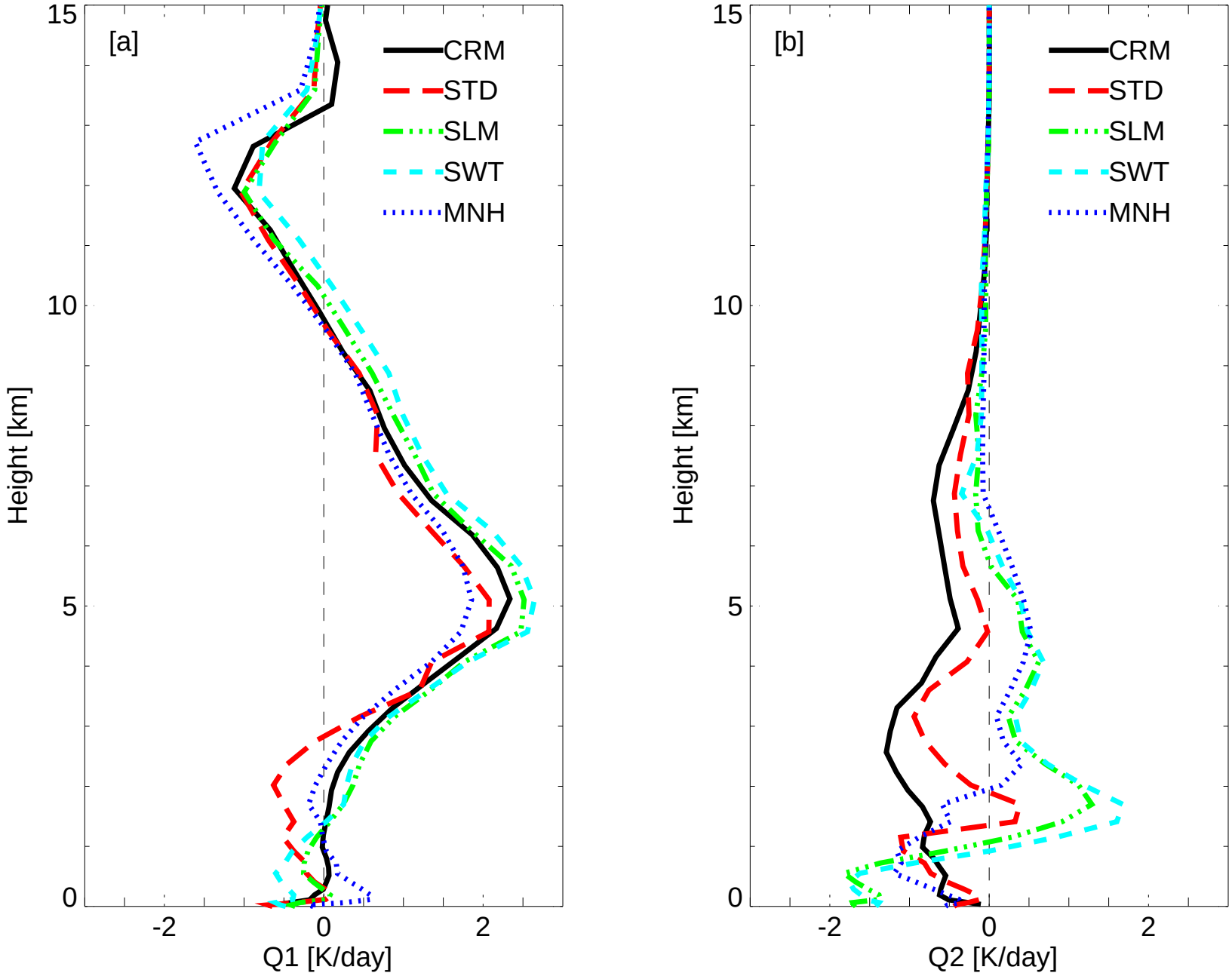




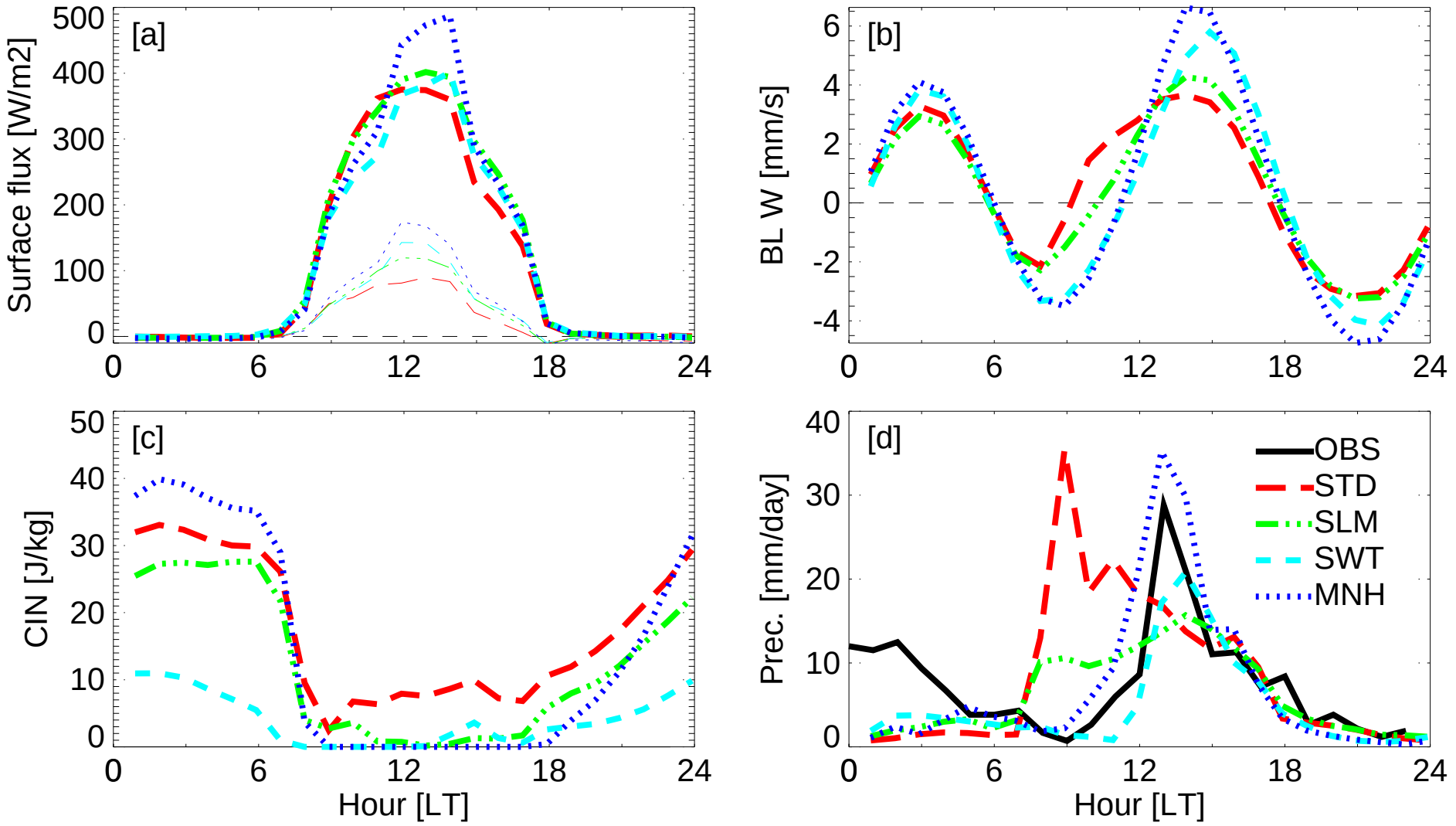




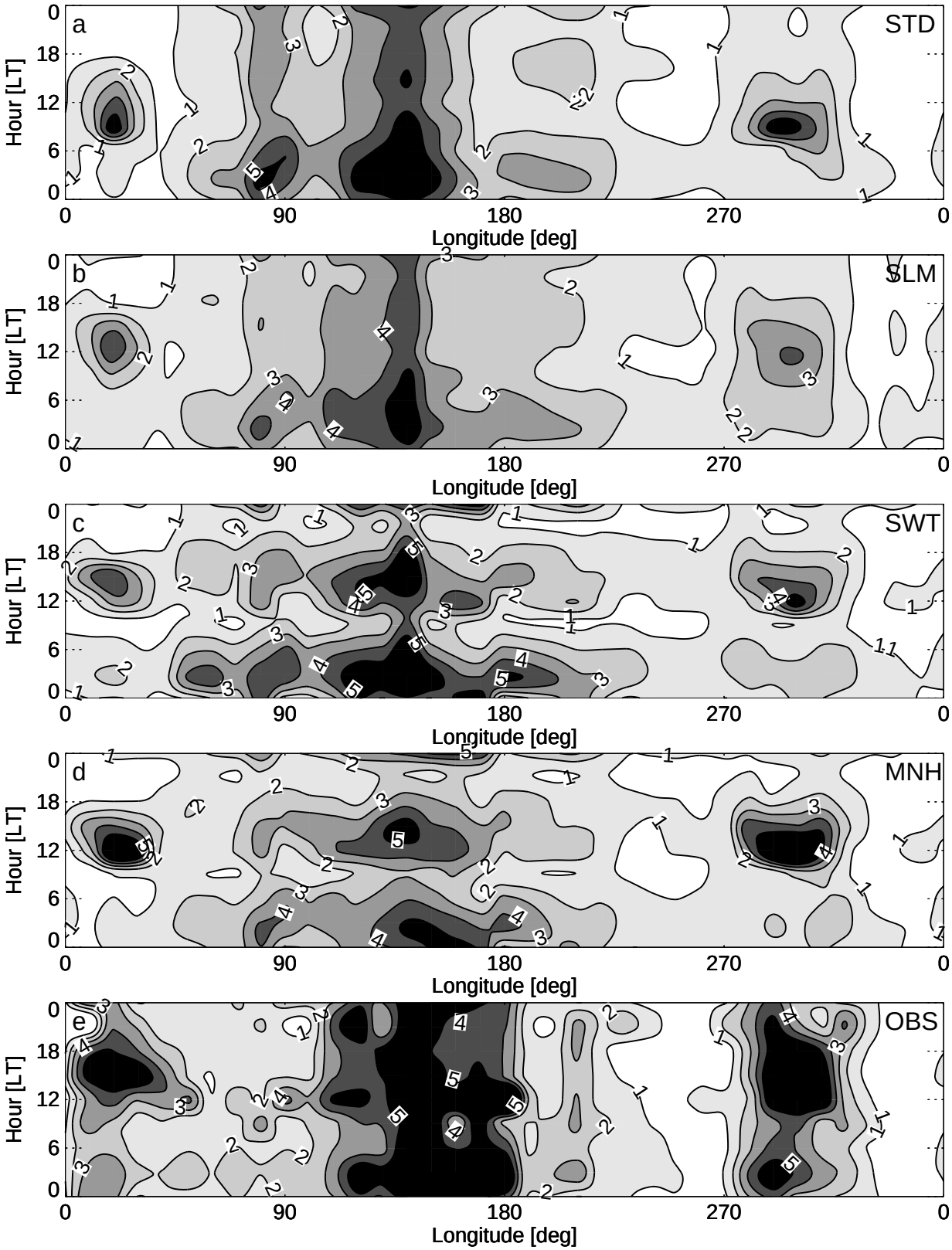
Idealized case study



Rondônia area - February 1999



Diurnal cycle at global scale



Precipitation (mm day^{-1})

Fields averaged between 20°S and 20°N

Conclusion

the current models can reasonably represent

the diurnal cycle of convective precipitation

- ☞ when an appropriate trigger function is used in the convection scheme
- ☞ when the late morning shallow convection is correctly represented.

phase of tropical convection ↔ semidiurnal tide of large-scale convergence:

the trigger could be related to the large-scale convergence