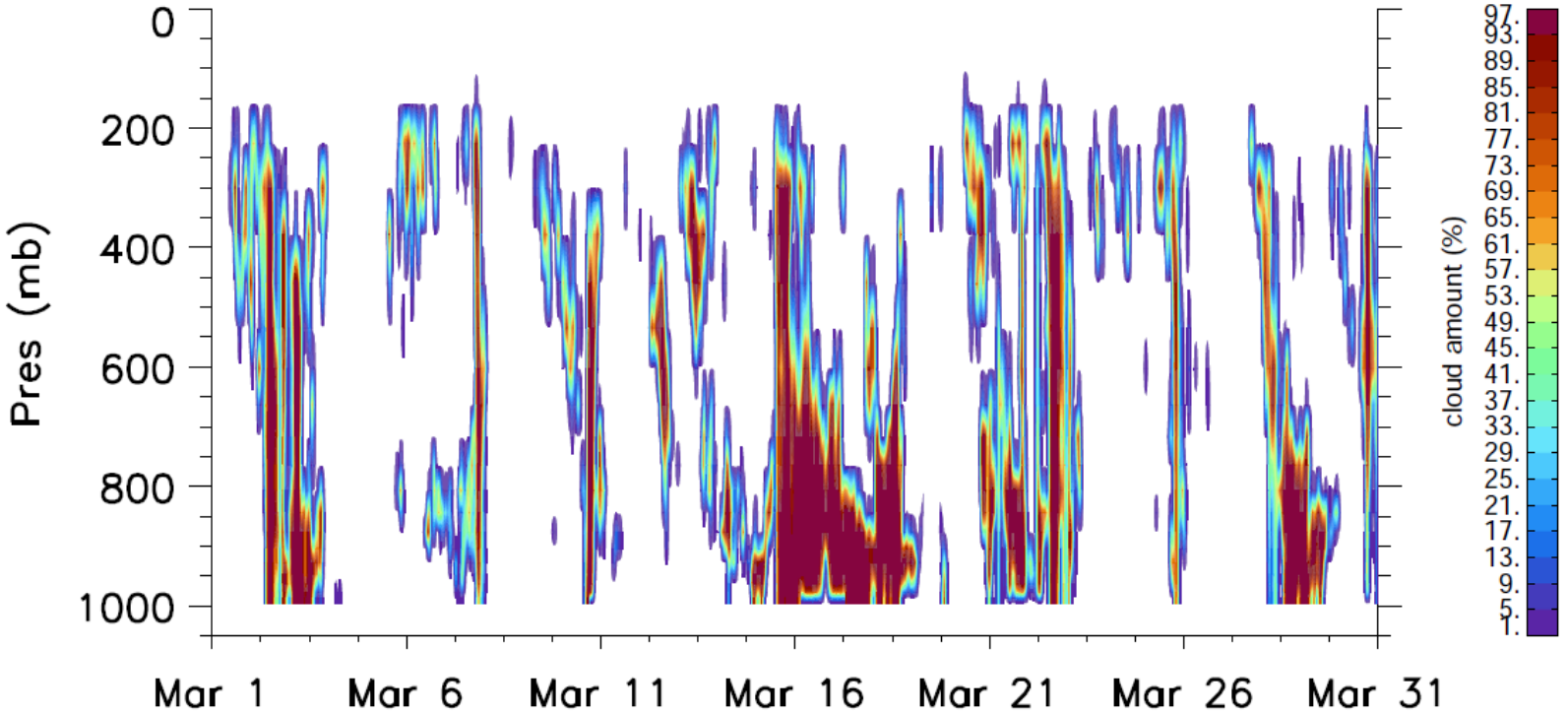
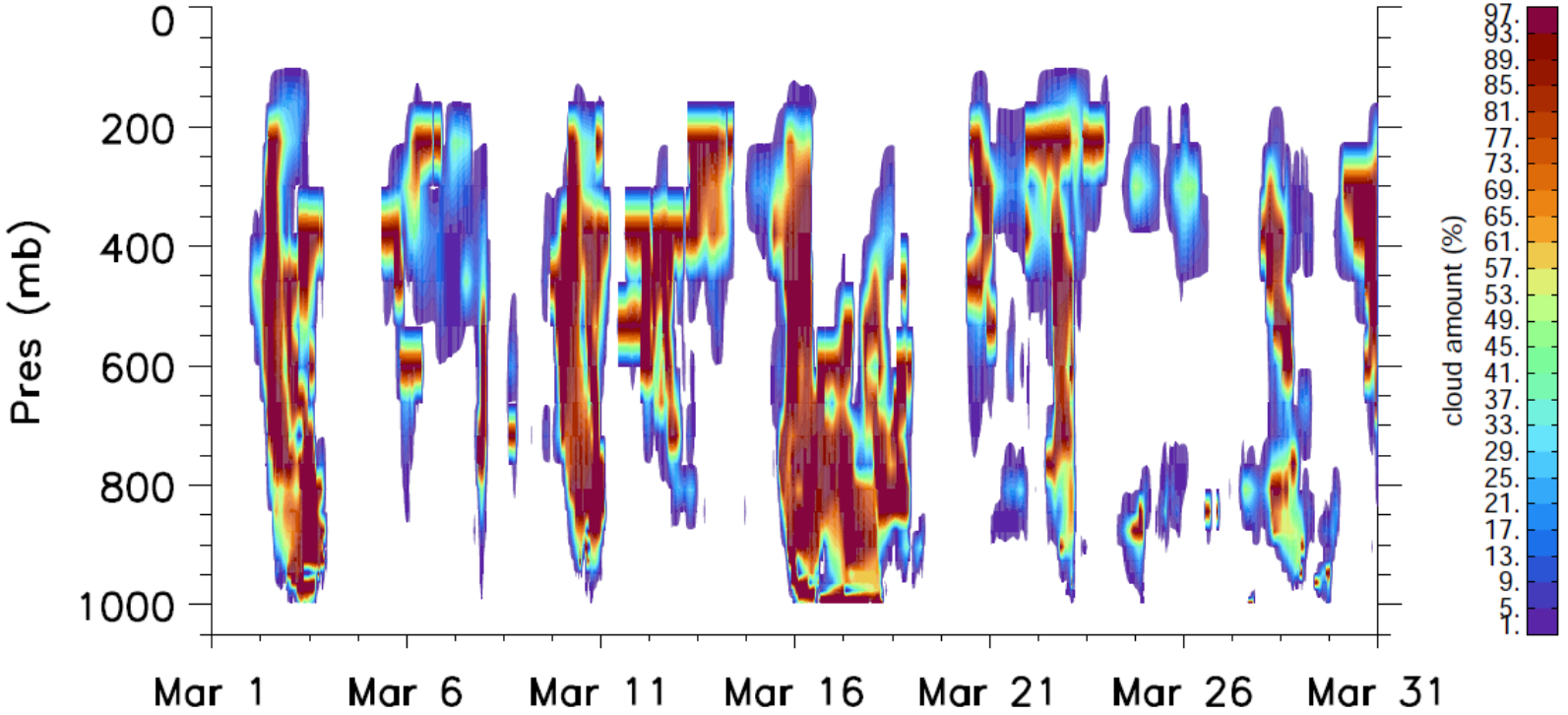
Composite Analysis of GFDL SCM: Implications for FASTER

Yanluan Lin, Leo Donner

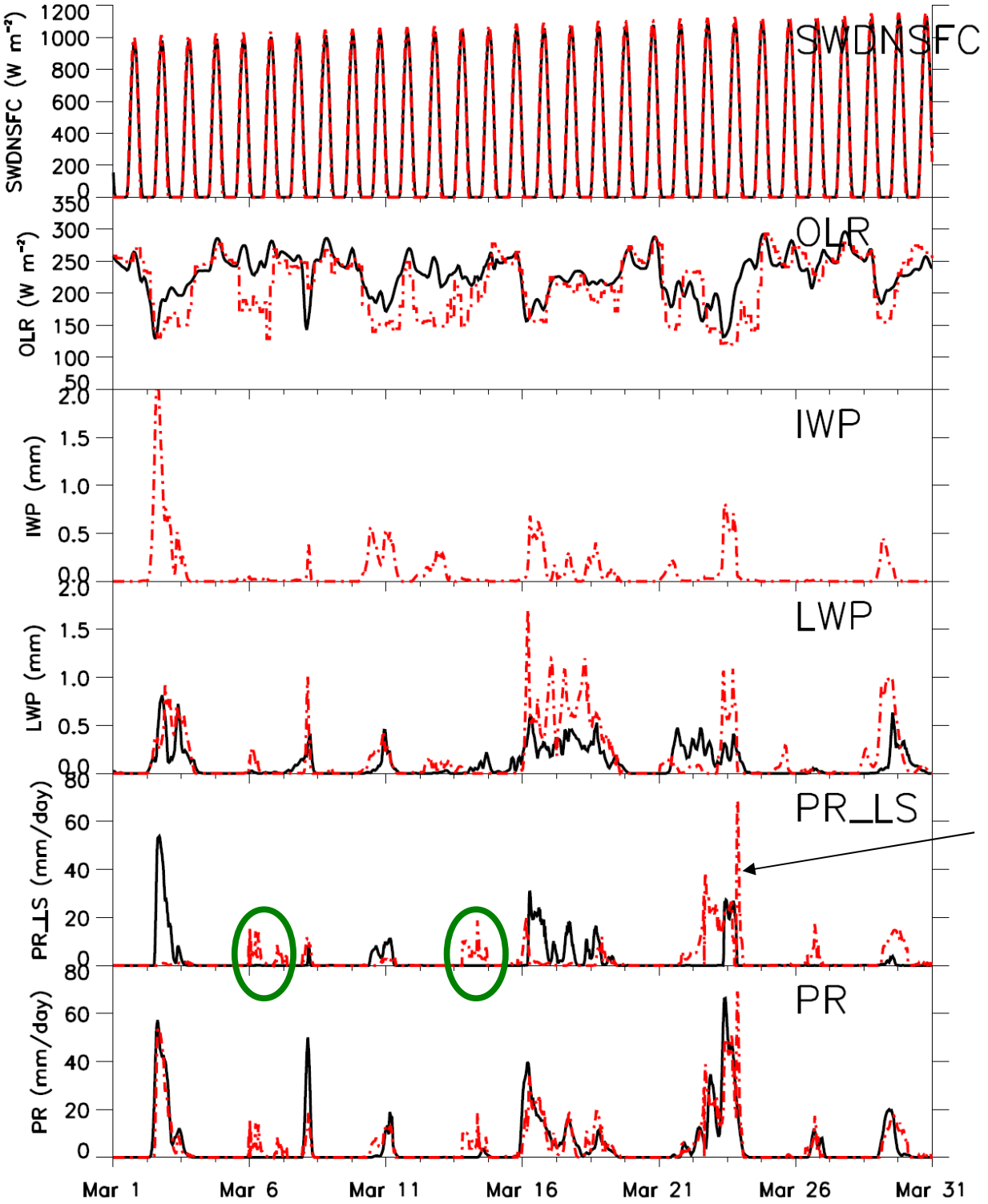
FASTER breakout
March 15, 2010



ARSCL
Cloud fraction



AM2 SCM



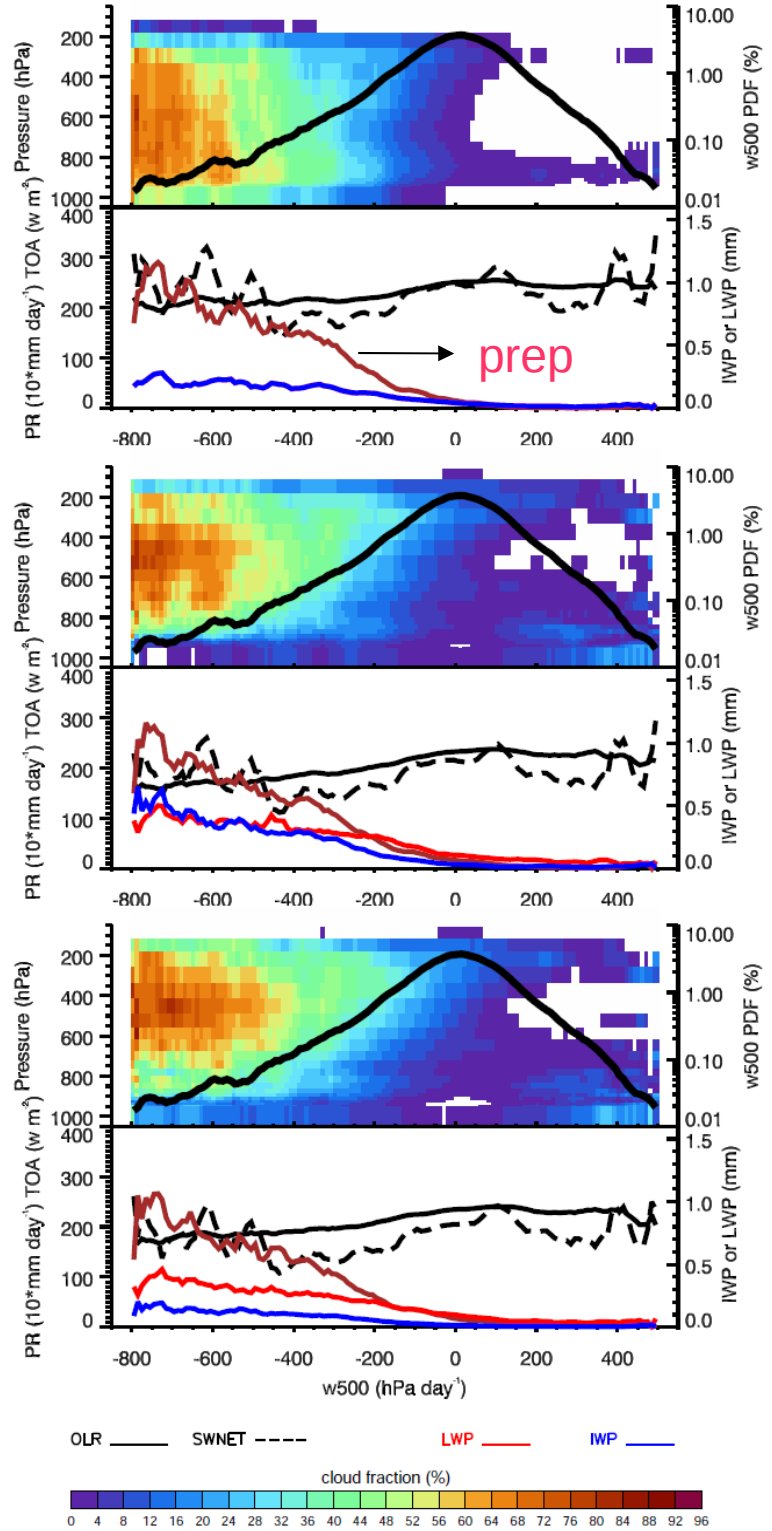
March 2000

PR_CONV

ARM

AM2

AM3



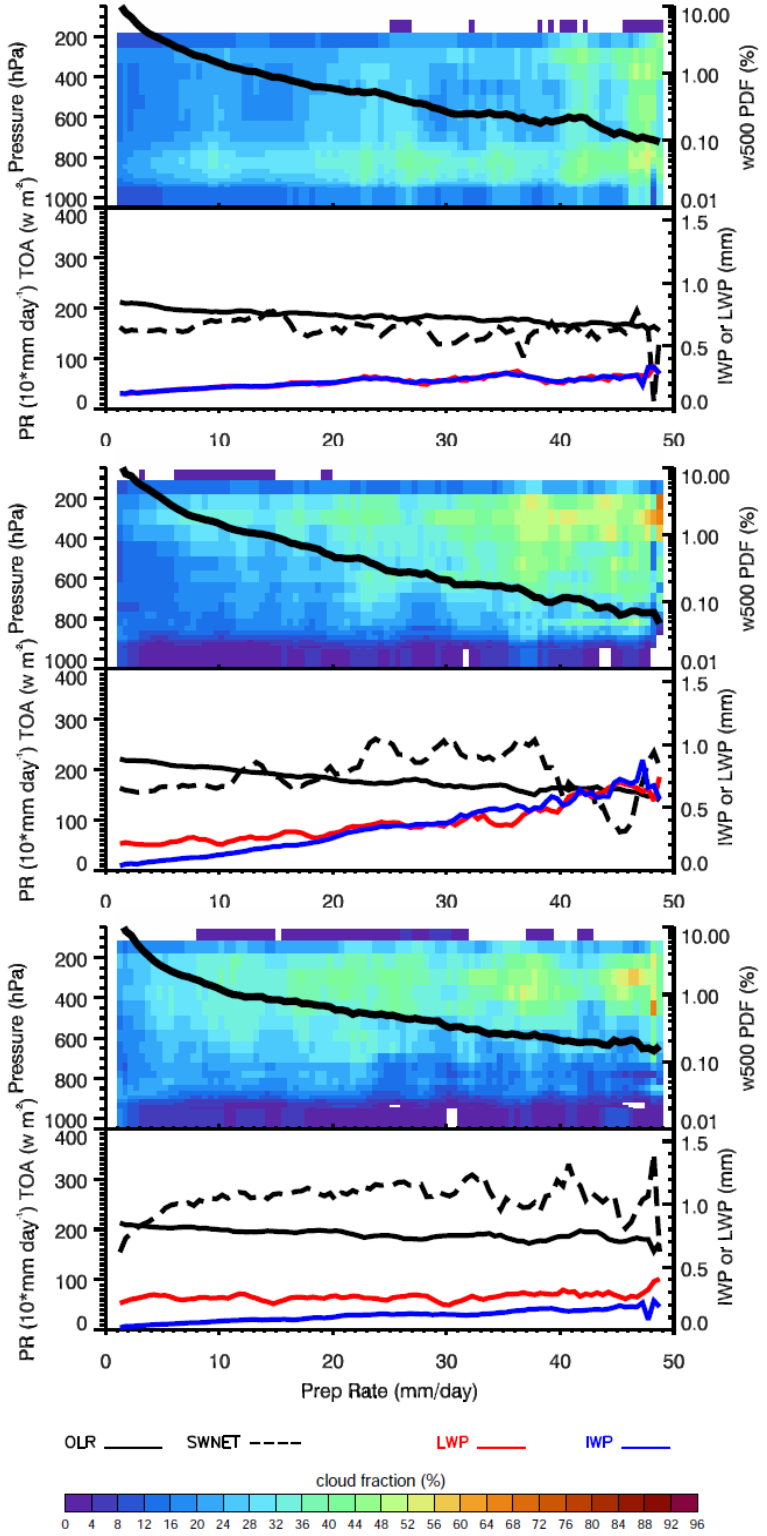
Composite based on 500 mb vertical motion using 3-year ARM OBS, AM2, and AM3

- Top heavy cloud fraction for model
- Model has more low and upper level cloud when subsidence dominates

ARM

AM2

AM3



Composite based on total precipitation rate using 3-year ARM OBS, AM2, and AM3

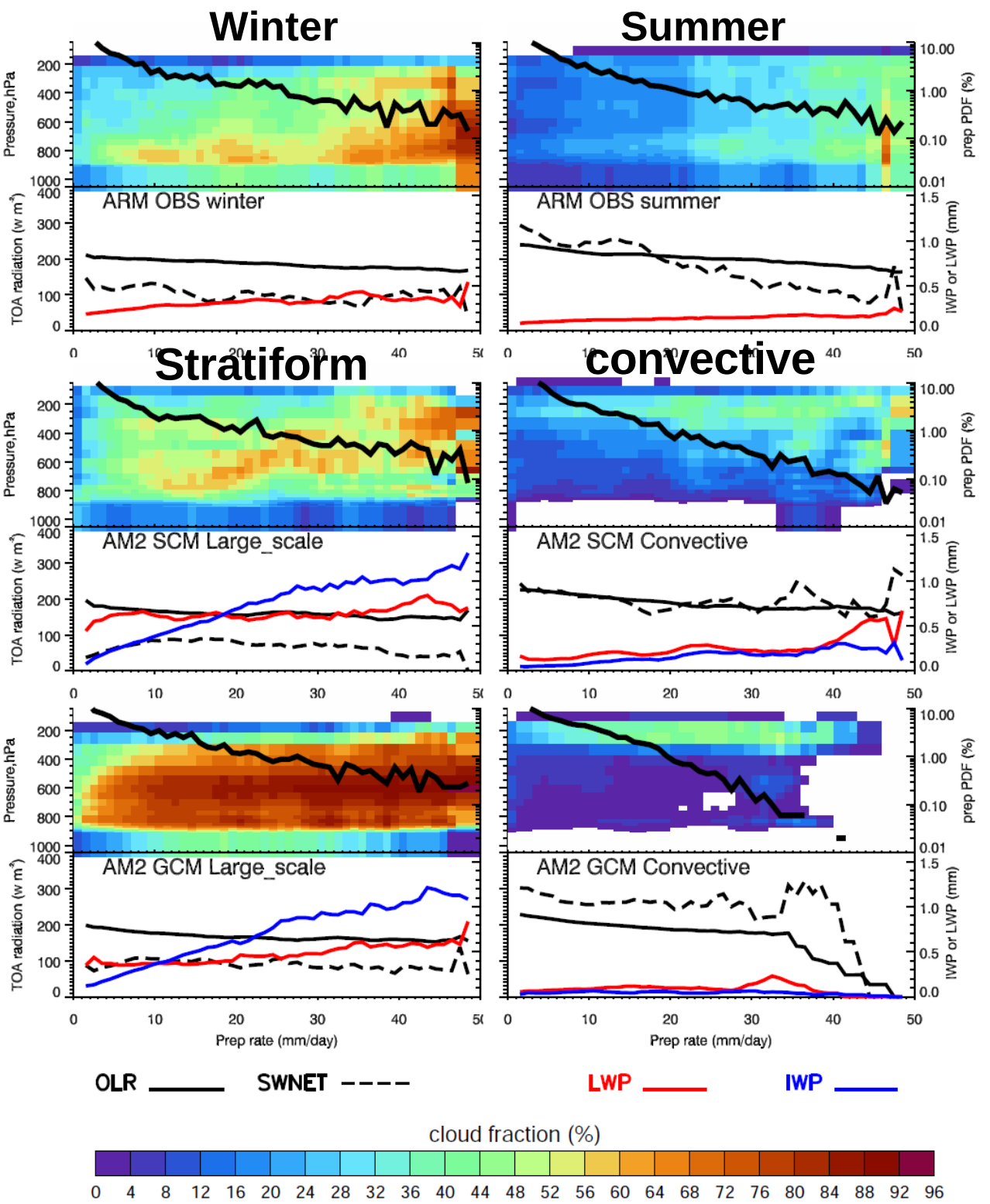
- Model has larger upper level cloud fraction

- OLR is close between OBS and models, while TOA SW absorbed is different, which implies diurnal cycle may be not correct in model.

Composite of cloud fraction, LWP, IWP, OLR, and TOA SW absorbed

The connection between SCM and GCM is not obvious

Need of separation between stratiform and convective precipitation from ARM observations



ARM OBS

AM2 SCM

AM2 GCM

Some conclusions

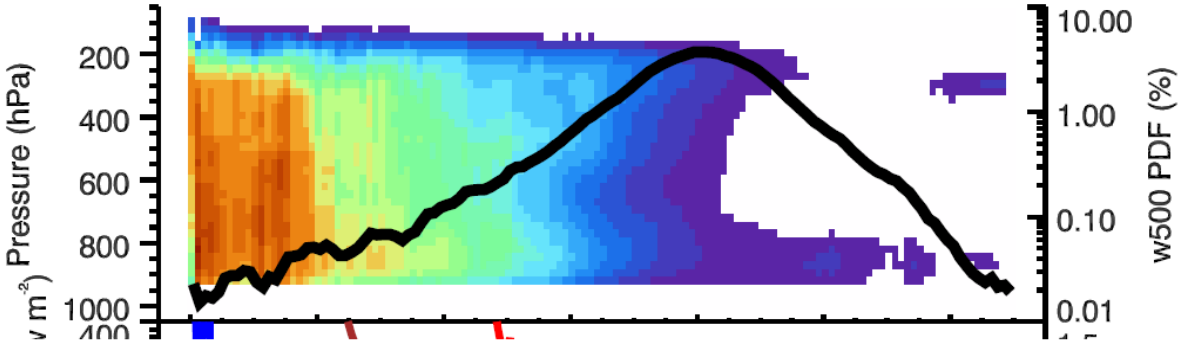
1. ***SCM precipitation is well constrained by forcing, but cloud is not.***

2. ***For the same stratifrom precipitation, GCM generally has larger cloud fraction than SCM.***

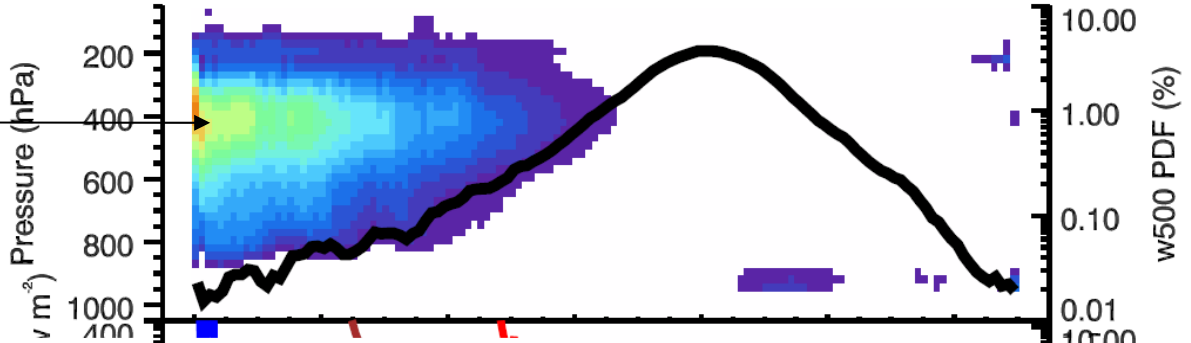
3. ***Convection triggering is too frequent in AM2 SCM.***

4. ***Composite analysis using long term SCM simulations is helpful to identify some systematic errors.***

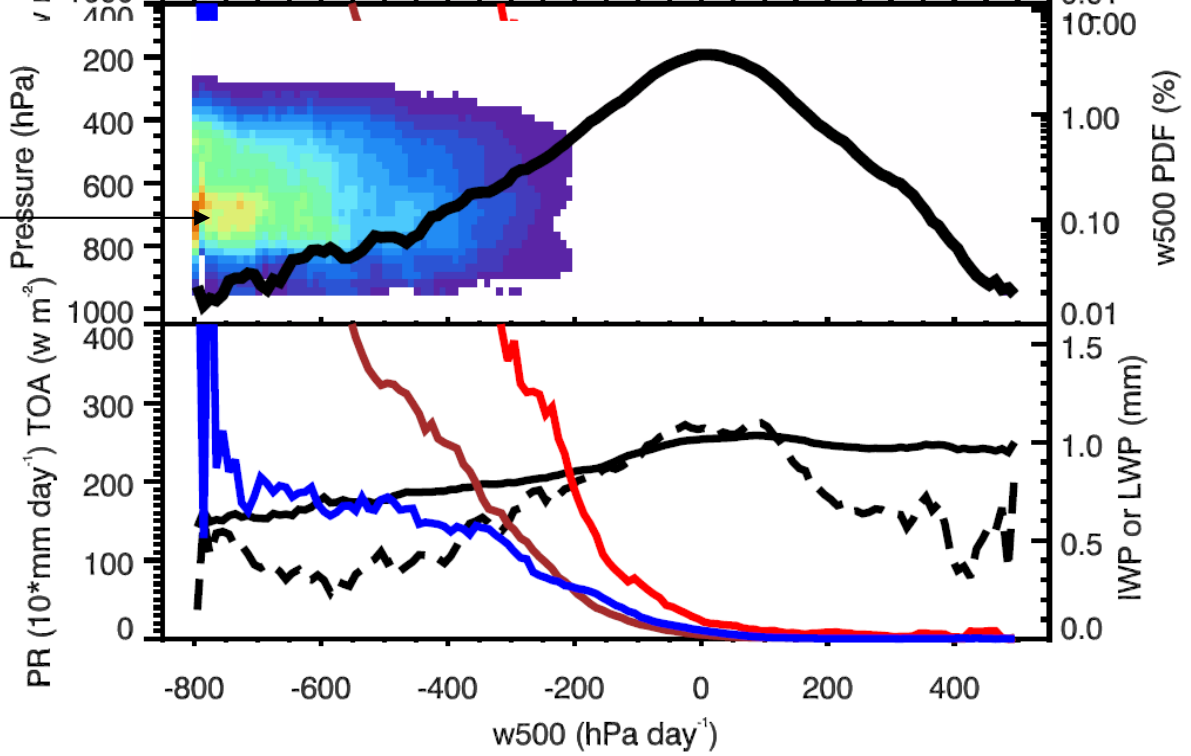
Cloud fraction



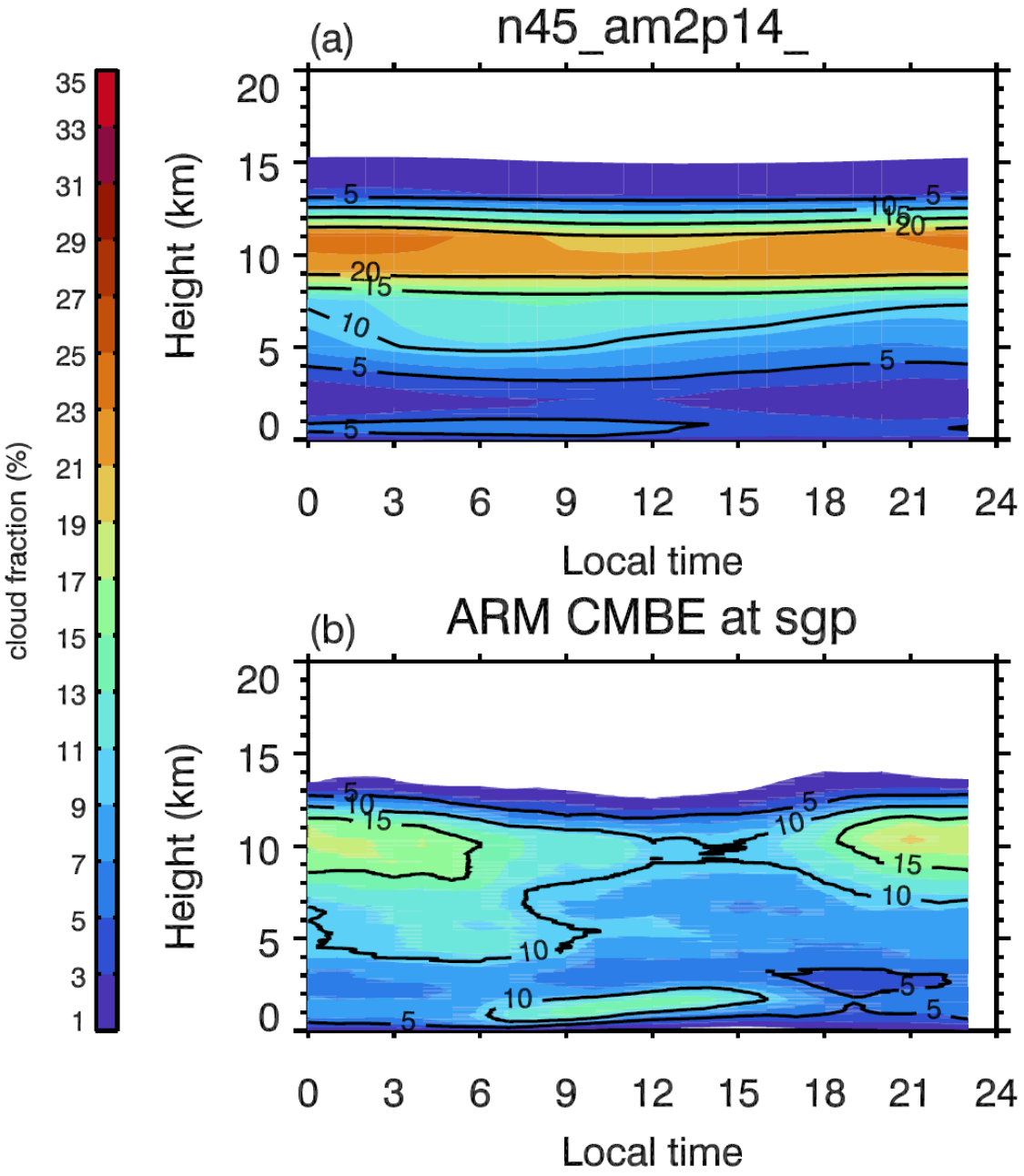
Q1



Q2



Future work



Diurnal cycle