

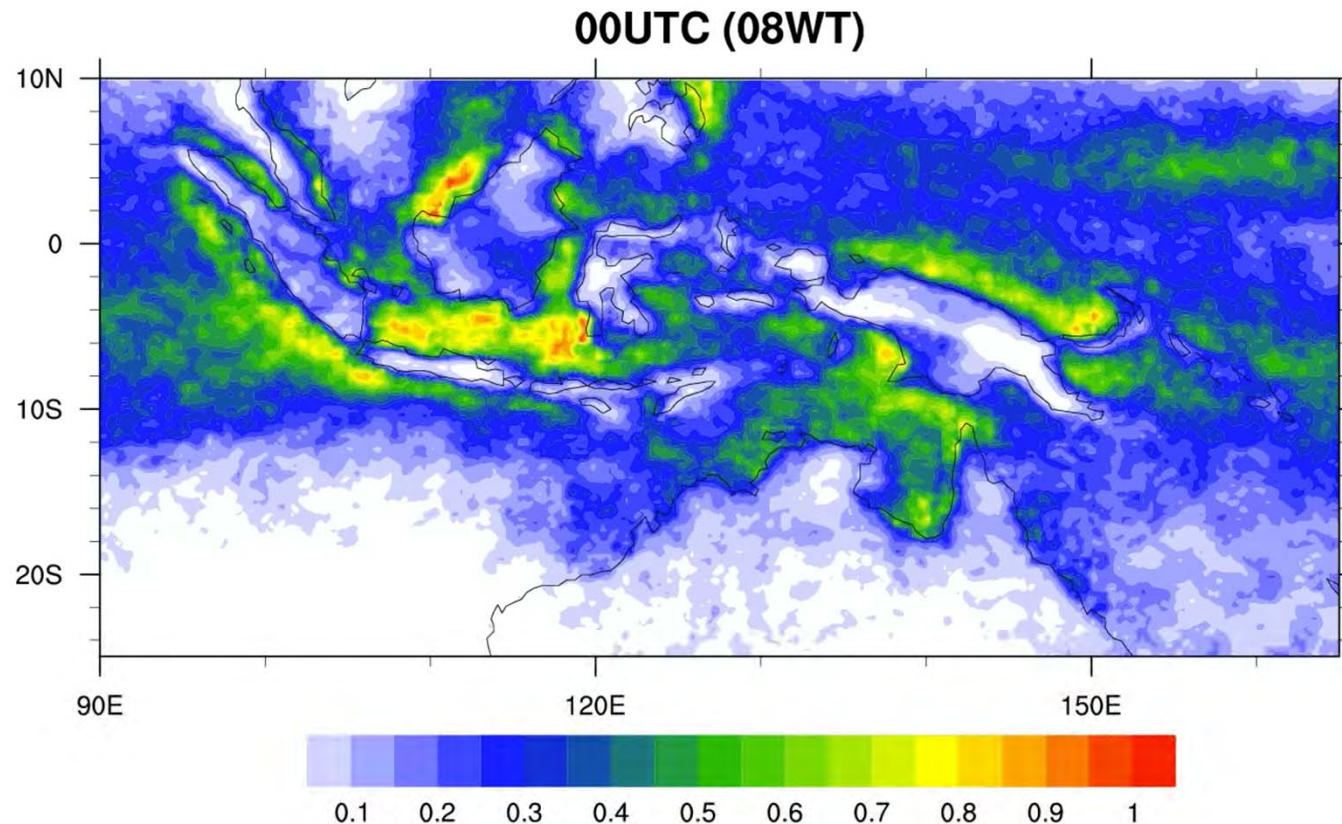
YMC modelling efforts – Why bother?

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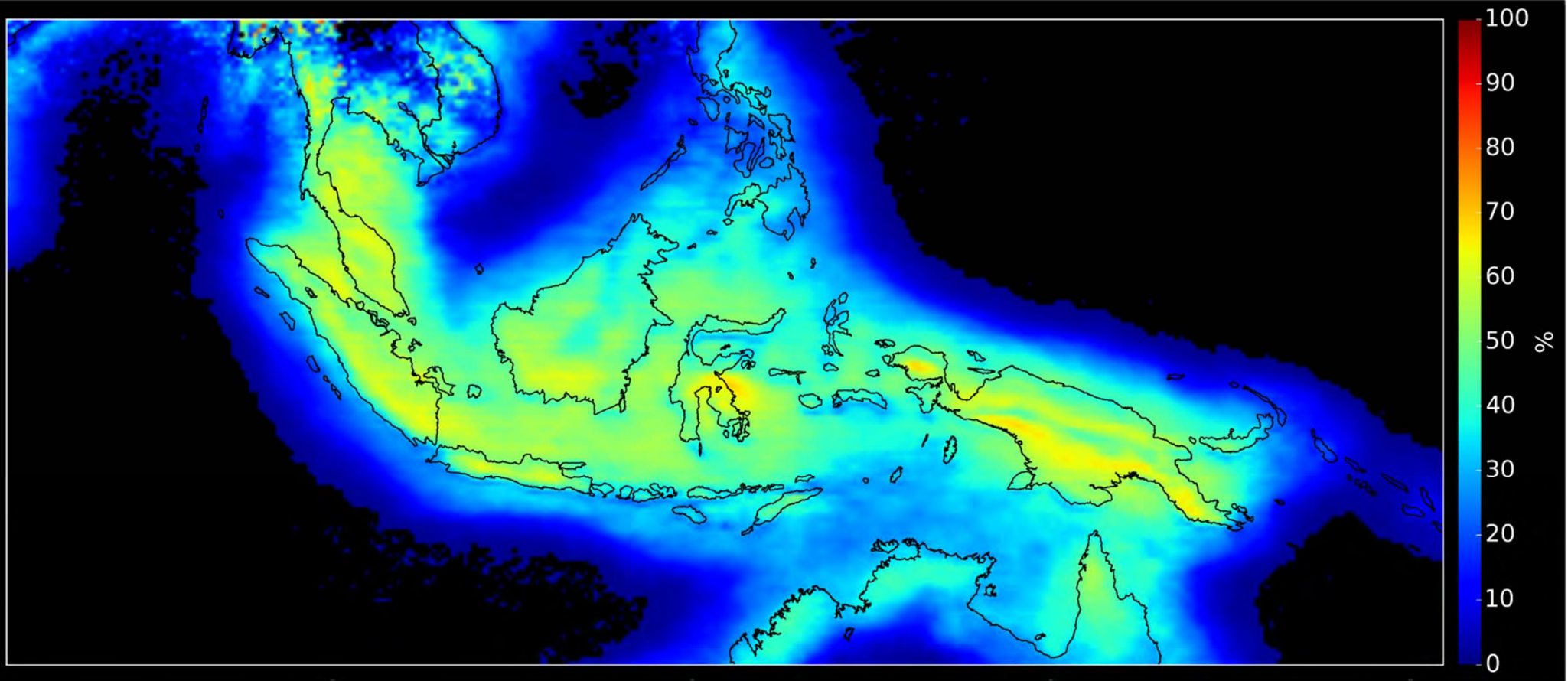
Based on the work of G Berry, M Bergemann, Juliane Schwendicke, Duncan Ackerley, Suaydhi Suaydhi

The MC provides a fascinating set of convective features

Mean diurnal cycle – December – TRMM



A large fraction of the rainfall is associated with coastal features:

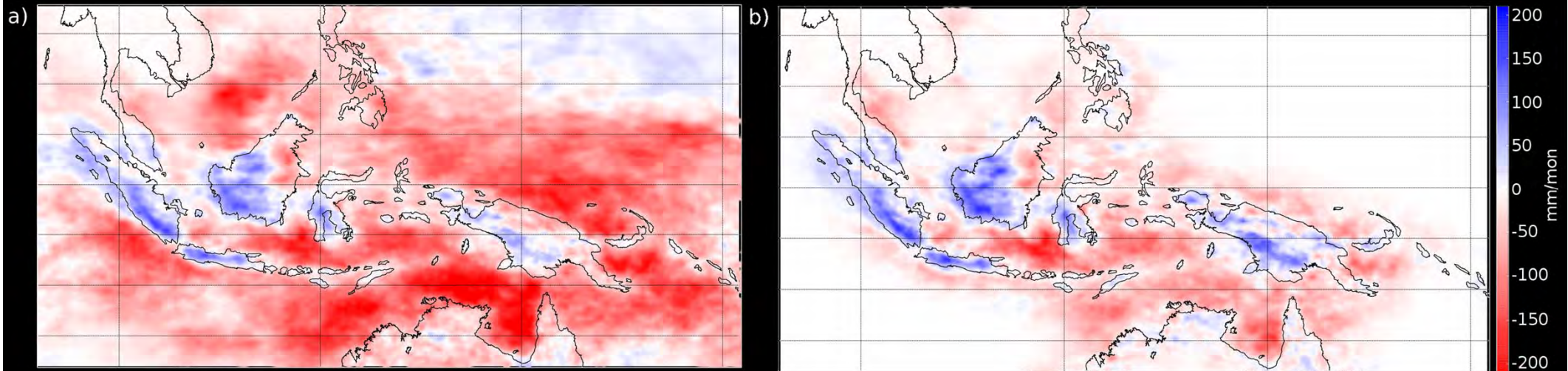


Annual percentage of rainfall from coastal features

Thanks to Martin Bergemann

The Maritime Continent does interesting things to the MJO (and other waves)

Rainfall difference – Suppressed – Active MJO Phase

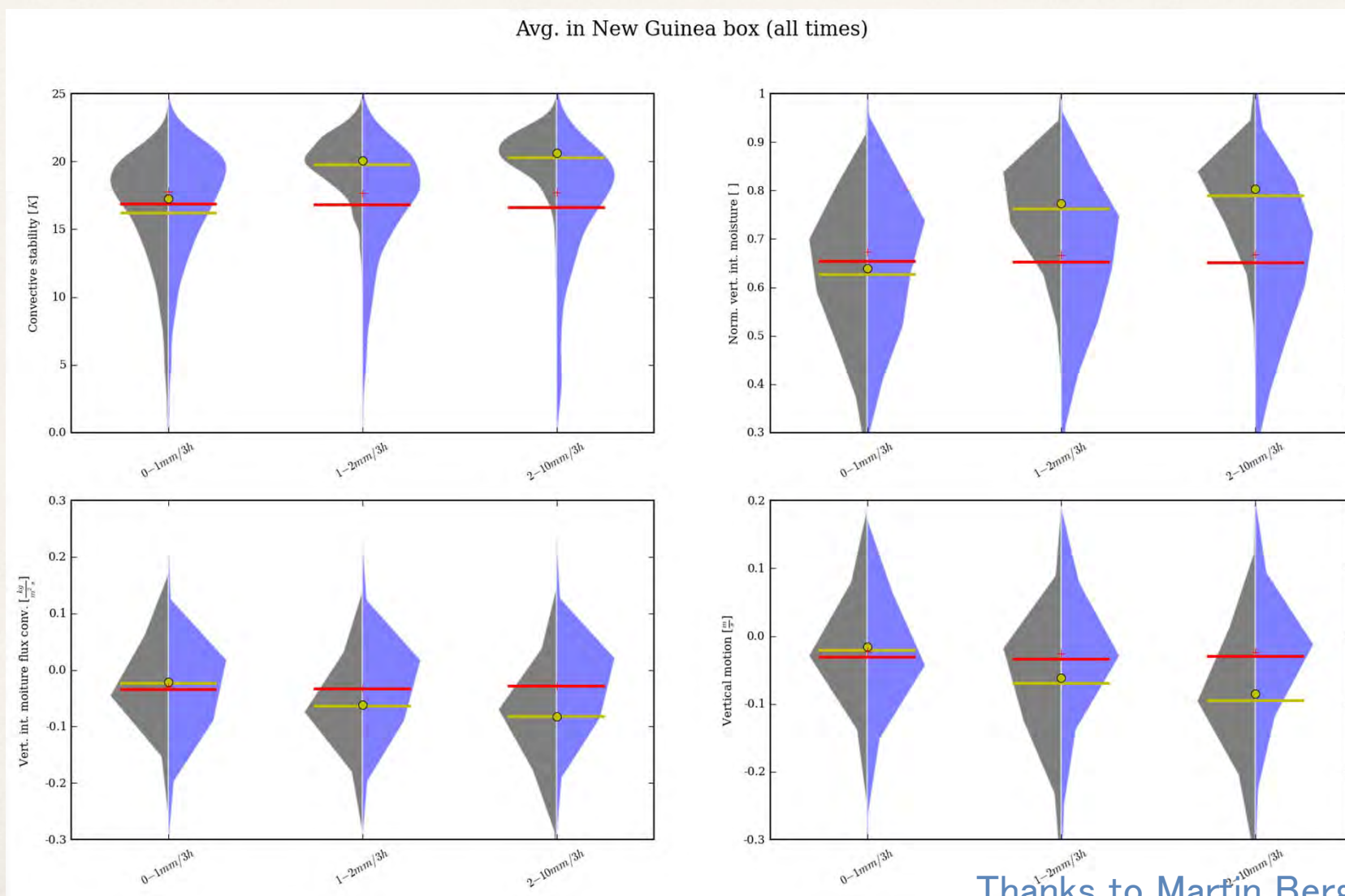


All rain

Coastal rain

Thanks to Martin Bergemann

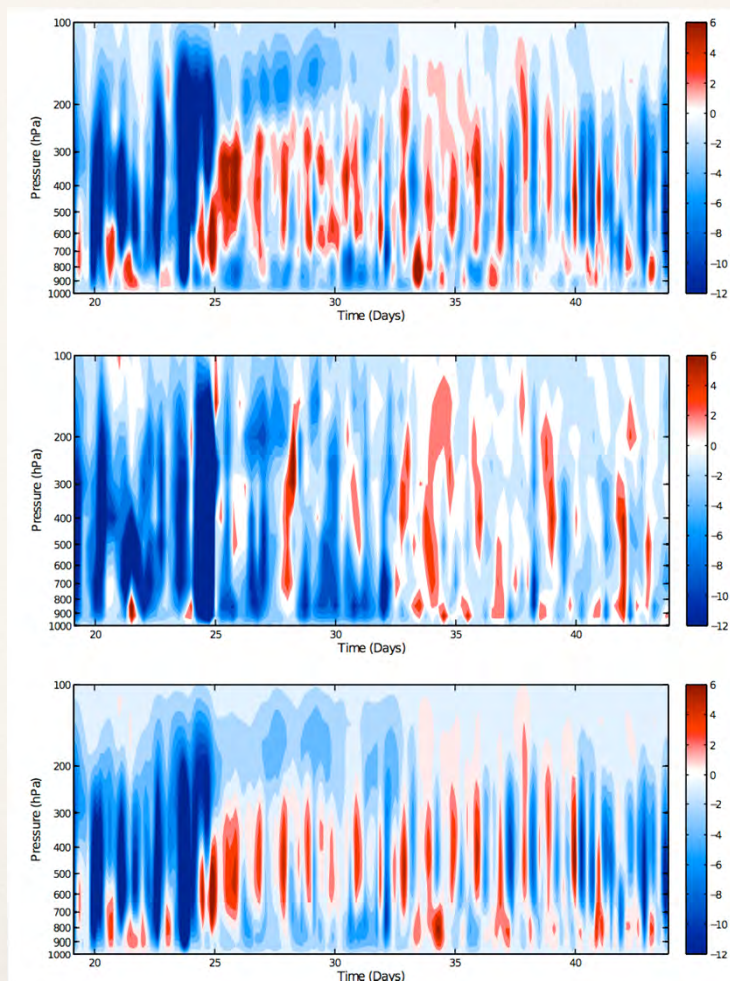
Rainfall over land occurs at distinctly different large-scale conditions



Thanks to Martin Bergemann

Consequently we must know the large-scale state well

TWP-ICE $\omega(p)$



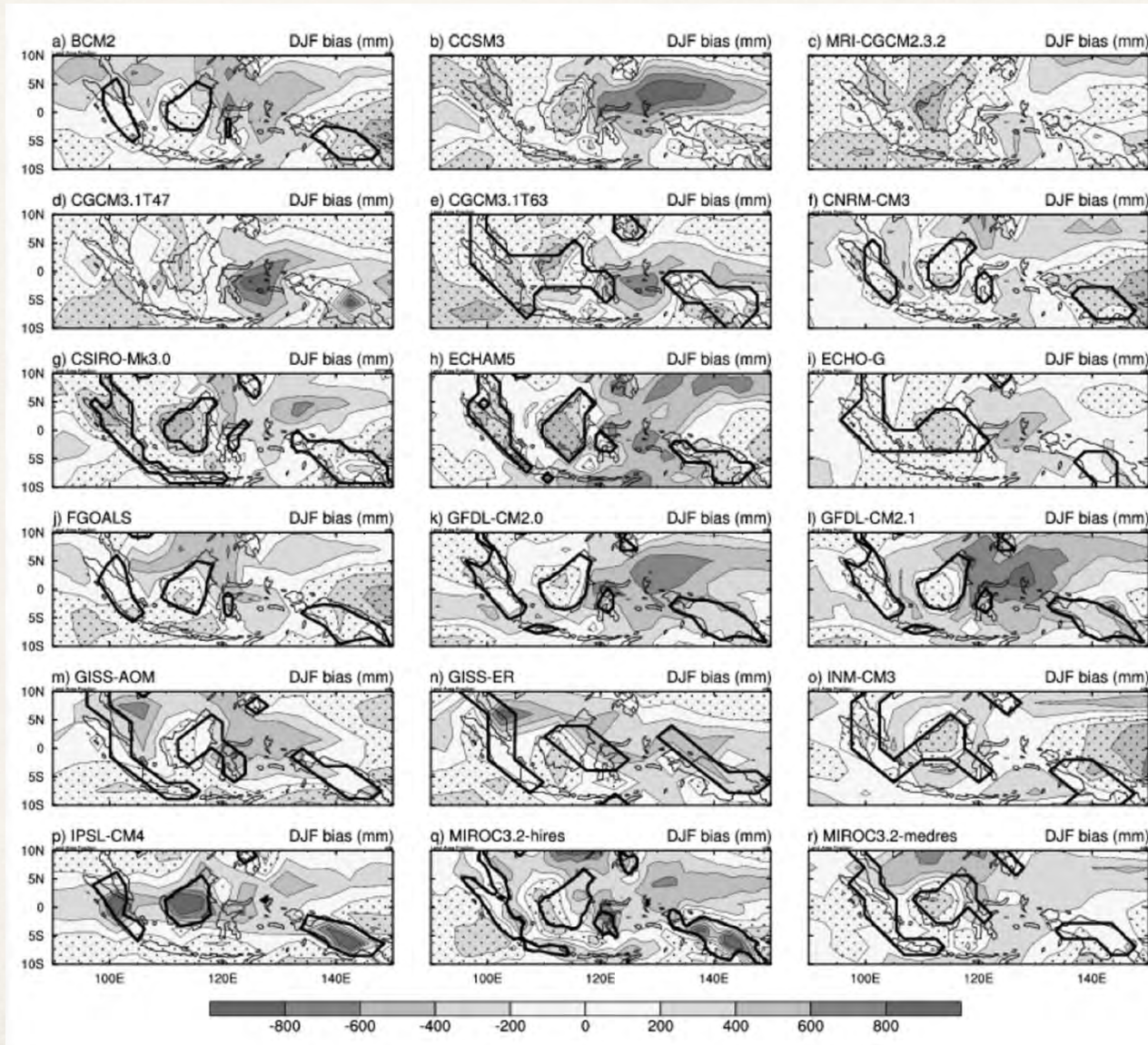
Analysis
Obs

Analysis
ECMWF

Analysis
Hybrid

Large Scales

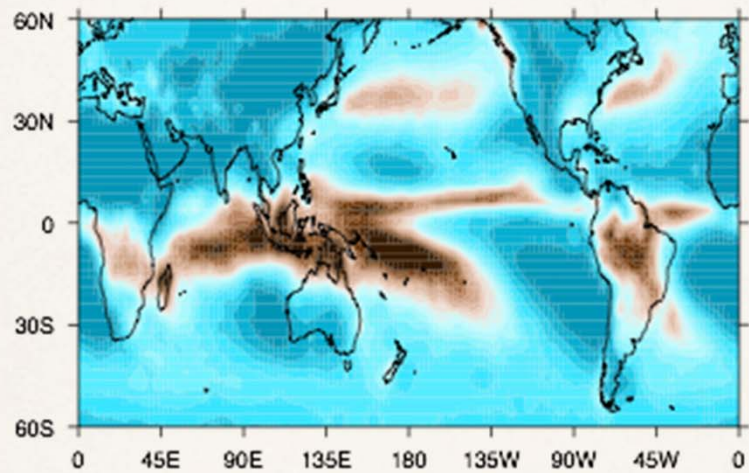
Models have all sorts of trouble around the Maritime Continent



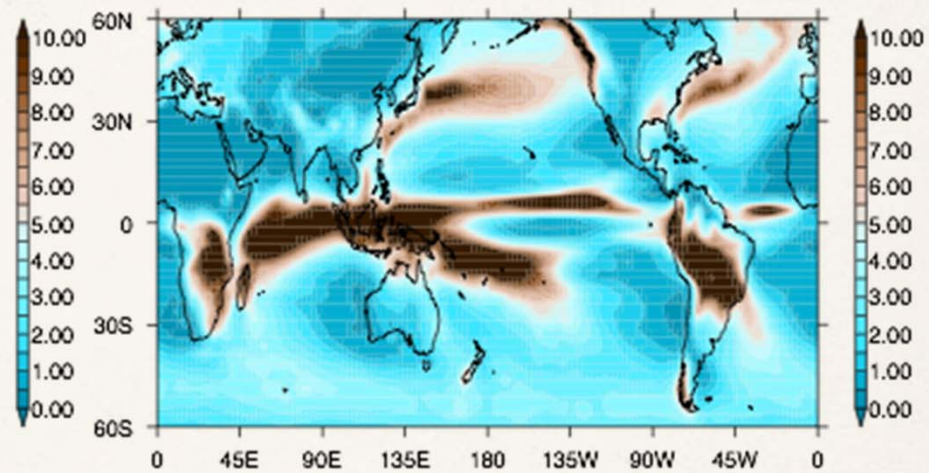
DJF Rainfall biases
– CMIP3 models

ACCESS has large rainfall biases around the Maritime Continent

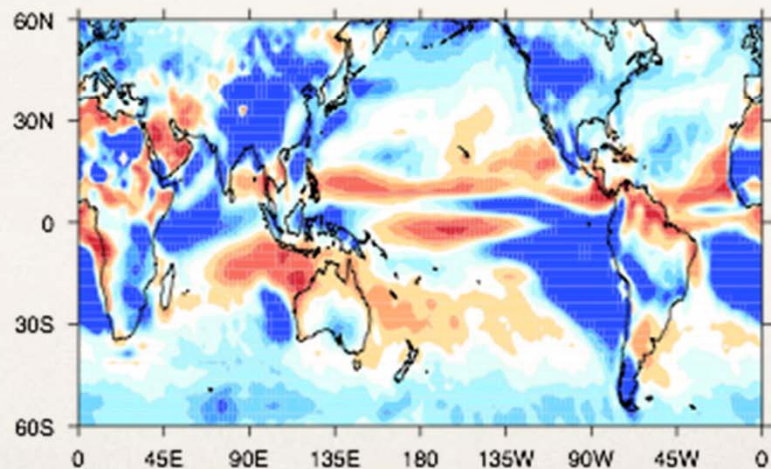
(a) CMAP DJF-mean precipitation (mm day^{-1})



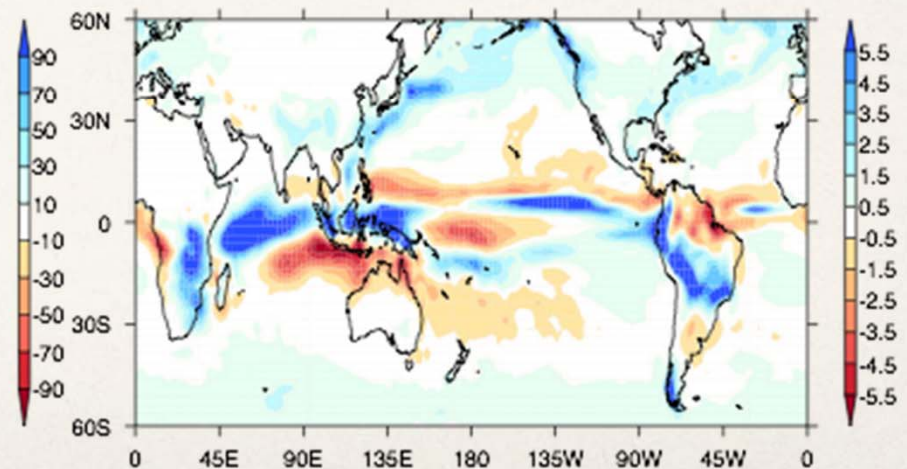
(b) ACCESS1.3 DJF-mean precipitation (mm day^{-1})



(c) ACCESS1.3 - CMAP precipitation (%)



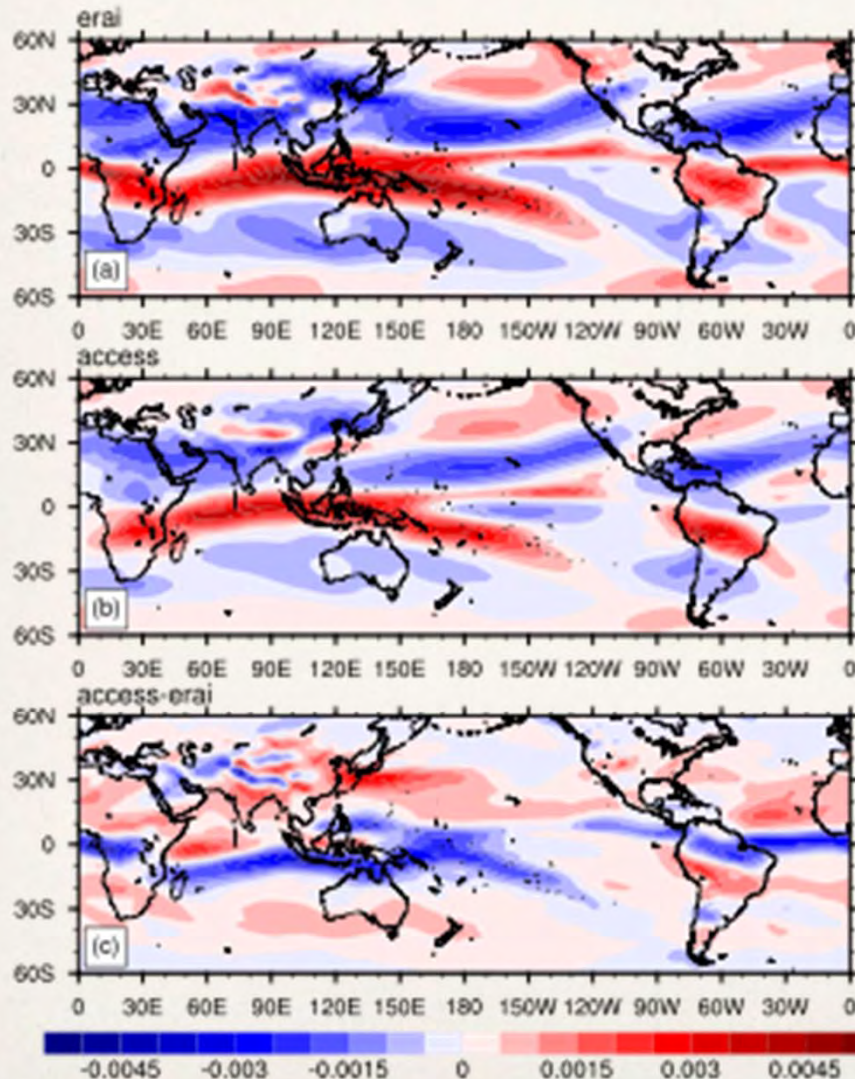
(d) ACCESS1.3 - CMAP precipitation (mm day^{-1})



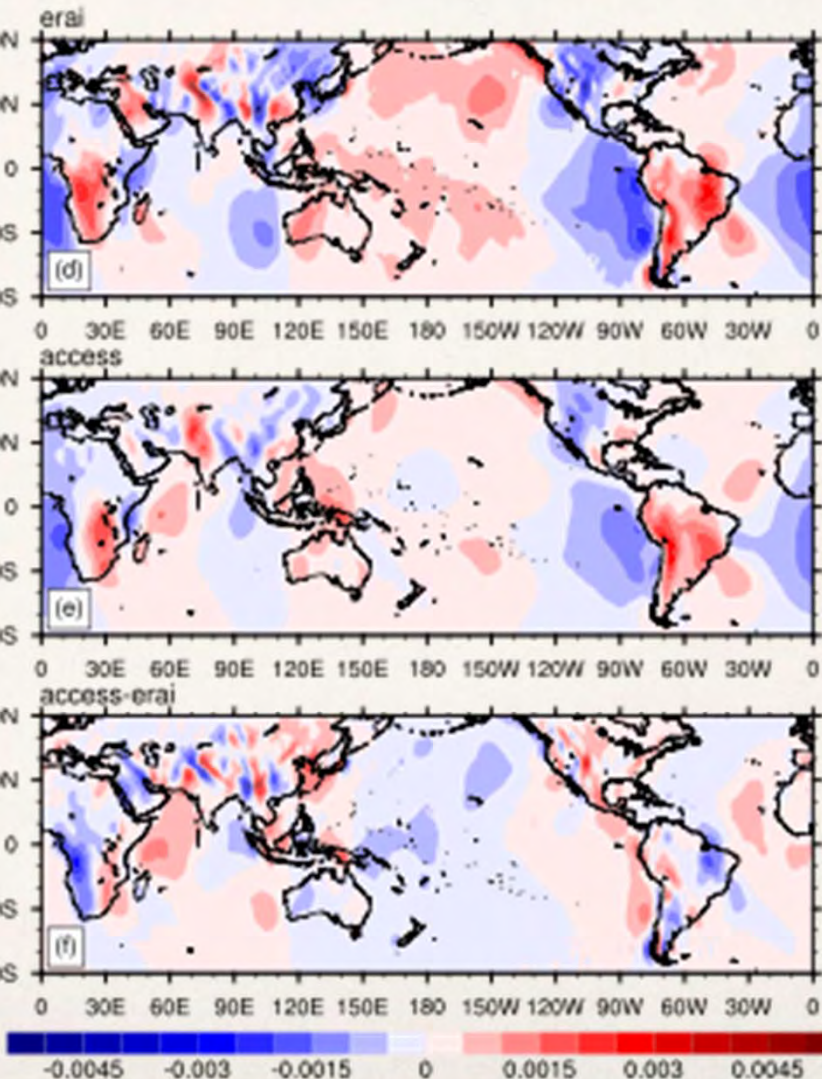
Thanks to Duncan Ackerley

There is a dynamical link between the biases over the MC and other regions

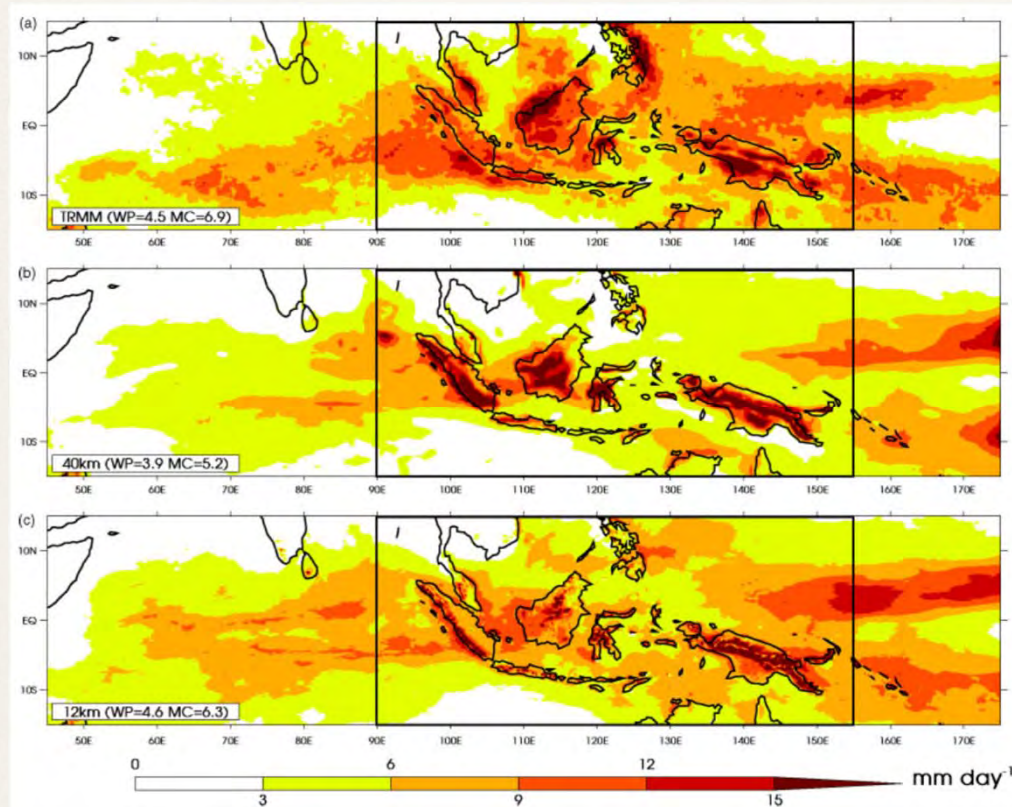
Hadley circulation DJF 500 mb



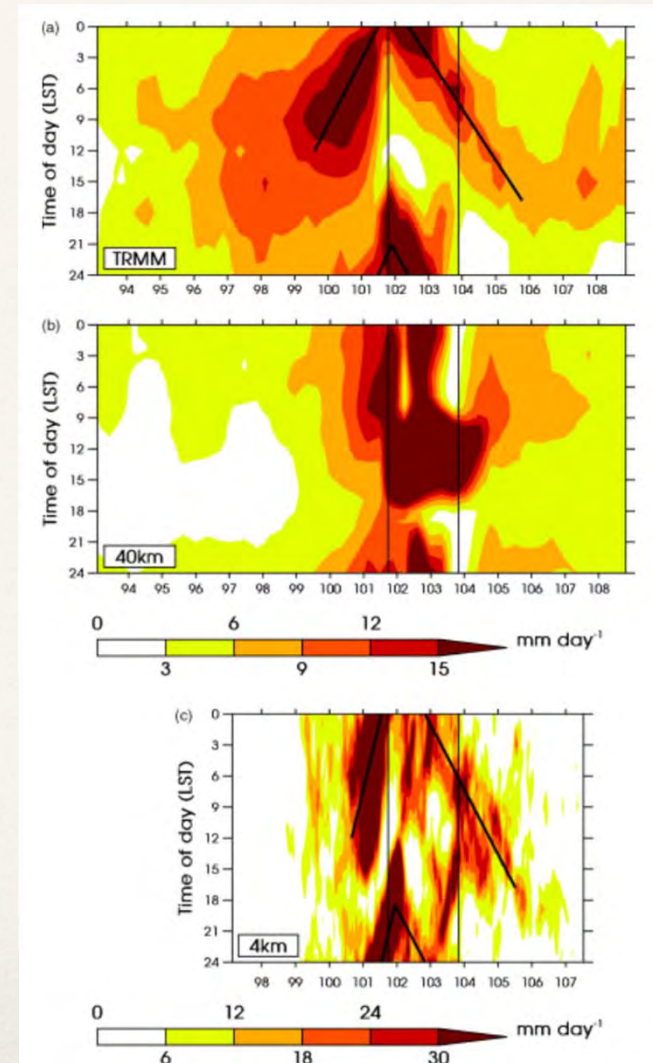
Walker circulation DJF 500 mb



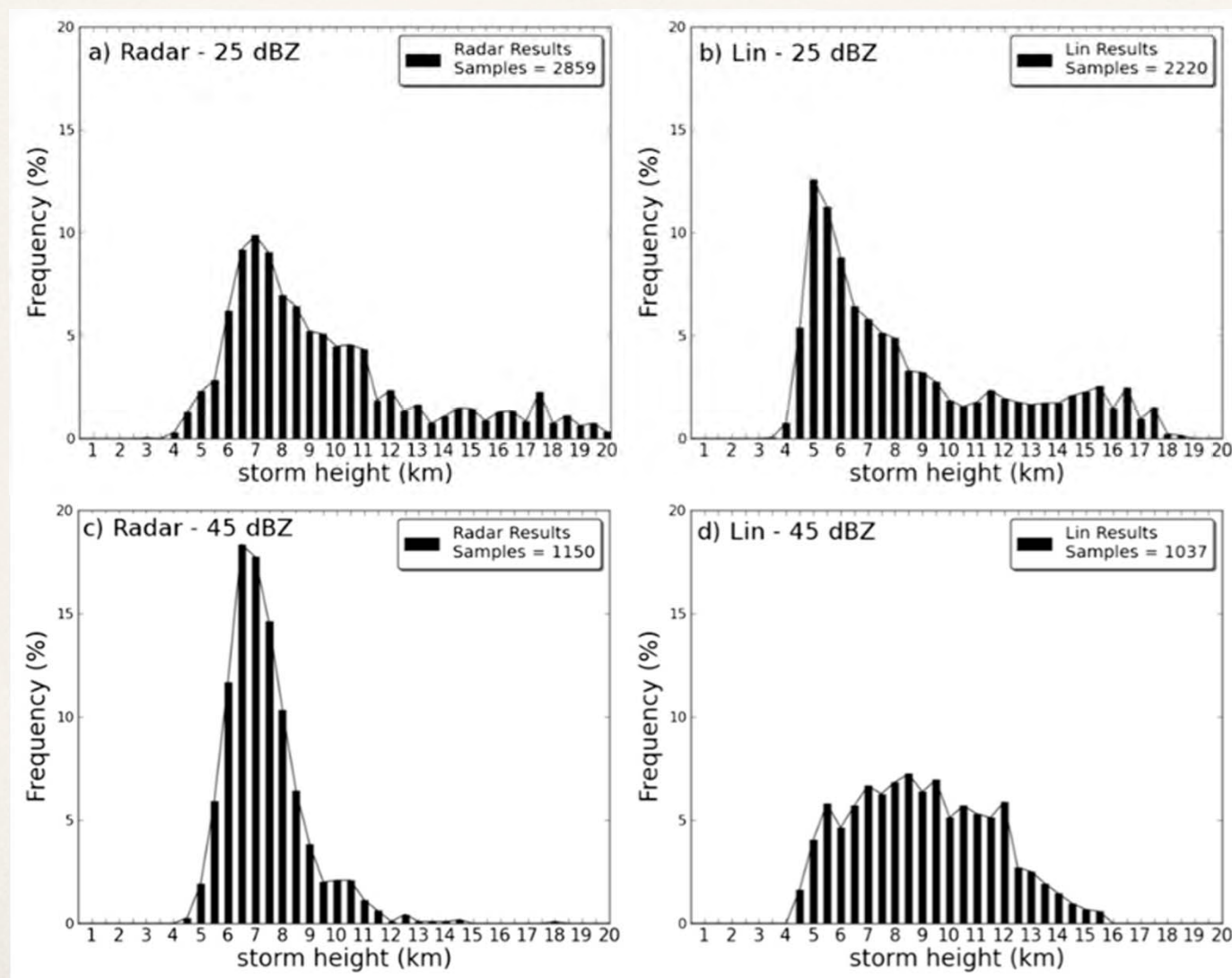
High-resolution models capture some of the rainfall behaviour



Love et al, 2011, QJ

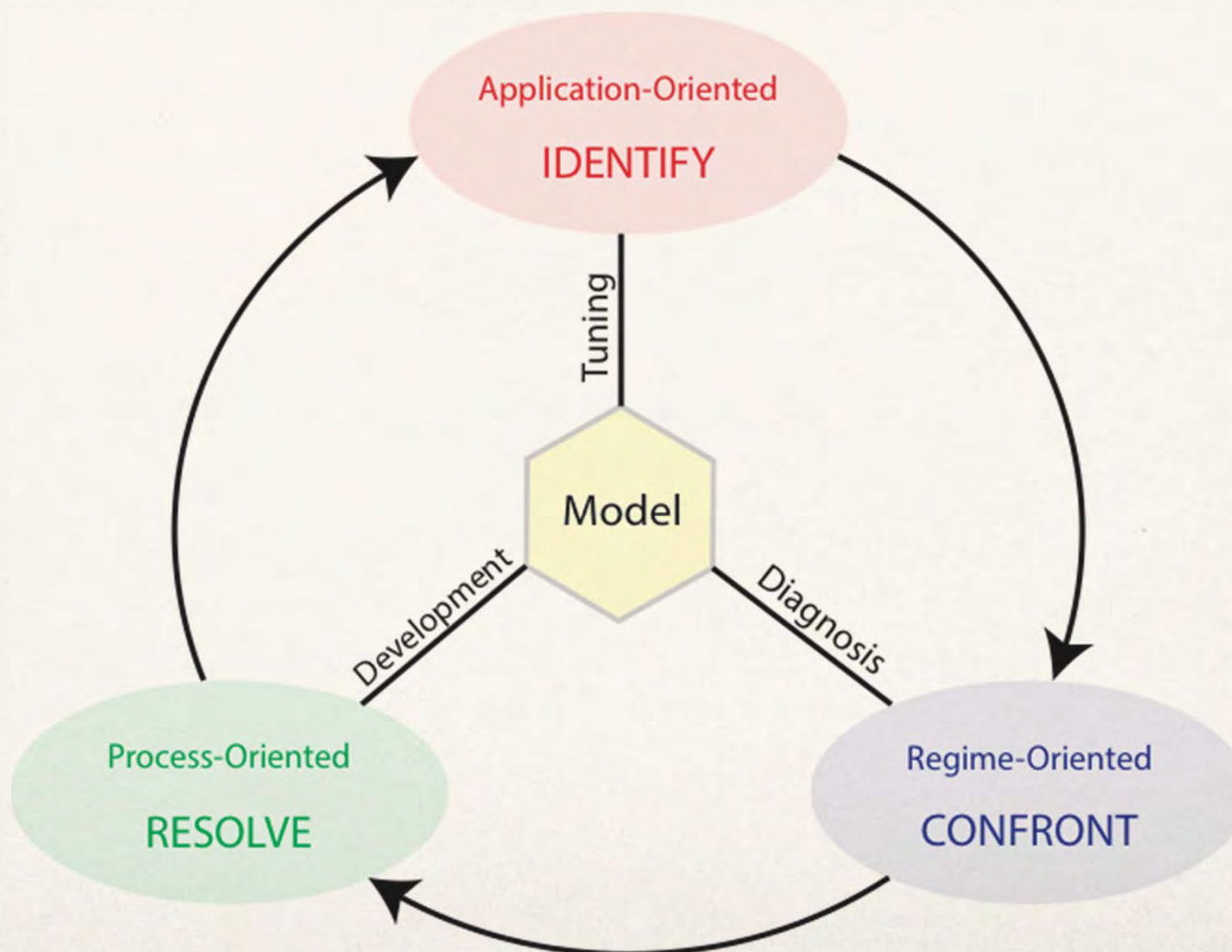


But more in-depth evaluation reveals interesting problems:



Caine et al., 2013

How are models really improved?



Goals for YMC modelling activities

- ❖ Process understanding at all scales – Hi-res models, NWP-style experiments and GCM sensitivity experiments
- ❖ Model evaluation against observations, both large-scale and YMC
- ❖ Inform model development
- ❖ Study grey-zone issues for deep convection

Potential activities

- ❖ CMIP5/CORDEX evaluation studies
- ❖ Comprehensive model study under GASS (AMIP, T-AMIP, LAM, CRM)
- ❖ Grey-zone community experiment including comprehensive CRM evaluation
- ❖ Real-time model predictions

And finally ...

- ❖ It is better understanding that will support modelling, e.g., what makes convection possible under conditions that do not allow it to occur over the open ocean?
 - ❖ Larger clouds = less entrainment?
 - ❖ Same entrainment but modified environment due to focussing by sea-breeze?
 - ❖ Something completely different?
- ❖ Questions like this will be what will move us forward