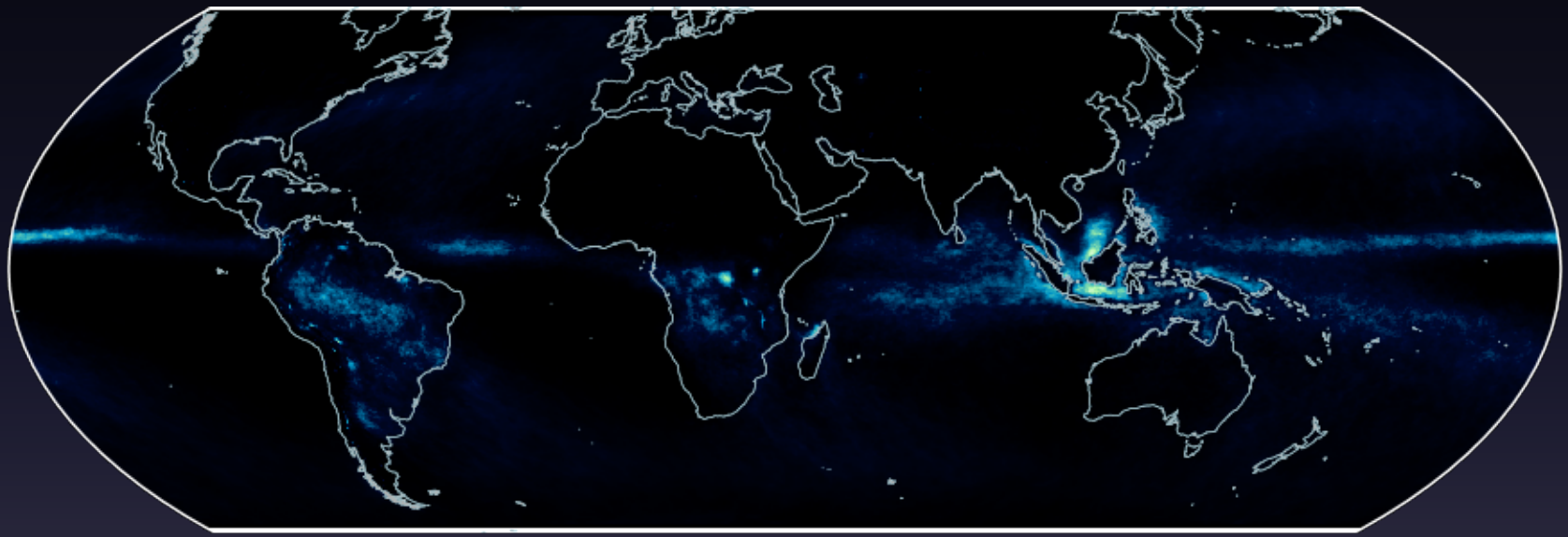
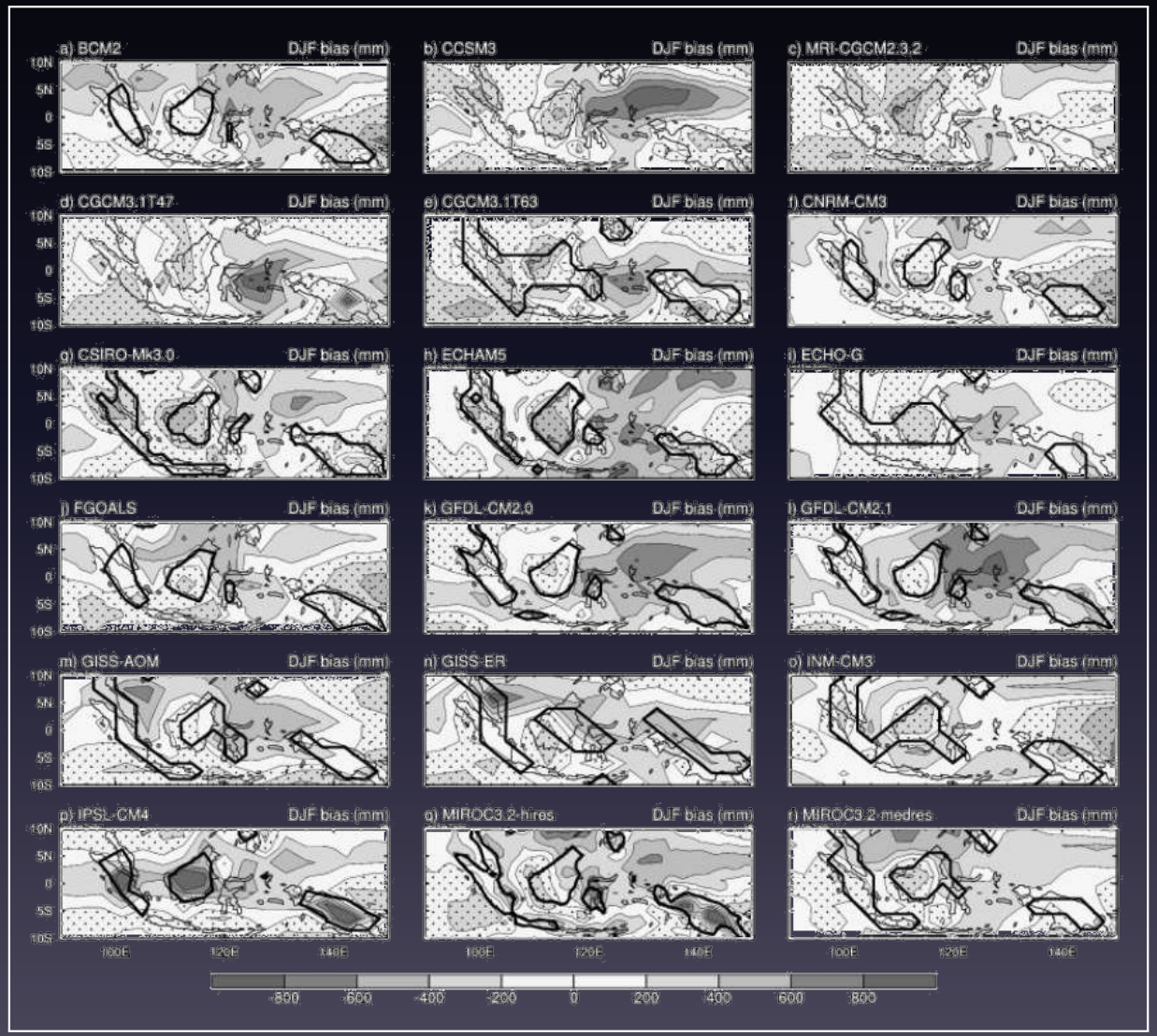
A climatology of coastal rainfall



Martin Bergemann, Christian Jakob, Todd Lane

Australian National University
MONASH University
THE UNIVERSITY OF MELBOURNE
UNSW AUSTRALIA
UTAS

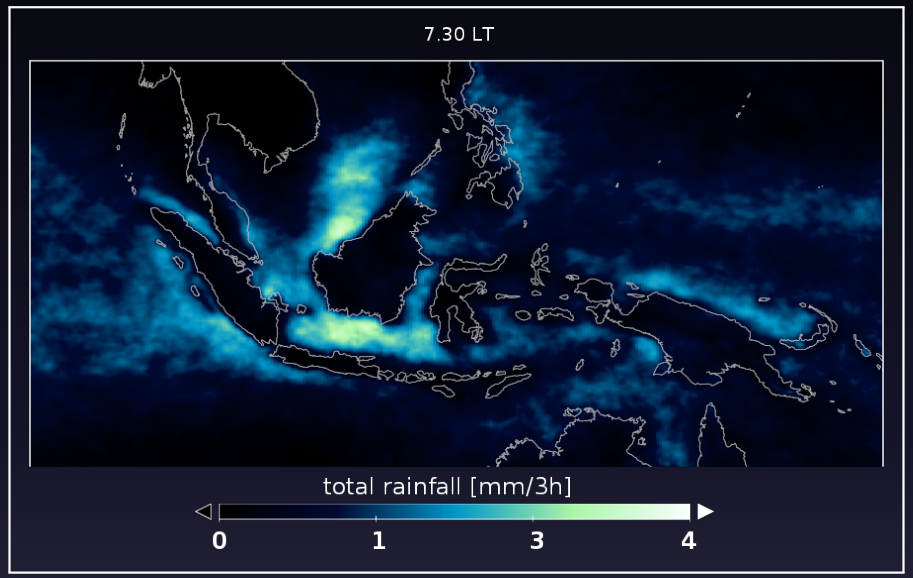
How is coastal rainfall represented in GCM's?



: Rainfall bias in 18 different climate models

Can rainfall due to land-sea interaction be characterized?

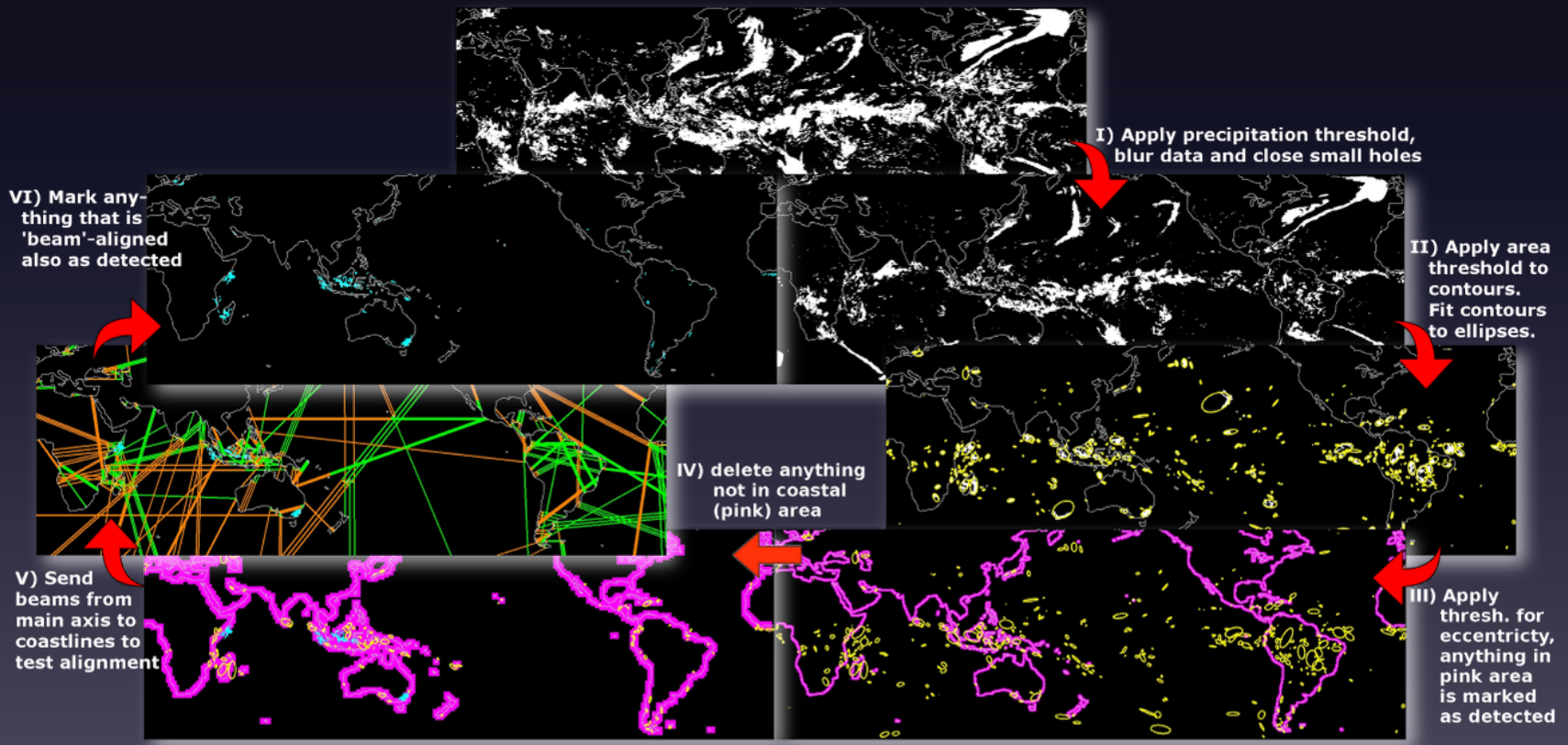
Can rainfall due to land-sea interaction be characterized?



- develop a simple artificial target recognition algorithm
- four heuristics to determine coastline triggered rainfall:
  1. rainfall is of high intensity
  2. the rainfall to be detected is meso-scale
  3. occurs within coastal area (500 km from coast)
  4. along the coastline $\rightarrow$ aligned with the coast

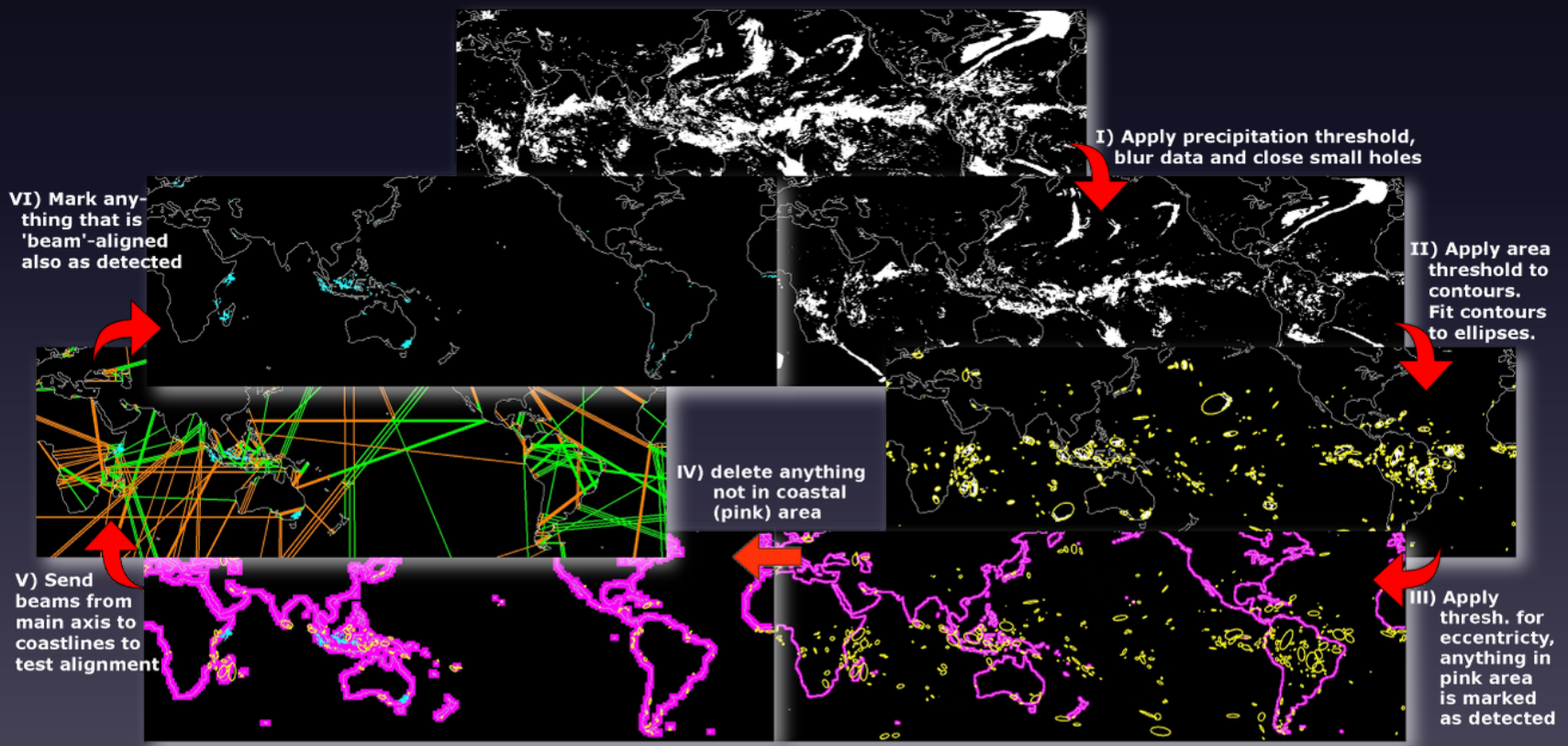
How to objectively identify coastline triggered rainfall?

Find high intensity rainfall domains, occurring within a coastal area and stretching along the coastline

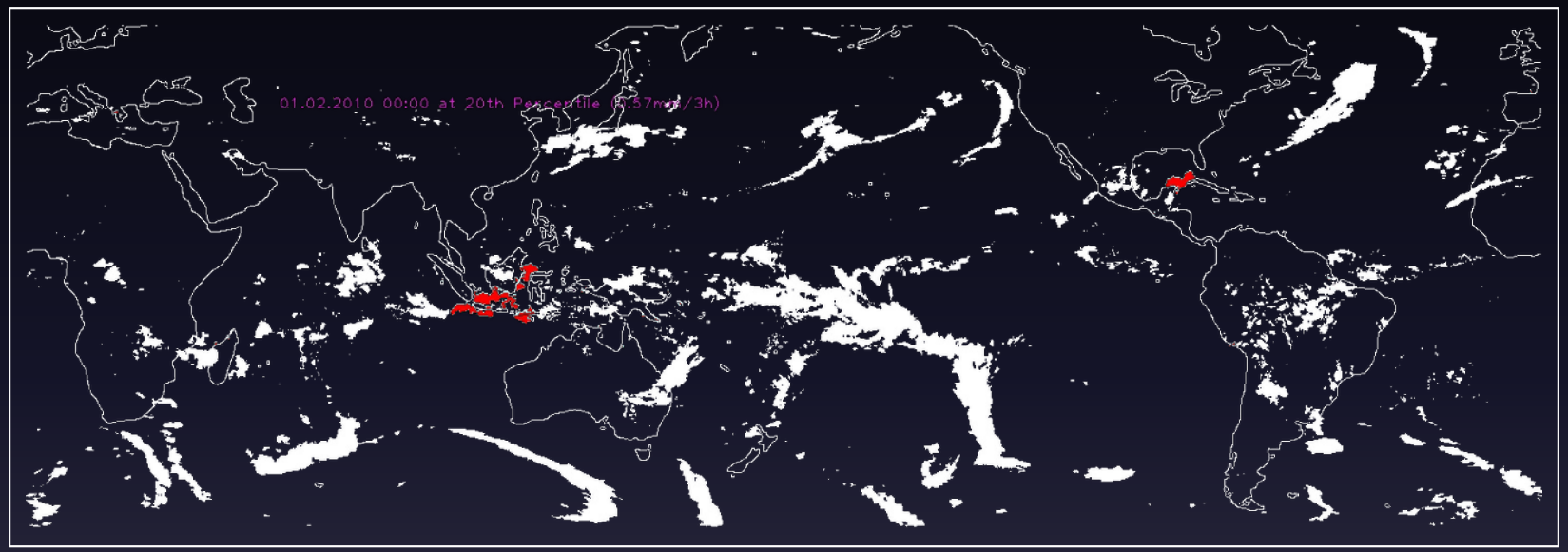


How to choose the optimal threshold combination?

application of 3 arbitrary thresholds
$\rightarrow$ create an ensemble of $3^3 = 27$ threshold setups



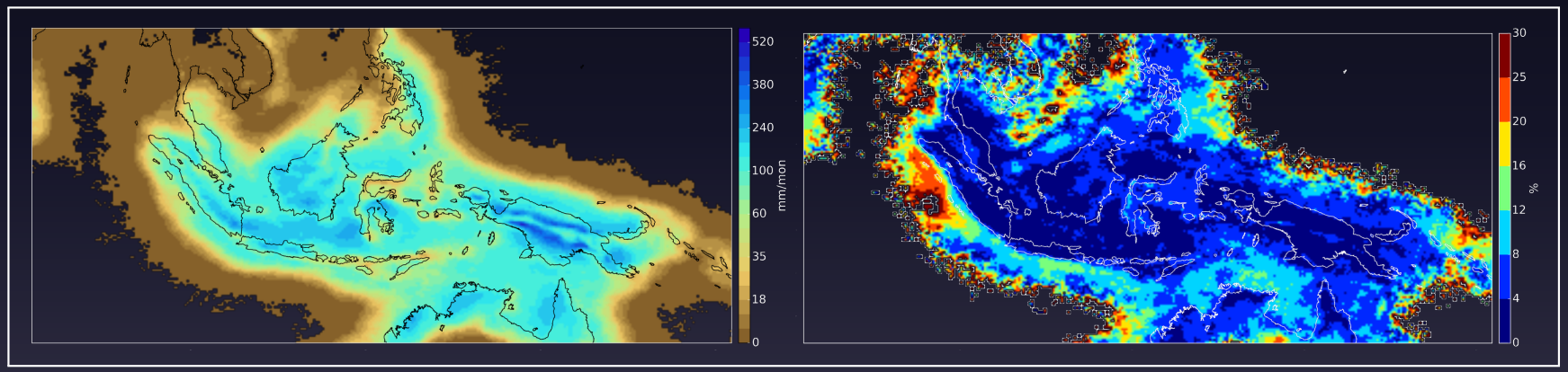
How is the algorithm applied?



- applied on 3 hly satellite based rainfall estimates (CMORPH)
- 27 different data sets are created $\rightarrow$ ensemble
- climatology and diurnal cycle investigation $\rightarrow$ evaluation

How much rainfall is detected?

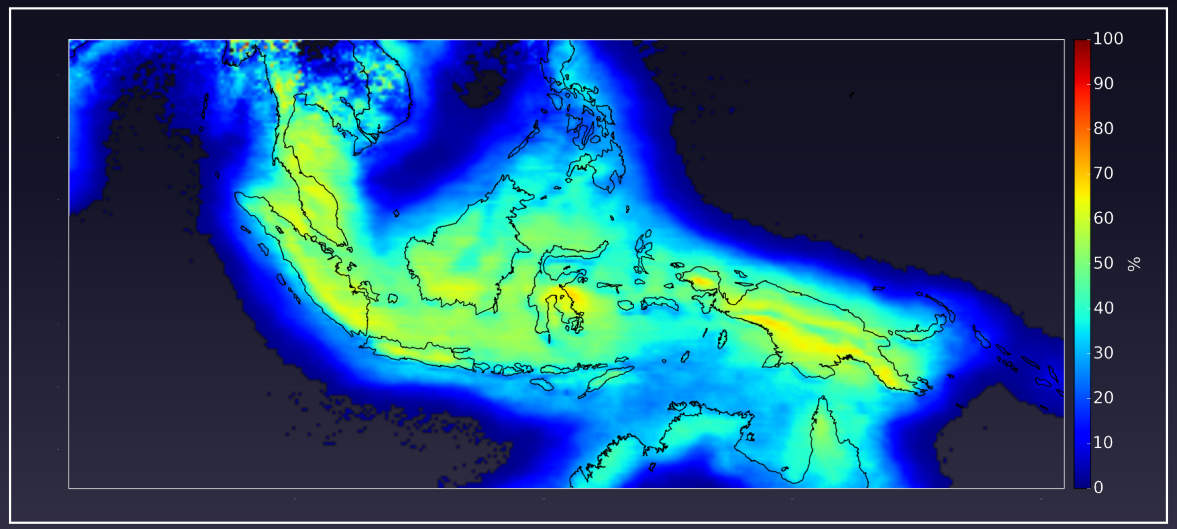
ensemble mean and standard deviation of detected precipitation



- seasonal (monsoon) variability is captured by the algorithm
- MC and Colombian Coast $\rightarrow$ high amounts of rainfall throughout the entire year
- better agreement over land

How important is the detected rainfall?

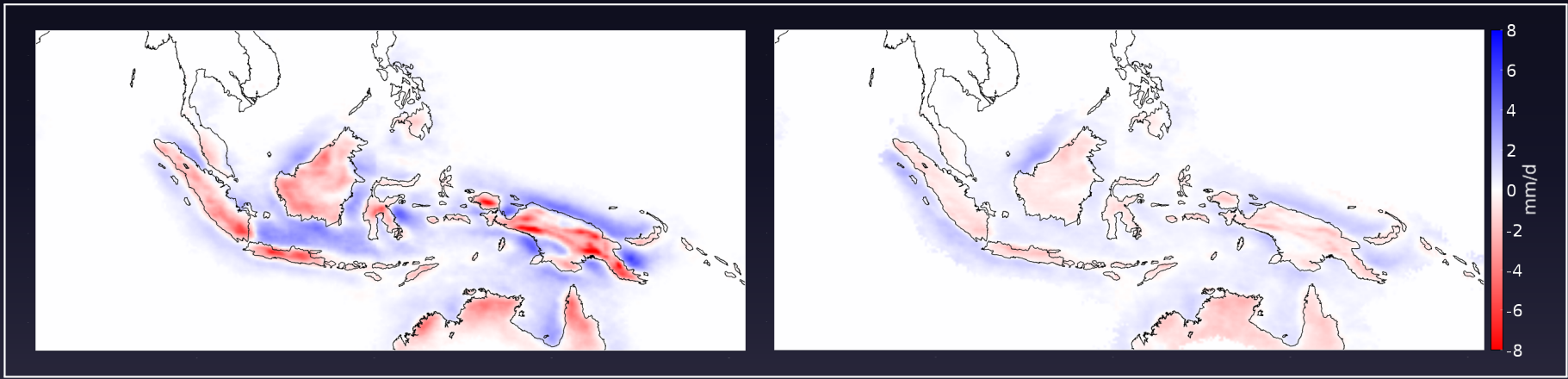
fraction of total yearly rainfall coming from detected rainfall



- fraction: detected rain / total rain
- reveals regions where land-sea interaction is important

How well diurnal cycle represented?

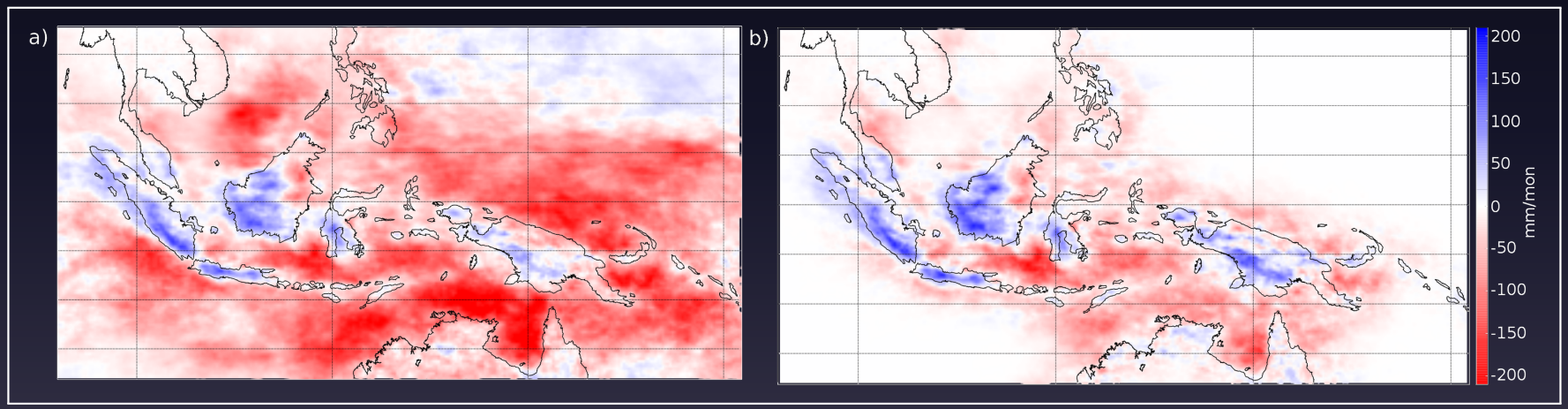
day time (1030LT - 2130LT) - night time (2130LT - 1030LT) rainfall



- strong diurnal variation over MC
- residual rainfall: total precip. - detected precip.
  weak diurnal variability $\rightarrow$ good

How does the MJO effect coastal rainfall on the MC?

suppressed - active MJO Phase for
a) total rainfall b) detected rainfall during DJF



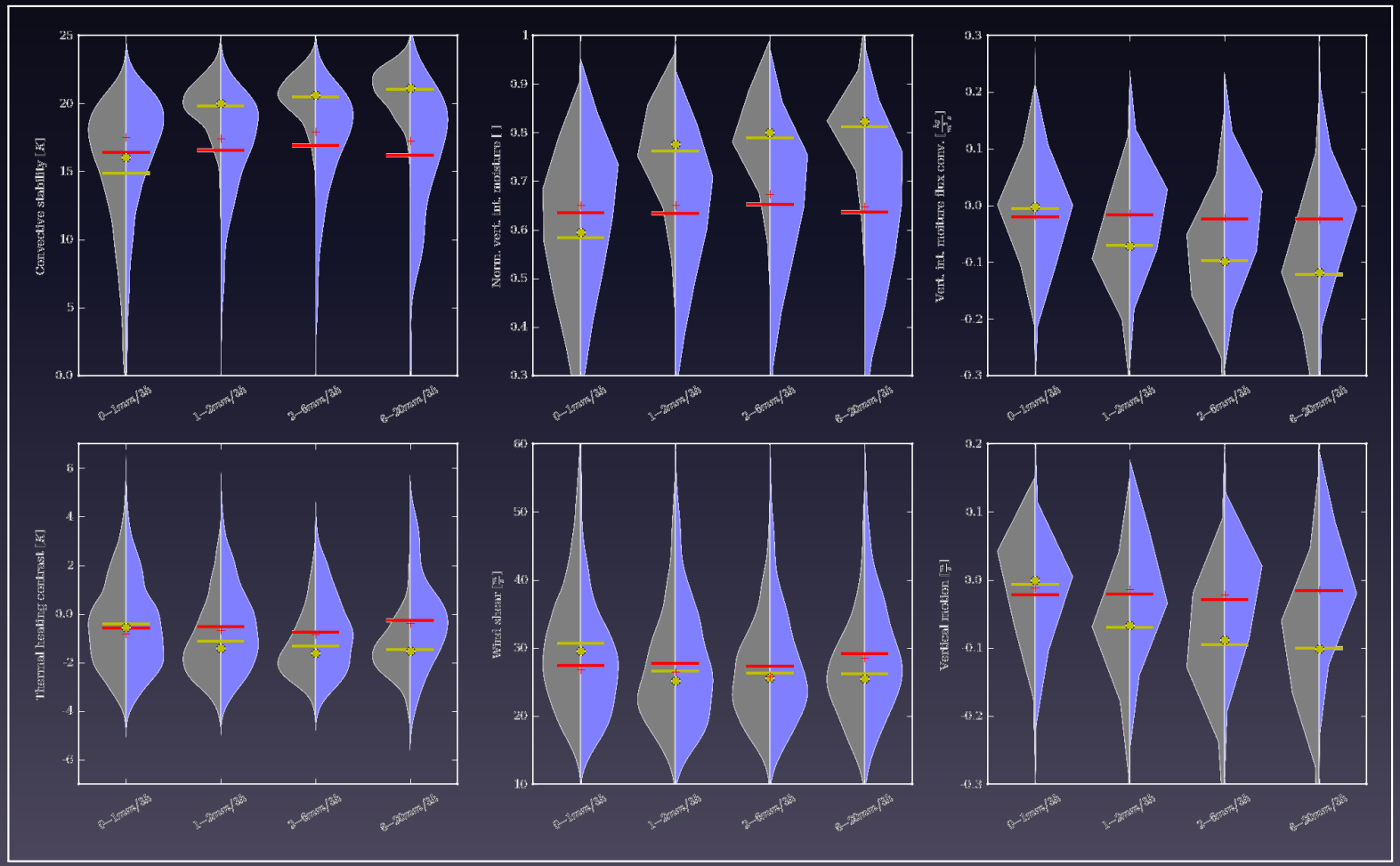
- differences stronger for suppressed phase
- more rainfall over land during suppressed phase

What is this all useful for?

- coastal features are a trigger for precipitating convection
  - but to what extent are coastal processes causing deep (precipitating) convection?
- how are coastal effects linked to large scale modes of climate variability?
- how differs coastline triggered rainfall from overall precipitation?

How will the data be used?

Large scale variables in relation to coastal rainfall



Why could it be interesting for you?

Why could it be interesting for you?

- Canny-edge detection for separating domains of interest in non-continuous data

- done by:
  - openSource $\rightarrow$ huge community
  - for Linux, OS X, Windows, ...
  - API available in C/C++, Java, Python & Matlab
  - sophisticated build-in methods like neuronal networks, Bayesian classifiers, ...