

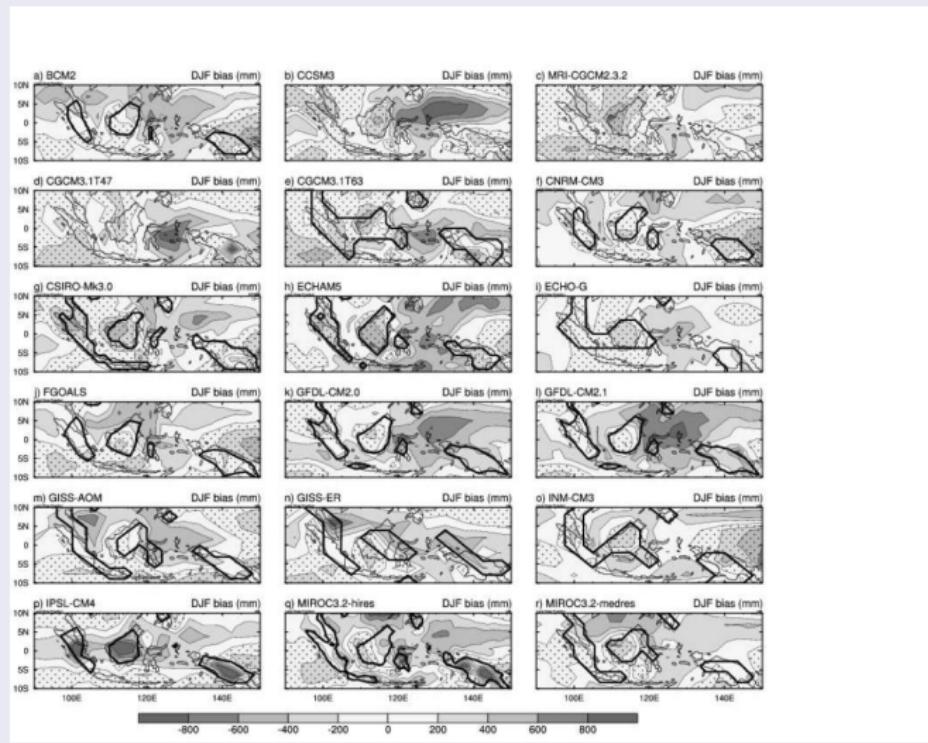
# The role of coastline initiated precipitation in the tropics

Martin Bergemann<sup>1,3)</sup>, Christian Jakob<sup>1,3)</sup>, Todd Lane<sup>2,3)</sup>

Monash University<sup>1)</sup>, University of Melbourne<sup>2)</sup>, ARC Center of excellence for  
climate system sciences<sup>3)</sup>

# How do GCM's represent the MC rainfall?

## CMIP3 rainfall bias comparison for the MC (Suaydhi et al.)



# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
  - complex coastal shape and terrain

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle
- influenced by large-scale phenomena like MJO and ENSO

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle
- influenced by large-scale phenomena like MJO and ENSO

⇒ Can the influence of the coast on rainfall be described and parametrized?

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle
- influenced by large-scale phenomena like MJO and ENSO

⇒ Can the influence of the coast on rainfall be described and parametrized?

- Objectively identify rainfall due to land-sea interaction

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle
- influenced by large-scale phenomena like MJO and ENSO

⇒ Can the influence of the coast on rainfall be described and parametrized?

- Objectively identify rainfall due to land-sea interaction
- Identify large-scale variables favoring coastal rainfall

# What causes the rainfall bias?

- land-sea-interaction is predominant on the MC
  - land-sea-breeze systems
- complex coastal shape and terrain
  - mountain-valley-breeze systems
- strong diurnal/nocturnal rainfall cycle
- influenced by large-scale phenomena like MJO and ENSO

⇒ Can the influence of the coast on rainfall be described and parametrized?

- Objectively identify rainfall due to land-sea interaction
- Identify large-scale variables favoring coastal rainfall

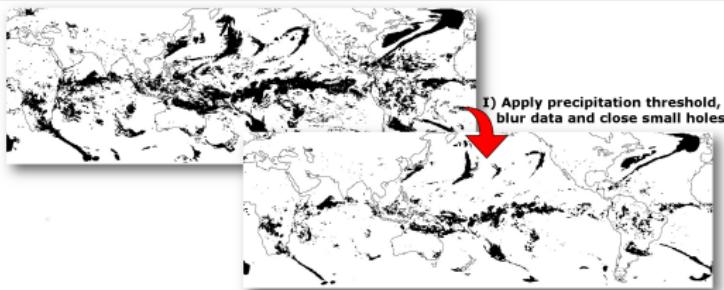
# How to objectively identify coastline triggered rainfall?

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



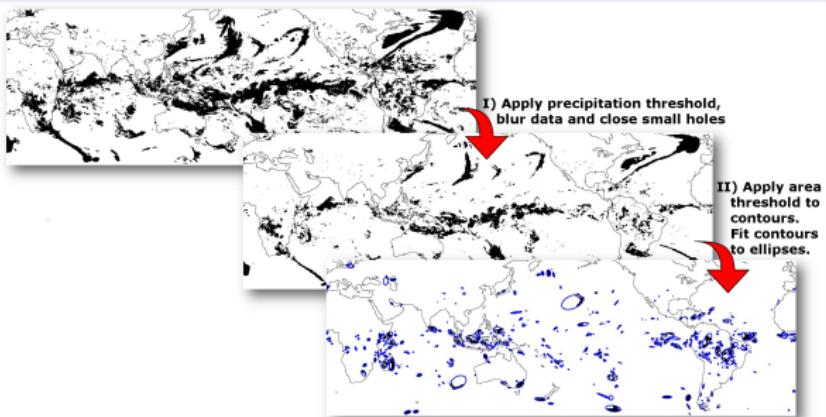
# How to objectively identify coastline triggered rainfall?

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



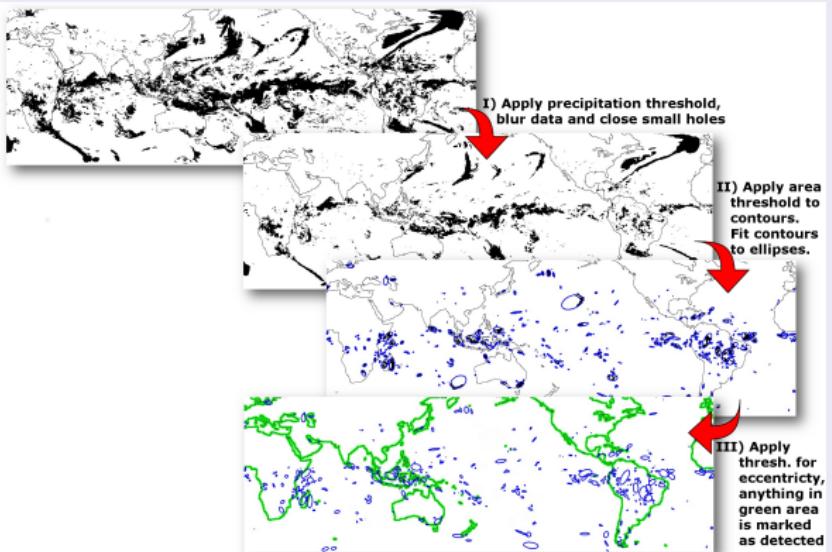
# How to objectively identify coastline triggered rainfall?

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



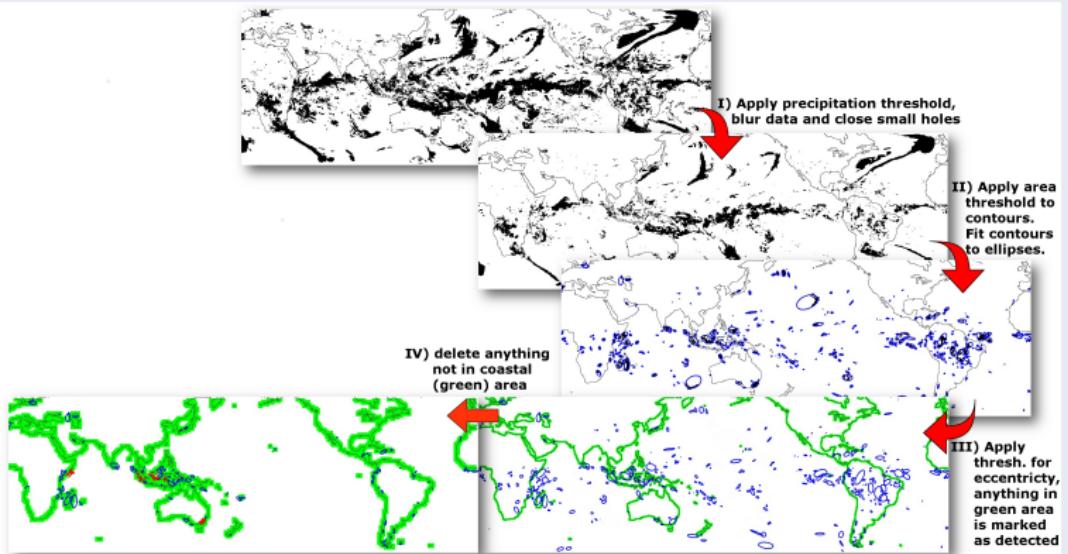
# How to objectively identify coastline triggered rainfall?

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



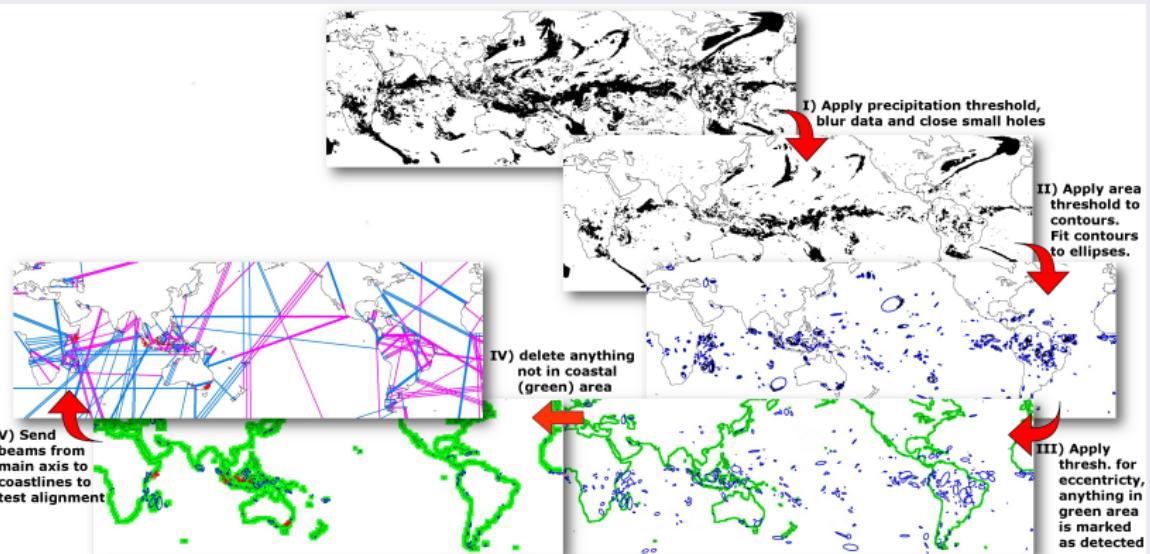
# How to objectively identify coastline triggered rainfall?

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



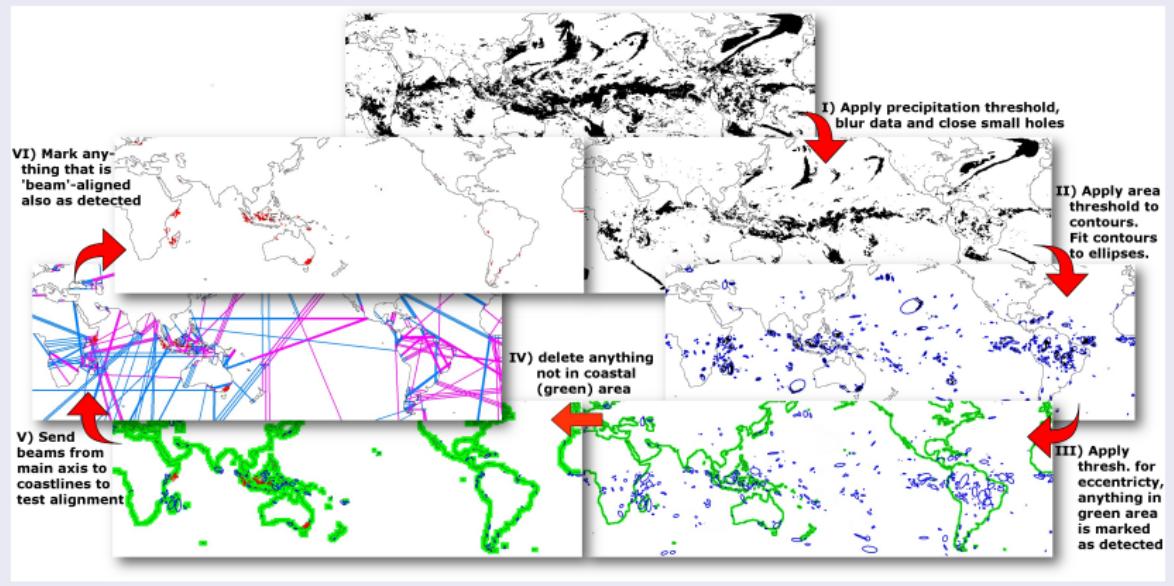
# How to objectively identify coastline triggered rainfall?

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

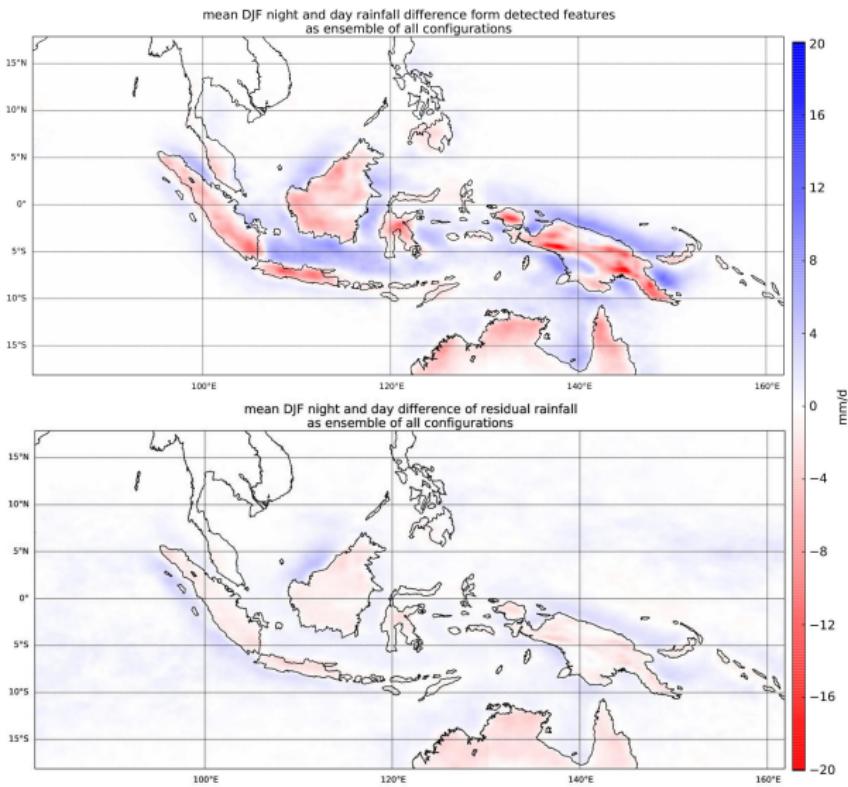


# How to objectively identify coastline triggered rainfall?

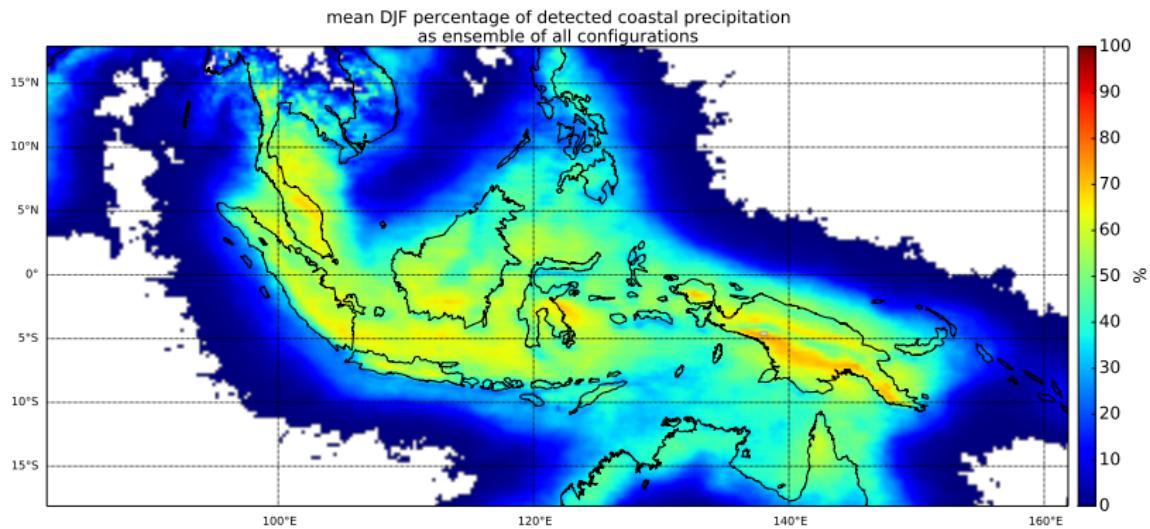
Find high intensity rainfall domains, occurring within a coastal area and stretch along the coastline



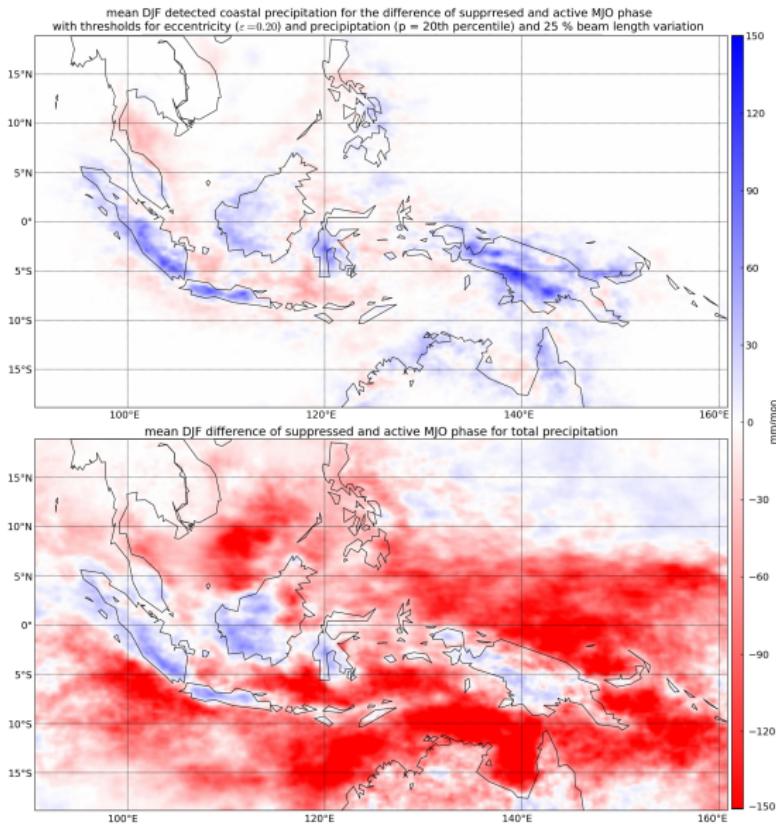
# Can the diurnal cycle be reproduced?



# How important is this type of rainfall for the MC?



# How does the MJO affect this type of rainfall?



# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data

# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data
- The method can be applied globally and on any rainfall dataset

# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data
- The method can be applied globally and on any rainfall dataset
- First test runs are working and show that coastline triggered precipitation is of great importance for Maritime Continent

# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data
- The method can be applied globally and on any rainfall dataset
- First test runs are working and show that coastline triggered precipitation is of great importance for Maritime Continent
- The results also suggest that there is a strong impact of large scale phenomena like ENSO and the MJO on the diurnal rainfall cycle over the Maritime Continent

# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data
- The method can be applied globally and on any rainfall dataset
- First test runs are working and show that coastline triggered precipitation is of great importance for Maritime Continent
- The results also suggest that there is a strong impact of large scale phenomena like ENSO and the MJO on the diurnal rainfall cycle over the Maritime Continent
- With the established baseline dataset large scale variables that favor coastal rainfall will be identified.

# What are the main conclusions so far?

- A way of objectively identify coastline induced rainfall has been developed
- The algorithm is very sensitive towards a rainfall threshold that has to be applied on the rain data
- The method can be applied globally and on any rainfall dataset
- First test runs are working and show that coastline triggered precipitation is of great importance for Maritime Continent
- The results also suggest that there is a strong impact of large scale phenomena like ENSO and the MJO on the diurnal rainfall cycle over the Maritime Continent
- With the established baseline dataset large scale variables that favor coastal rainfall will be identified.