

# Coastal Tropical Convection

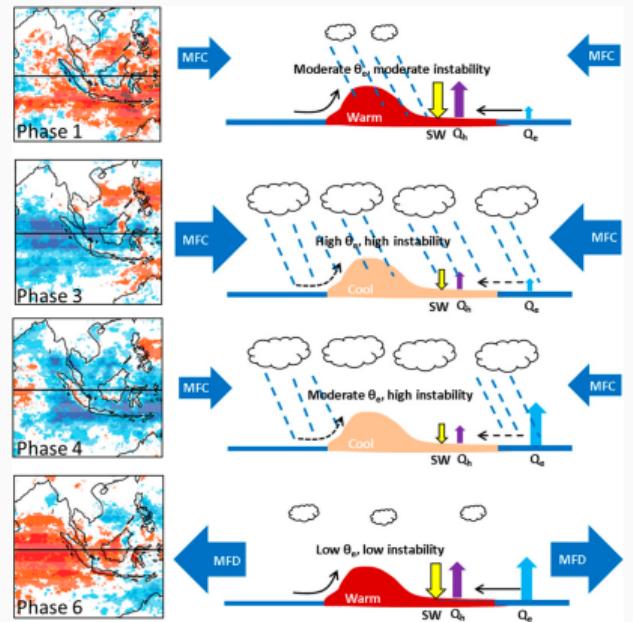
an outline for a stochastic modeling approach

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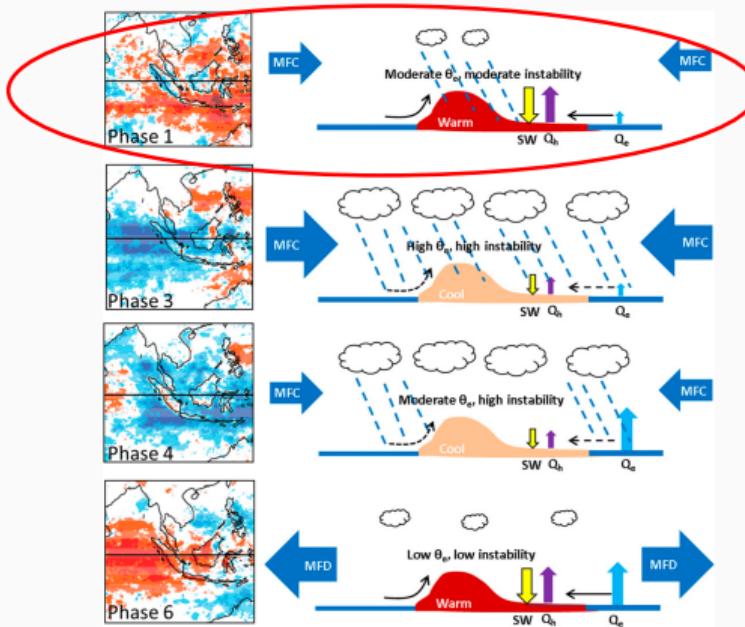
<sup>1)</sup>Monash University, <sup>2)</sup>University of Victoria

04. July 2017

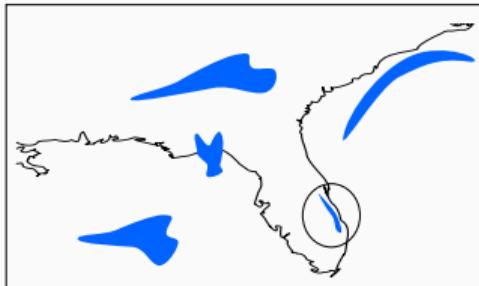
# MJO $\leftrightarrow$ MC rainfall



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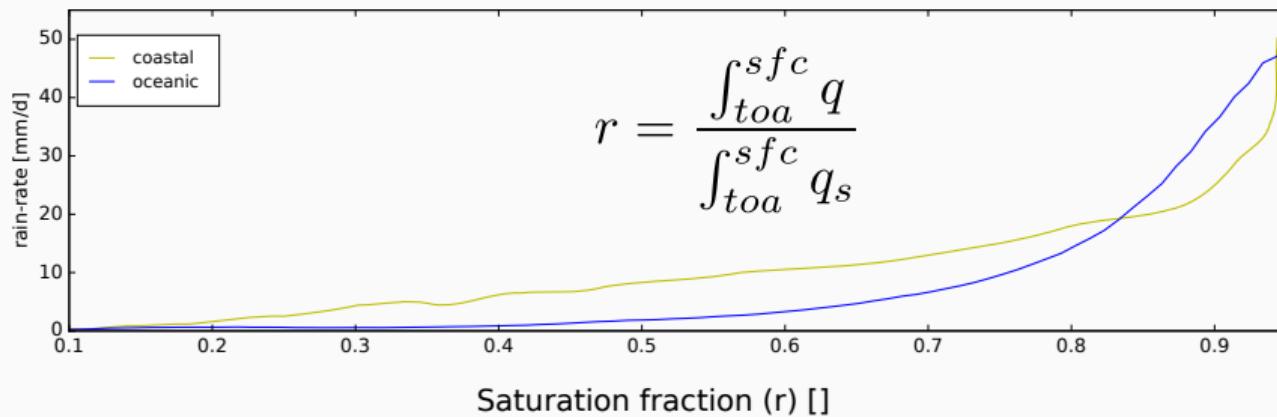


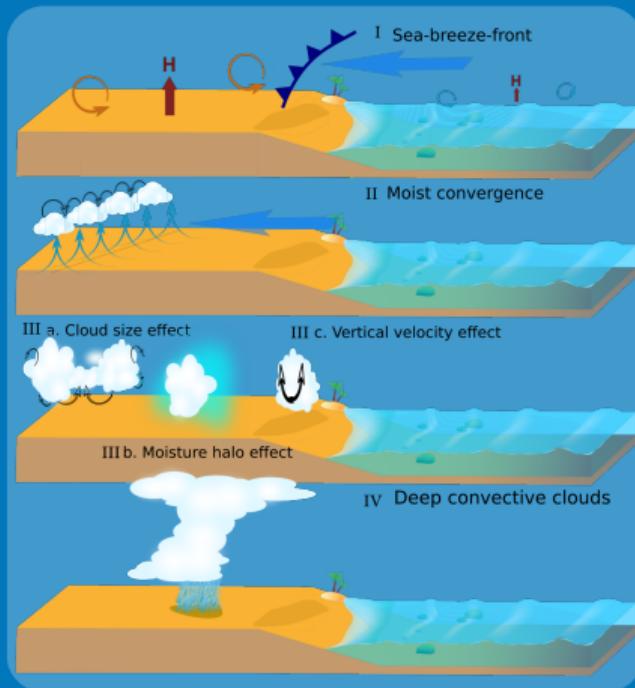
# Rainfall ←→ Humidity



Detect rainfall patterns that:

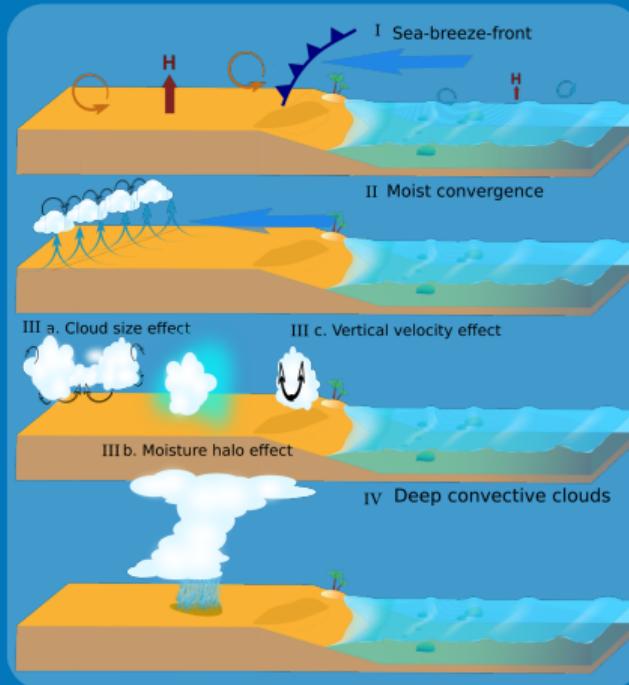
- occur in coastal areas
- are not synop scale
- are aligned with the coastline



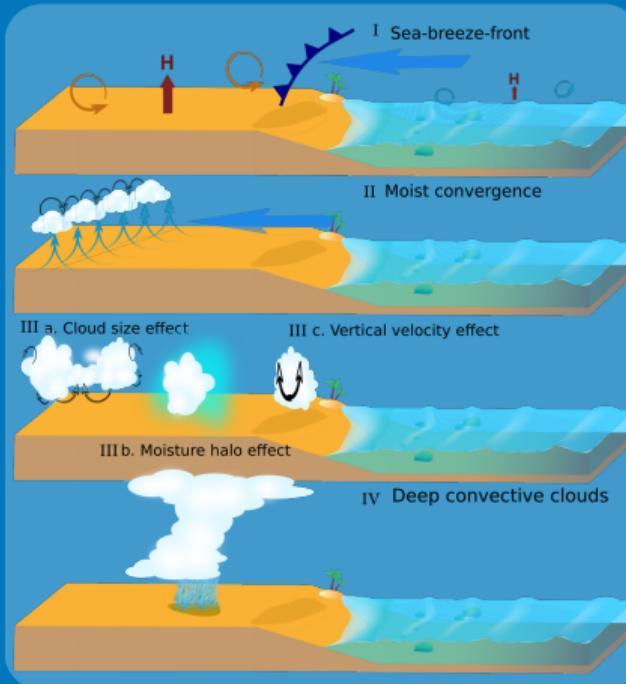




When are coastal effects present?

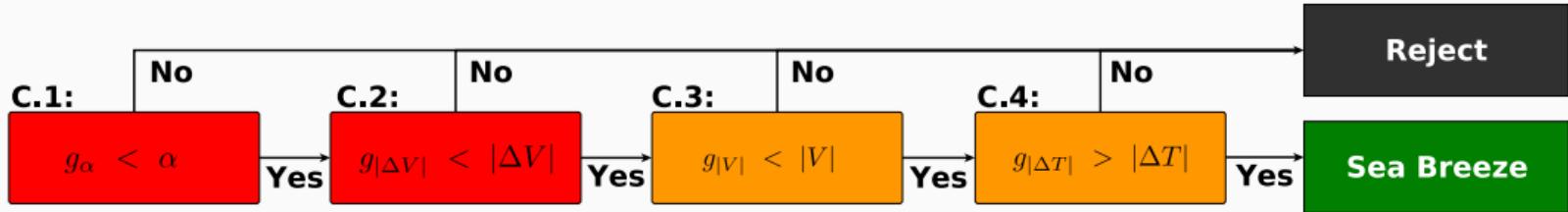


 When are coastal effects present?



 How to change the cu. param.?

# Identification of sea-breeze conditions



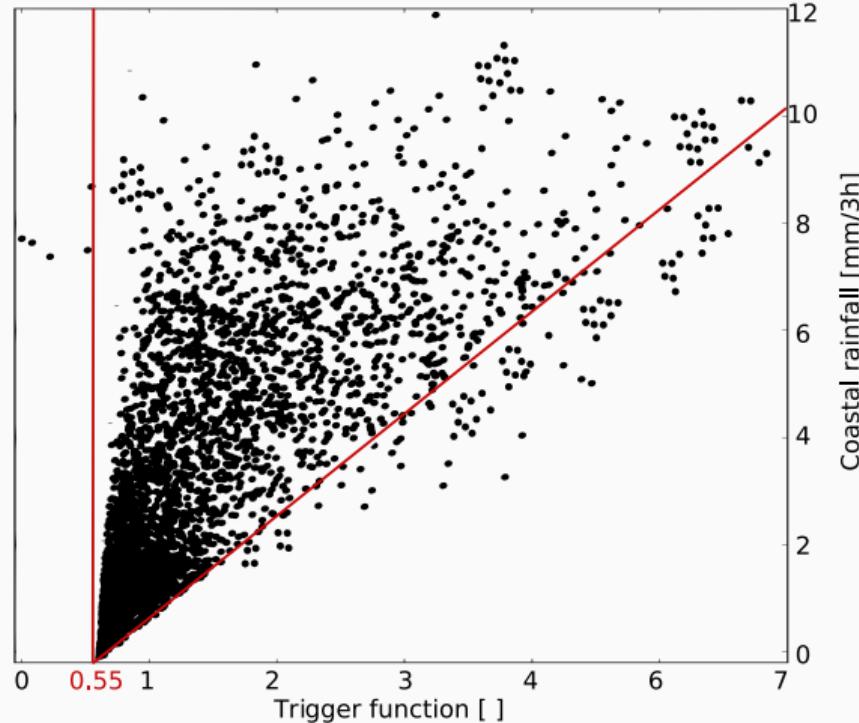
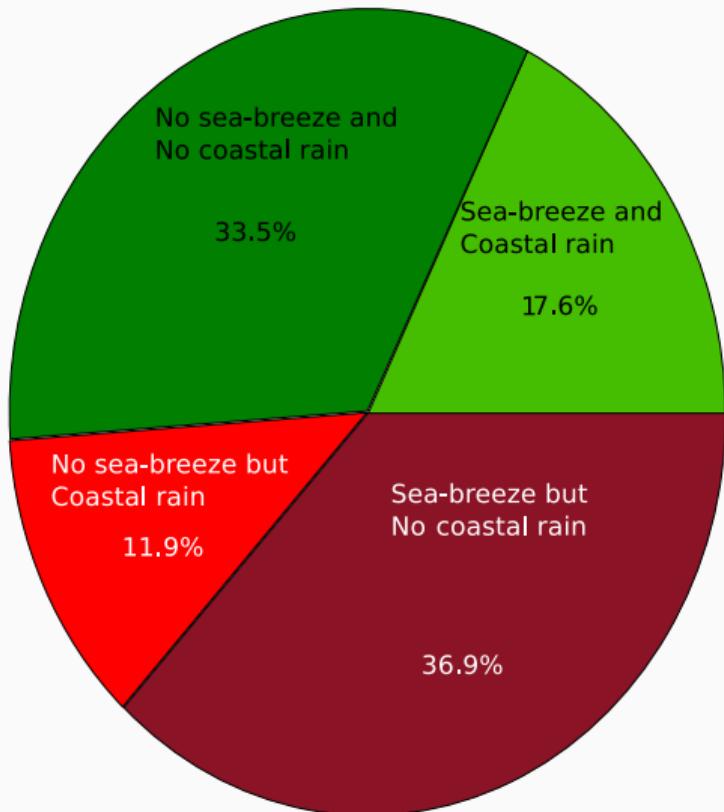
large-scale conditions only (Borne et al. 1998)

Binary (yes/no):

Scale the output by  $|V|$  and  $|\Delta T|$

$$f(t) = \begin{cases} 0 & \text{if } f(t) = 0 \\ \underbrace{\frac{|g_{\Delta T}(t)|}{\Delta T}}_{>0} \cdot \underbrace{\frac{|\vec{V}| - g_{|\vec{V}|}(t)}{|\vec{V}|}}_{>0} & \text{if } f_B(t) = 1 \end{cases}$$

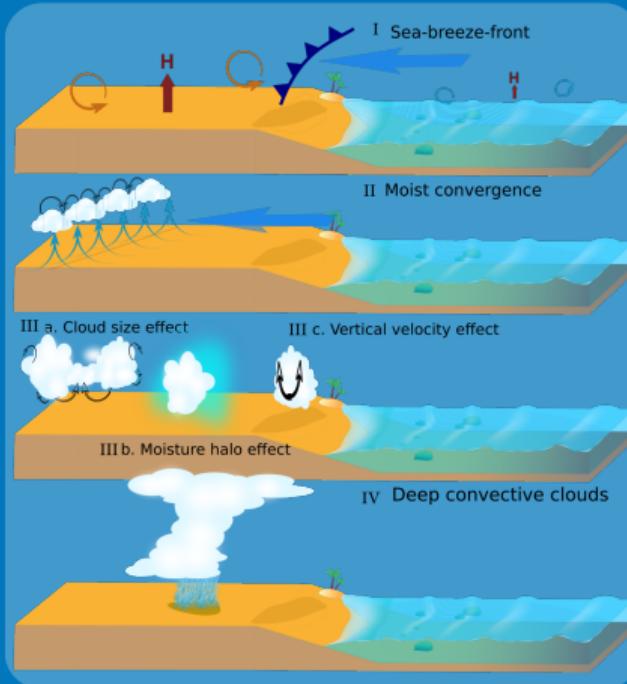
# Performance test with coastal rainfall



$$\Delta T = 1.75 \text{ K} \quad |\vec{V}| = 11 \frac{\text{m}}{\text{s}} \quad \Delta |\vec{V}| = 6 \frac{\text{m}}{\text{s}} \quad \Delta \alpha = 90^\circ$$

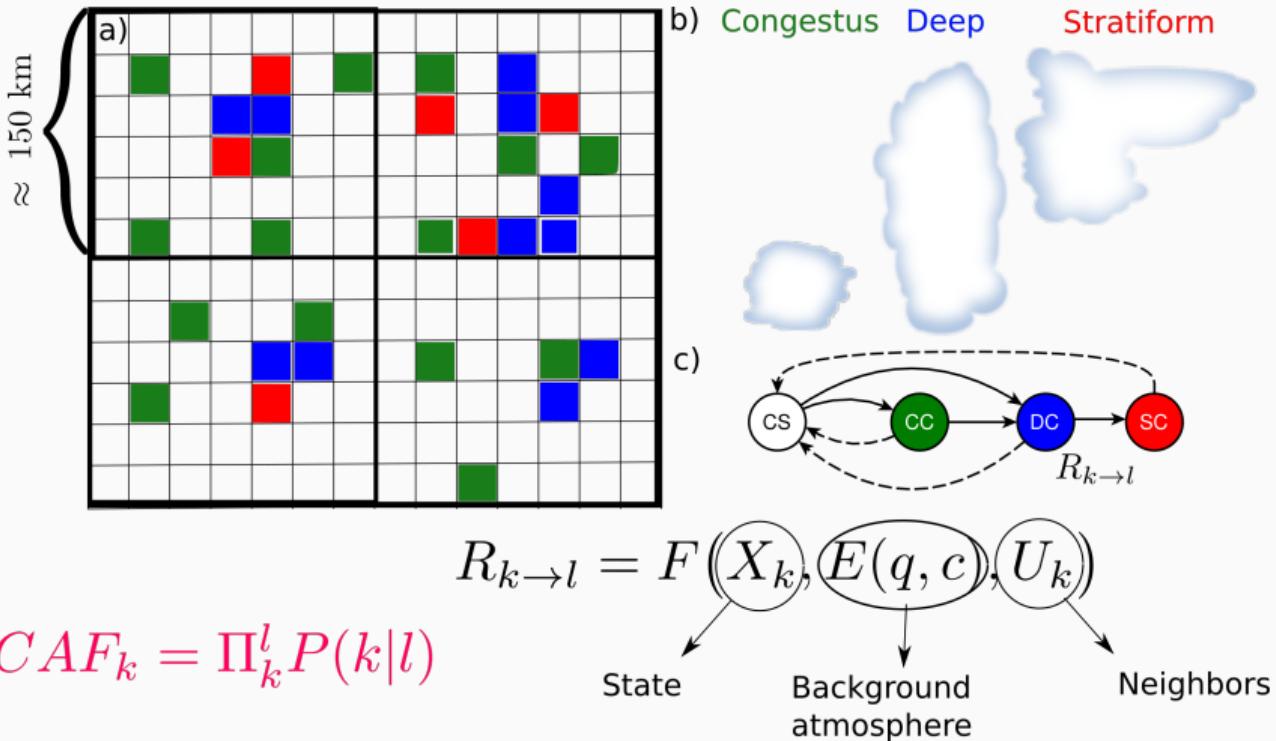


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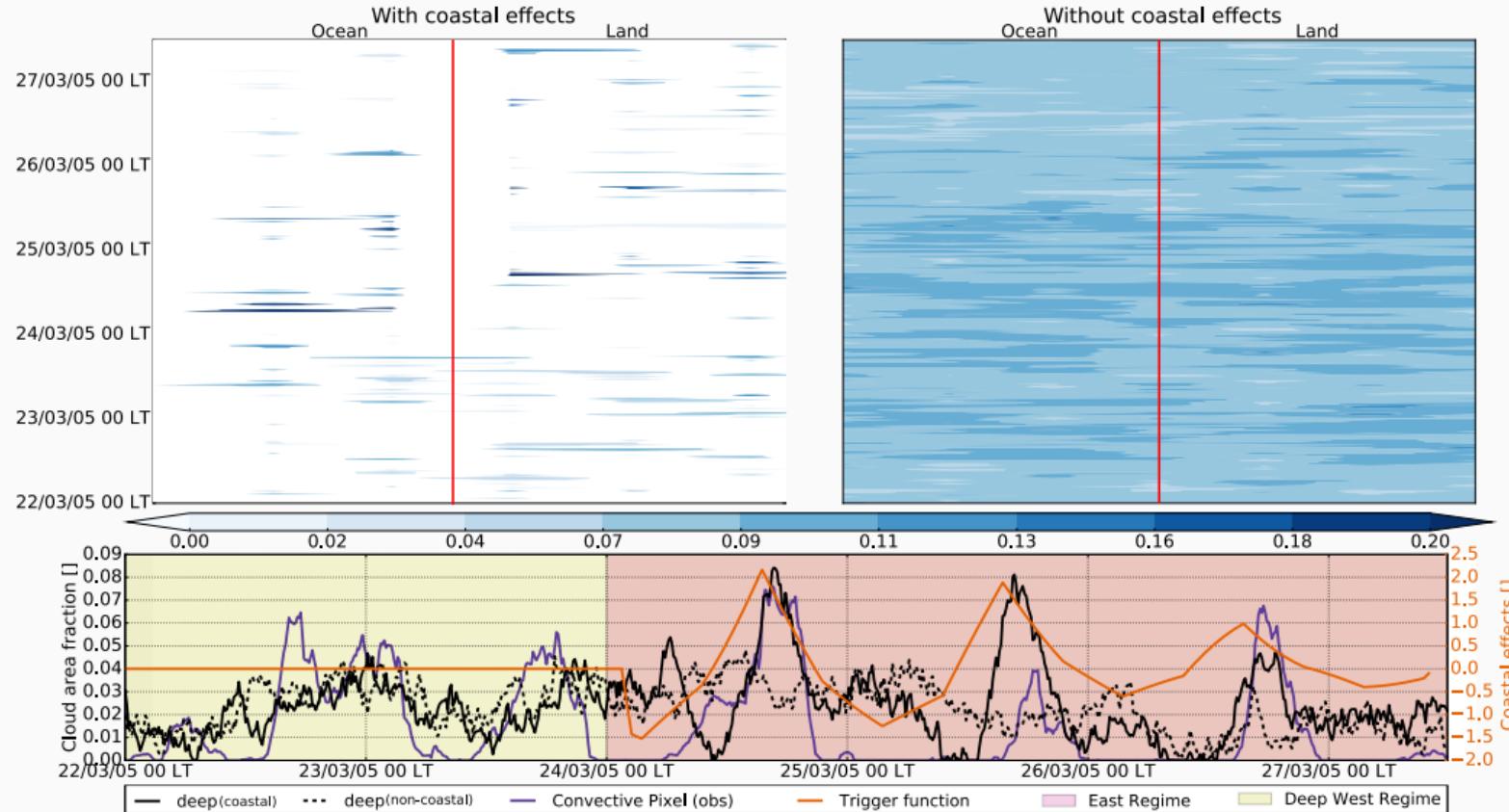
# The stochastic multi-cloud model (smcm)



calculate transition rates  $R_{kl}$  of 3 cloud types

Increase/decrease occurrence of convection  
according coastal effects.

# A real world example-Darwin, Australia





⚡ coastal trigger → UM



⚡ SMCM → ECHAM6