

Imagery with Heavy Rainfall Potential Areas

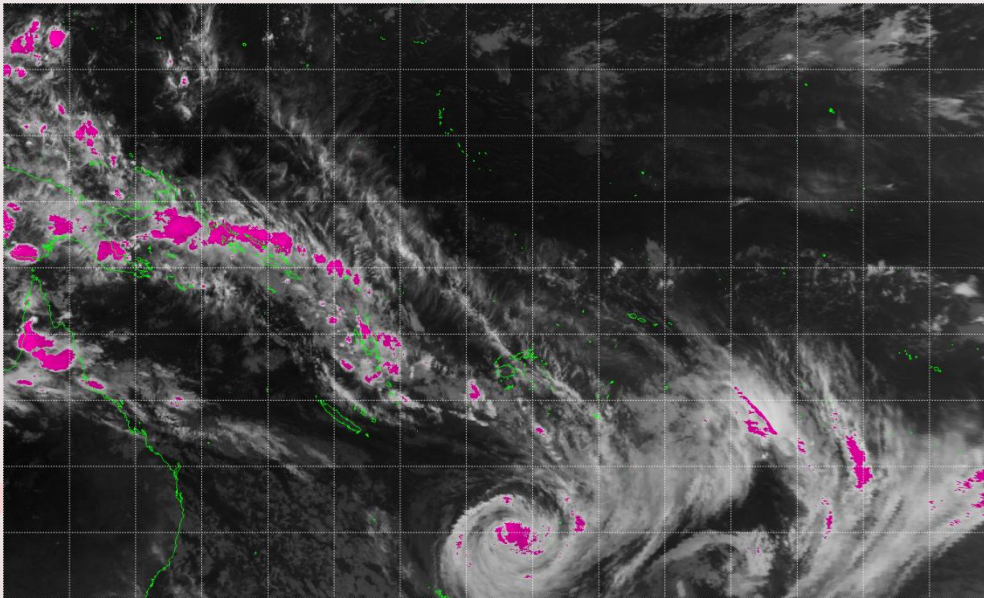
- a product to support severe weather monitoring -

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Overview

This product is

- providing information on clouds that may cause heavy rainfall
- identifying the clouds from MTSAT observations
- coming in image form (JPEG)

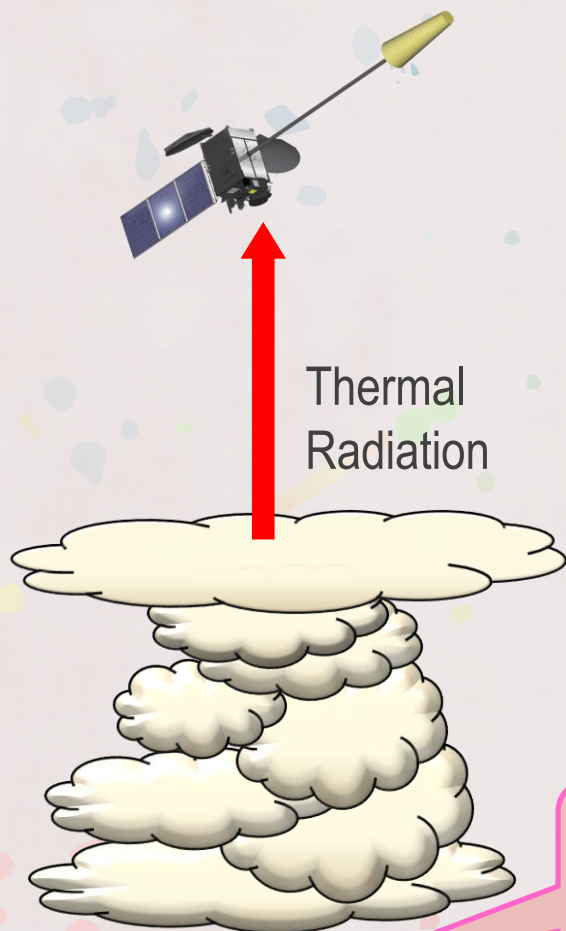


1 hourly
0.05 * 0.05 degrees grid

http://mscweb.kishou.go.jp/RA-V/sat_img.htm

Basic Approach

MTSAT has no function to observe rainfall



Thermal
Radiation

- Focusing on deep convective clouds
- Finding the clouds from TB of 6.7, 10.8, 12.0 μm
- Referring to GSMaP rainfall data

Rain or not rain,
that is the question.

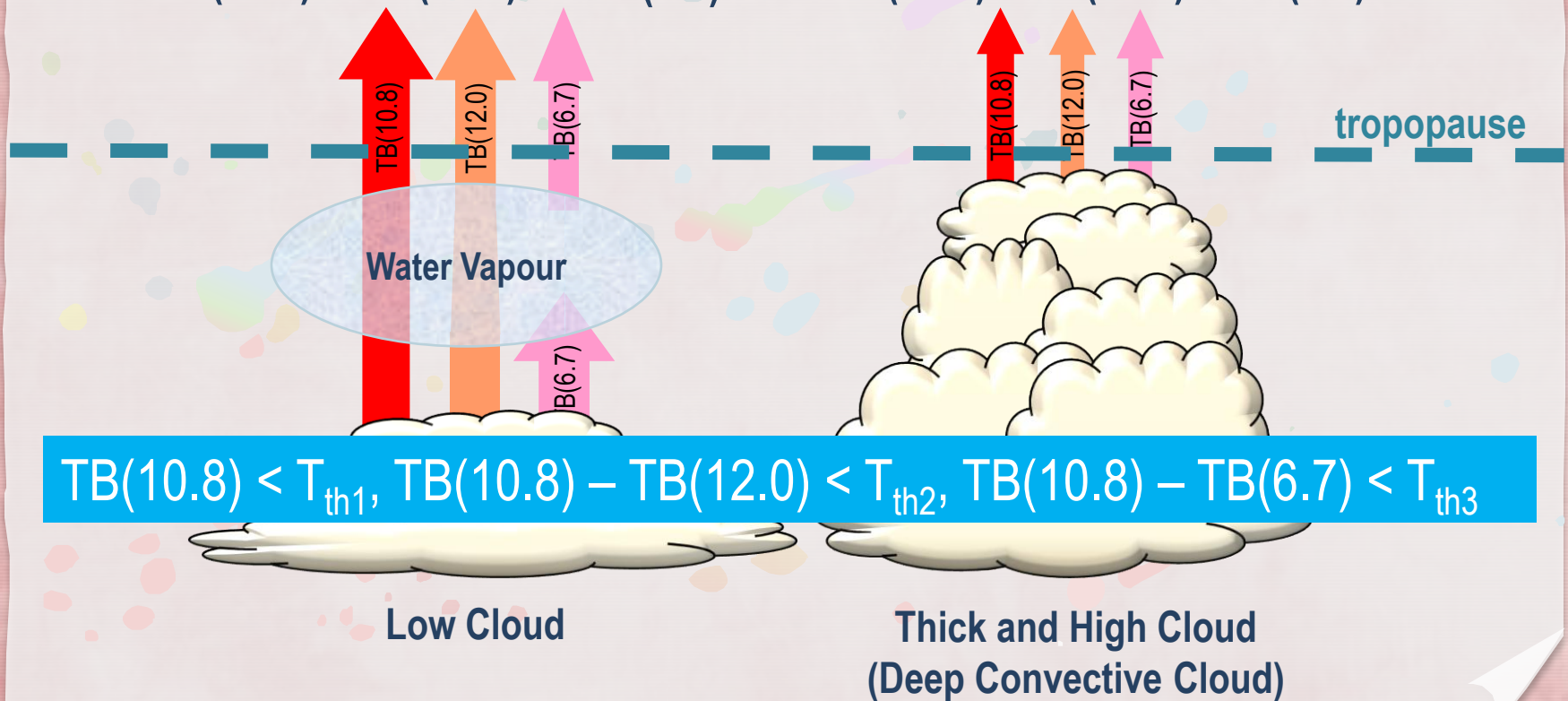
GSMaP: Global Satellite
Mapping of Precipitation
(Courtesy of JAXA/EORC)

Basic Ideas for Identification

$$TB(10.8)_{\text{Low Cloud}} > TB(10.8)_{\text{High Cloud}}$$

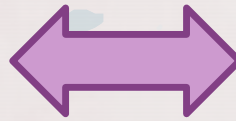
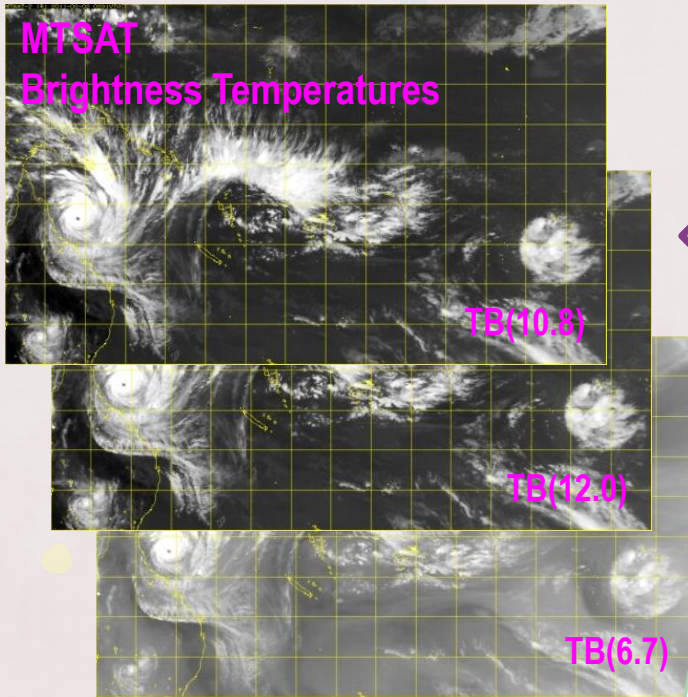
$$TB(10.8) > TB(12.0) \gg TB(6.7)$$

$$TB(10.8) \approx TB(12.0) \approx TB(6.7)$$

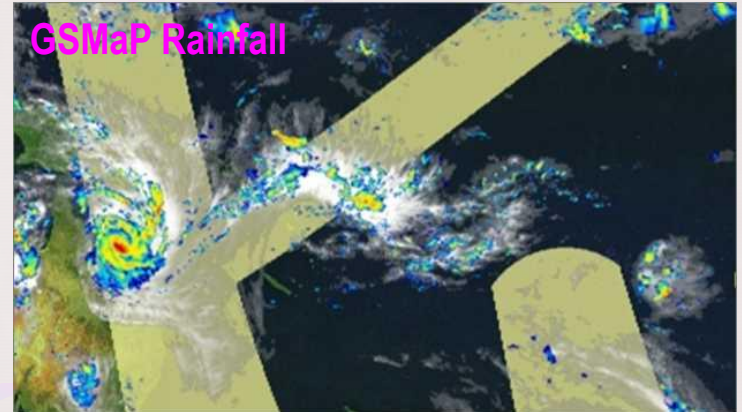


Threshold Determination

MTSAT
Brightness Temperatures



GSMaP Rainfall



Rain 0.1 0.5 1.0 2.0 3.0 5.0 10.0 15.0 20.0 25.0 30.0 [mm/hr]

Rainfall rate of GSMaP
retrieved from
microwave radiometers

POD: Probability of Detection
FAR: False Alarm Ratio



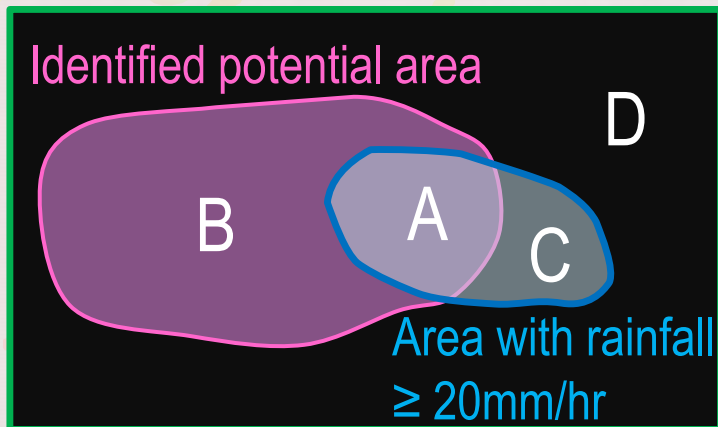
Validation

- Comparison with GSMaP
- Period : August - September 2010

	$\geq 20\text{mm/hr}$
POD (Probability of Detection)	0.79
FAR (False Alarm Ratio)	0.98

$$\text{POD} = N_A / (N_A + N_C)$$

$$\text{FAR} = N_B / (N_A + N_B)$$



Potential area	Yes	No
Rainfall ($\geq 20\text{mm/hr}$)		
Yes	N_A	N_C
No	N_B	N_D

Summary

- Product indicates deep convective clouds that may cause heavy rainfall.
- Identified areas cover about 79% of rainfall zones with more than 20 mm/hr.
- Product is helpful in severe weather monitoring for the regions in absence of adequate radar coverage.