Satellite Meteorology – Derived Products for Disaster Monitoring at BMKG

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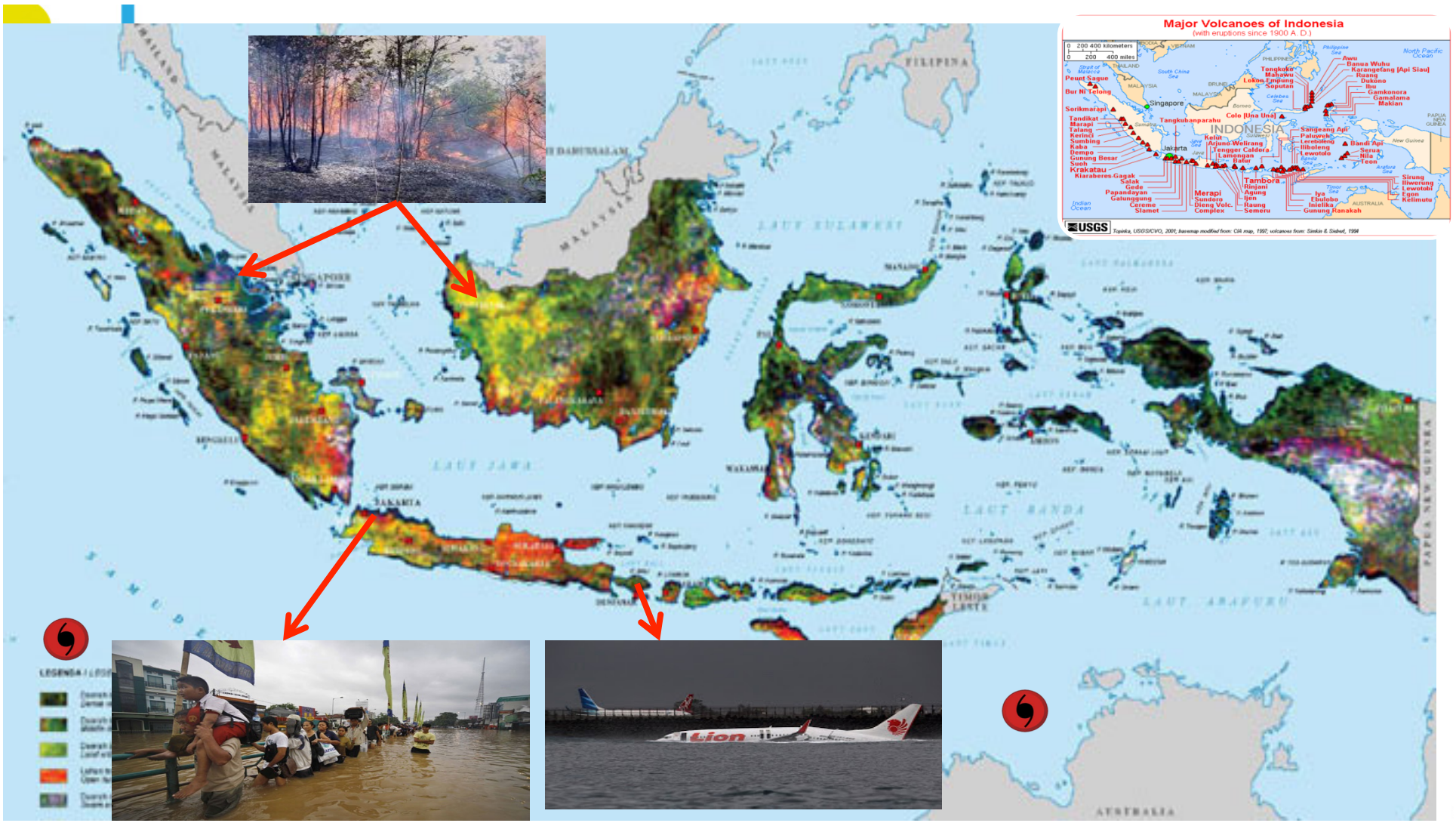
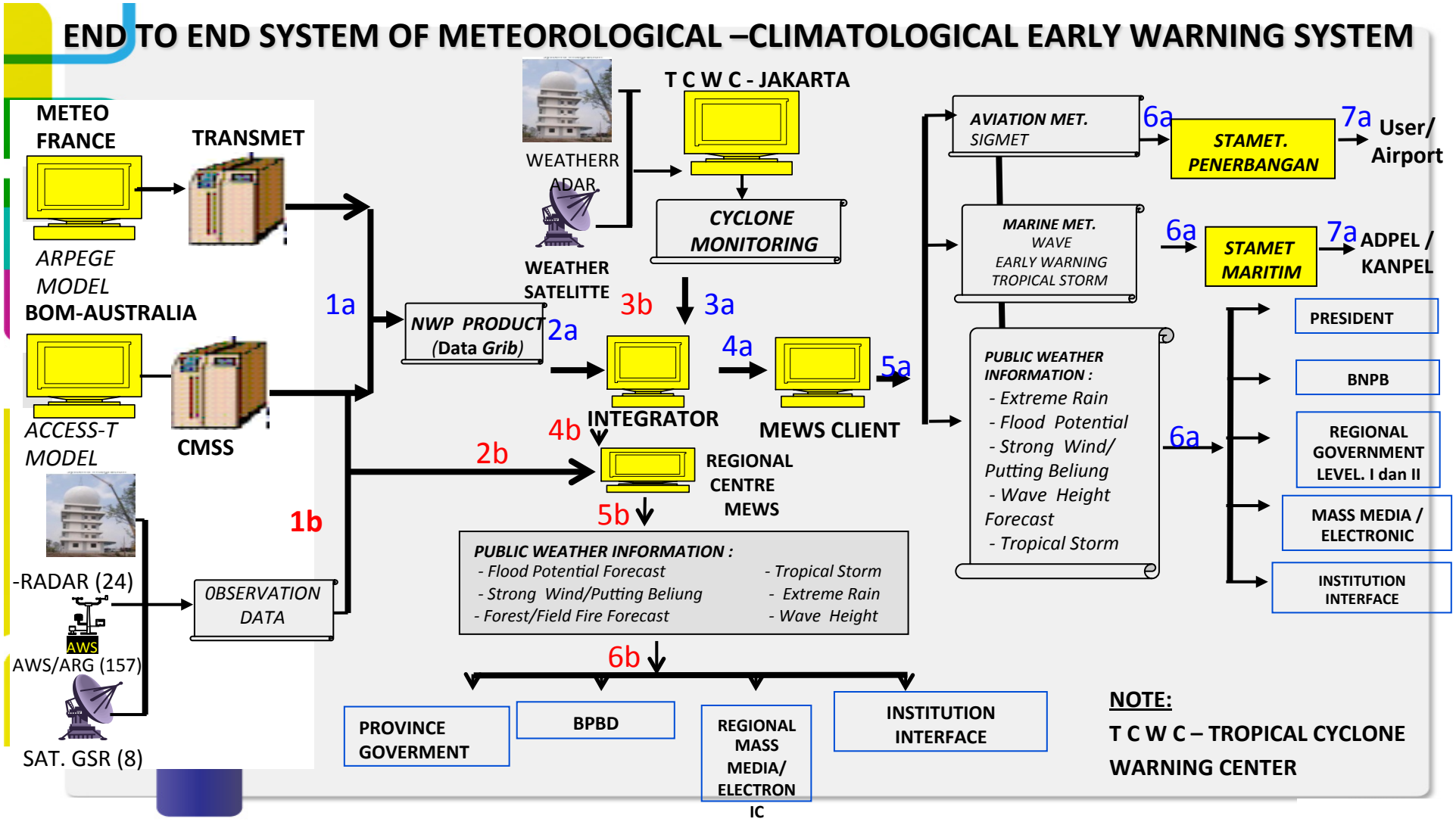
OUTLINE

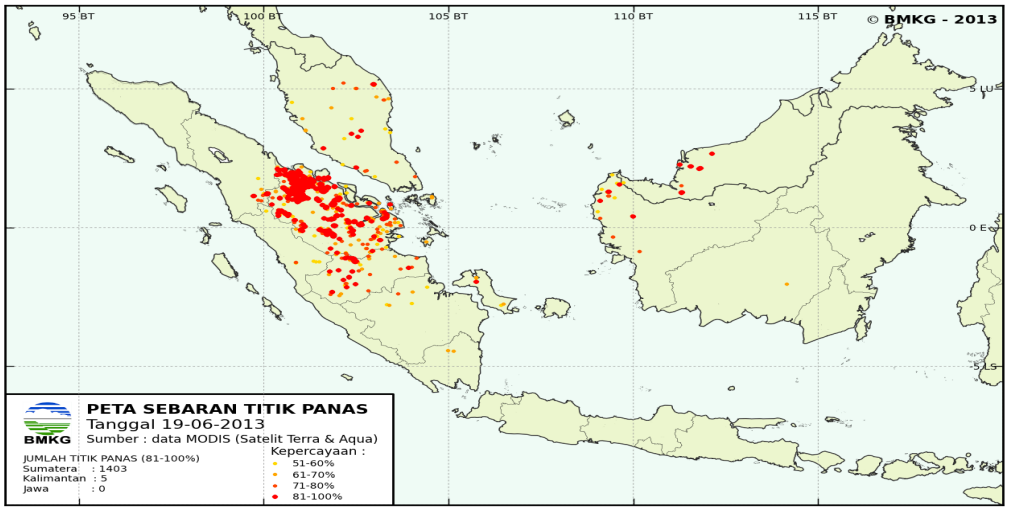
- Overview of BMKG's Meteorology Early Warning System (MEWS)
- Satellite-derived products for meteorological-related disaster events
- Conclusion
- Future challenges

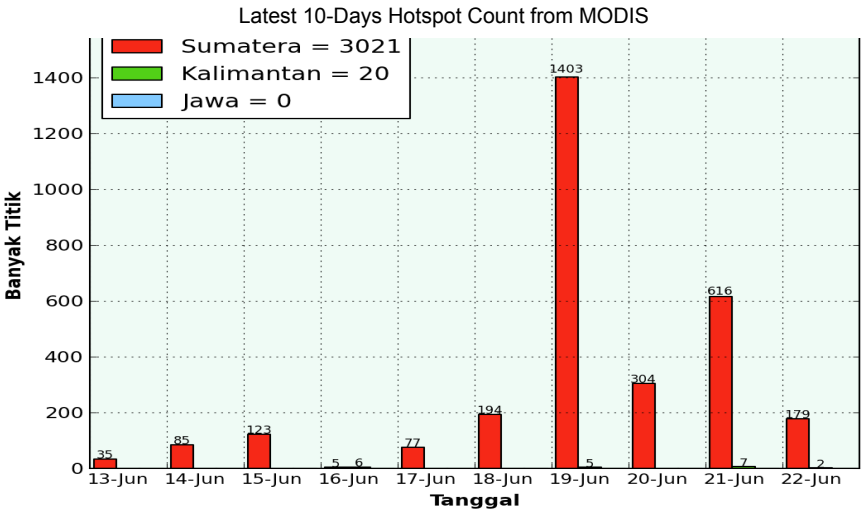

Major Volcanoes of Indonesia
(with eruptions since 1900 A.D.)
INDONESIA
Jakarta
Singapore
USGS
FILIPINA
MALAYSIA
LAUT JAWA
LAUT BANDA
LAUT ARAFURU
AUSTRALIA
JAKARTA
lion

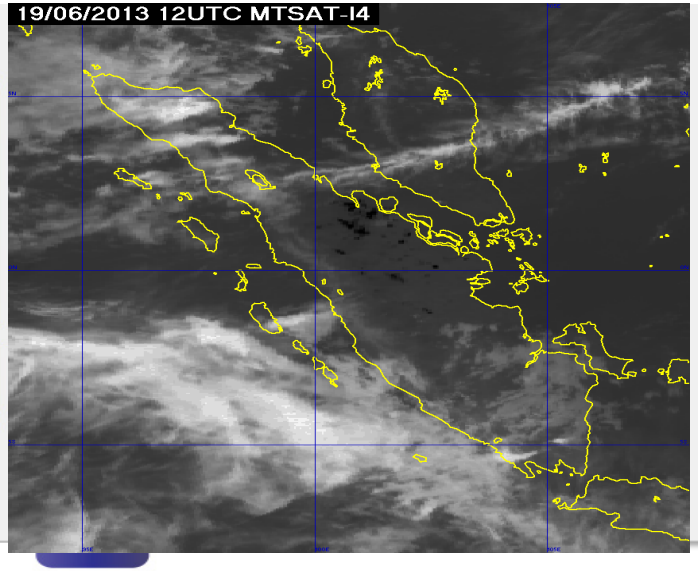
END TO END SYSTEM OF METEOROLOGICAL –CLIMATOLOGICAL EARLY WARNING SYSTEM

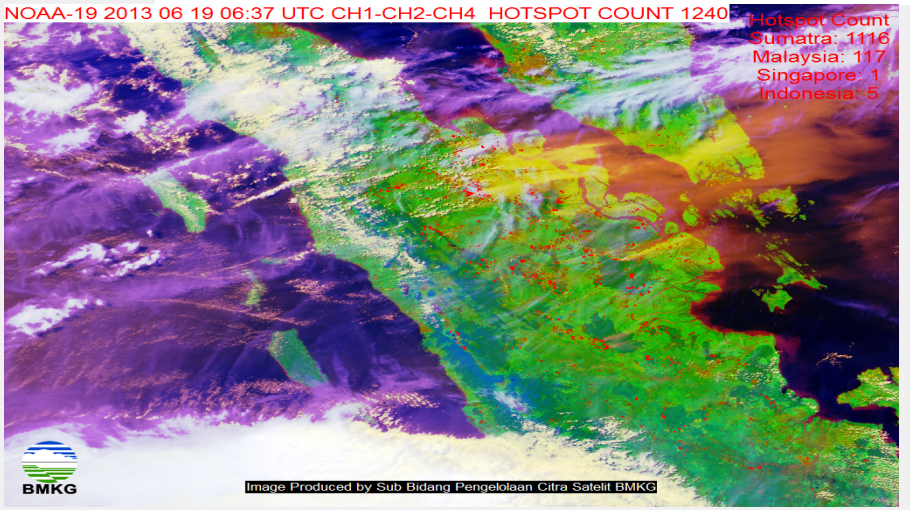


FOREST FIRE MONITORING

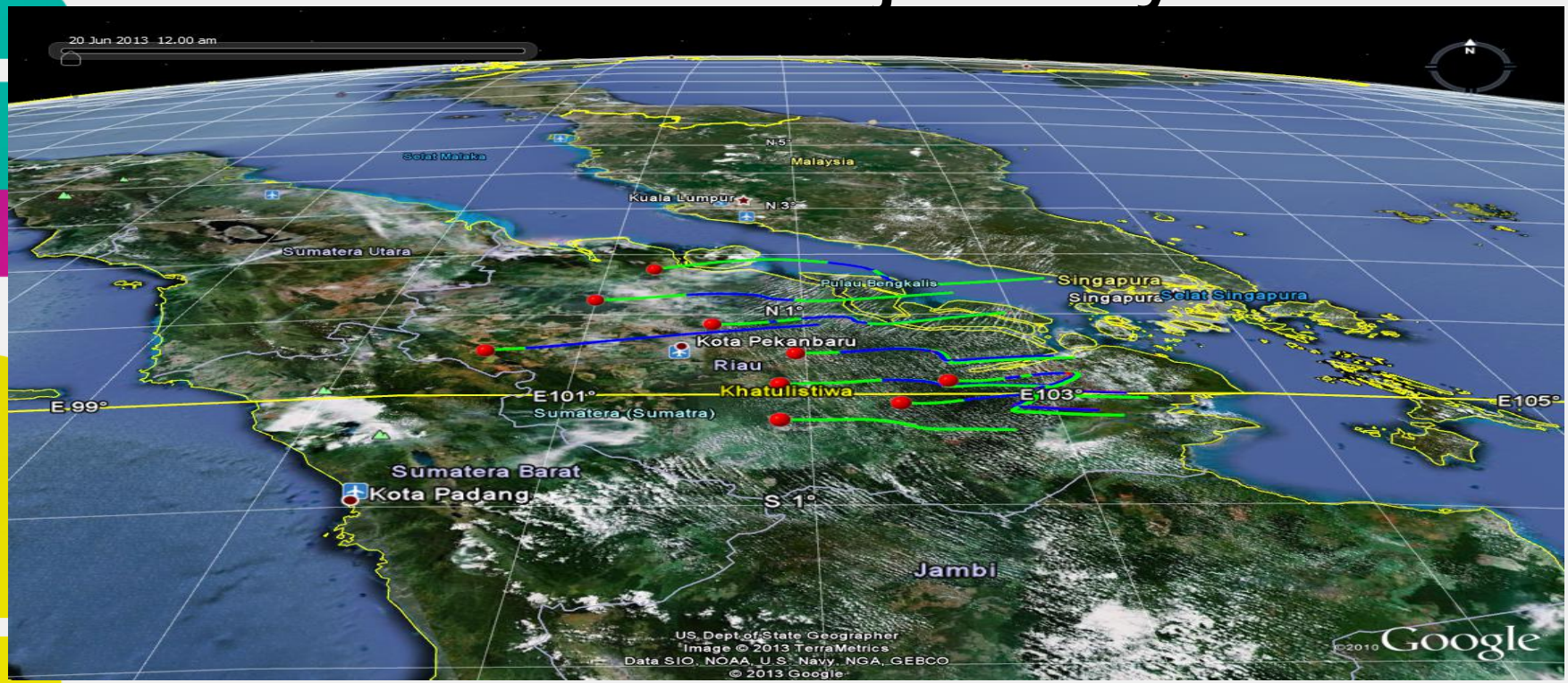

95 BT
100 BT
105 BT
110 BT
115 BT
© BMKG - 2013
PETA SEBARAN TITIK PANAS
Tanggal 19-06-2013
Sumber : data MODIS (Satelit Terra & Aqua)
JUMLAH TITIK PANAS (81-100%)
Sumatera : 1403
Kalimantan : 5
Jawa : 0
Kepercayaan :
51-60%
61-70%
71-80%
81-100%


Latest 10-Days Hotspot Count from MODIS
Sumatera = 3021
Kalimantan = 20
Jawa = 0
Banyak Titik
Tanggal
13-Jun
14-Jun
15-Jun
16-Jun
17-Jun
18-Jun
19-Jun
20-Jun
21-Jun
22-Jun
35
85
123
5
6
77
194
1403
5
304
616
7
179
2


19/06/2013 12UTC MTSAT-I4


NOAA-19 2013 06 19 06:37 UTC CH1-CH2-CH4 HOTSPOT COUNT 1240
Hotspot Count
Sumatra: 1116
Malaysia: 117
Singapore: 1
Indonesia: 5
BMKG
Image Produced by Sub Bidang Pengelolaan Citra Satelit BMKG

Smoke Trajectory

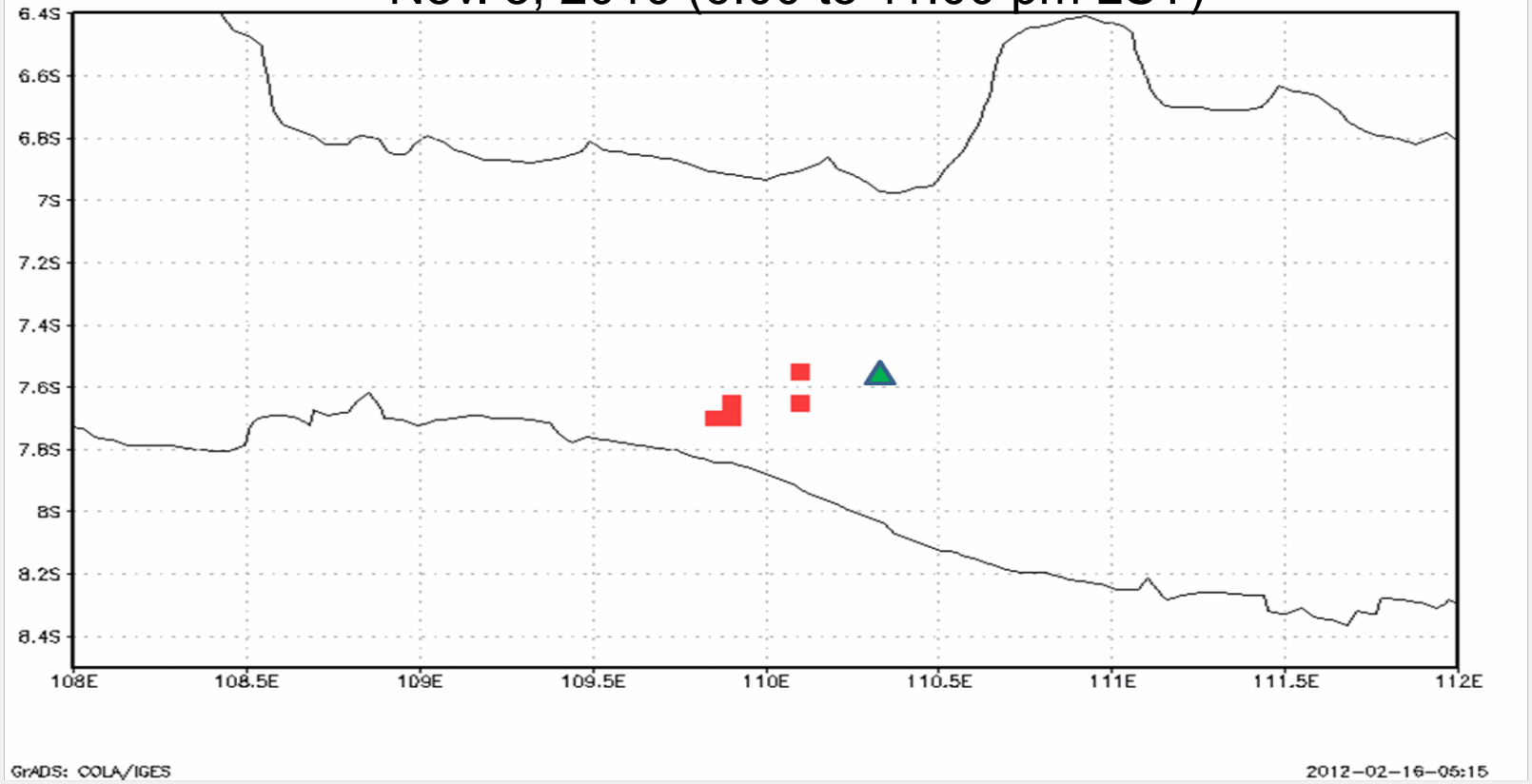


BMKG-NOAA Hysplit Model

Source Height : 10 m 1 m **Surface**

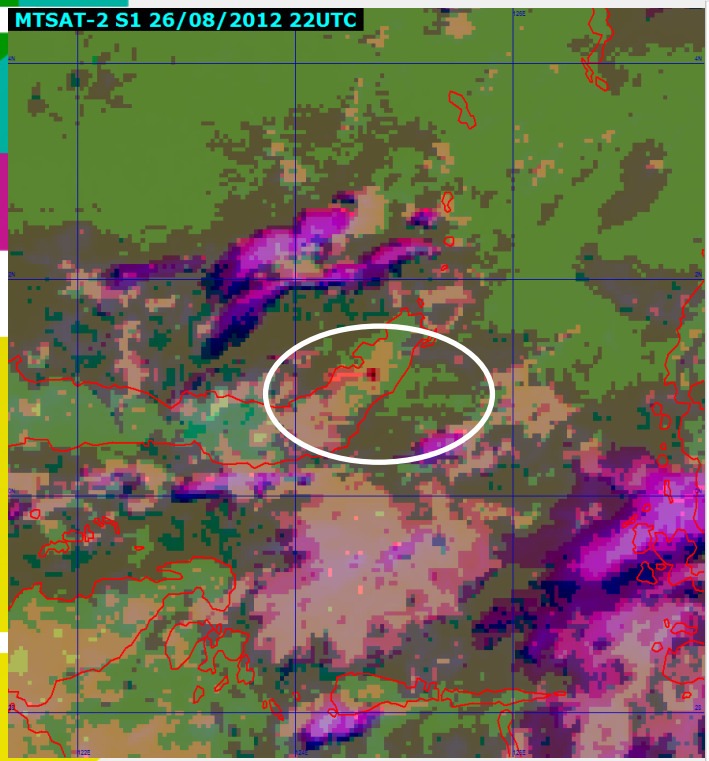
VOLCANIC ASH MONITORING

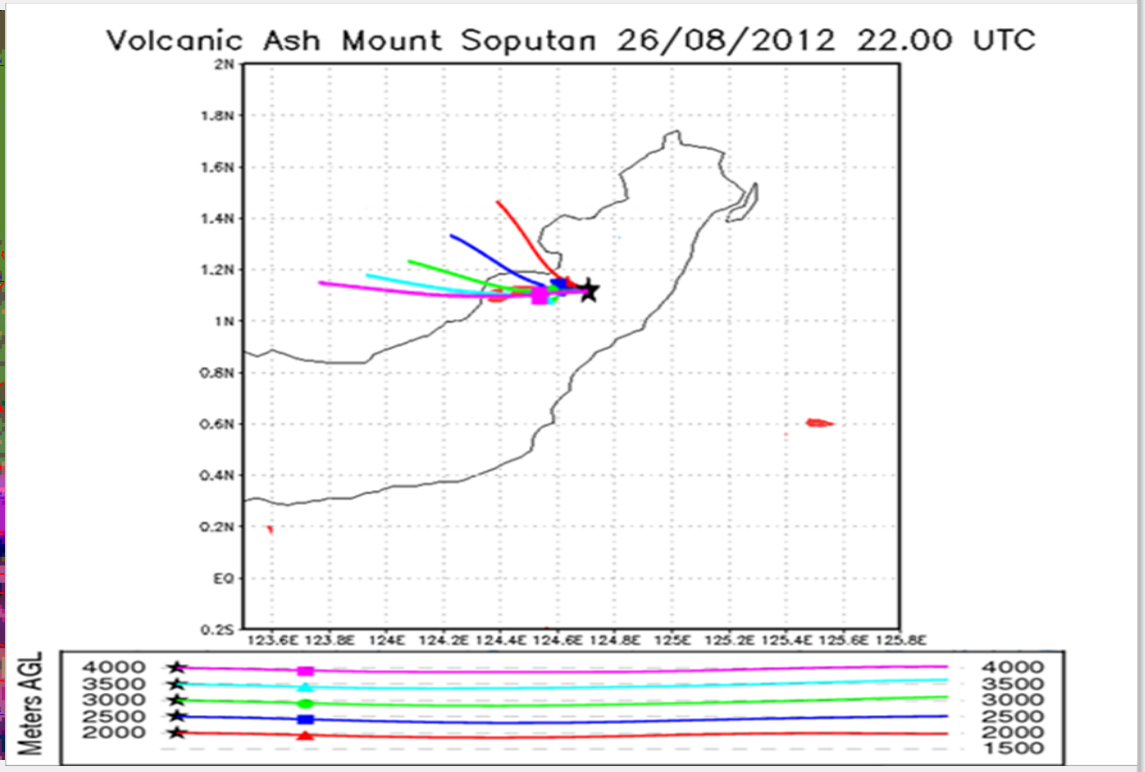
Volcanic ash from Mt. Merapi Eruption
Nov. 5, 2010 (6:00 to 11:00 pm LST)



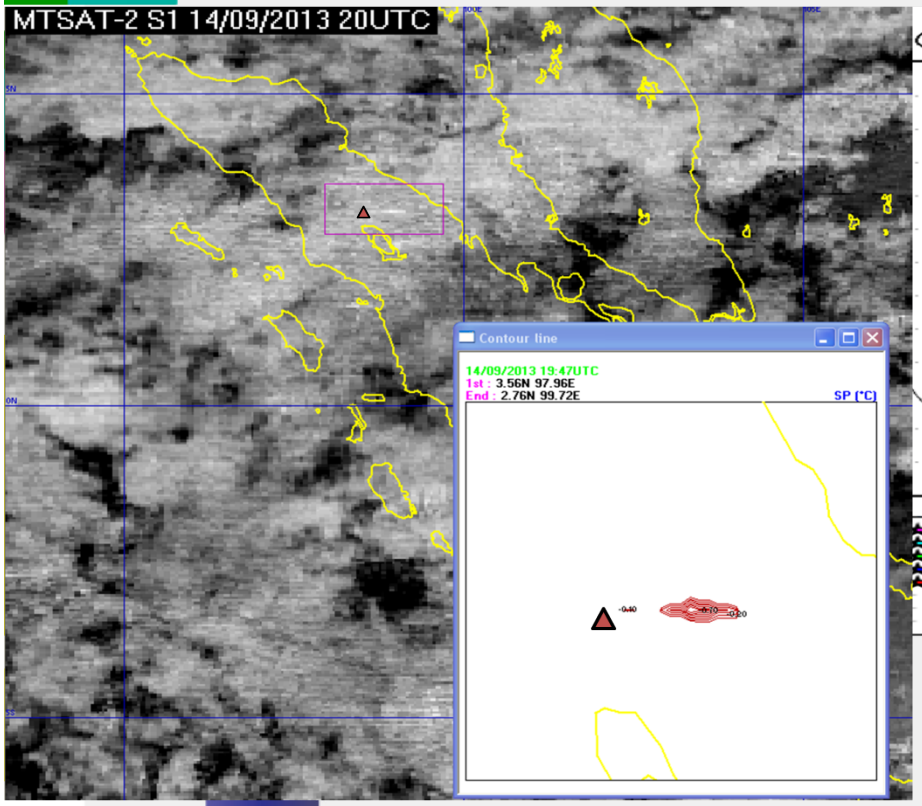
- BTD [11µm-12µm] < -2 ; BTD [3.8µm-11µm] > 0 dan TVAP > 100

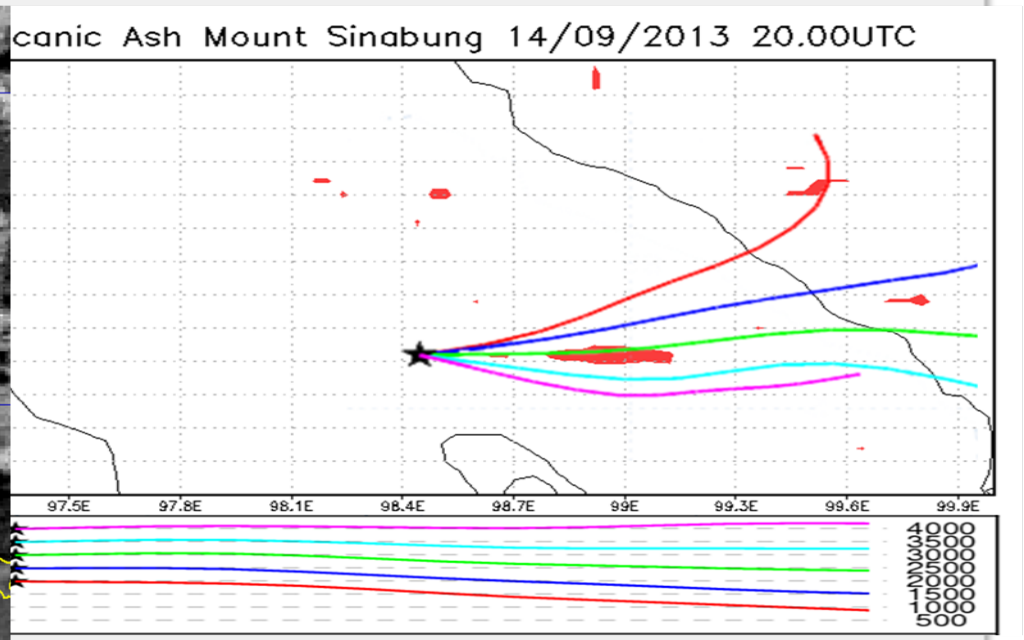
Mt. Soputan Eruption, August 26, 2012 at 22.00 UTC



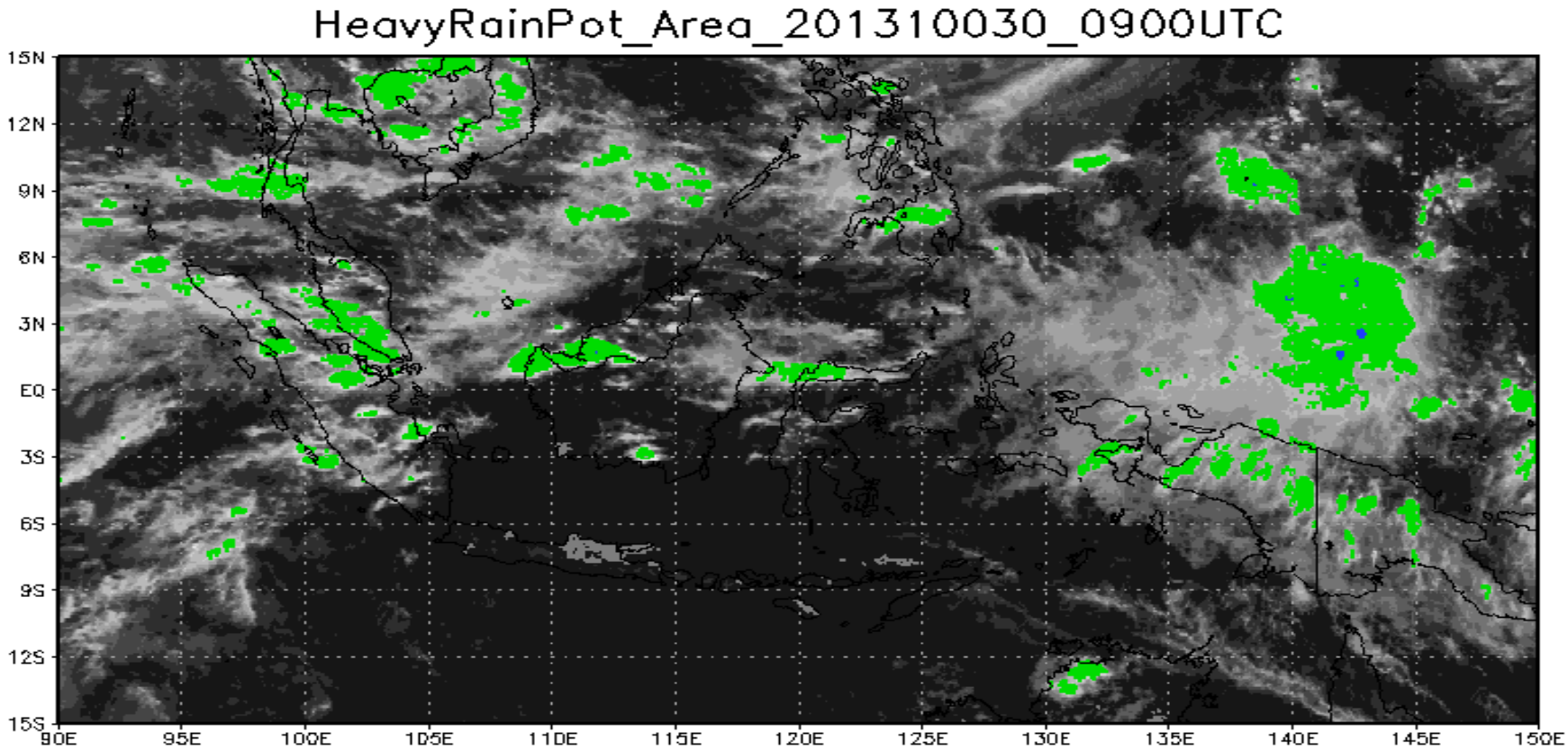


Mt. Sinabung Eruption, September 14, 2013 at 20.00 UTC

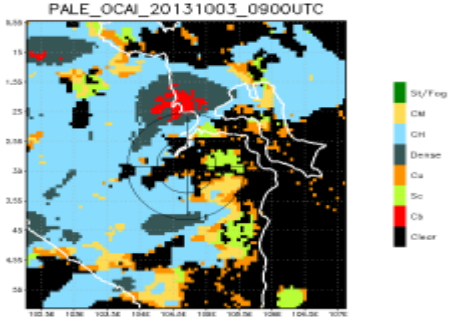




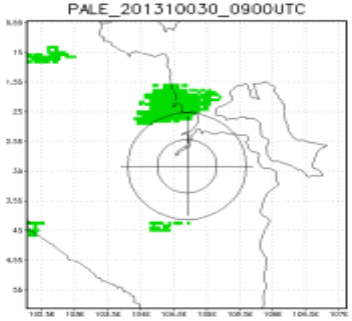
POTENTIAL HEAVY RAINFALL MONITORING


HeavyRainPot_Area_201310030_0900UTC
15N
12N
9N
6N
3N
EQ
3S
6S
9S
12S
15S
90E
95E
100E
105E
110E
115E
120E
125E
130E
135E
140E
145E
150E

PALE_OCAI_20131003_0900UTC



PALE_201310030_0900UTC



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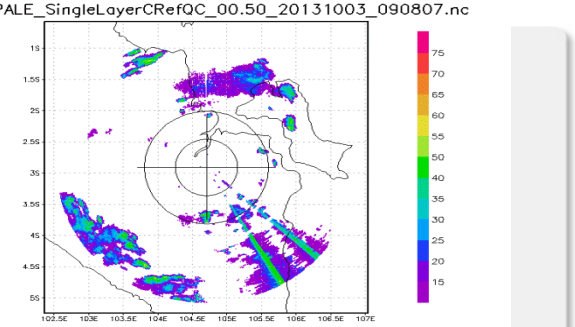
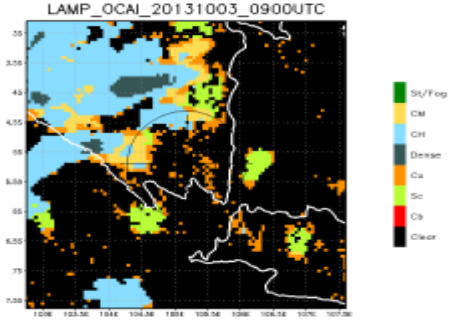
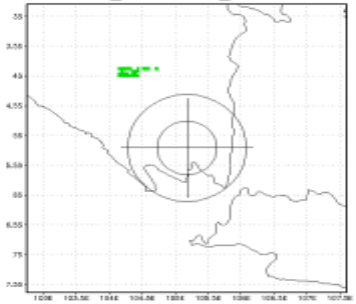


LAMP_OCAI_20131003_0900UTC



LAMP_201310030_0900UTC



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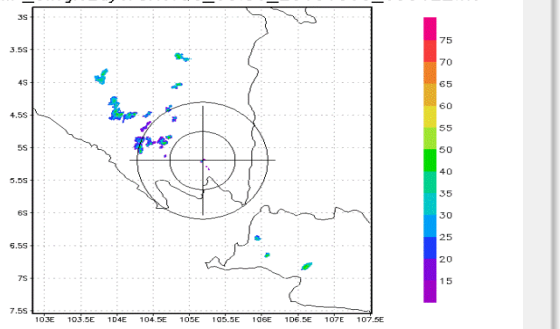
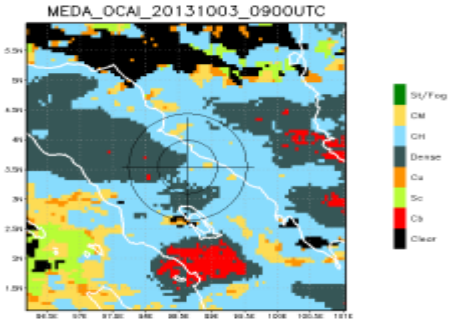
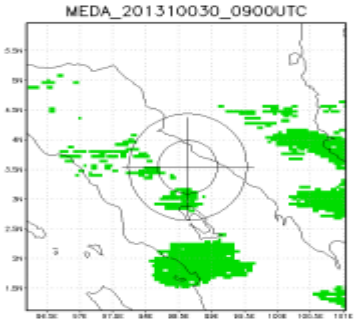


MEDA_OCAI_20131003_0900UTC



MEDA_201310030_0900UTC



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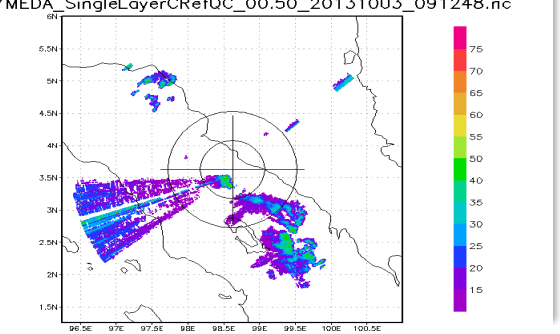


Cb-Cloud Detection

Time: 13, 14 , 15, 16UTC

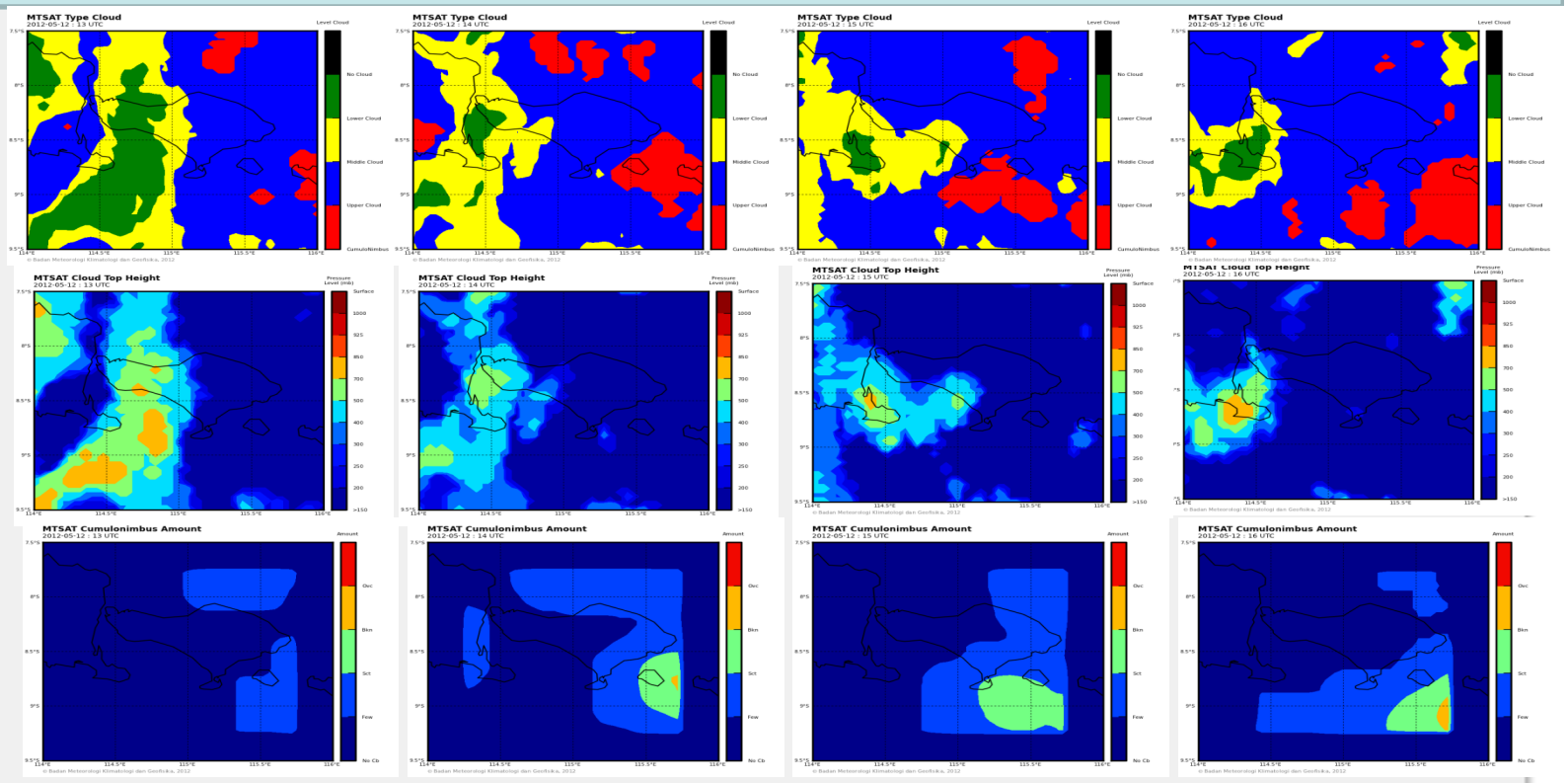
CB detection –Bali Island (12 May 2012)

Cloud Type

Cloud Top Height

CB Amount

METAR



FEW016 **FEW016** **FEW016CB** **FEW016CB**

Ngurah Rai Airport, Denpasar-Bali

Validation with METAR

Detection \ Metar	Cb exist	No Cb exist
Cb exist	FA	FC
No Cb exist	FB	FD

POD = 50%

FAR = 0%

POD = FA / (FA+FC)

FAR = FB / (FA+FB)

N = 24		METAR	
		Y	N
Detection	Y	5	5
	N	0	14

Conclusion

- Geostationary satellites such as MTSAT can be used to observe volcanic ash with high temporal resolution that is useful for aviation weather services in our region.
- Potential heavy rainfall product from satellite data provide gap-filling information to BMKG's forecasters at regions where lack of radar observation found. In line with this, we are now engaged of combining radar data to provide alert system of significant weather events to forecasters → *next generation of Himawari 8/9 is expected to be able to enhance forecasting accuracy with its higher temporal and spatial resolution data*
- Satellite-derived Cb-detection using threshold and split windows technique is useful to support surface-based observation and forecasting of Cb existence for aviation stakeholders

Future challenges for BMKG

- False alarms of volcanic-ash detection using MTSAT – need further improvement of algorithm.
- Need improvement in the accuracy of potential heavy rainfall detection with validation using near real-time observation data (e.g. Radar rainfall estimate, GSMaP products).
- More satellite-derived products for aviation weather services (e.g. Turbulence, icing, wind-shear potential region) as one of BMKG's prioriy to be developed in the near future.