FDRS DEVELOPMENT FOR LAND AND FOREST FIRE PREVENTION AND MITIGATION

BMKG

Presented on:

"ASEAN Technical Workshop on Development of the ASEAN Peat Land Fire Prediction and Early Warning System"
Kuala Lumpur, 20-21 March 2012

AGENCY FOR METEOROLOGY CLIMATOLOGYL AND GEOPHYSICS

Scope of presentation :

1. Fire Danger Rating System
2. FDRS Implementation Phases
3. FDR Development (1999 – 2002)
4. FDR Operation (2003 – now)
5. Product Of FDRS: Current Status
6. Smoke Dispersion and Trajectory Forecast Model
7. Dessimination of FDRS information
8. FDRS Future Development Program

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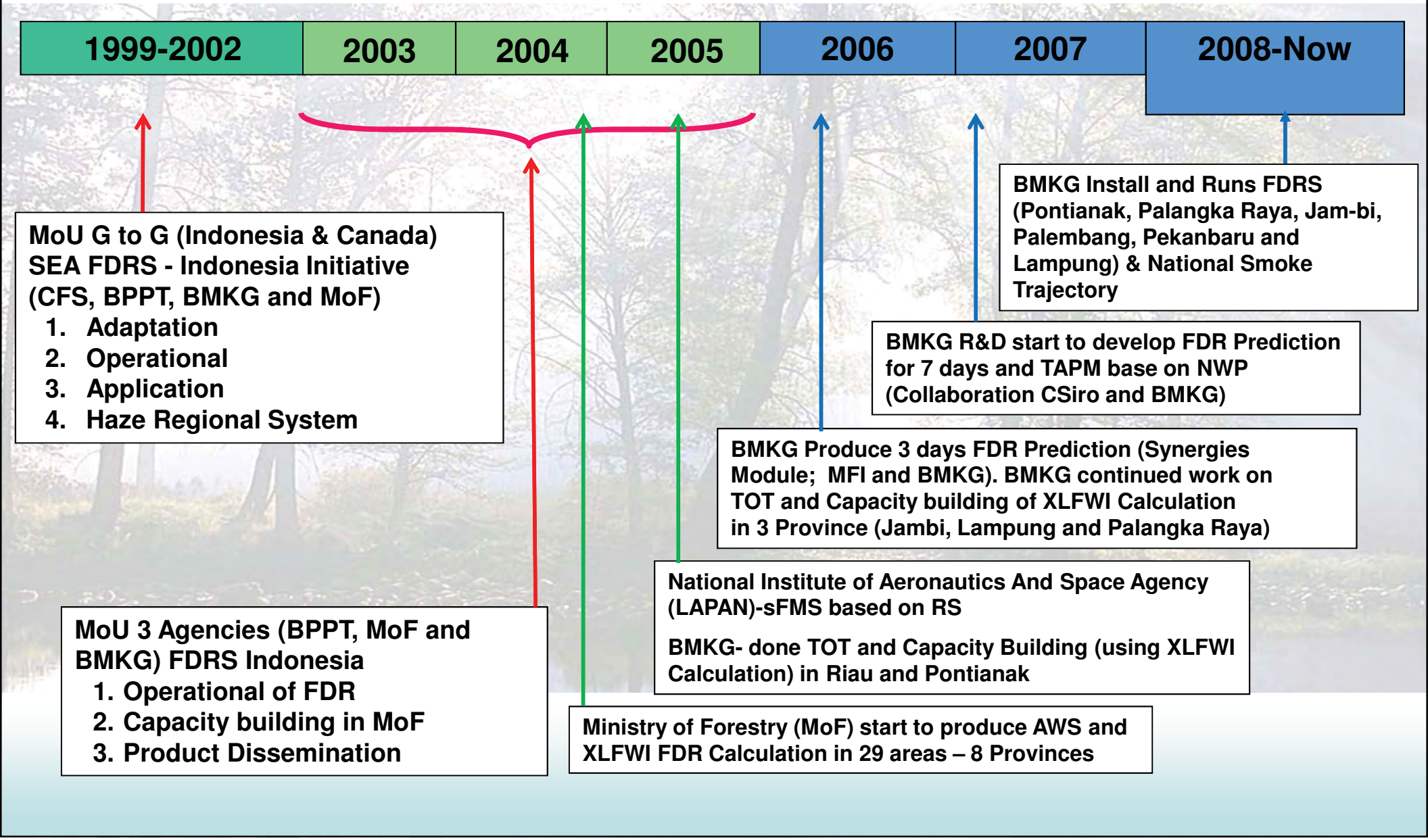
1. Fire Danger Rating

- Evaluation of (meteorological) factors that influence fire danger
- A system for fire danger rating to evaluate the fire environment on regular intervals and in objective way.
- Provides information and guidelines for fire management

2. FDRS Implementation Phases



3. FDR Development (1999-2002)

- Institutions:
  - Agency for Meteorology Climatology and Geophysics (BMKG)
  - National Institute of Aeronautics and Space (LAPAN)
  - Ministry of Forestry (MoF)
  - Agency for Assessment and Application of Technology (BPPT)
  - Canadian Forest Service (CFS)

- Pilot project areas:
  - Riau Province
  - West Kalimantan Province

3. FDR Development (1999-2002)

Development Component:	Adaptation	Operation	Application
Agency roles:	BMKG HO	BMKG HO (electronic FDRS) BMKG Local Office (manual/remote access)	BAPEDAL DEPHUT PEMDA Media, dll.
BMKG Activities:	-Formulate FDRS team -Integrate weather database -Map fire climate zones -Calibrate FDRS locally	-Decode weather data -Generate daily FDRS maps -Forecast FDRS	-Preparation of FDRS outputs -Dissemination of outputs to users
FDRS Project Support:	-FDRS concepts training -Mission to Canada -Database/GIS training -Analysis of fire weather -Technical support	-Assist with decoding -Train FDRS operators -Database training -Technical support -Facilitate budget support from user agencies	-Output materials -Communications with user groups -Regional networking -Technical support -Build Link between fdrs members about FDRS dissemination

4. FDR Operation (2003 – now)

- Information providers:
  - BMKG (since February 2002) → weather station based, spatial information
  - LAPAN (since 2005) → satellite remote sensing-based, spatial information
  - Ministry of Forestry (since 2005) → Single weather station based-ExcelFWI Calculation (29 Operation areas for 8 Provinces)
- Users:
  - Ministry of Forestry
  - Ministry of Environment
  - Disaster Management Agency
  - ASEAN Secretariat
  - CARE Indonesia
  - Etc.

INDONESIA FOREST FIRE DANGER RATING SYSTEM
FIRE WEATHER DATA PROCESSING

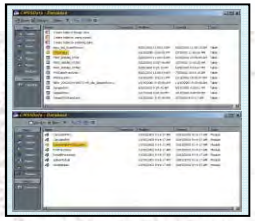
INPUT DATA

SYNOPTIC (SURFACE) WEATHER DATA

3-hourly synoptic data from ~163 BMKG weather observing stations in Indonesia is collected in the Computer Message Switching System (CMSS) which automatically decodes and retranslates it at every 16.00LST. Data is stored for a week and renewed.

FTP
File Transfer Protocol

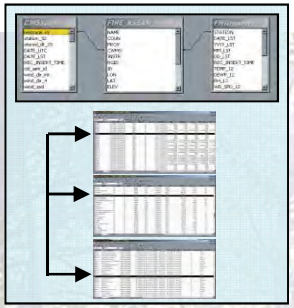
WEATHER DATABASE SYSTEM



Raw weather data from CMSS (FTP) stored in FDRS-BMKG computer in Relational Database System using Microsoft Access.

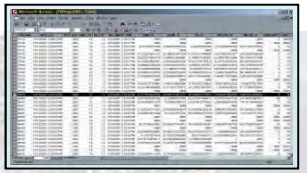
SCRIPT
MS Access Modules

WEATHER DATA CONVERSION



ODBC
Open database connection

FIRE WEATHER INDEX INPUT



Real time fire weather database consists of 3 tables:
- "CMSSData" contains 3 hourly synoptic data
- "FIRE_ASEAN_VSTN" contains South East Asia weather station catalog
- "FWIInput" contains Fire Weather Input.
- Each table has similar relational structure.

COUNTRY - WIDE SPATIAL ANALYSIS

Fire Weather Index Inputs

- Temperature
- Relative Humidity
- Wind Speed
- Rainfall

Fuel Moisture Code Maps

Fine Fuel Moisture Code (FFMC)

- Wind Speed

- Temperature
- Relative Humidity
- Rainfall

Duff Moisture Code (DMC)

- Temperature
- Rainfall

Drought Code (DC)

Fire Behavior Index Maps

Initial Spread Index (ISI)

Buildup Index (BUI)

Fire Weather Index (FWI)

EARLY WARNING SYSTEM

Purpose of the Indonesia FDRS initiative is to strengthen the capacity of resource management organizations to prevent and control unwanted vegetation fires and associated haze.

The FDRS is designed to support Indonesia agencies in monitoring fire conditions and in developing actions to support prevention, monitoring and mitigation activities at local levels.

The Meteorological Climatological and Geophysical Agency (BMKG) operates the FDRS according to the procedures explained.

Communication products

Daily report (Website)

Users
- Fire Brigades
- Forestry Offices
- Regional BMG

Weekly Synopsis and Forecast

- Forestry Department
- Agriculture Department
- Environment Ministry

Monthly Report

- Forestry Department
- Agriculture Department
- Industry Department
- National Coordination Board For Natural Disaster
- Local Government

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CURRENT FDRS OPERATIONAL STATUS IN INDONESIA

The purpose of the Indonesia Forest Fire Danger Rating System initiative is to strengthen the capacity of resource management organizations to prevent and control unwanted vegetation fires and associated haze.

The FDRS is designed to support Indonesian agencies in monitoring fire conditions and in developing actions to support prevention, monitoring and mitigation activities.

The Meteorological Climatological and Geophysical Agency (BMKG) operates the FDRS according to the procedures explained below.

The Global Telecommunication System (GTS) is a global network, which exchanges meteorological data and products in the framework of the World Weather Watch (WWW) program of the World Meteorological Organization (WMO). The GTS links three World Meteorological Centers (WMC) located in Washington, Moscow and Melbourne, fifteen Regional Telecommunication Hub (RTH) and NMS. BMG is connected with one WMC (Melbourne) and one Regional Meteorology Center (RMC Singapore).

WMC – Melbourne
RMC - Singapore

MFI - France

Global telecommunication system, GTS

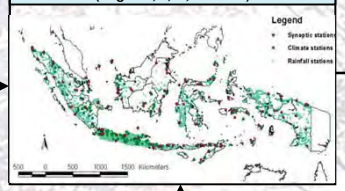
INDOSAT

Weather Observations From Indonesia Synoptic Station Network

Single Side Band (SSB)

Very Small Aperture Terminal (VSAT)

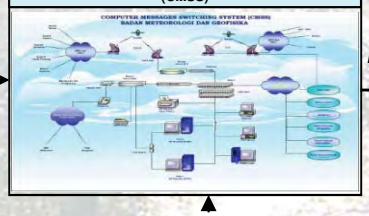
Indonesian Regional Meteorology Office (Region I, II, III, IV and V)



Telex, Fax or phone

Very Small Aperture Terminal (VSAT)

Computer Messages Switching System, Jakarta (CMSS)



File transfer protocol (FTP)

BMKG-RDBMS

Real time meteorological data (T, RH, fff, RR) is processed in Relational Database Management System to be used as input for GIS processing.

Very Small Aperture Terminal (VSAT)

Very Small Aperture Terminal (VSAT)

Single Side Band (SSB)

Telex, Fax or phone

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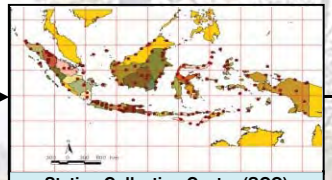


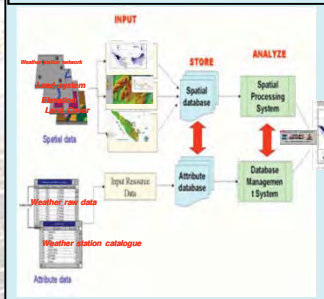
Station Collecting Center (SCC)

Fire Danger is an assessment of the fixed and variable factors of the fire environment, which determine the ease of ignition, rate of fire spread, difficulty of control and fire impacts. Fire Danger Rating is the process of systematically evaluating the individual and combined factors influencing fire danger.

In many fire danger rating systems only the weather elements are considered. The other legs of the fire environment triangle, fuel and topography, are assumed constant. In other systems, fire and topography are explicitly included in the system.
Site specific weather is needed to project the behavior of a specific fire. Fire danger rating, on the other hand, uses weather observations at a fixed site to give a broad area assessment of fire potential. The difference between fire behavior and fire danger is essentially a matter of scale.

Fire danger rating system which implemented at BMKG is using the Spatial Fire Management System (FMS). Static data layers, such as landcover and topography are used along with meteorological data to calculate daily fire danger maps.

GEOGRAPHICAL INFORMATION SYSTEM (GIS)

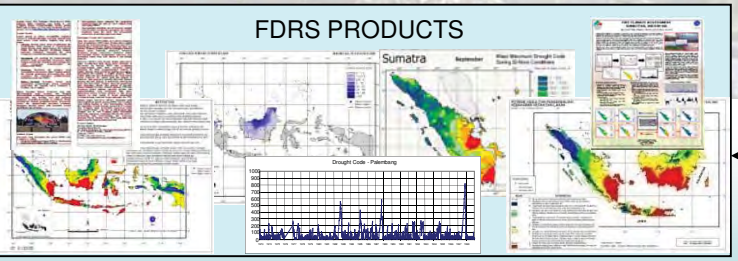


The fire danger rating system helps fire control managers to make decisions on:

- Land use activities and regulations
- Fire suppression planning and allocation of fire suppression resources
- Daily incidence response
- Burning plans and permits

FDRS USERS

FDRS PRODUCTS



Main data communication

Alternative data communication

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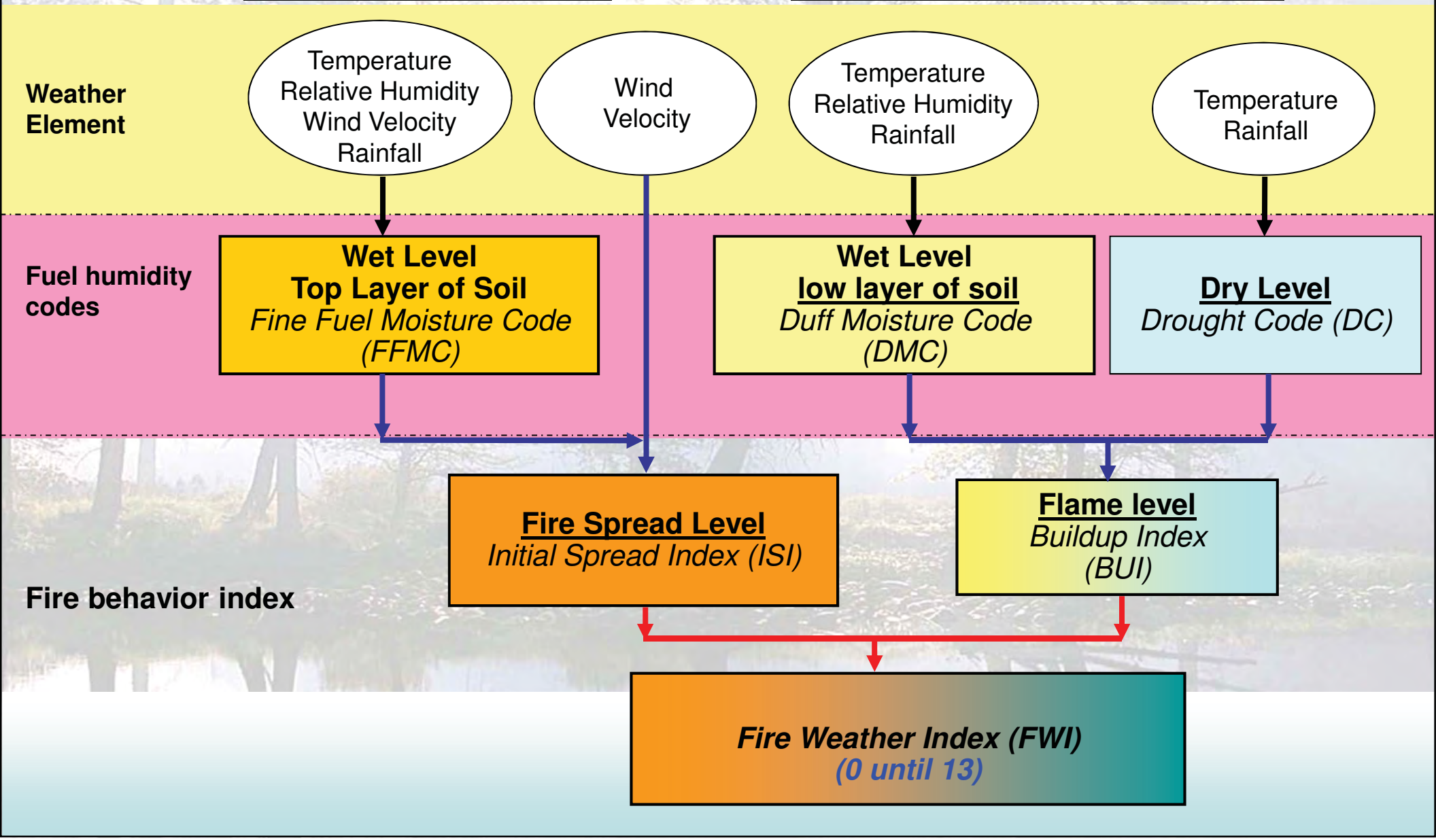
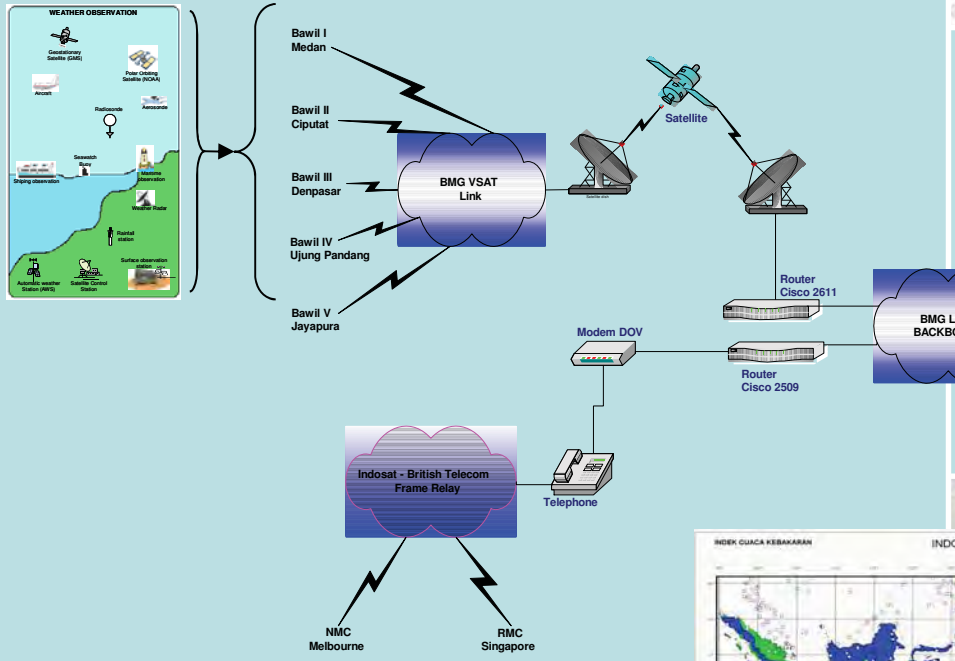
MODELING FDRS BASED ON WEATHER PARAMETERS OF "REALTIME OBS" AND "3 DAYS PREDICTION"



BMKG

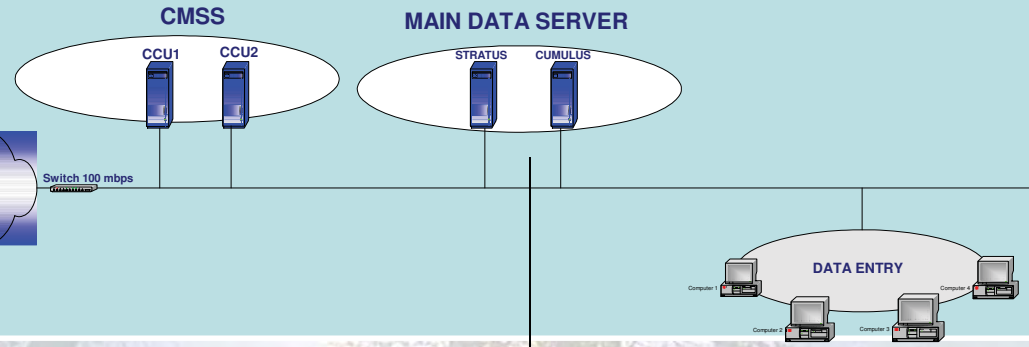
Daily Operational FDRS at BMKG Head Office

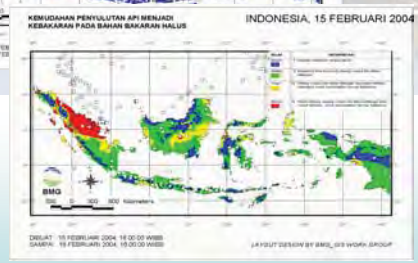
Weather data reporting system

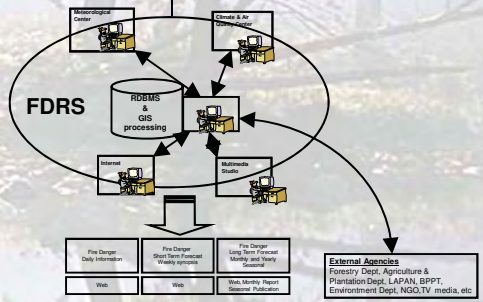


Existing FDRS configuration at BMKG

Real time Weather data Decode 16.00 LST

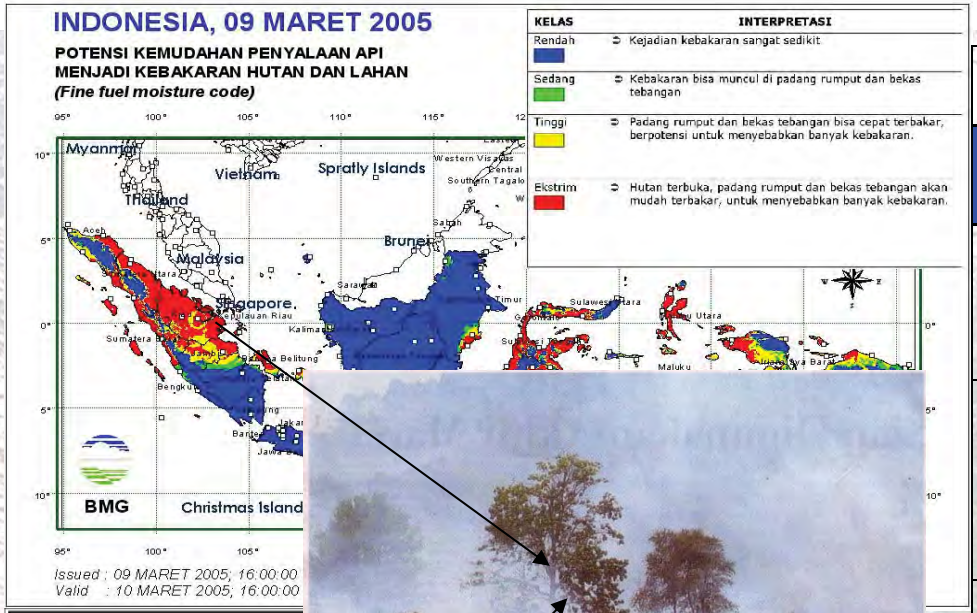




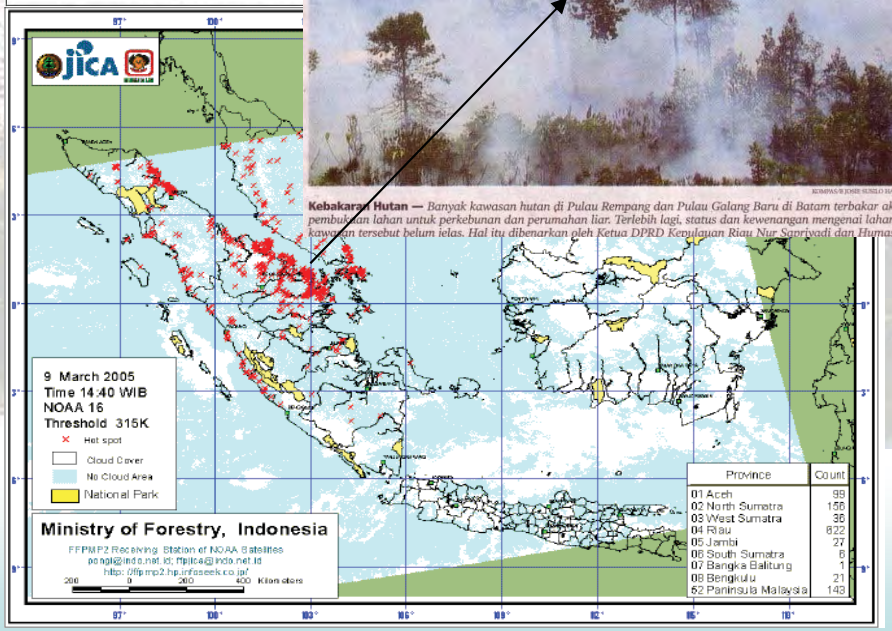


FDRS maps processing (16.15 LST)

FDRS INTERPRETATION



Kebakaran Hutan — *Banyak kawasan hutan di Pulau Rempang dan Pulau Galang Baru di Batam terbakar akibat pembukaan lahan untuk perkebunan dan perumahan liar. Terlebih lagi, status dan kewenangan mengenai lahan di kawasan tersebut belum jelas. Hal itu dibenarkan oleh Ketua DPRD Kepulauan Riau Nur Sarjiyadi dan Humas*



FIRE WEATHER INDEX

CLASS	FIRE CHARACTERISTICS	FIRE SUPPRESSION DIFFICULTY
LOW	Creeping surface fires	No control problems unless fire is deep burning
MODERATE	Surface fires may spread vigorously or with moderate fire intensity*	Fire can be controlled by direct attack with hand tools and water
HIGH	Fast spreading or moderate to high intensity fire	Fire control requires power pumps and/or fire break construction using mechanized line-building tools
EXTREME	Fast spreading or high intensity fire	Very difficult to control. Indirect attack using drip torches from control lines may work

National Scale

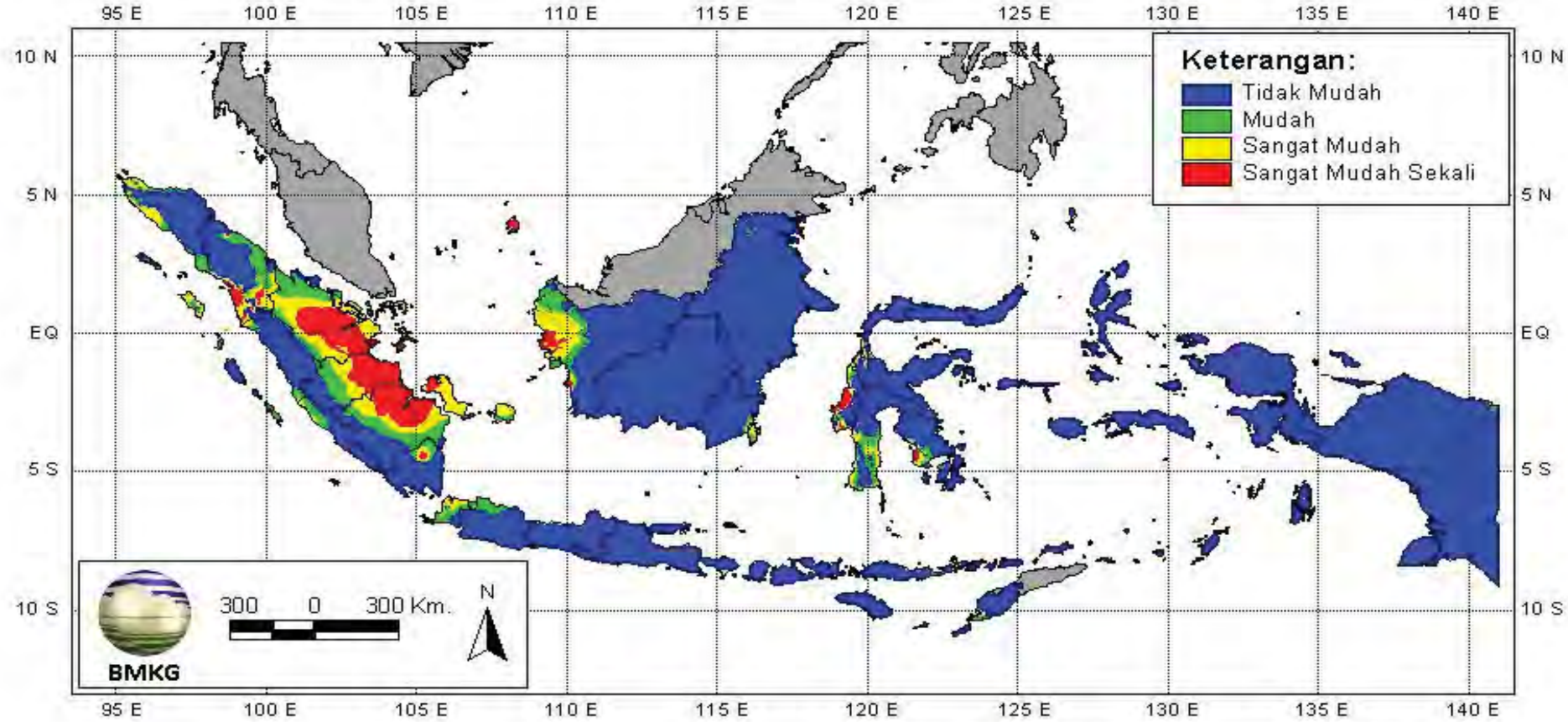
5. PRODUCT OF FDRS: CURRENT STATUS

Based On Synoptics Data

POTENSI KEMUDAHAN TERJADINYA KEBAKARAN DITINJAU DARI ANALISA PARAMETER CUACA

Fine Fuel Moisture Code

Berlaku untuk : 11 Maret 2012



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Realtime Pengamatan Sinoptik BMKG

POTENSI TINGKAT KESULITAN PENGENDALIAN APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

Fire Weather Index

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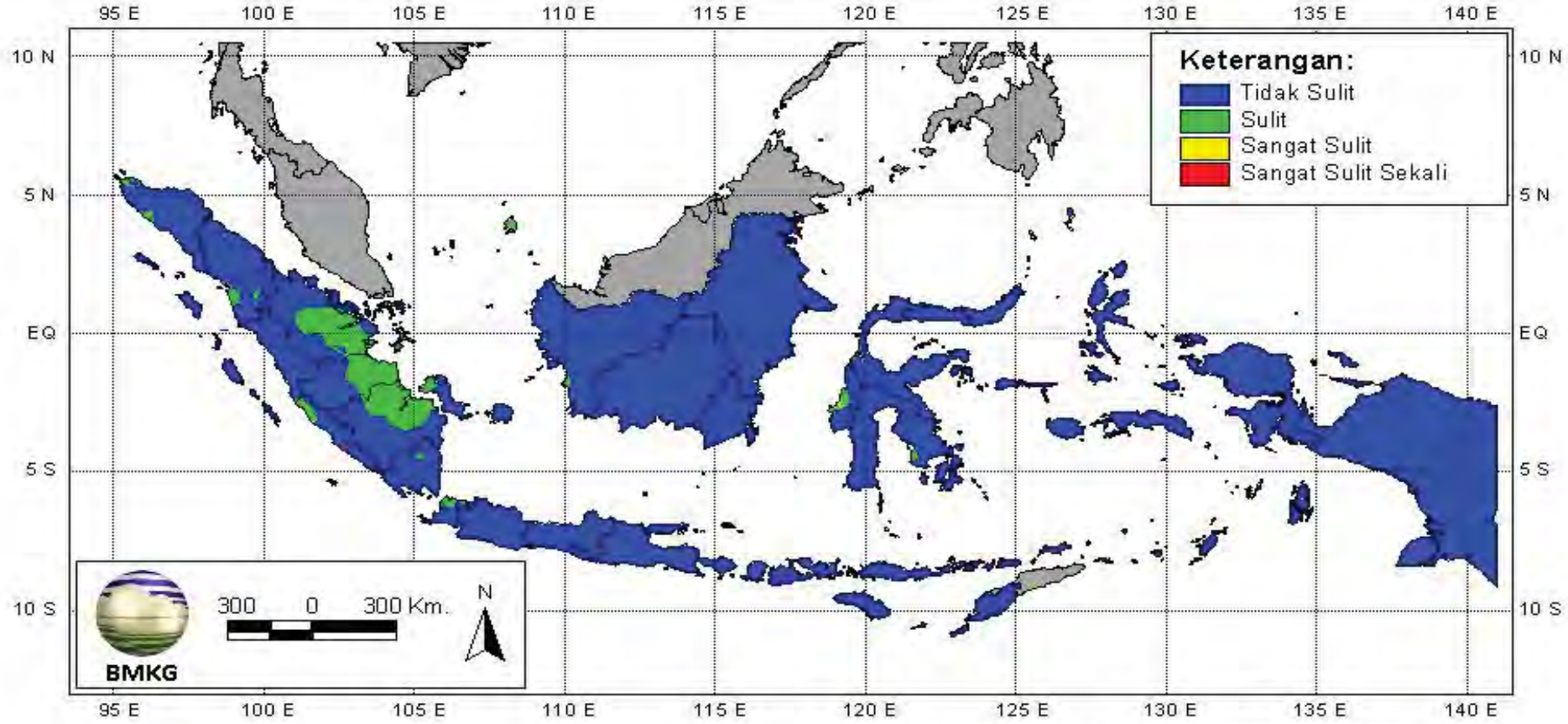

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POTENSI KEMUDAHAN TERJADINYA KEBAKARAN DITINJAU DARI ANALISA PARAMETER CUACA

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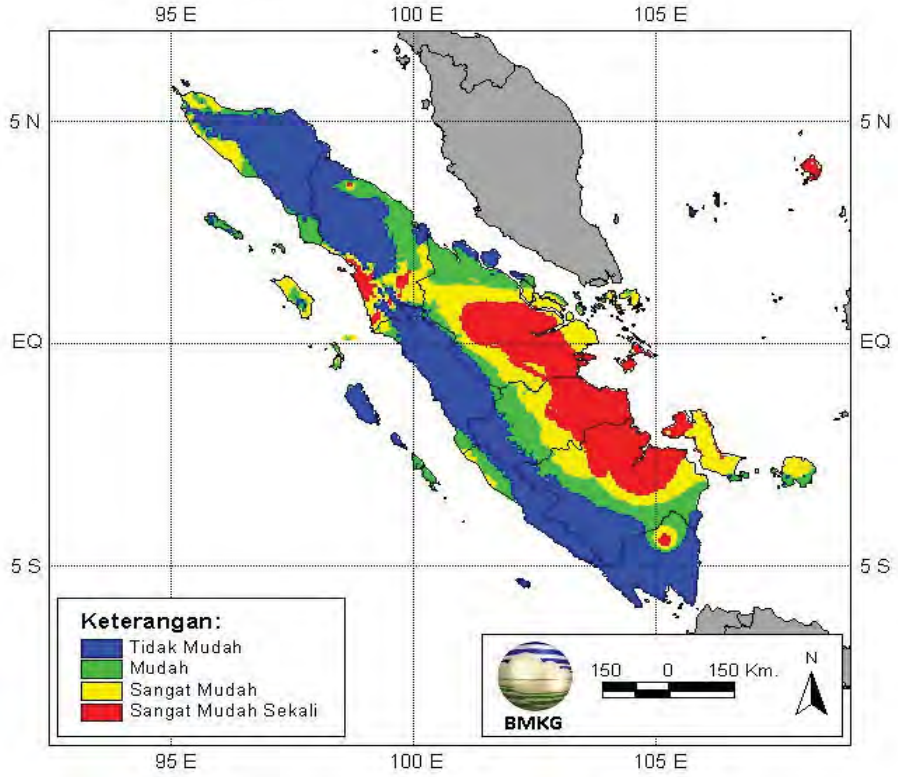

Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Realtime Pengamatan Sinoptik BMKG

POTENSI TINGKAT KESULITAN PENGENDALIAN APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

Fire Weather Index

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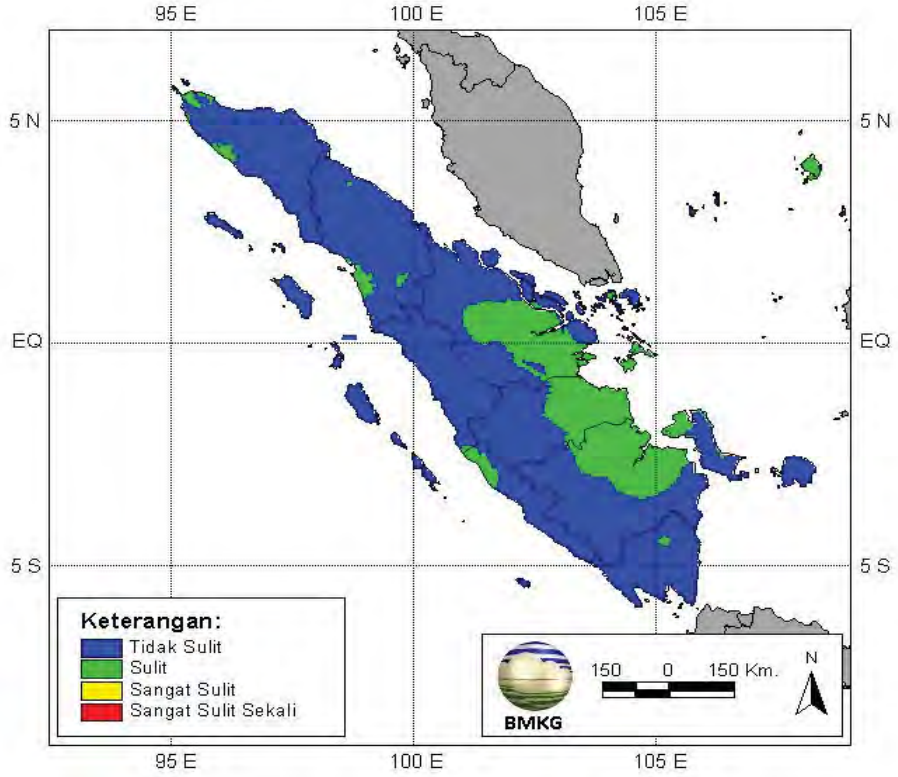

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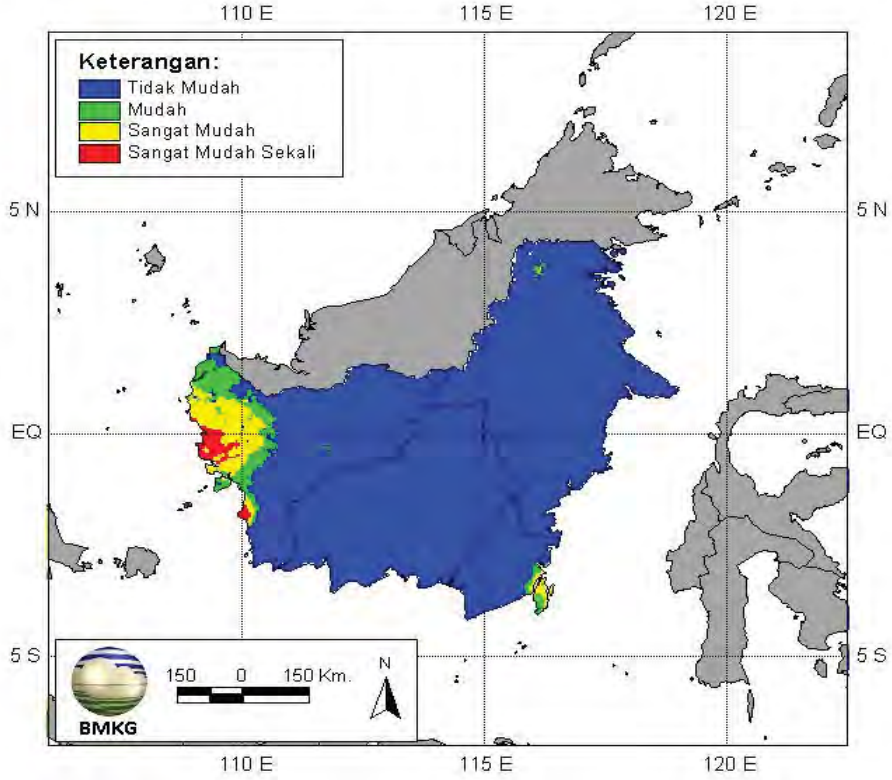

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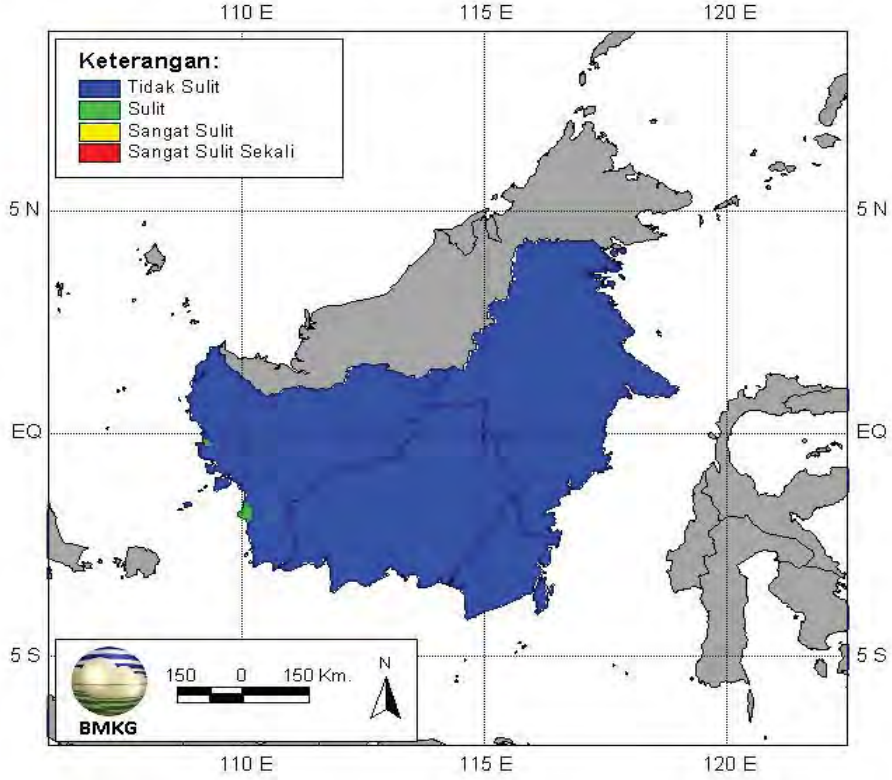


Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Realtime Pengamatan Sinoptik BMKG

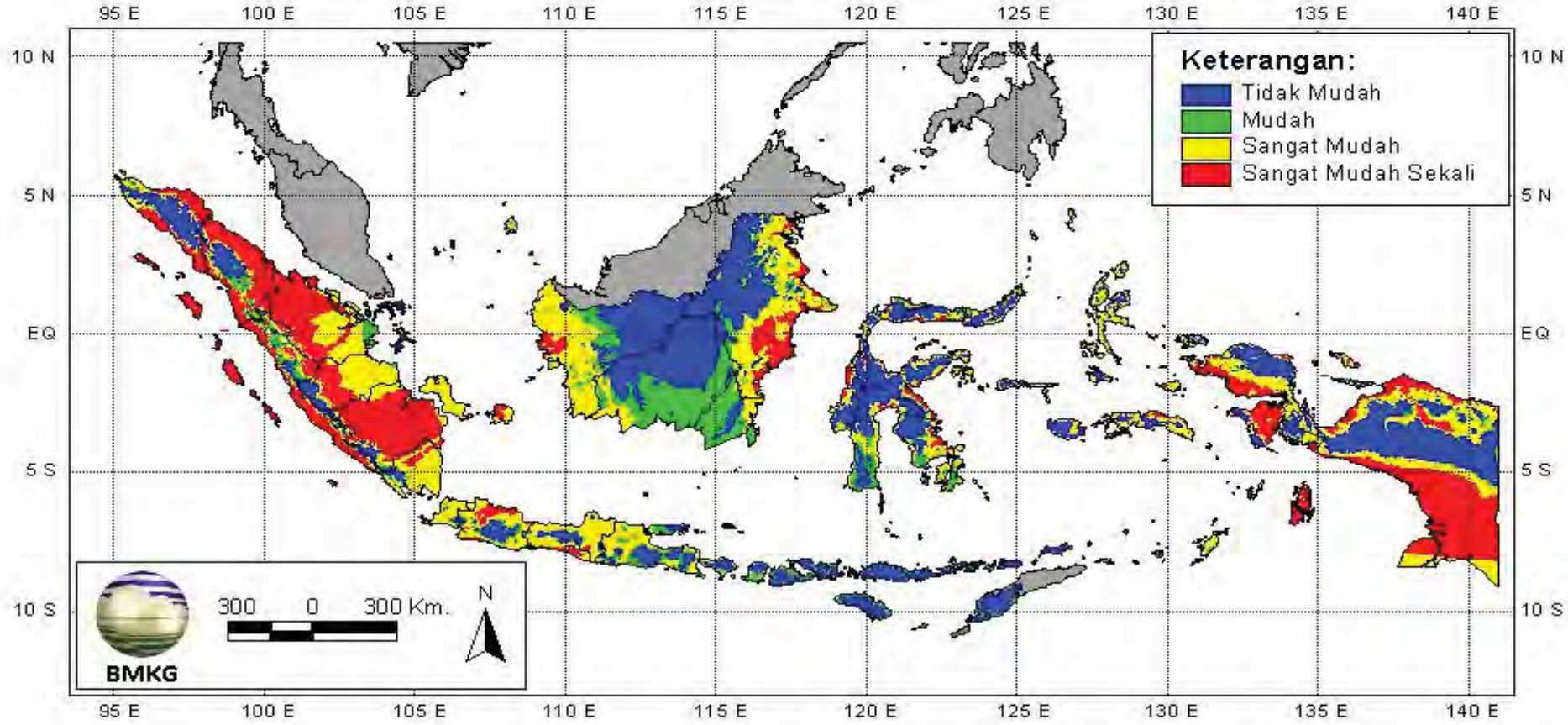
5. PRODUCT OF FDRS: CURRENT STATUS

Based On Forecast Data

POTENSI KEMUDAHAN TERJADINYA KEBAKARAN DITINJAU DARI ANALISA PARAMETER CUACA

Fine Fuel Moisture Code

Berlaku untuk : 14 Maret 2012



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Prakiraan (Model ARPEGE)

POTENSI TINGKAT KESULITAN PENGENDALIAN APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

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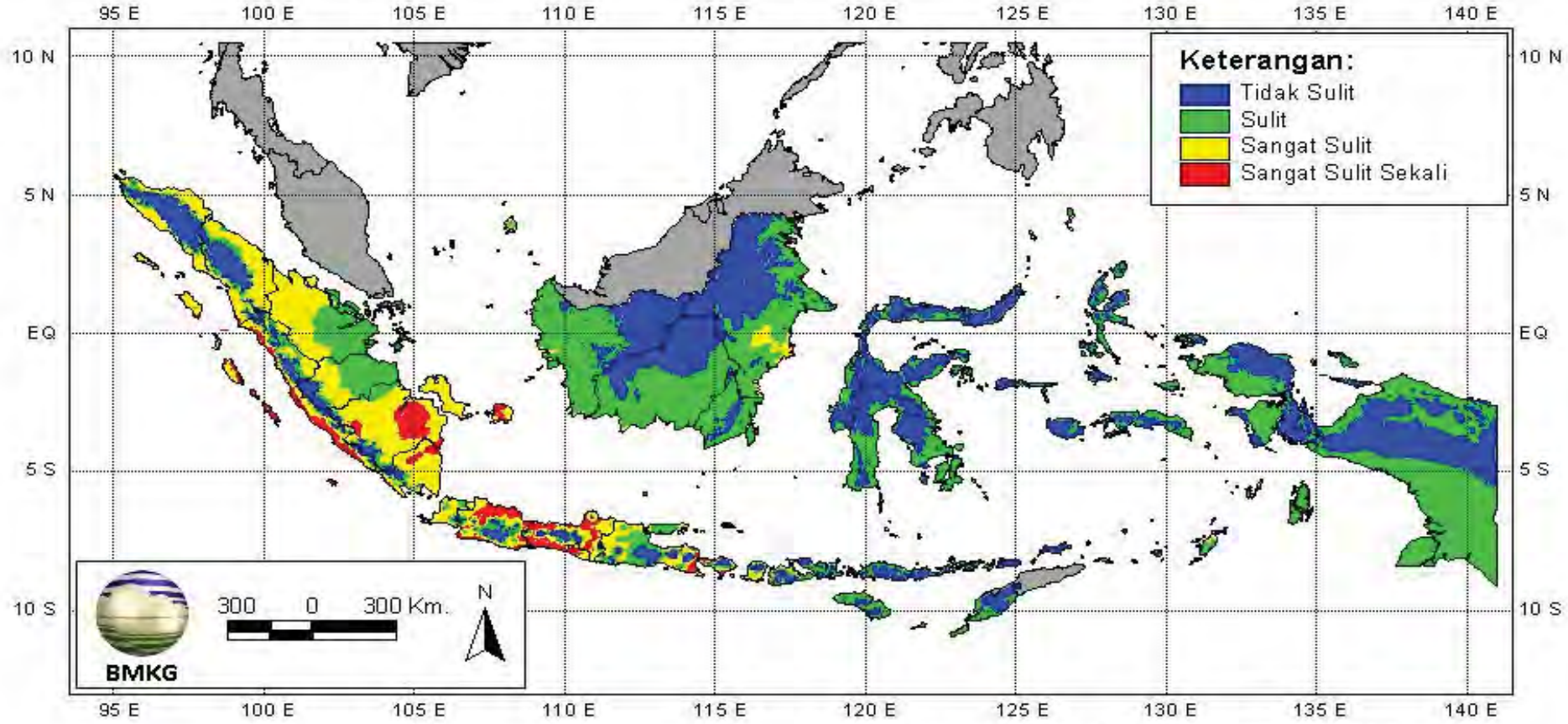

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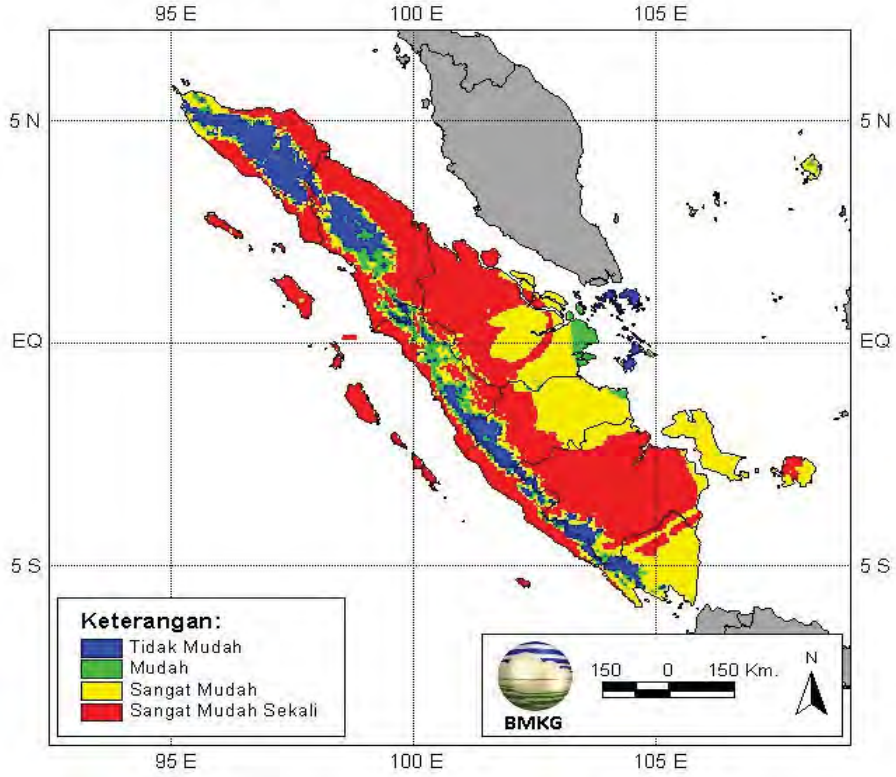

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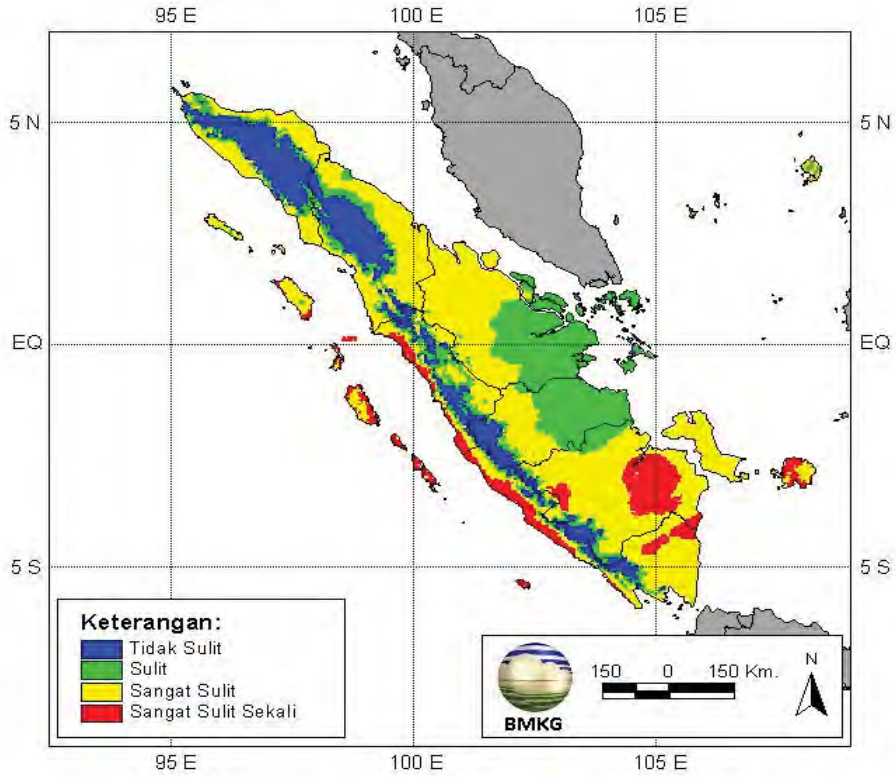

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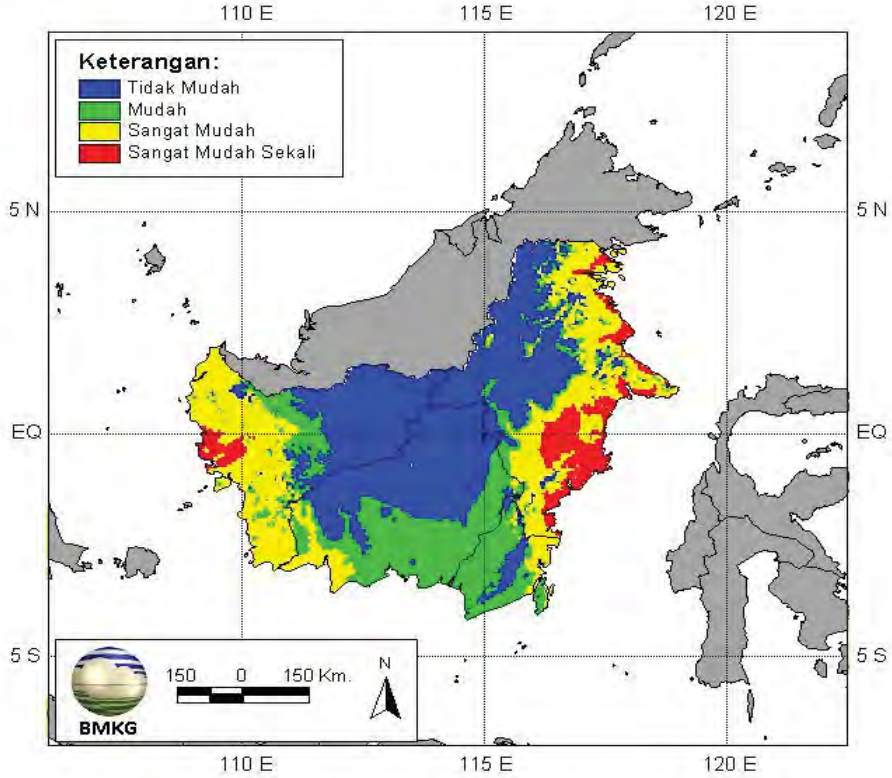

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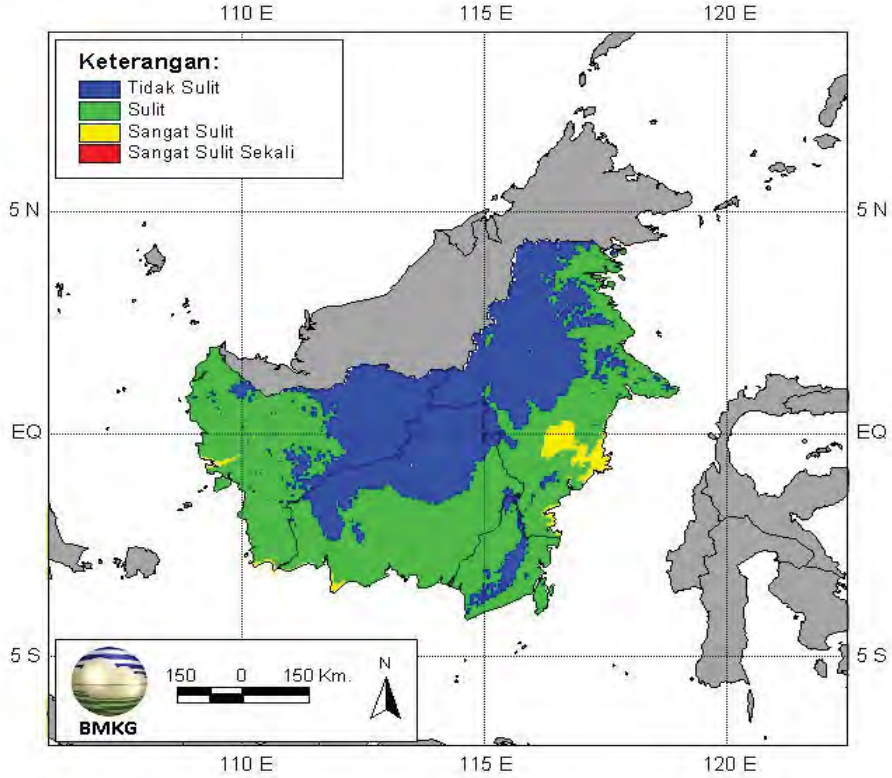

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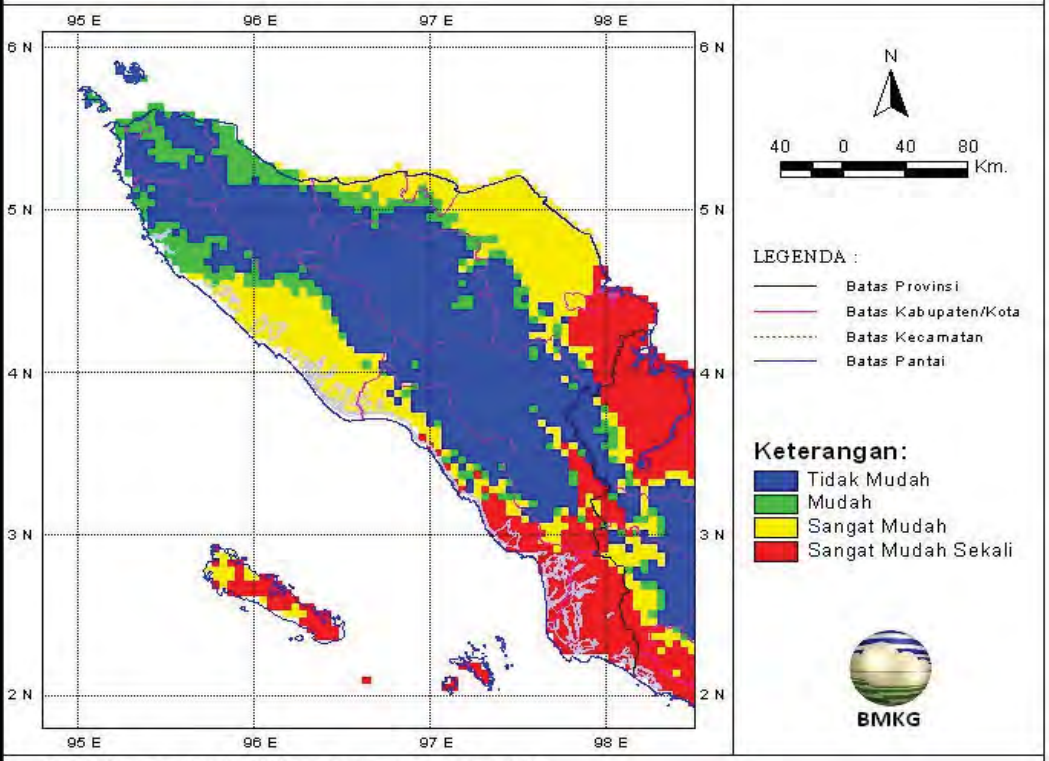

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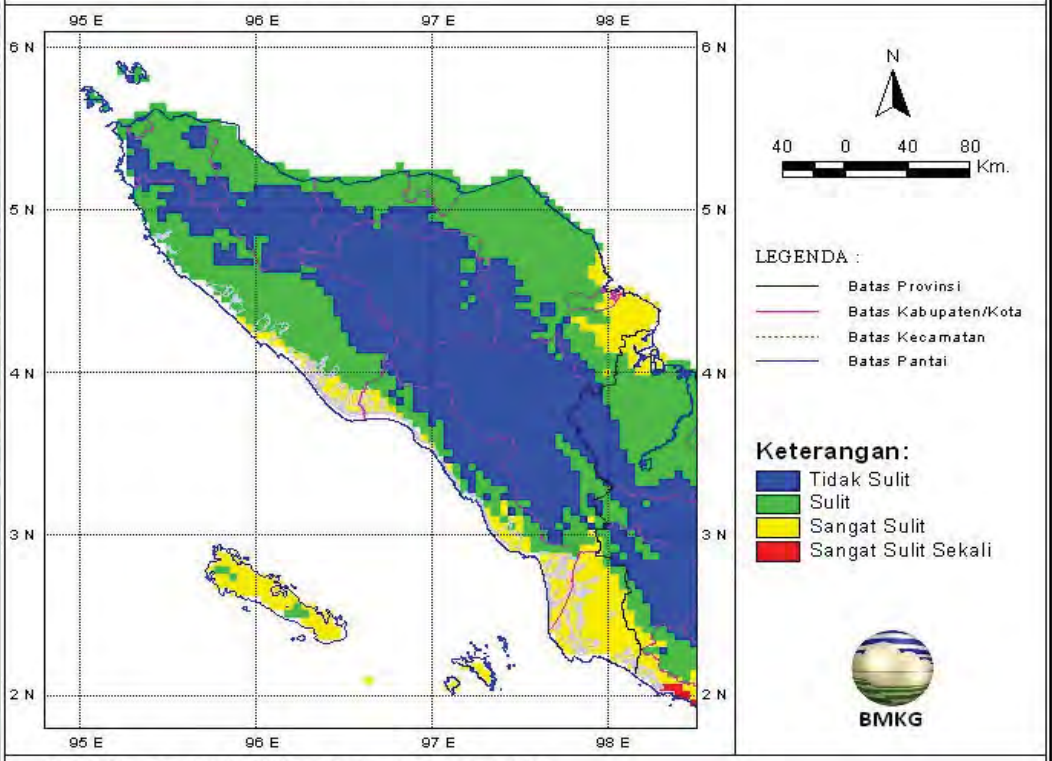

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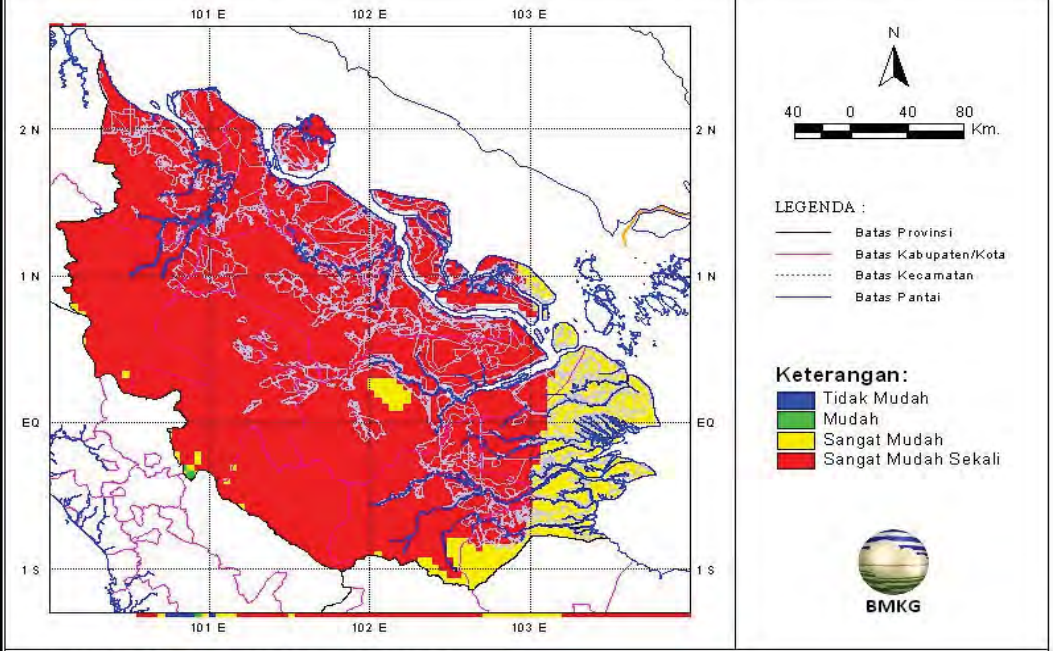

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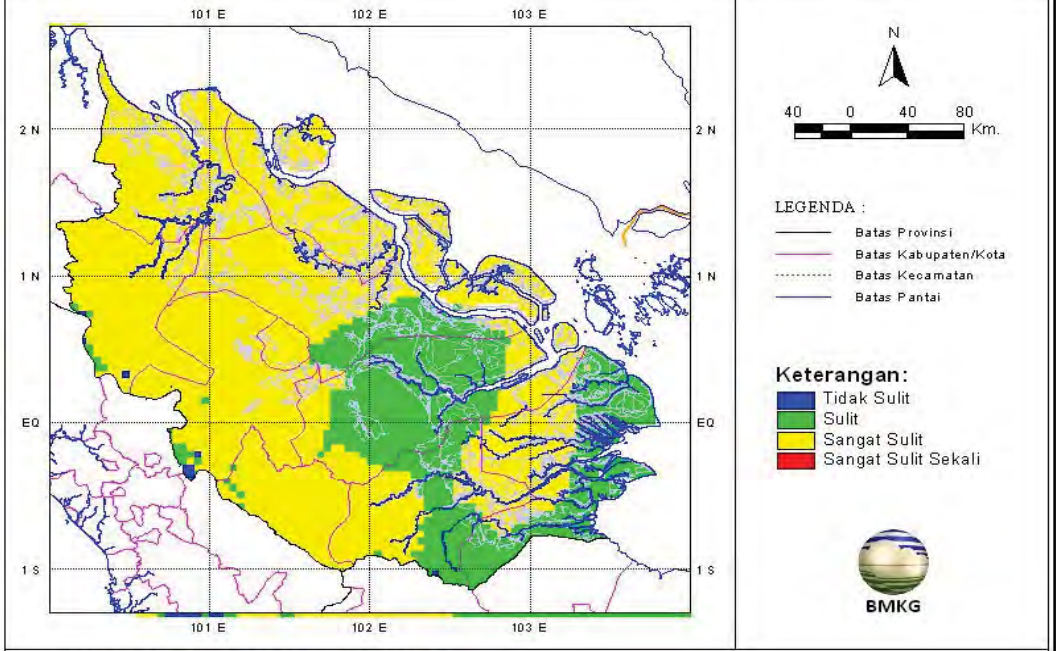
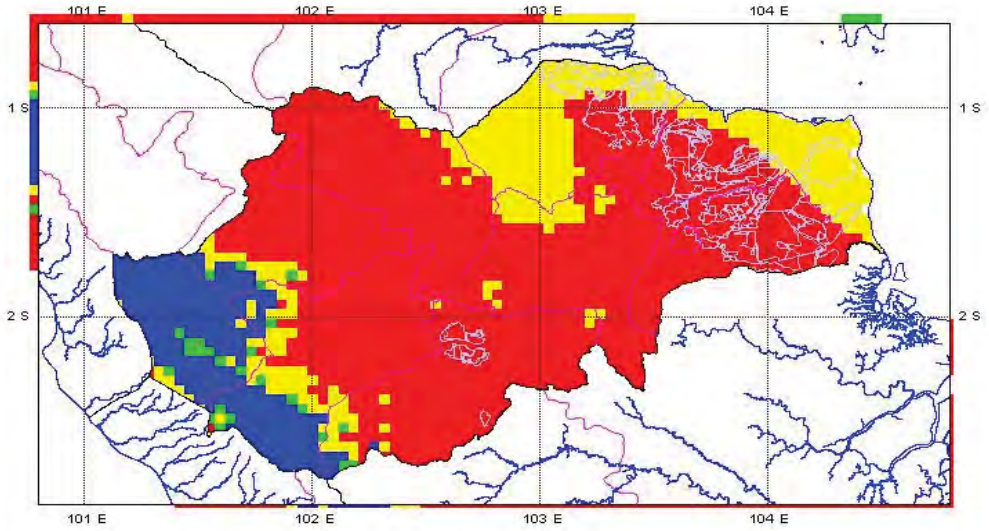


Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Prakiraan (MODEL ARPEGE)

POTENSI KEMUDAHAN TERJADINYA KEBAKARAN DITINJAU DARI ANALISA PARAMETER CUACA

Fine Fuel Moisture Code

Berlaku untuk : 13 Maret 2012



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Prakiraan (MODEL ARPEGE)

N

30 0 30 60 Km.

LEGENDA :

- Batas Provinsi
- Batas Kabupaten/Kota
- Batas Kecamatan
- Batas Pantai

Keterangan:

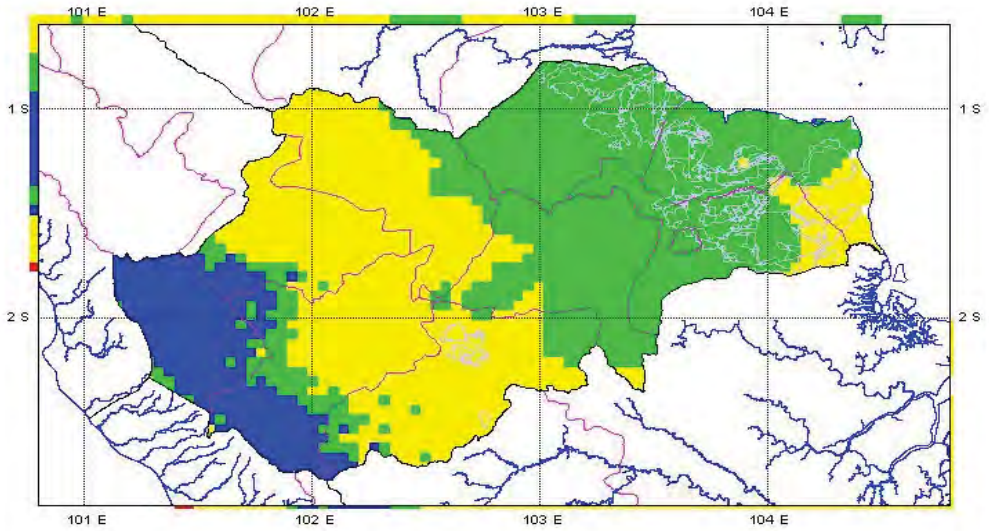
- Tidak Mudah
- Mudah
- Sangat Mudah
- Sangat Mudah Sekali

BMKG

POTENSI TINGKAT KESULITAN PENGENDALIAN APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

Fire Weather Index

Berlaku untuk : 13 Maret 2012



Subid Cuaca Ekstrim Bidang Peringatan Dini BMKG
Sumber Data : Data Prakiraan (MODEL ARPEGE)

N

30 0 30 60 Km.

LEGENDA :

- Batas Provinsi
- Batas Kabupaten/Kota
- Batas Kecamatan
- Batas Pantai

Keterangan:

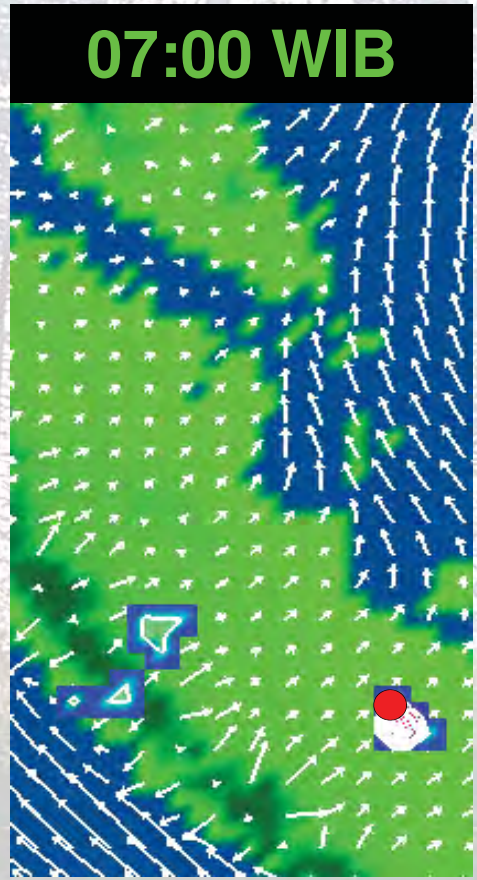
- Tidak Sulit
- Sulit
- Sangat Sulit
- Sangat Sulit Sekali

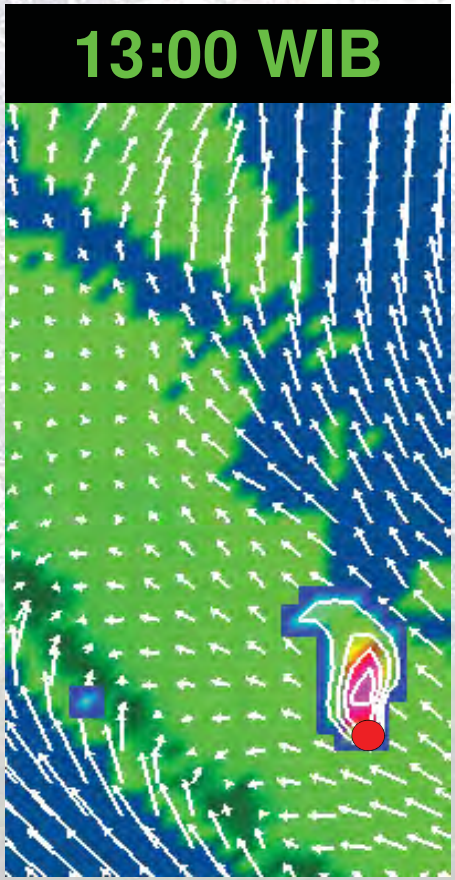
BMKG

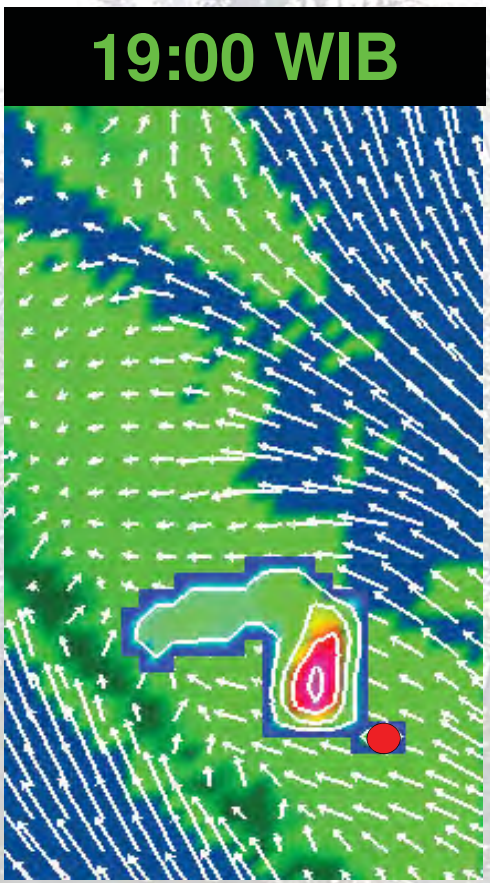
6. HAZE DISPERSION AND TRAJECTORY FORECAST MODELS

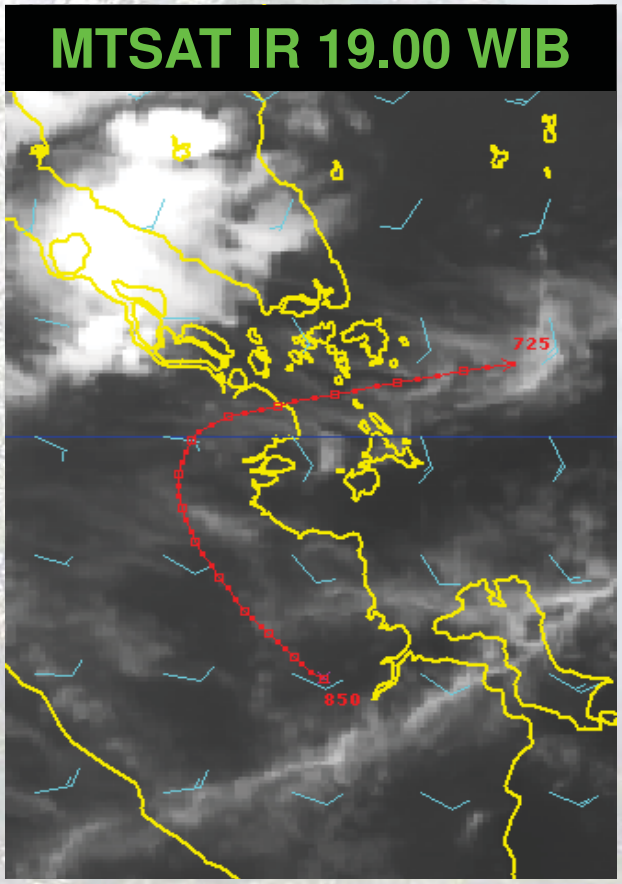
SMOKE DISPERSION AND TRAJECTORY FORECAST FOR SOUTH SUMATERA

VALID FOR 26 AGUSTUS 2011; 07.00, 13.00, and 19.00 WIB









Levels Haze Consentration:

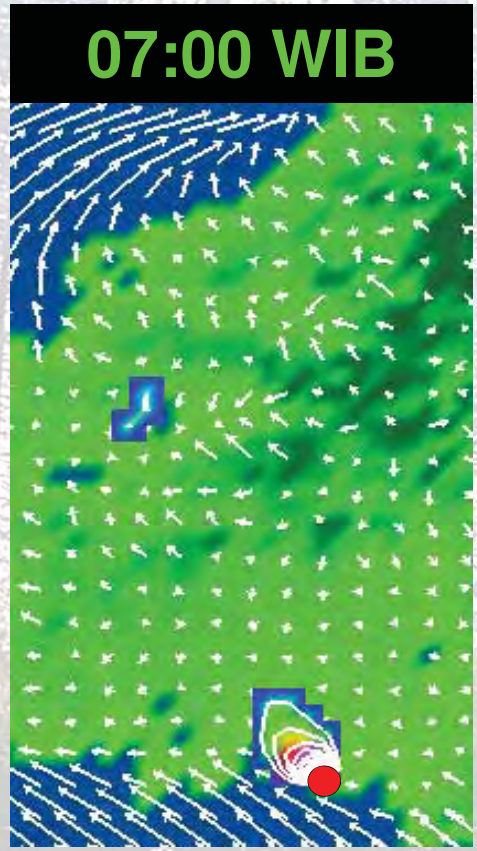
- **High Consentration**
- **Moderate Consentration**
- **Low Consentration**

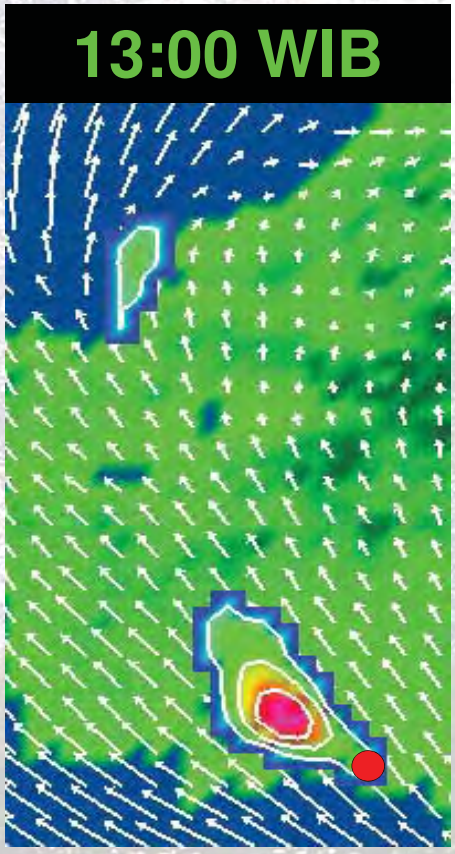
Source: BMKG

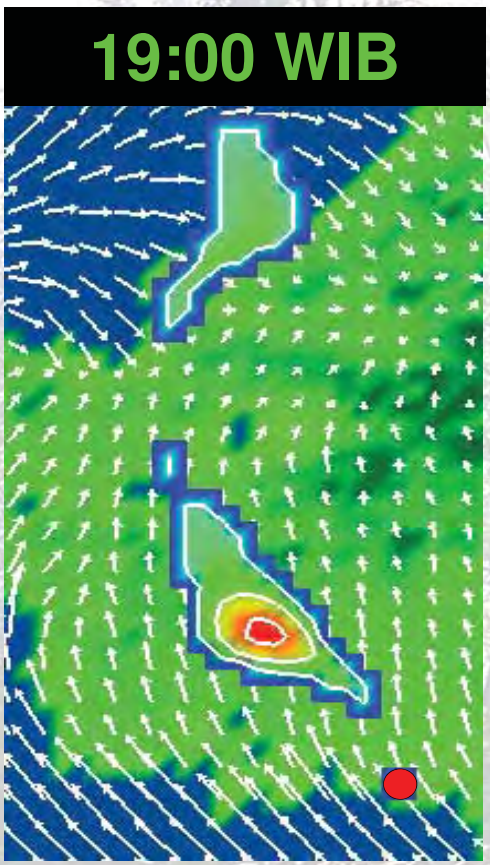
TAPM ***(The Air Pollution Model)***

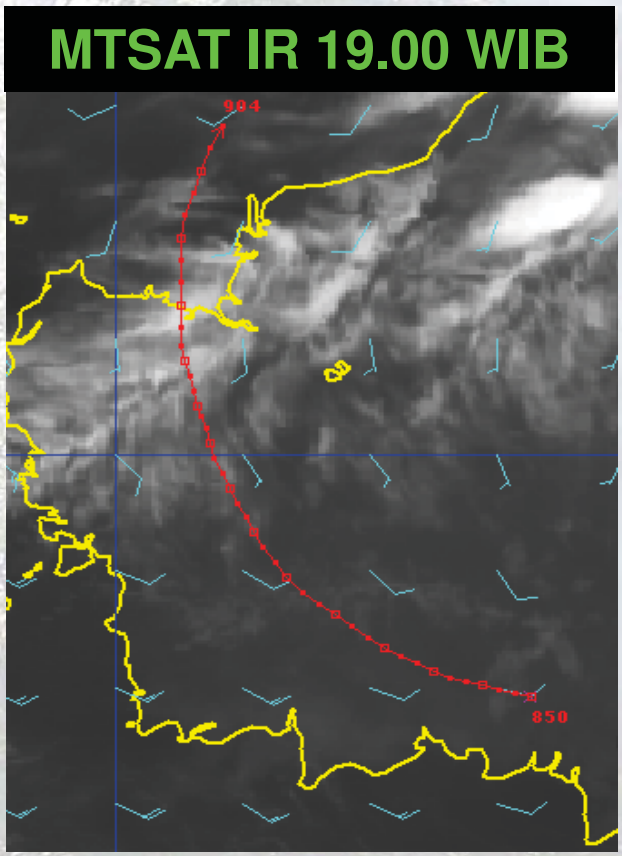
SMOKE DISPERSION AND TRAJECTORY FORECAST FOR CENTRAL KALIMANTAN

VALID FOR 26 AGUSTUS 2011; 07.00, 13.00, and 19.00 WIB









Levels Haze Consentration:

- **High Consentration**
- **Moderate Consentration**
- **Low Consentration**

Source: BMKG

TAPM ***(The Air Pollution Model)***

7. DESSIMINATION OF FDRS INFORMATION

Daily Operational FDRS at BMKG

Existing FDRS information at BMKG (http://www.bmkg.go.id/BMKG_Pusat/Meteorologi/Kebakaran_Hutan.bmkg)

Pencarian Bahasa English

BADAN METEOROLOGI, KLIMATOLOGI, DAN GEOFISIKA

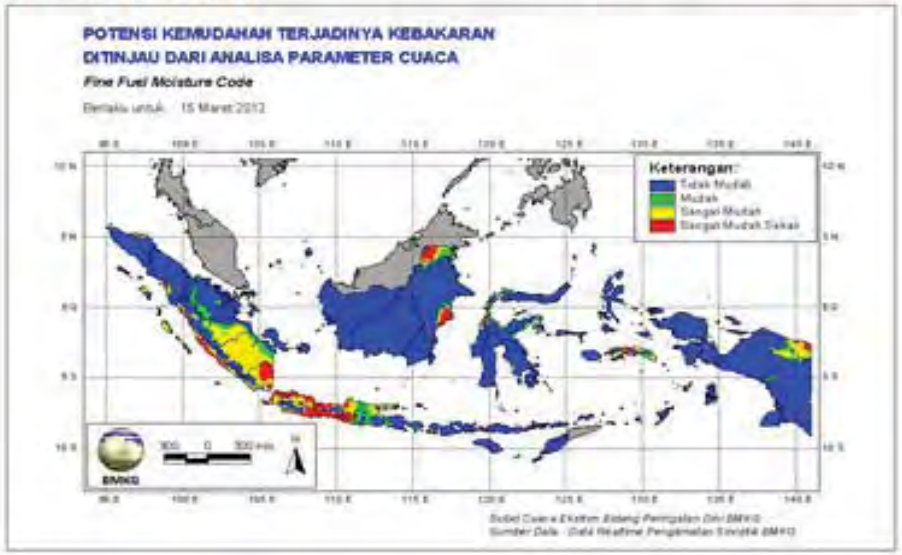
BMKG | PROFIL | METEOROLOGI | KLIMATOLOGI | GEOFISIKA | SARANA TEKNIS | SESTAMA | UPT | LAIN LAIN

Beranda » Meteorologi » Kebakaran Hutan

SISTEM PERINGKAT BAHAYA KEBAKARAN INDONESIA

Situs ini memberikan informasi kepada pengelola kebakaran yang bekerja untuk mencegah dan mengendalikan kebakaran lahan dan vegetasi di Indonesia.

Bahaya Kebakaran adalah indikator umum dari kondisi yang berhubungan dengan kebakaran termasuk dan kemudahan dimulainya api, penyebaran api, dampak fisik kebakaran, dan tingkat kesulitan pengendalian api.



Prakiraan Cuaca Indonesia

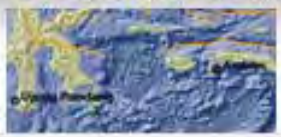
15 Maret 2012

Padang	Pontianak	Makassar
Hujan Ringan	Hujan Ringan	Hujan Ringan
21 - 32 °C	23 - 33 °C	24 - 31 °C
Ambon	**Yogyakarta**	**Surabaya**
Hujan Ringan	Hujan Sedang	Hujan Sedang
24 - 31 °C	22 - 33 °C	24 - 32 °C

Info Selengkapnya

Gempa Terkini

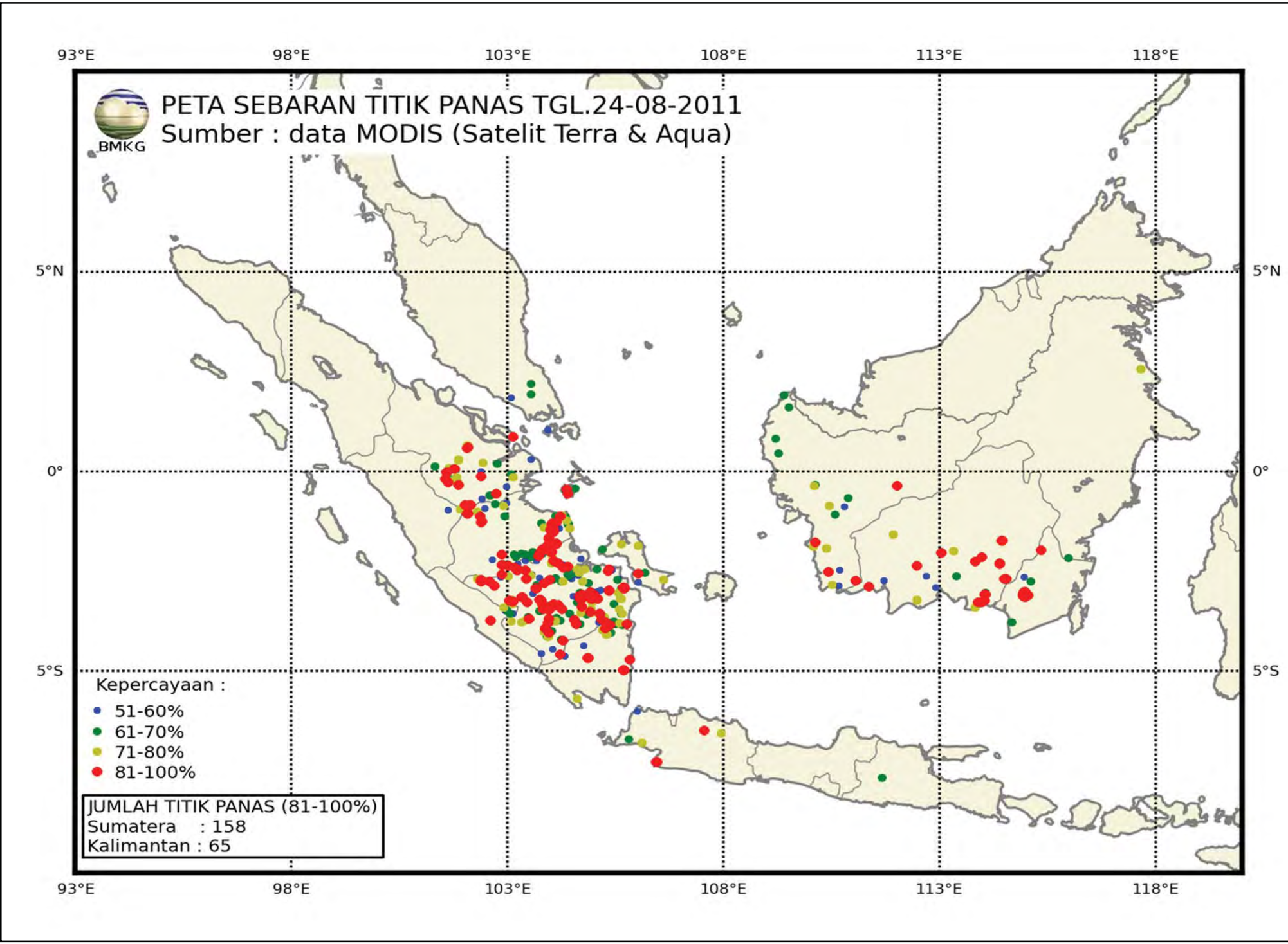
15 Maret 2012 17:28:57 WIB



5,1 Skala Richter

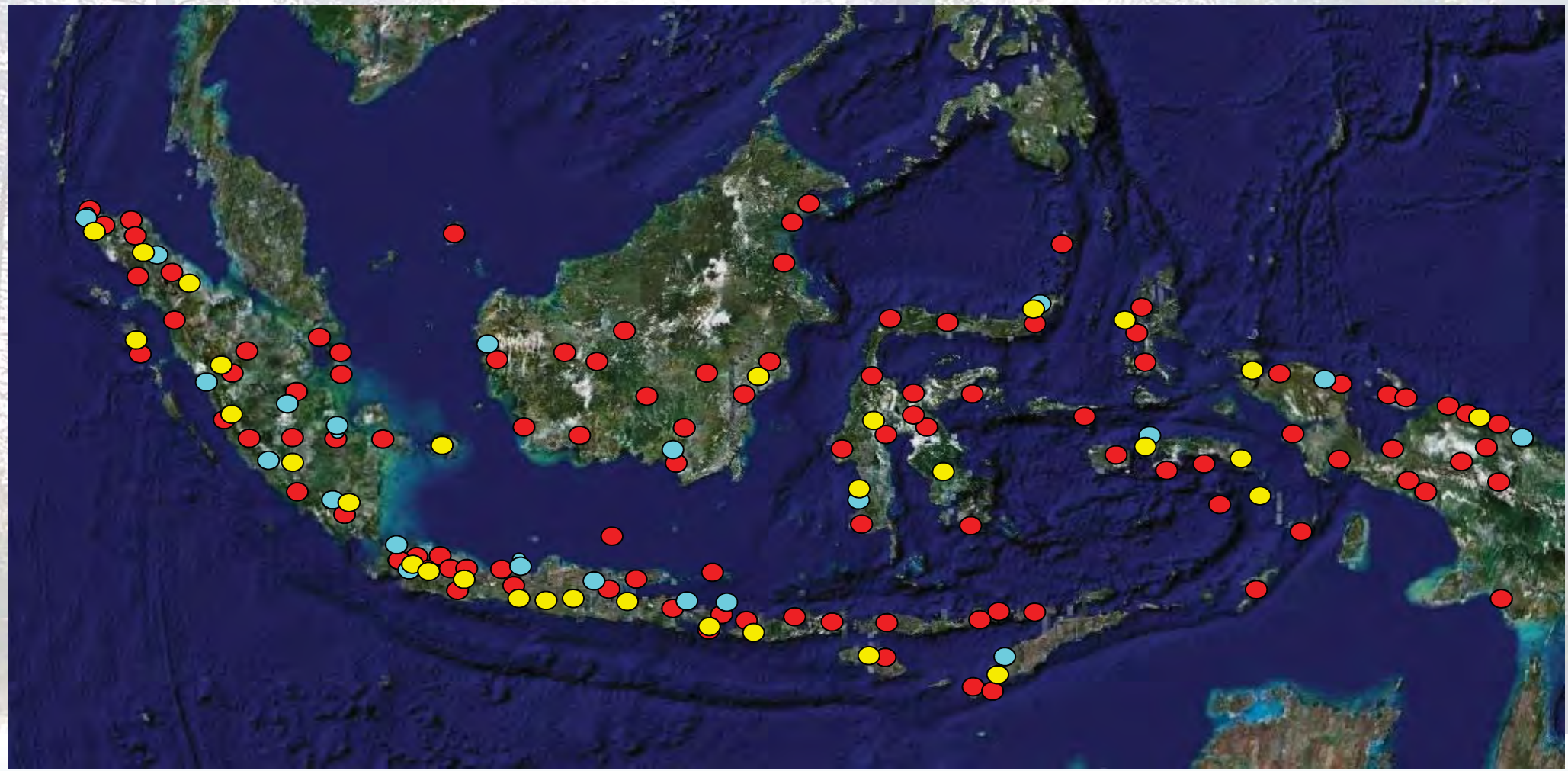
Lokasi :7.51 LS-126.70 BT

Kedalaman : 313 Km


PETA SEBARAN TITIK PANAS TGL.24-08-2011
Sumber : data MODIS (Satelit Terra & Aqua)
BMKG
93°E
98°E
103°E
108°E
113°E
118°E
5°N
0°
5°S
Kepercayaan :
51-60%
61-70%
71-80%
81-100%
JUMLAH TITIK PANAS (81-100%)
Sumatera : 158
Kalimantan : 65

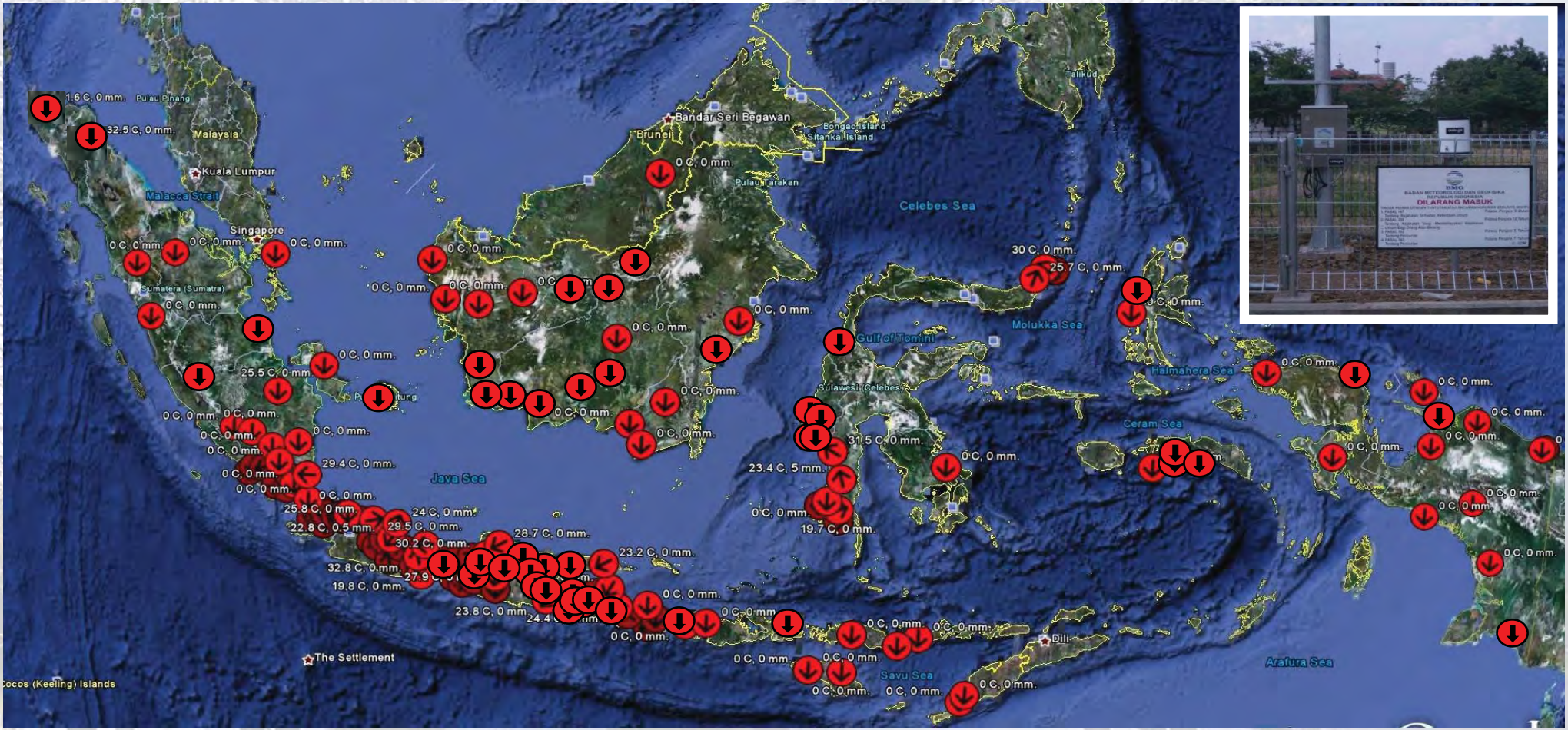
8. FUTURE DEVELOPMENT

WEATHER STATION NETWORK IN INDONESIA



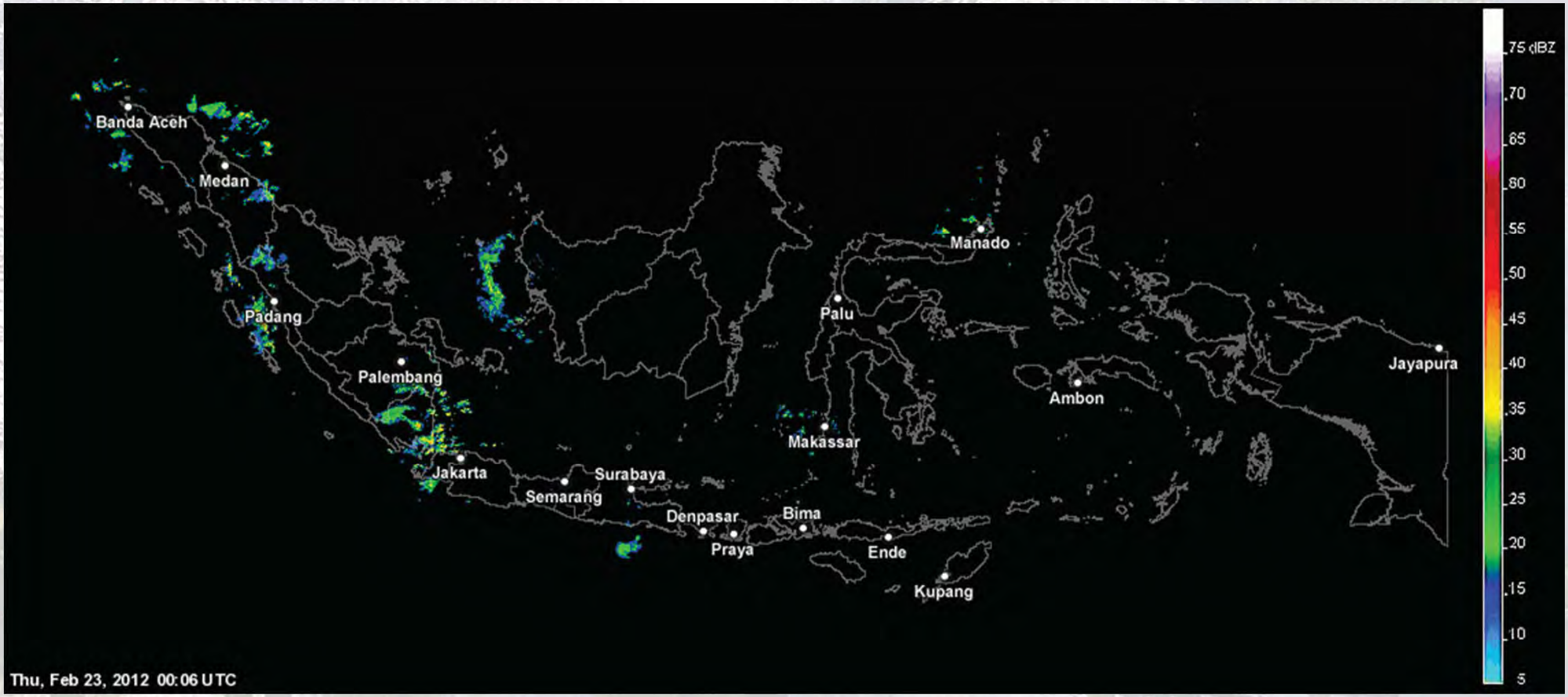
Meteorological Station (120) Geophysical Station (31) Climatological Station (21)

AUTOMATIC WEATHER STATION (AWS) NETWORK



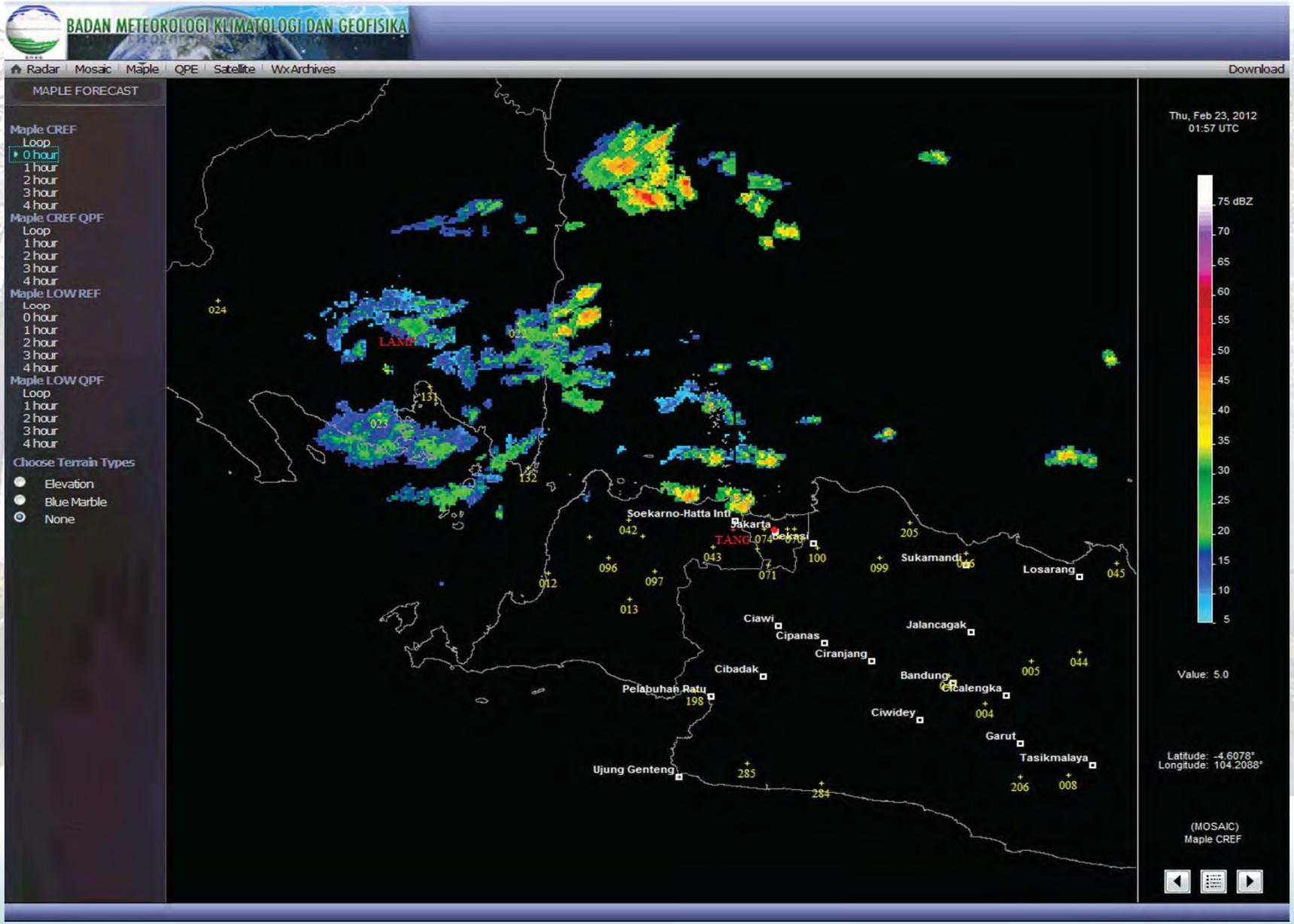
BMKG

Integrated Radar Network

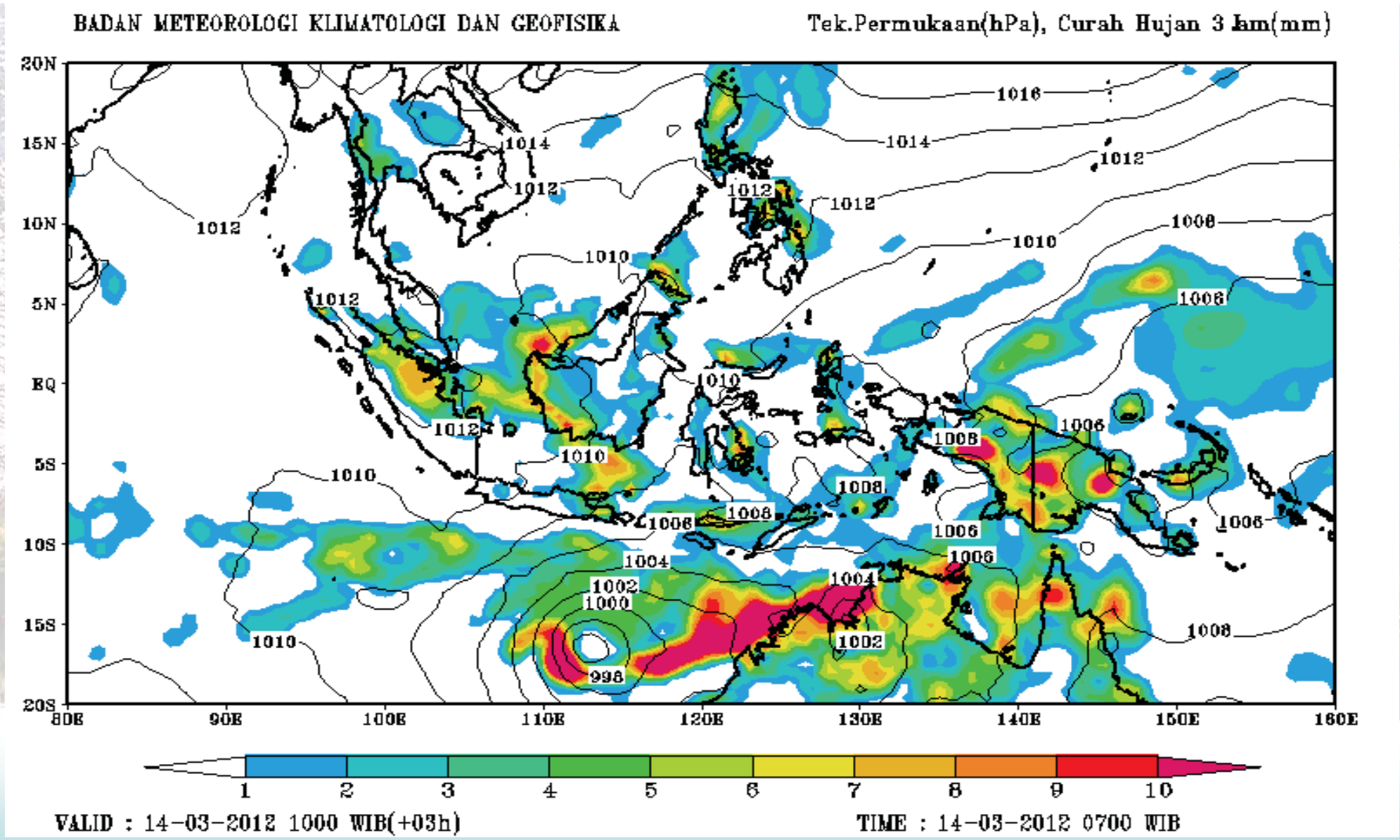


BMKG

Integrated Radar Network



NWP Product

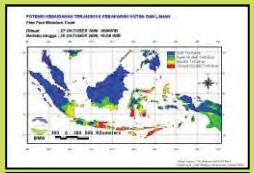

BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA
Tek.Permukaan(hPa), Curah Hujan 3 Jam(mm)
20N
15N
10N
5N
EQ
5S
10S
15S
20S
80E
90E
100E
110E
120E
130E
140E
150E
160E
1 2 3 4 5 6 7 8 9 10
VALID : 14-03-2012 1000 WIB(+03h)
TIME : 14-03-2012 0700 WIB

BMKG

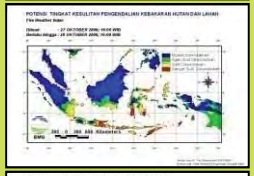
FIRE DANGER RATING SYSTEM (FDRS) OUTPUT PRODUCT

REALTIME ANALYSIS

FINE FUEL MOISTURE CODE (FFMC)

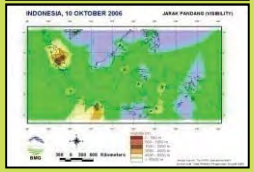


FIRE WEATHER INDEX (FWI)



HAZE MONITORING

HORIZONTAL VISIBILITY MONITORING

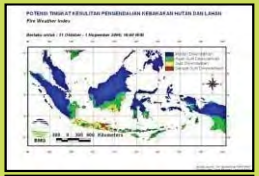


SATELLITE DATA INTEGRATION (HOTSPOT/FIRE SPOT/ HAZE MONITORING)

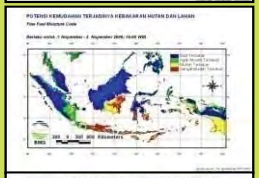
SHORT RANGE FORECAST (2 - 3 DAY FORECAST)

H + 2 DAY FORECAST FINE FUEL MOISTURE CODE (FFMC)

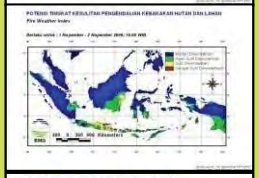
H+2 DAY FORECAST FIRE WEATHER INDEX (FWI)



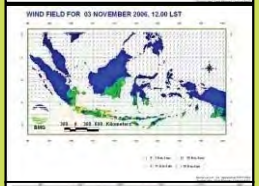
H + 3 DAY FORECAST FINE FUEL MOISTURE CODE (FFMC)



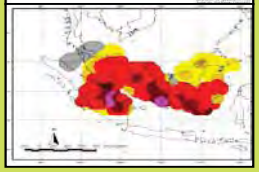
H + 3 DAY FORECAST FIRE WEATHER INDEX (FWI)



H +2, AND +3 DAY FORECAST 10 METER WIND FIELD

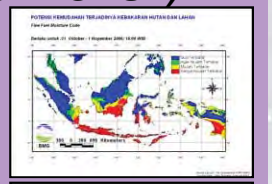


H +2, AND +3 DAY FORECAST HAZE DISPERSION/ TRAJECTORY MODEL

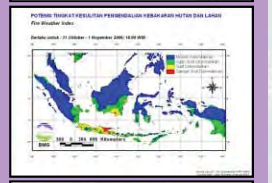


MEDIUM LONG RANGE FORECAST (1–2 MONTH FORECAST)

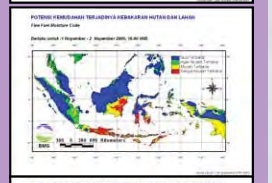
H+1 MONTH FORECAST FINE FUEL MOISTURE CODE (FFMC)



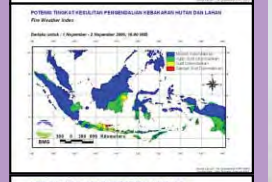
H+1 MOTNH FORECAST FIRE WEATHER INDEX (FWI)



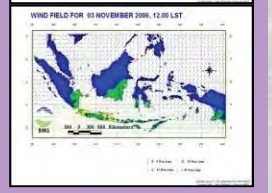
H+2 MONTH FORECAST FINE FUEL MOISTURE CODE (FFMC)



H+2 MONTH FORECAST FIRE WEATHER INDEX (FWI)



H +1 AND H+2 MONTH FORECAST 10 METER WIND FIELD



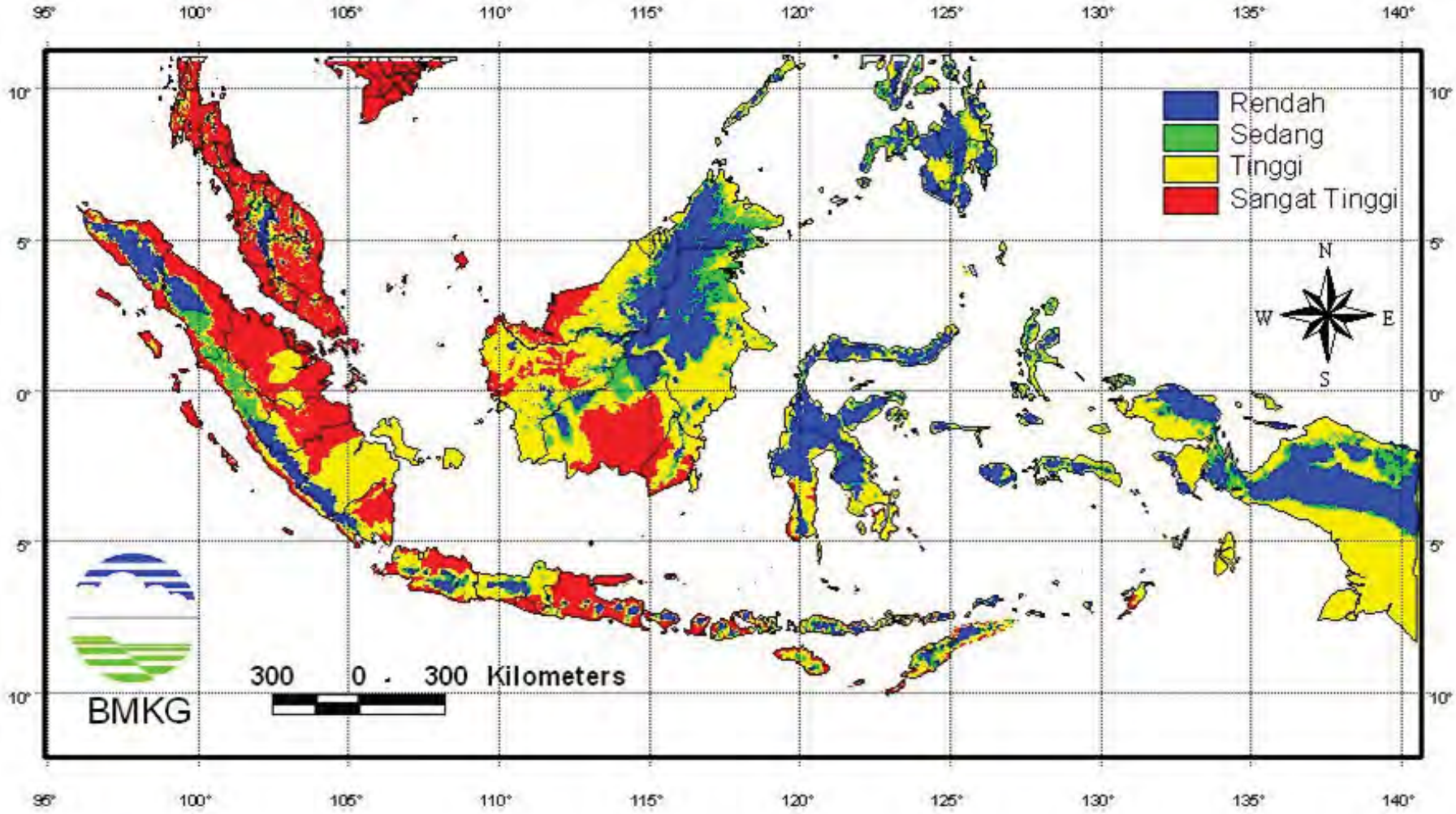
EXISTING SYSTEM

PROGRAM DEVELOPMENT

POTENSI KEMUDAHAN TERJADINYA KEBAKARAN DITINJAU DARI ANALISA PARAMETER CUACA

Fine Fuel Moisture Code

Berlaku untuk : 29 Juni 2011 - 30 Juni 2011; 16:00 WIB

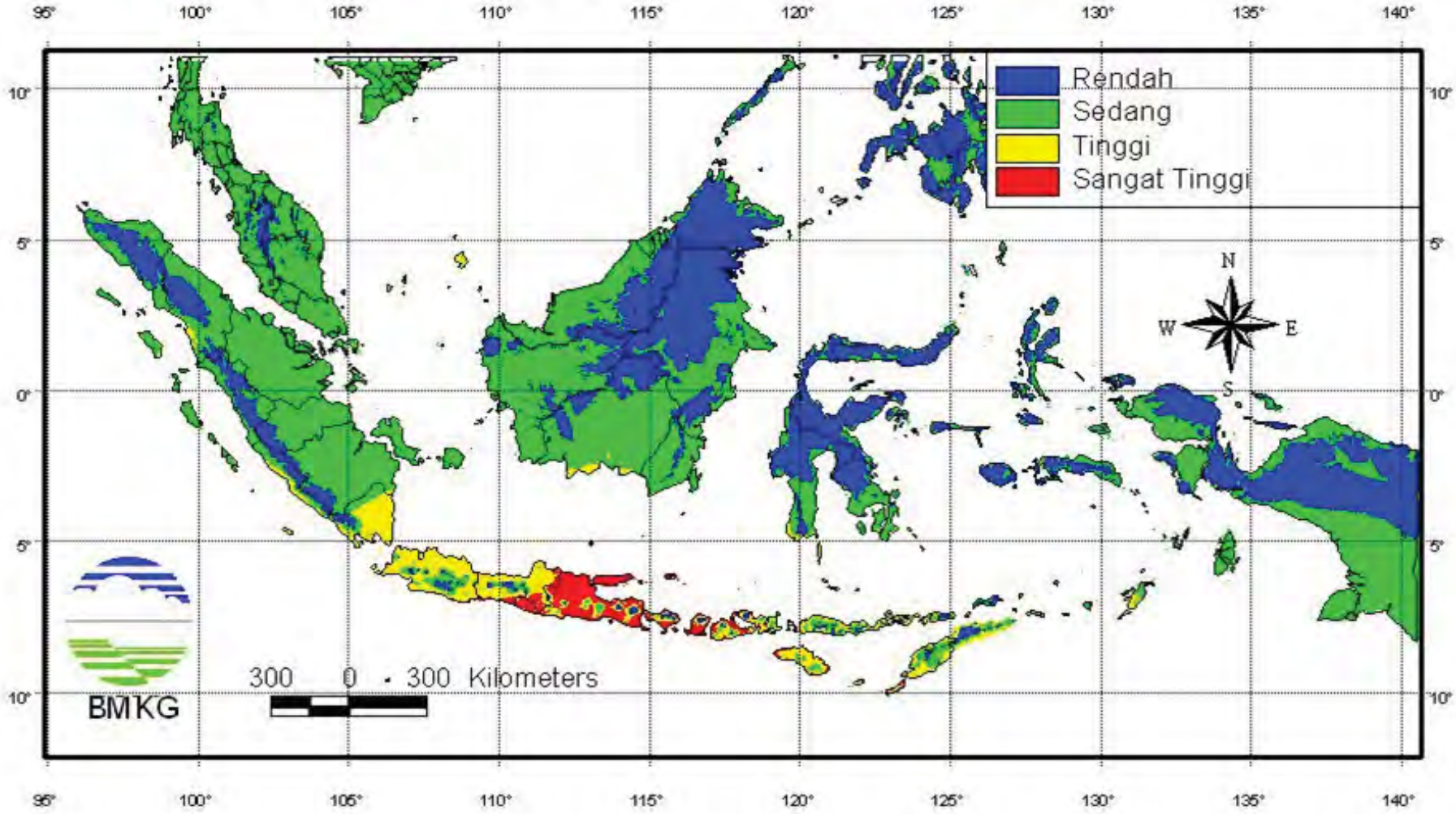


Design Layout : Tim Operasional FDRS BMKG
Sumber data : Data Pakiraan Synergie BMKG

POTENSI TINGKAT KESULITAN PENGENDALIAN APABILA TERJADI KEBAKARAN HUTAN DAN LAHAN

Fire Weather Index

Berlaku untuk : 29 Juni 2011 - 30 Juni 2011; 16:00 WIB



Design Layout : Tim Operasional FDRS BMKG
Sumber data : Data Pakiraan Synergie BMKG

Thank you very much .....

Agency for Meteorology Climatology and Geophysics
Jl. Angkasa 1 No. 2, Kemayoran, Jakarta
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+62 21 6546315/18
+62 21 4246321 Ext 4106