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IMPLEMENTING CLIMATE INFORMATION TO SUPPORT SUSTAINABLE AGRICULTURE IN INDONESIA

NURHAYATI & MARJUKI

Agency for Meteorology Climatology and Geophysics (BMKG), Indonesia

Presented on **2017 APEC Climate Symposium (APCS)**

Increasing Sustainable Agricultural Production using Climate Information

Can Tho, Viet Nam 18 – 20 August 2017

Agency for Meteorology Climatology and Geophysics (BMKG), Indonesia



OUTLINE

1. BACKGROUND;

2. BMKG CLIMATE INFORMATION PRODUCTS;

3. STRATEGY TOWARD SUSTAINABLE AGRICULTURE;

4. CONCLUSION



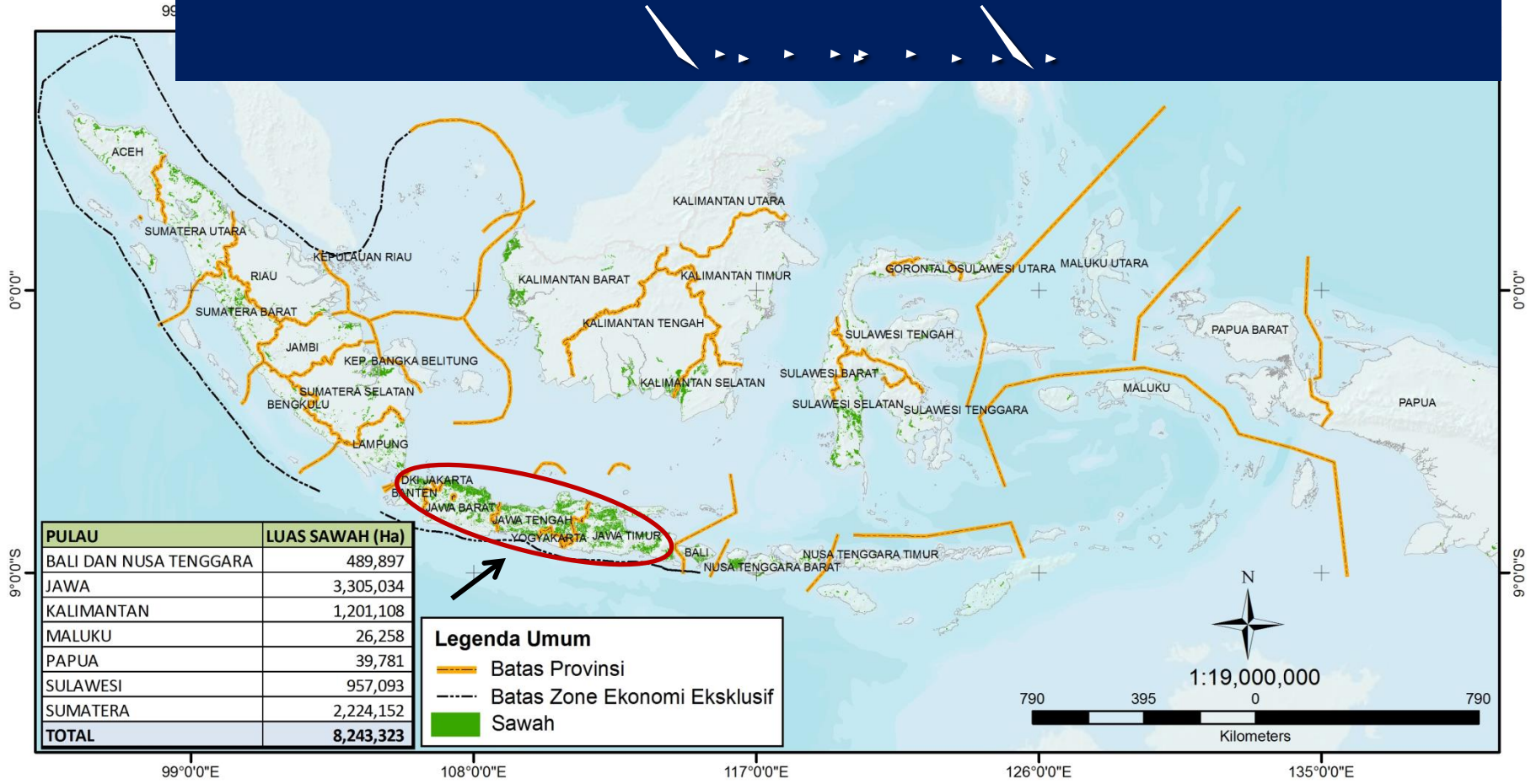
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BACKGROUND

INDONESIA



- Archipelagic country ~ 17,504 islands (10,000 small islands), right at the equatorial line;
- 4 M-km² width of ocean and 2 M-km² land, 6,000 km distance from east to west, and 80,000 km of coastal length;
- Flanked by 2 oceans (India and Pacific) and 2 continents (Australia and Asia);
- Exposed by 3 types of rain, 2 extreme weather on the east and west, more than 340 seasonal variation zone.



Irrigated Area (82.16%)
Non Irrigated Area (17.84%)

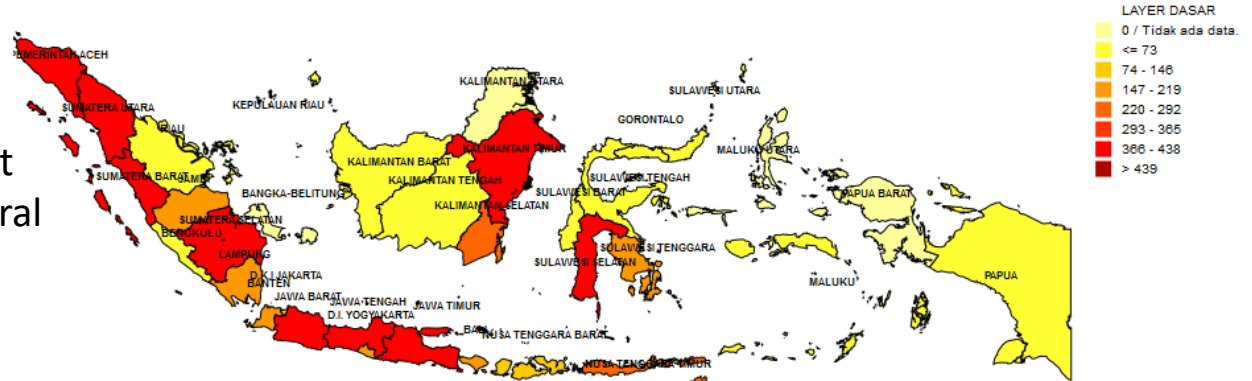
Rice fields in Indonesia are mostly located in Java Island (40%)

Source : IAARD, 2015

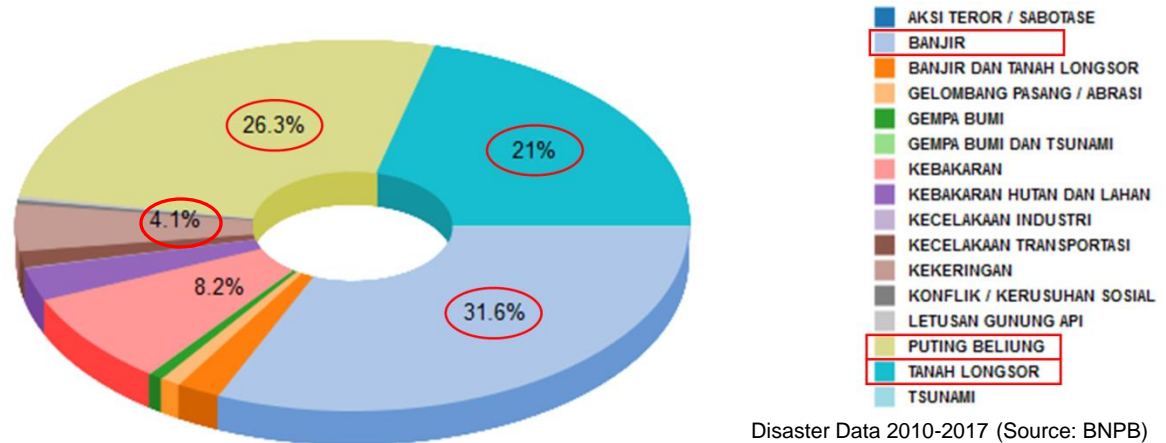


BACKGROUND

- Indonesia is one of the most vulnerable country for natural disasters.
- On average, 350 disasters occurred in each province during 2010-2017 period.
- More than 50 % of the disasters were hydrometeorological disasters
- 31.6% Flood; 26.3% small scale tornado; 21% Landslide.



Disaster occurrence map on 2010-2017 (Source: BNPB)



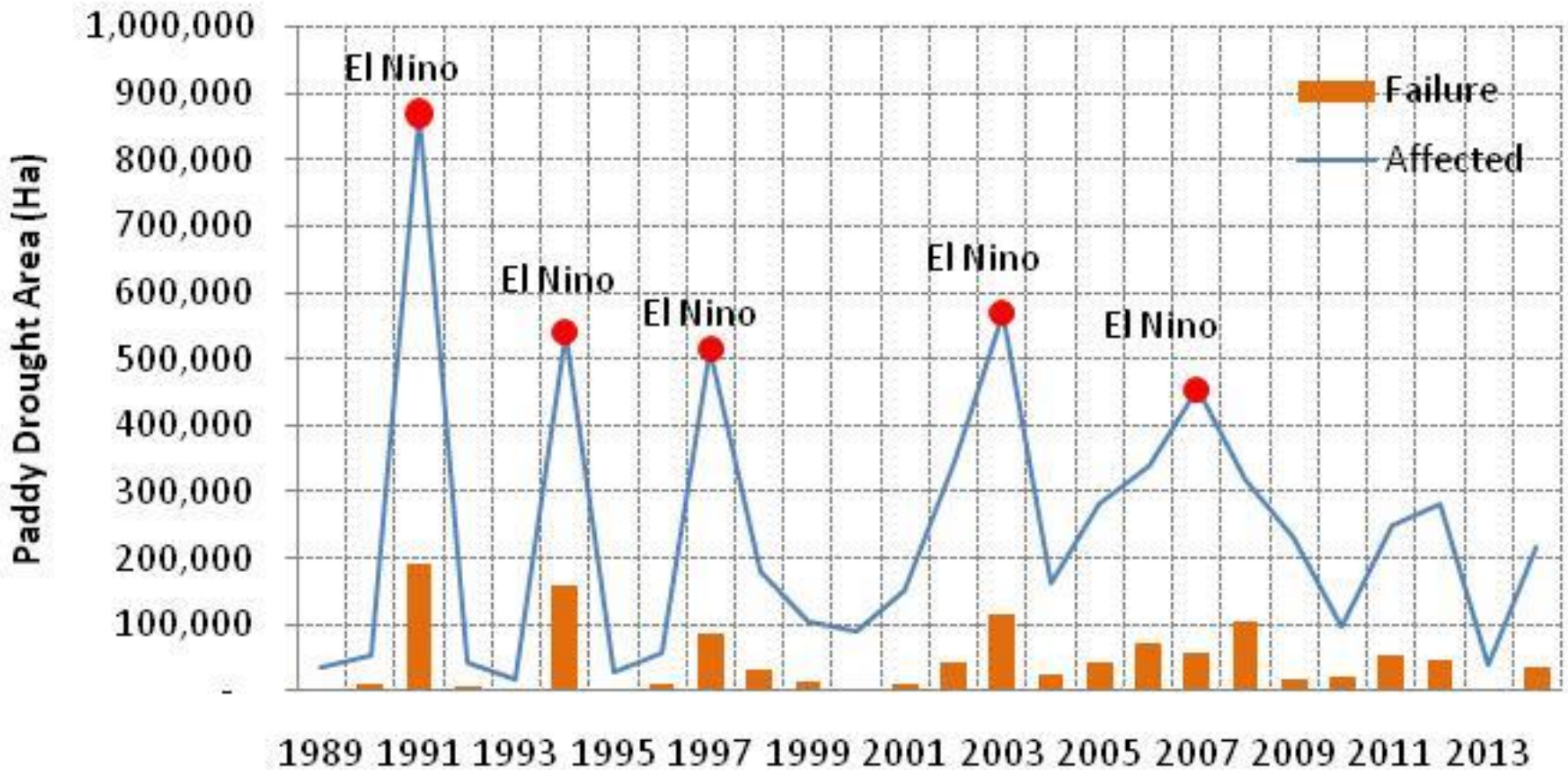
Disaster Data 2010-2017 (Source: BNPB)

Accurate and multi- timescale forecast is needed for disaster mitigation plan



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RICE AREA AFFECTED BY DROUGHT (1989-2014)

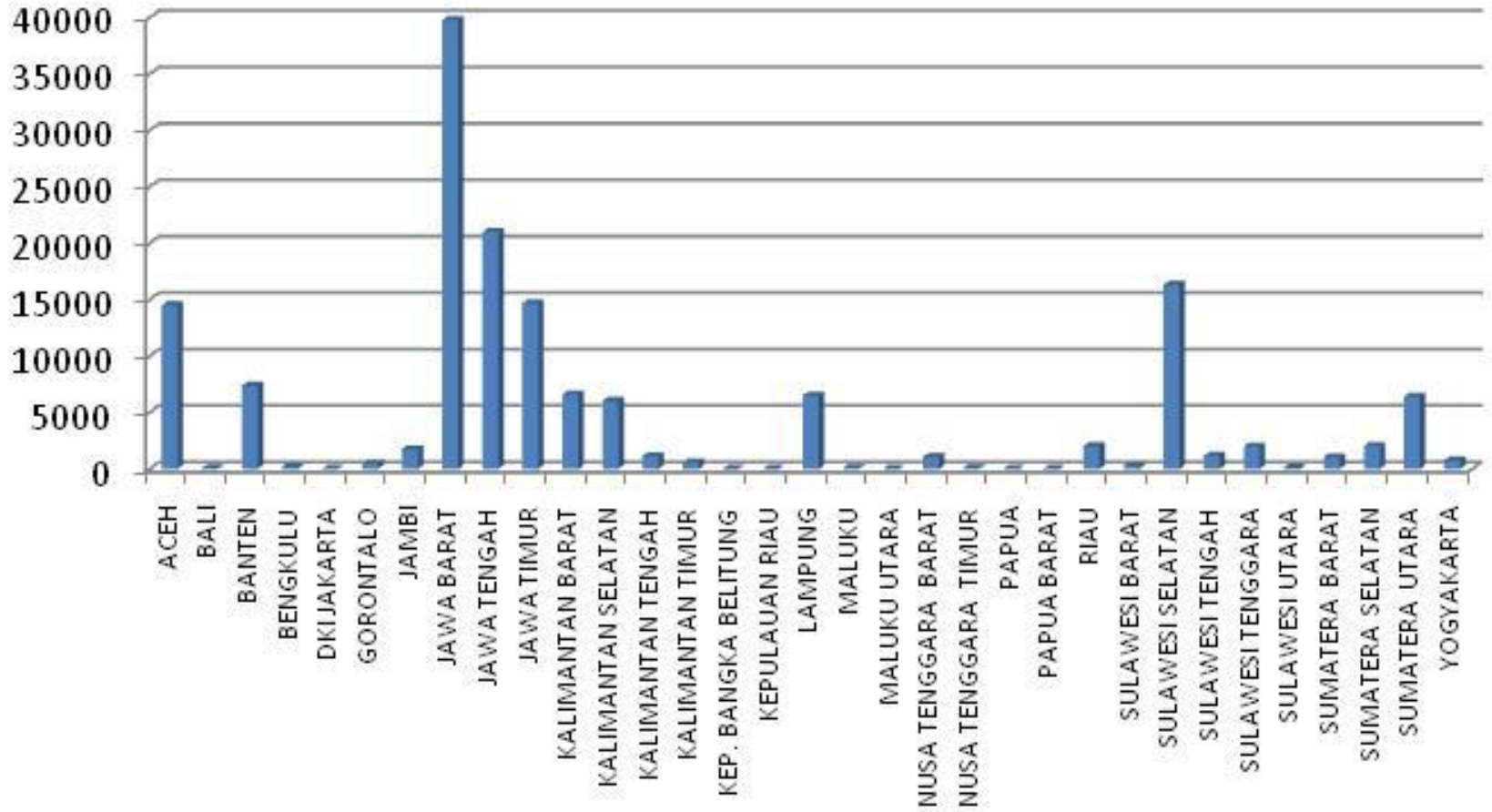




RICE FIELD AFFECTED BY INUNDATION (1989-2013)

B

RATA-RATA LUAS SAWAH TERKENA BANJIR (HA) PERIODE 1989-2013



Province



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CLIMATE INFORMATION PRODUCTS



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bmgk.go.id/?lang=EN

FRIDAY, APRIL 21, 2017

INDONESIA STANDARD TIME 11:33:25 WIB /04:33:25 UTC



METEOROLOGICAL, CLIMATOLOGICAL, AND
GEOPHYSICAL AGENCY

[PROFILE](#)

[WEATHER](#)

[CLIMATE](#)

[AIR QUALITY](#)

[EARTHQUAKE & TSUNAMI](#)

[IT & INFRASTRUCTURE](#)

CLIMATE FORECAST

[Monthly Precipitation Forecast](#)

[Seasonal Forecast](#)

[Flood Potential](#)

CLIMATE ANALYSIS

[Monthly Precipitation](#)

[Atmosphere Dynamics](#)

[Extreme Climate Analysis](#)

[Standardize Precipitation Index](#)

[Water Balance](#)

CLIMATE INFORMATION

[Sea Surface Temperature](#)

[El Nino Index](#)

[Pacific Subsurface Temperature](#)

CLIMATE CHANGE

[Precipitation Trends](#)

[Temperature Trends](#)

[Normal Precipitation Shift](#)

[Climate Change Extreme](#)

[Climate Change Projection](#)

[Climate Change And Air Quality Reports](#)

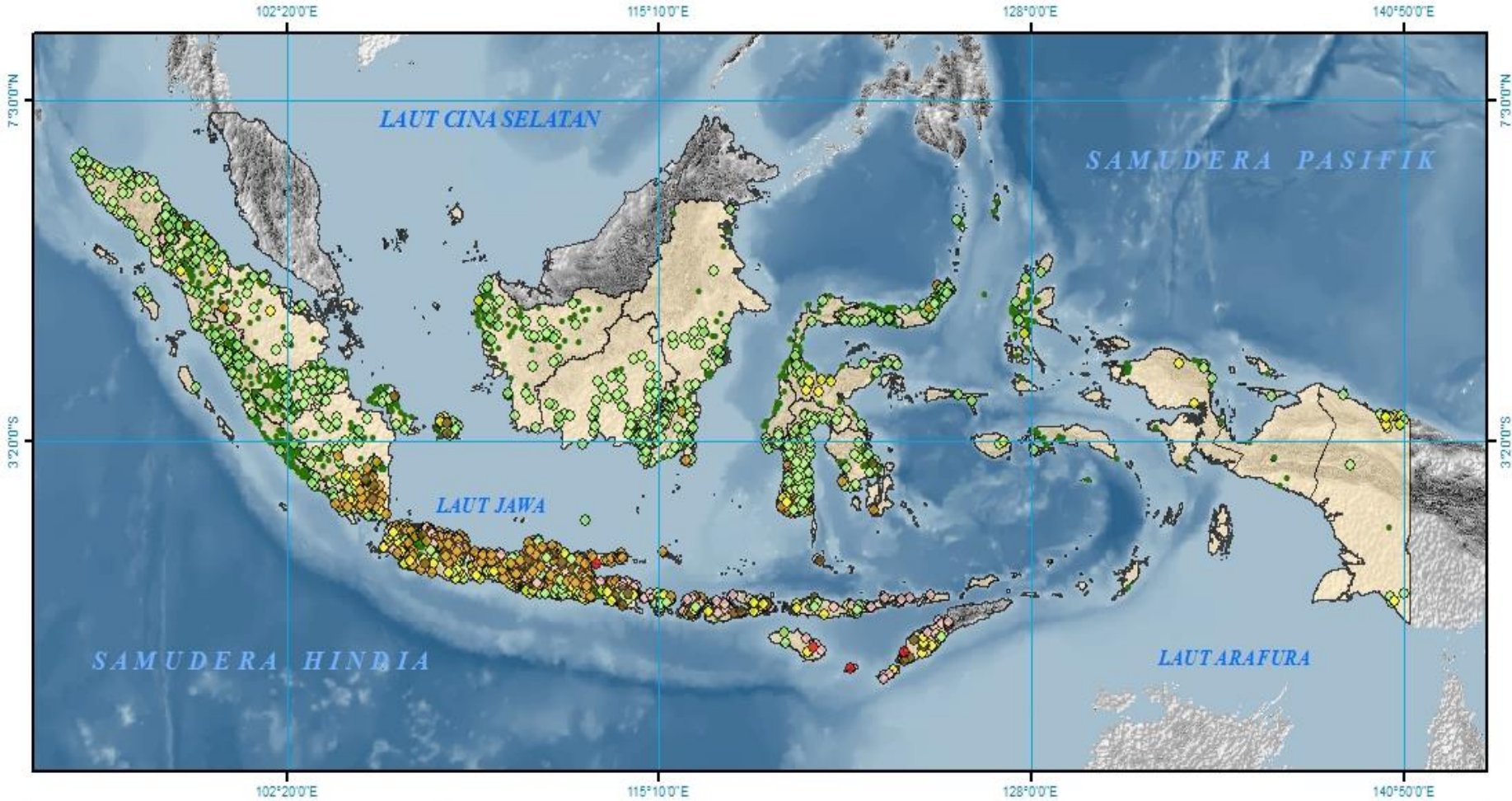
[Read More →](#)



21 April 2017 | **Bangka Belitung**

Waspada potensi hujan sedang-lebat disertai petir pada siang – sore hari di wilayah Kab. Bangka Barat, Bangka, Selatan, Pangkalpinang dan Belitung [More Information→](#)

Early Warning



**MONITORING HARI TANPA HUJAN
BERTURUT-TURUT**
MONITORING OF CONSECUTIVE NO RAIN DAYS

UPDATED 10 AGUSTUS 2017

INDONESIA



KLASIFIKASI (Jumlah Hari)
Classification (Days)

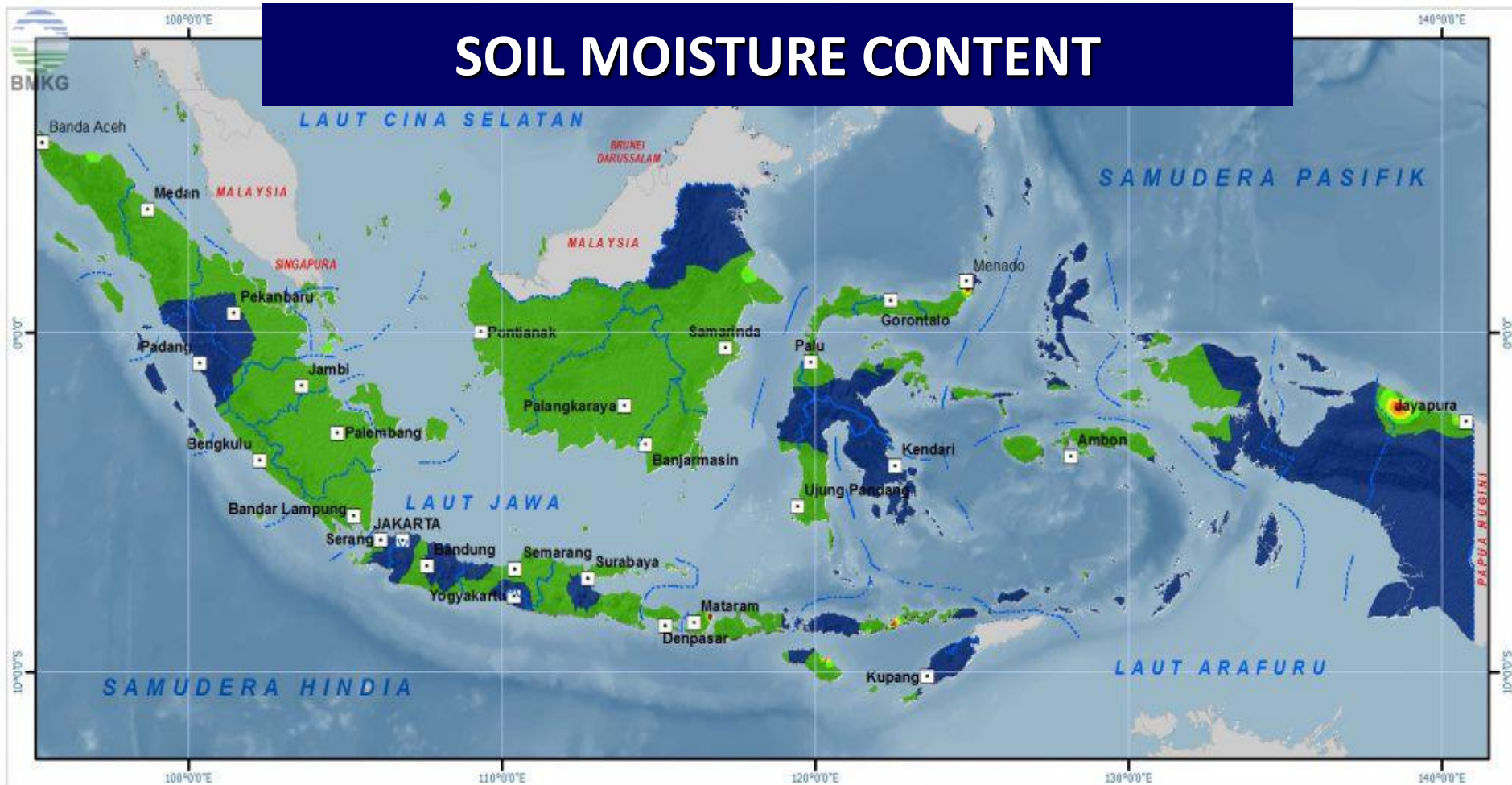
- 1 - 5 ● Sangat Pendek (Very Short)
- 6 - 10 ● Pendek (Short)
- 11 - 20 ● Menengah (Moderate)
- 21 - 30 ● Panjang (Long)
- 31 - 60 ● Sangat Panjang (Very Long)
- > 60 ● Kekeringan Ekstrem (Extreme Drought)
- Masih ada hujan s/d updating (No Drought)

KETERANGAN (LEGEND)

- ★ Ibukota Propinsi (Province Capital)
- Ibukota Kabupaten (District Capital)
- Batas Propinsi (Province Boundary)
- Batas Kabupaten (District Boundary)



SOIL MOISTURE CONTENT



TINGKAT KETERSEDIAAN AIR TANAH SOIL WATER AVAILIBTY

MARET 2017

INDONESIA



Badan Meteorologi Klimatologi dan Geofisika

KETERANGAN / INFORMATION :

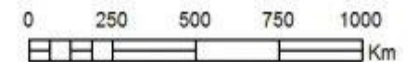
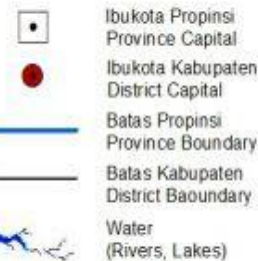
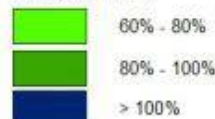
Kurang/Deficit



Sedang/Moderate



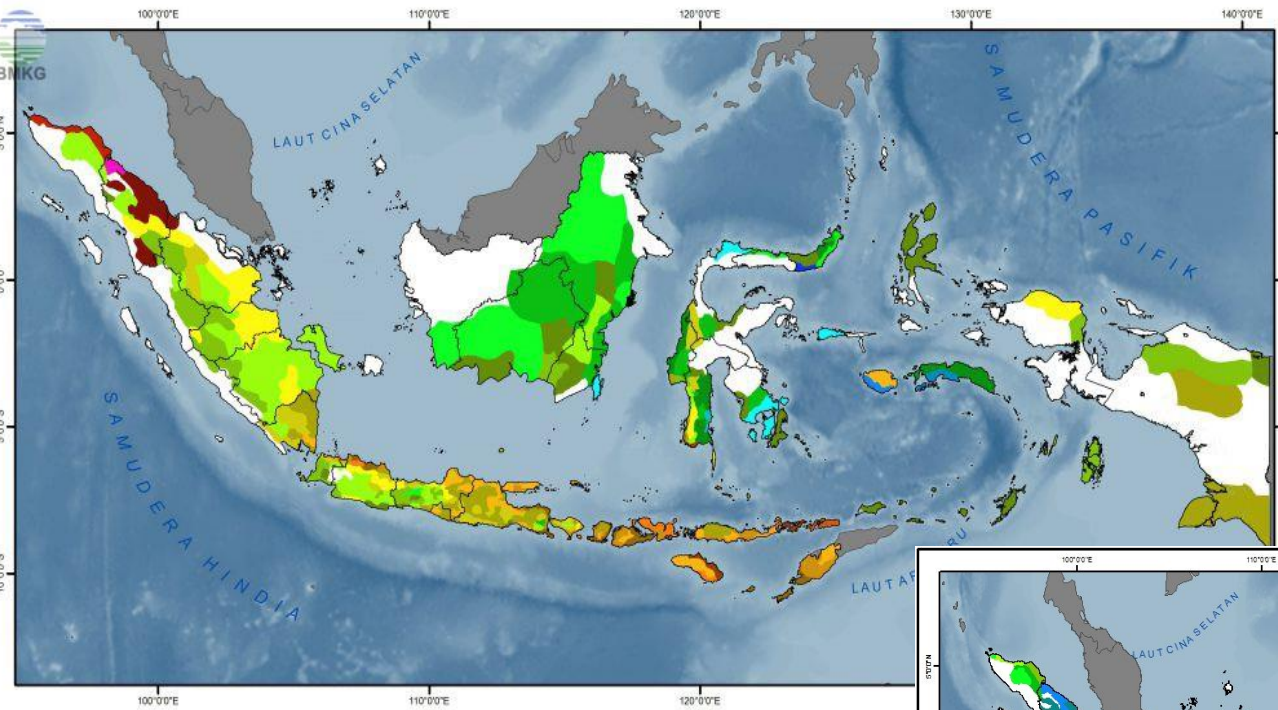
Cukup/Sufficient



Sumber Data :
1. Data Curah Hujan dan Evaporasi BMKG
2. Peta Rupabumi BIG Skala 1 : 250.000

Pemutakhiran berikutnya: 06 Mei 2017

DRY/WET SEASON ONSET PREDICTION



PRAKIRAAN AWAL MUSIM KEMARAU 2017 ZONA MUSIM (ZOM) DI INDONESIA



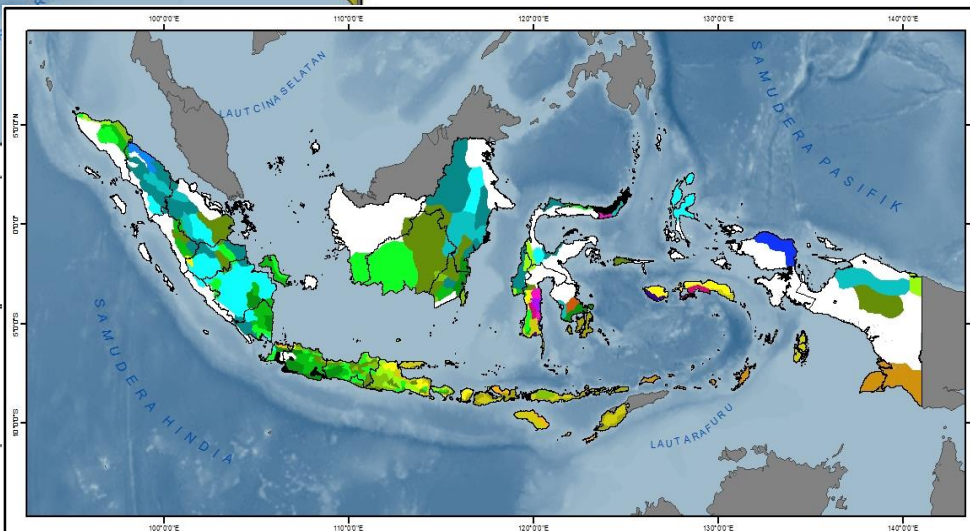
BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA

KETERANGAN

----- Batas Propinsi □ Wilayah yang tidak jelas perbedaan antara musim hujan dan kemarau

AWAL MUSIM KEMARAU

JAN I	MAR I	MEI I	JUL I	SEP I	NOV I
JAN II	MAR II	MEI II	JUL II	SEP II	NOV II
JAN III	MAR III	MEI III	JUL III	SEP III	NOV III
FEB I	APR I	JUN I	AGT I	OKT I	DES I
FEB II	APR II	JUN II	AGT II	OKT II	DES II
FEB III	APR III	JUN III	AGT III	OKT III	DES III



PRAKIRAAN AWAL MUSIM HUJAN 2016/2017



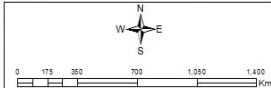
BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA

KETERANGAN

--- Batas Propinsi □ Wilayah yang tidak jelas perbedaan antara musim hujan dan kemarau
 □ Tidak Ada
 ■ Awal Musim Hujan 2016/2017

AWAL MUSIM HUJAN

JAN II	APR I	SEP I	NOV I
MAR II	MEI I	SEP II	NOV II
MAR III	MEI II	SEP III	NOV III
APR I	AGT I	OKT I	DES I
APR II	AGT II	OKT II	DES II
APR III	AGT III	OKT III	DES III

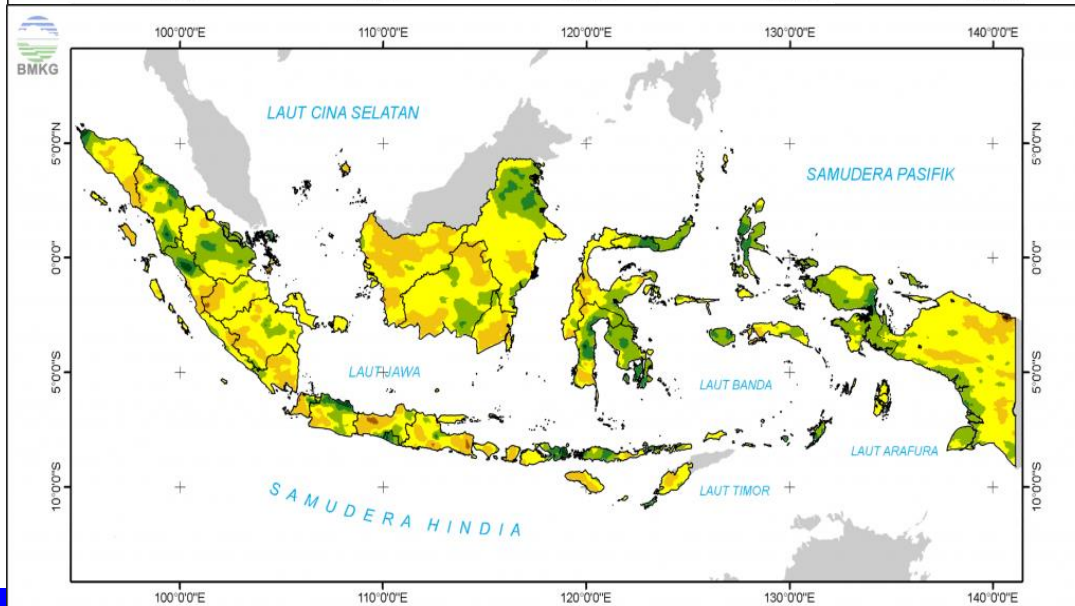
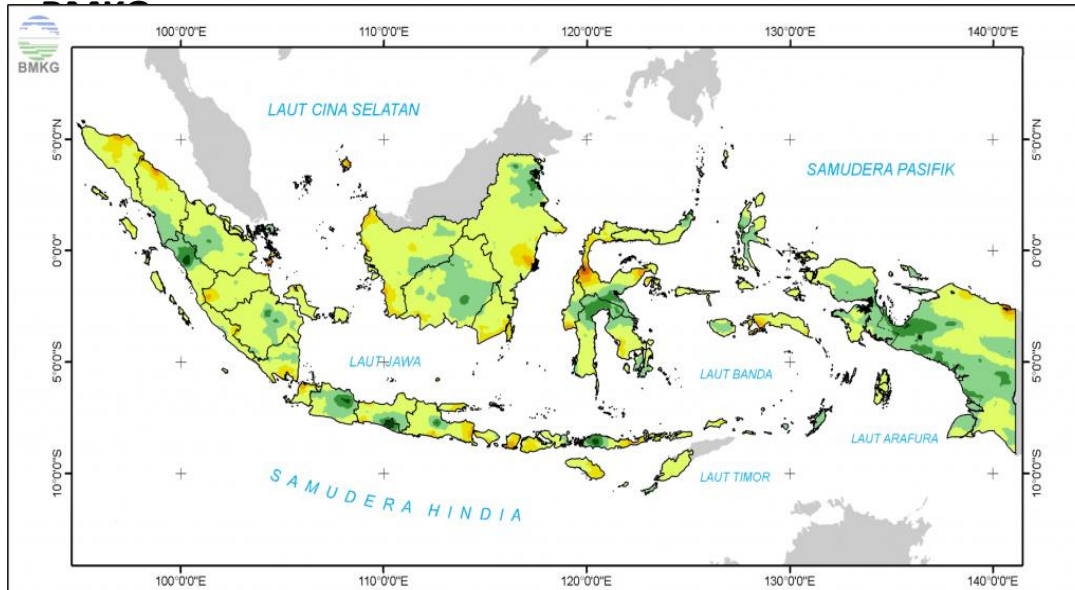


SUMBER DATA:

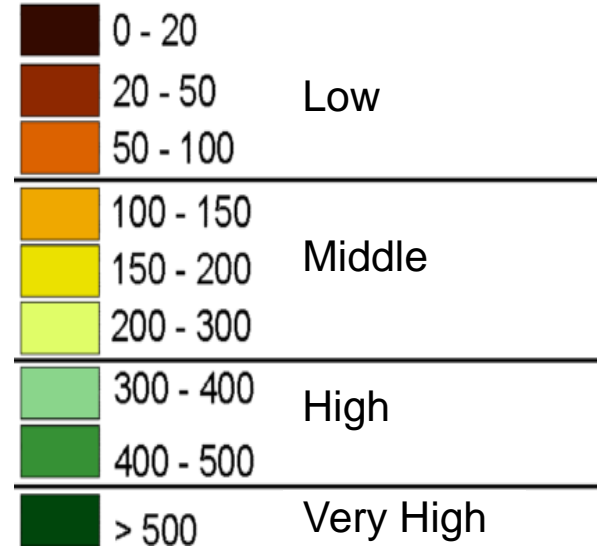
1. Prakiraan Musim Hujan 2016/2017 BMKG
2. Peta Rupa Bumi Skala 1 : 1 000 000



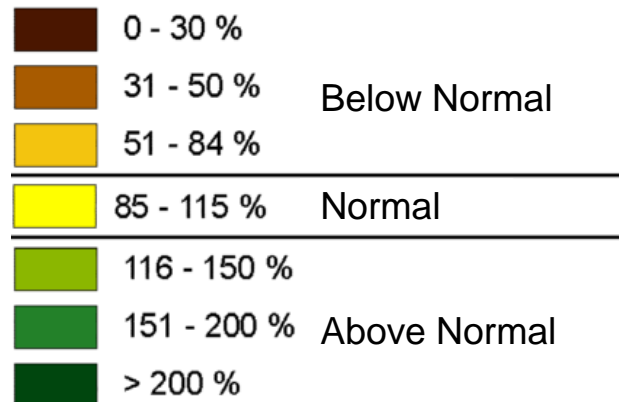
MONTHLY RAINFALL ANALYSIS



Rainfall (mm)



Compare to Normal

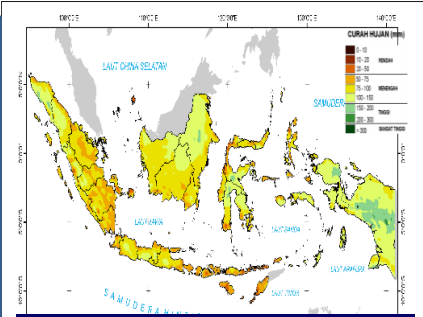




BMKG

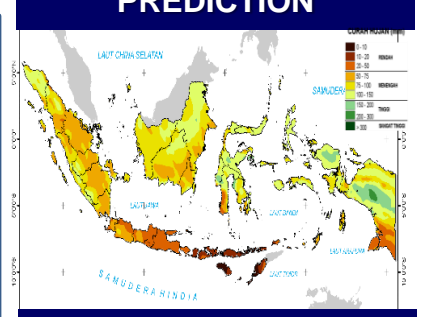
Rainfall: Prediction and Probability

APR' 17 - III



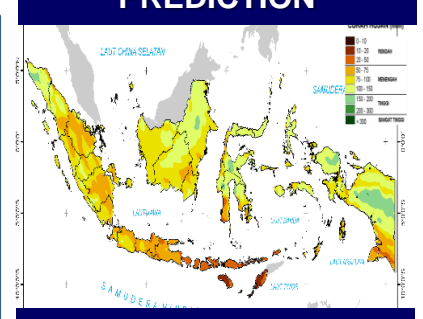
10-DAY RF PREDICTION

MEI' 17 - I



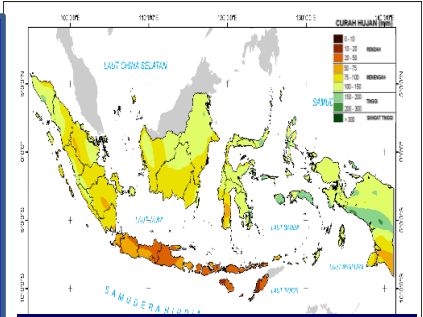
10-DAY RF PREDICTION

MEI' 17 - II

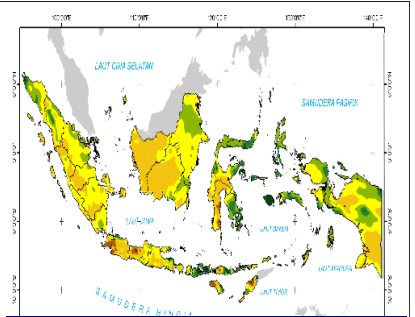


10-DAY RF PREDICTION

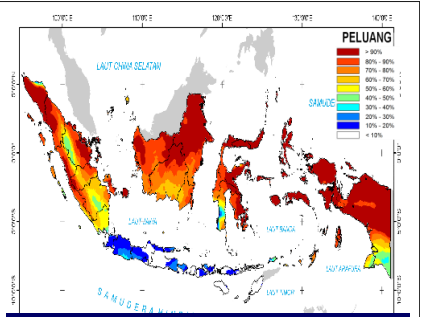
MAY 2017



RF PREDICTION

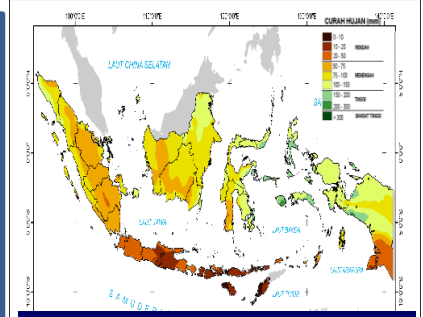


COMPARE TO NORMAL

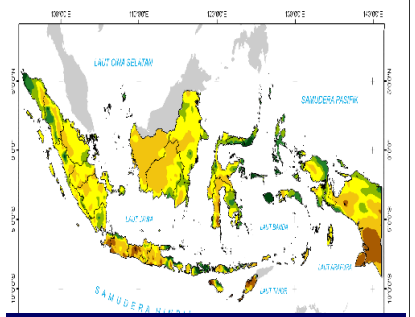


PROBABILITY RF >150mm

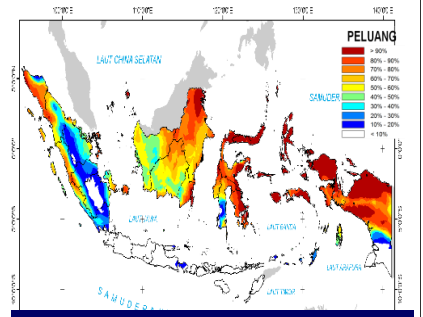
JUNE 2017



RF PREDICTION

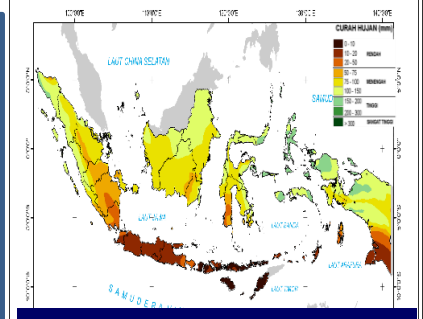


COMPARE TO NORMAL

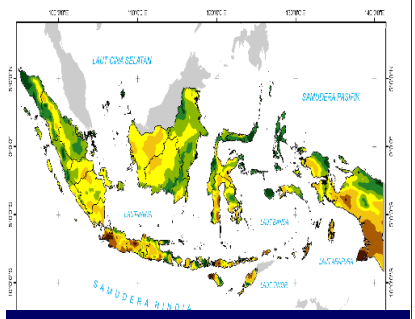


PROBABILITY RF >150mm

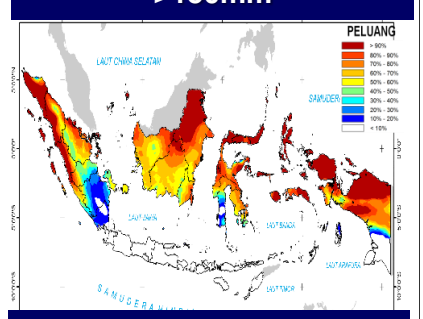
JULY 2017



RF PREDICTION



COMPARE TO NORMAL



PROBABILITY RF >150mm



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STRATEGIES

WEATHER FORECAST vs PUBLIC RESPONSE ??

Typhoon *Haiyan* (Phillippines)

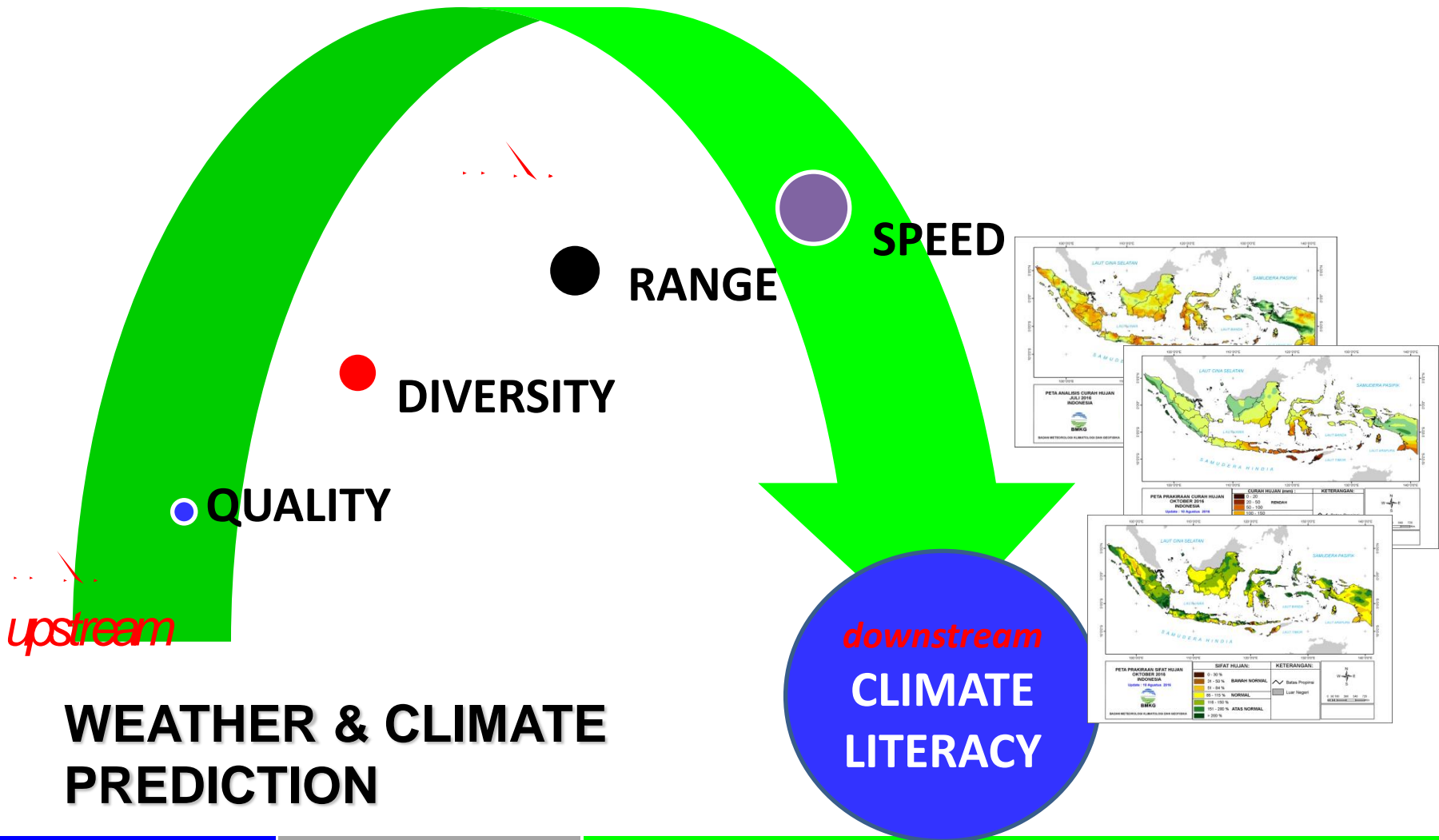


- Accurate warnings were issued by the meteorological agency – the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA) – for heavy rain and winds in time, and the government deployed planes and helicopters to the regions most likely to be affected.
- Many of the deaths were caused by the storm surge that resulted from the wind, which reached a maximum ten-minute sustained velocity of 275 km per hour.
- However, this was still not enough. Had there been **better knowledge of the risks**, particularly of the storm surge, it is likely that more extensive evacuations from exposed areas could have taken place sooner. **(Not enough knowledge of storm surge impacts) ---→ urgent needs of users outreach, impact-based forecast, extended range forecast.**

Tropical Cyclone **Haiyan (Yolanda)**, which struck the Philippines as a Category 5 storm on November 7 2013, as of 14 January 2014:

- 6,201 dead, 28,626 injured and 1,785 missing.
- More than sixteen million affected and more than US\$827 million estimated for the damage of infrastructure and agriculture (NDRRMC 2014).

LINKING THE UPSTREAM-DOWNSTREAM FLOW





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USERS INTERFACE FORUM

NATIONAL CLIMATE OUTLOOK FORUM (NCOF)

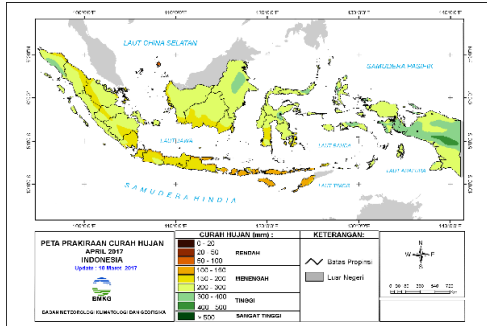


BMKG periodically holds the National Climate Outlook Forum (NCOF) consisting of several climate information providers and users :

- National Institute of Aeronautics and Space (LAPAN),
- Agency for the Assessment and Application of Technology (BPPT),
- Ministry of Public Works, (PUPR)
- Ministry of Agriculture, (MoA)
- National Disaster Management Agency (BNPB),
- Academia and World Food Program

NCOF aims to provide recommendation to reduce negative impacts on agriculture products based on the analysis of ENSO, SOI and monsoon.

climate field school (.)



Partnership
between provider
(NMHS), extension
workers (MoA,
users' interface)
and farmers (users)
in better
understanding
climate information

CFS DOCUMENTATION –INDOOR ACTIVITIES



CFS LEVEL 3-LESSON LEARNT FROM PRACTICING IN THE FIELD



Integrated Cropping Calendar

<http://katam.litbang.pertanian.go.id/>

KATAM TERPADU MODERN
SCIENCE . INNOVATION . NETWORKS
VERSI 2.5



MASUK

INTEGRATED CROPPING CALENDAR v 2.5

Rainy Season Oktober 2016 - March 2017

SMS CENTER
082-123-456-400
082-123-456-500

INTEGRATED CROPPING CALENDER | VALIDATION | VIP | ONLINE MONITORING | Fertilizer and Tools | Methods | Introduction | Drafting Team | Contacts | Help | Related Websites | Social Media

Main | Print for Extension | Print Document (PDF) | KATAM SMS | KATAM Android | Interactive Map | Interactive Data | Recommended Variety | Graph | RR Monthly Prediction | Pred. CH Bulanan (BMK)

Type keyword & click Search | Search | Reset

Season/Year : **MK 2017** Column : Katam Padi dan Palawija

Commodity : Paddy Field and Secondary C

Choose Administration

ADMINISTRASI

NASIONAL

BALI DAN NUSA TENGGARA

JAWA

KALIMANTAN

MALUKU

PAPUA

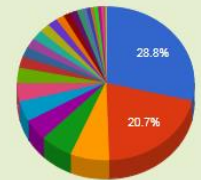
SULAWESI

SUMATERA

PETA KATAM TERPADU TINGKAT NASIONAL MK 2017



GRAFIK PRAKIRAAN AWAL
WAKTU TANAM TK. NASIONAL
KOM. PADI SAWAH BERDAS...



[Cetak Dokumen \(PDF\)](#)

REKAPITULASI TK. NASIONAL
PADI SAWAH MK 2017

Luas Baku : 8,135,089 ha
Potensi Luas Tanam MK I :
• Padi Sawah : 4,509,230 ha
• Jagung/ Kedelai : 2,310,215 ha
• Kedelai : 242,697 ha

INFORMASI TERSEDIA
PADA LEX

BADAN PENELITIAN
KE

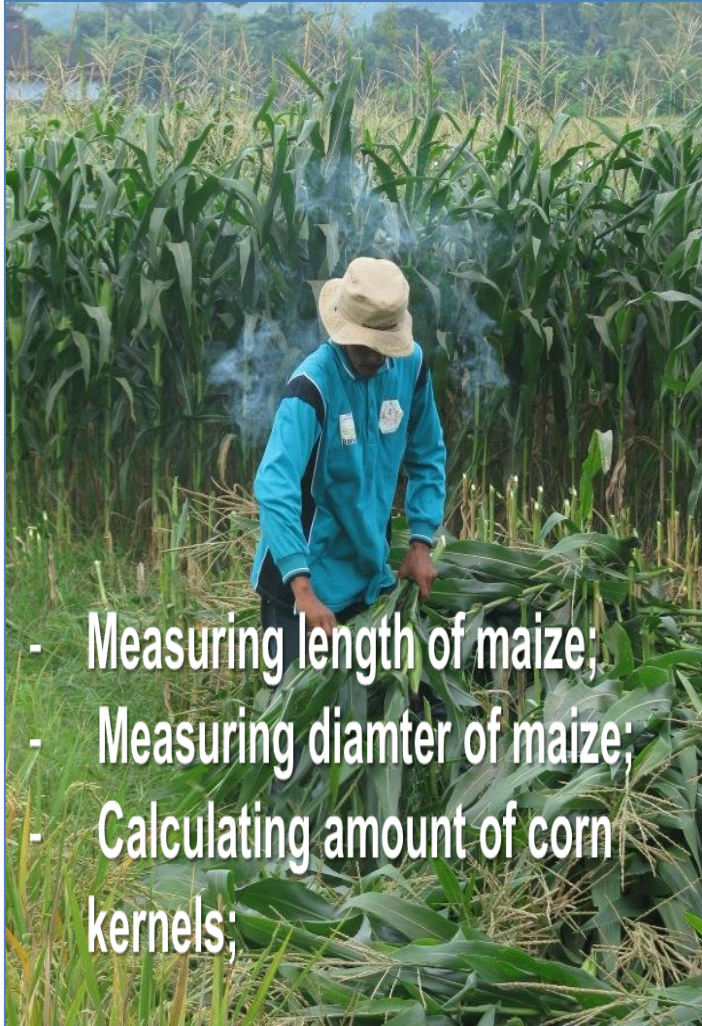
CFS-LEVEL 3-Observing the Crop Growth



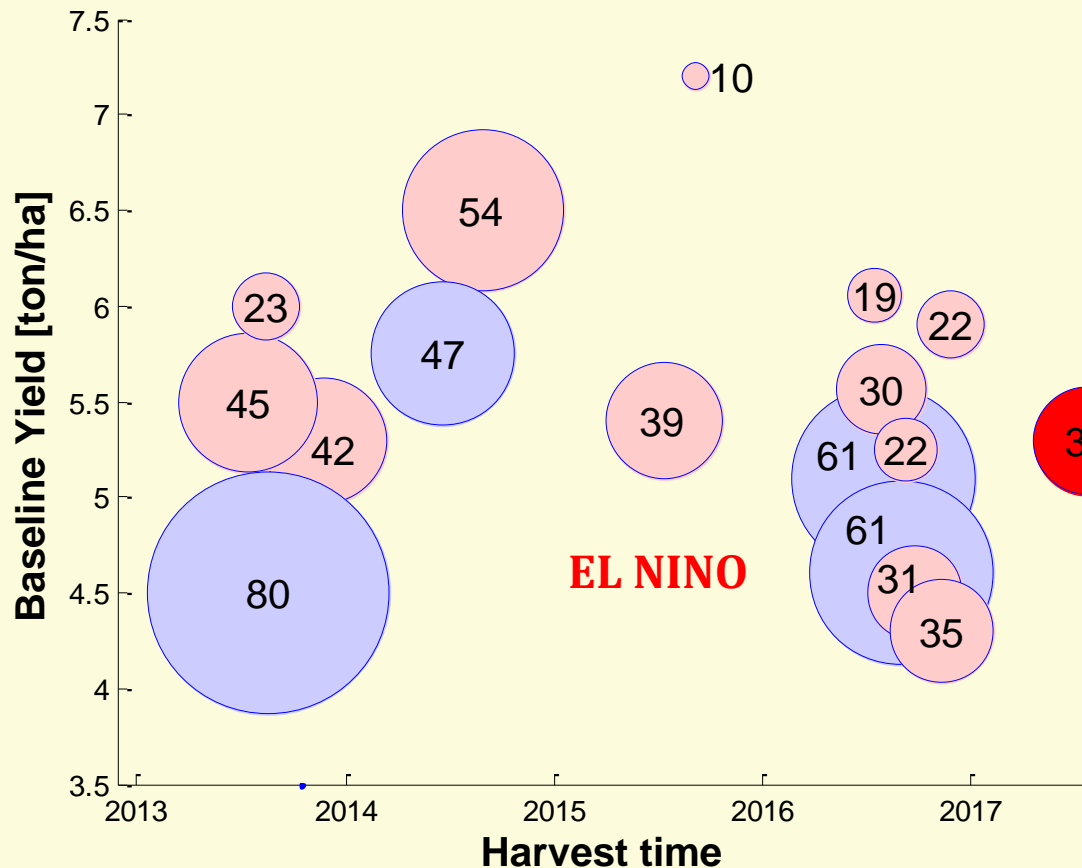


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


CFS LEVEL 3- HARVESTING



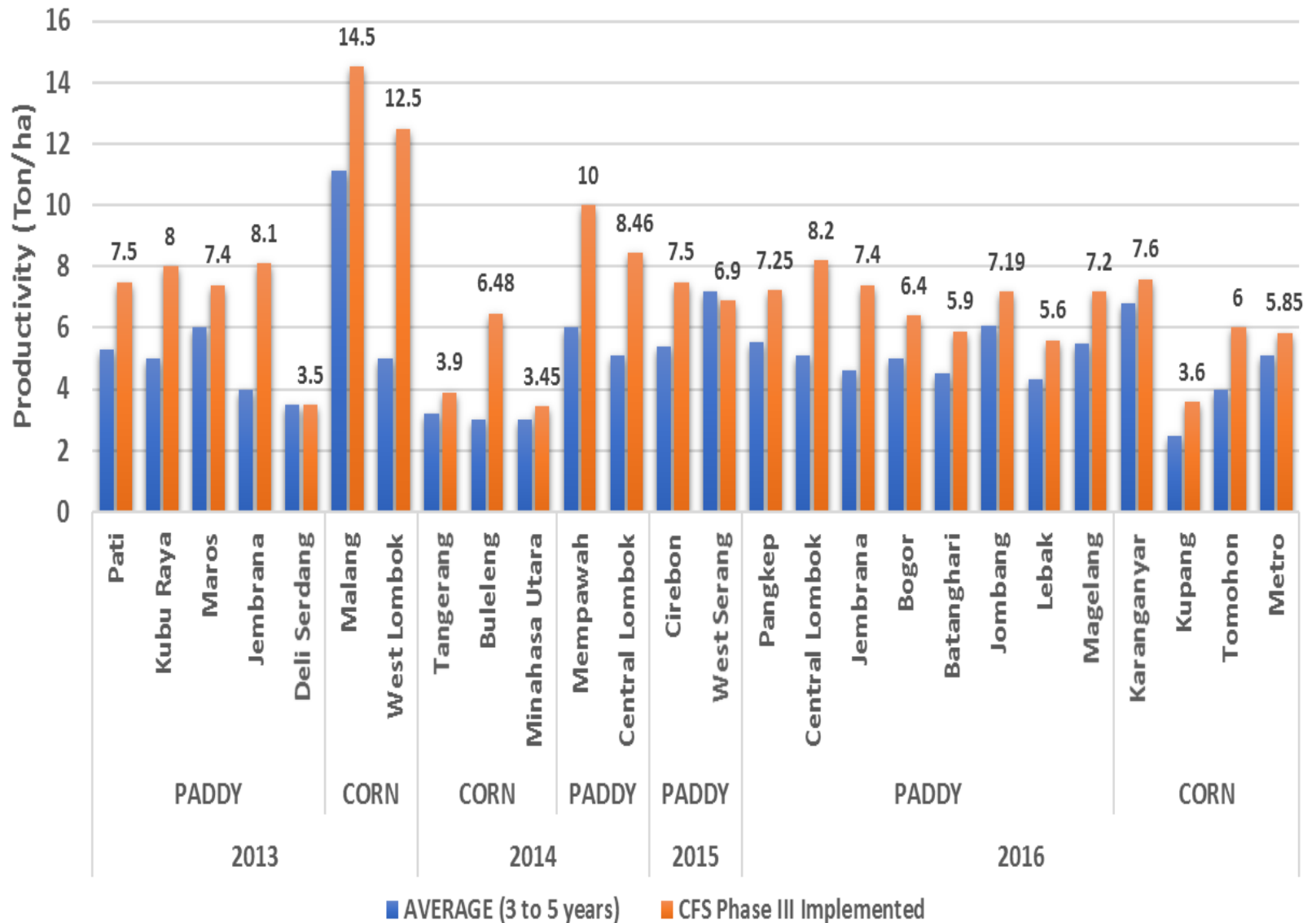
CFS RESULTS



Radius of the circles (and the percentage numbers %) represent increases of the yield after Climate Field Schools.

-  Locations with normal practices
-  Locations with advanced practices
-  National average of yield and average of increase after CFS

PLANT'S PRODUCTIVITY



CONCLUSION

- Agriculture is highly sensitive to extreme climate such that adaptation actions need to cope with climate change impact
- In achieving the target of resilient agriculture to climate change, several strategies applied for optimally utilizing climate information to increase agricultural production in supporting food security i.e by enhancing climate literacy and building communication with the users-Interface agencies.
- The National Climate Outlook Forum (NCOF) aims to improve (1) quality of climate prediction (2) information related to uncertainties (3) climate impacts on agriculture



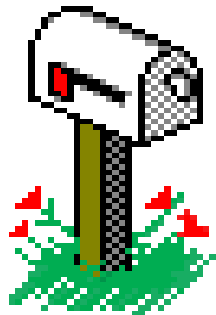
THANK YOU



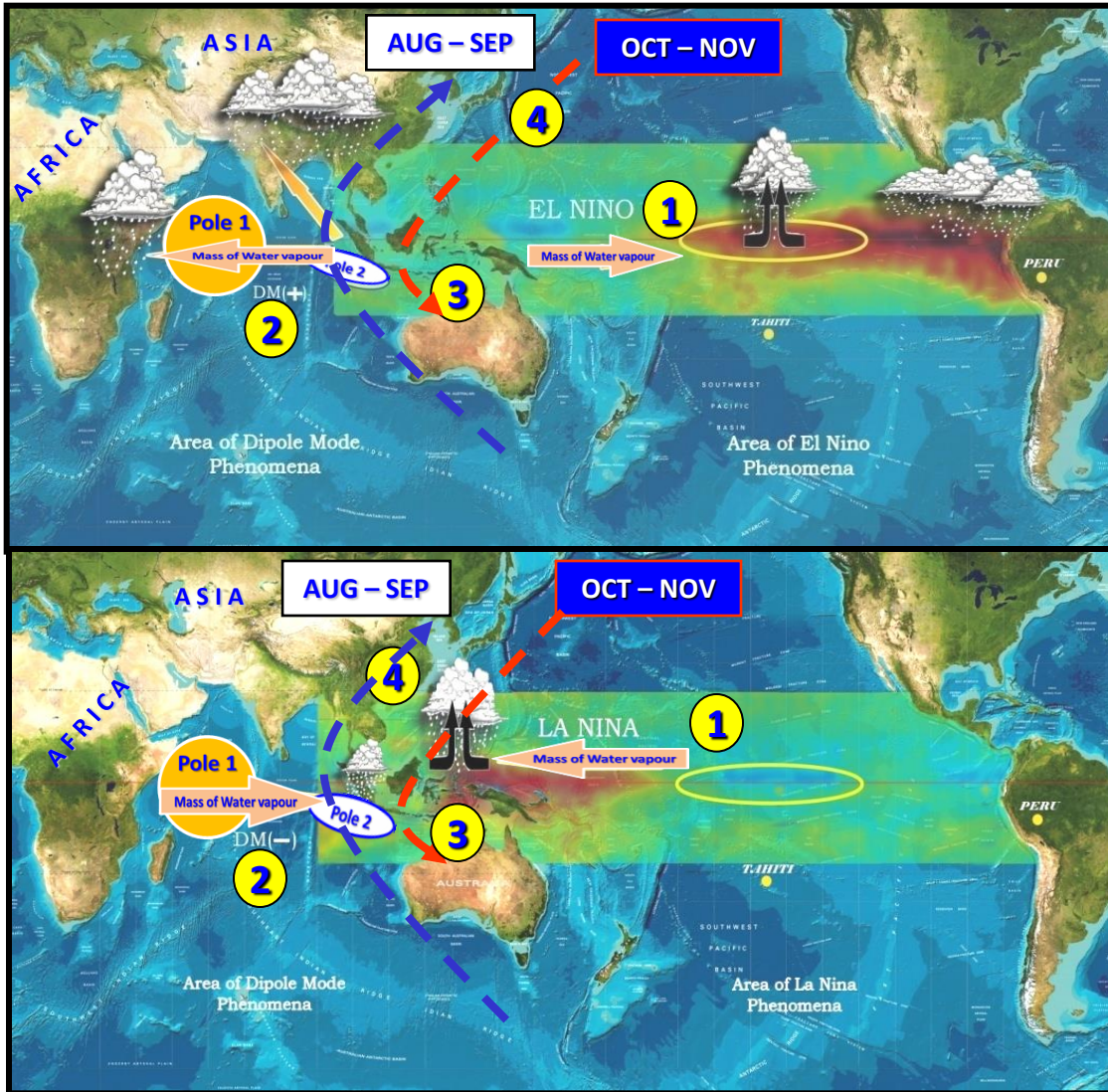
BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA

**JL. ANGKASA I NO. 2 KEMAYORAN
JAKARTA PUSAT – INDONESIA 10720**

<http://www.bmkg.go.id>



Climate factors 'controlling' rainfall in Indonesia



- 1 EASTERLY/ WESTERLY WIND (MONSOON)
- DIRECTION OF SEASONAL WIND
- AUG - SEP EASTERLY
- OCT- NOV WESTERLY
- 2 EL NIÑO / LA NIÑA
- 3 DIPOLE MODE POSITIVE/ DIPOLE MODE NEGATIVE
- 4 SURFACE TEMPERATURE

