

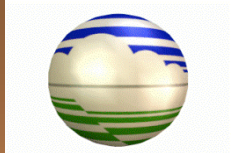
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# **CLIMATE OBSERVATION: RISK AND CHALLENGE – INDONESIAN CASE**

**Andi E. Sakya**

**Executive Secretary**

**Presented in Parallel Session of World Climate  
Conference – 3, Geneva – Switzerland, 1  
September 2009**



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**INTRODUCTION**

- Indonesia;
- Climate Factors;
- Tectonic Plate.

CLIMATE CHANGE

**CLIMATE CHANGE**

- Precipitation;
- Surface Temperature;
- CO<sub>2</sub> Concentration;
- Sea Level Rise;
- Vulnerability;
- Simulation.

OBSERVATION

**OBSERVATION**

Challenge

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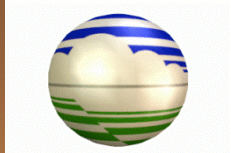
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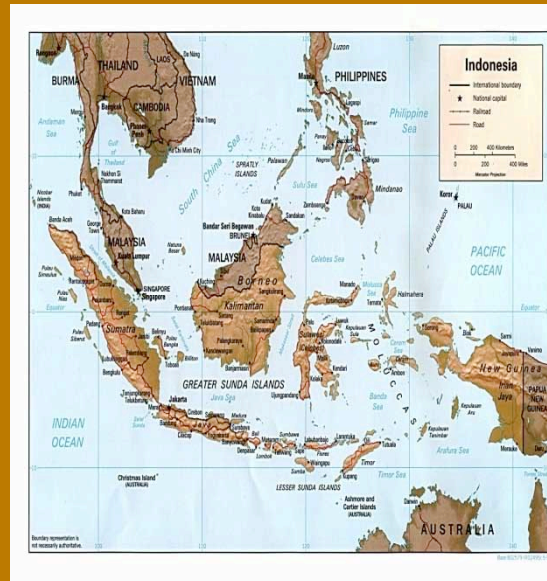
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# INTRODUCTION

## Indonesia



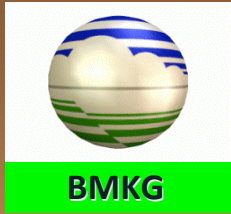
- Archipelagic country ~ 17,504 islands (10,000 small islands), right at the equatorial line;

- 4 Juta km<sup>2</sup> width of ocean and 2 Juta km<sup>2</sup> land, 6,000 distance length east to west, and 80,000 km of coastal length;

- Flanked by 2 ocean (India and Pacific) and 2 continents (Australia and Asia);

- Lays above three plates moving on different speed of creeping  
➔ prone to Earthquake and Tsunami;

- Exposed by 3 types of rain, 2 extreme weather on the east and west, more than 220 seasonal variation zone.



# INTRODUCTION

## Climate Factors

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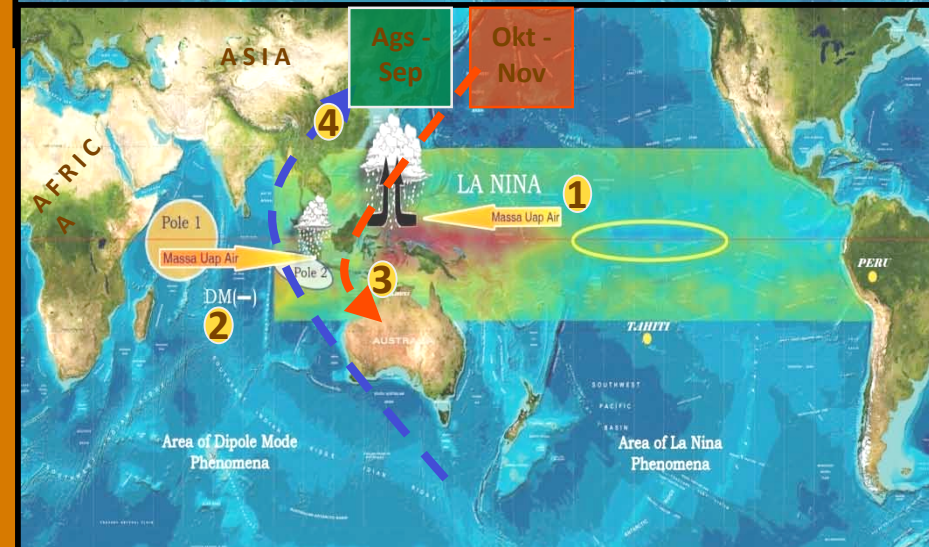
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- 1 EL NINO / LA NINA
- 2 DIPOLE MODE POSITIVE/  
DIPOLE MODE NEGATIVE
- 3 SURFACE TEMPERATURE
- 4 EASTERLY/ WESTERLY WIND

### EL NINO (°C)

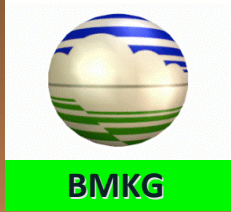
SEP 09	1.38
OKT 09	1.95
NOV 09	2.07
DES 09	1.94

### DIPOLE MODE (°C)

SEP 09	(+) 0.38
OKT 09	(+) 0.40
NOV 09	(+) 0.32
DES 09	(+) 0.22

### DIRECTION OF SEASONAL WIND

AGS – SEP EASTERLY	eq	
OKT– NOV WESTERLY	eq	



# INTRODUCTION

## Tectonic Plate

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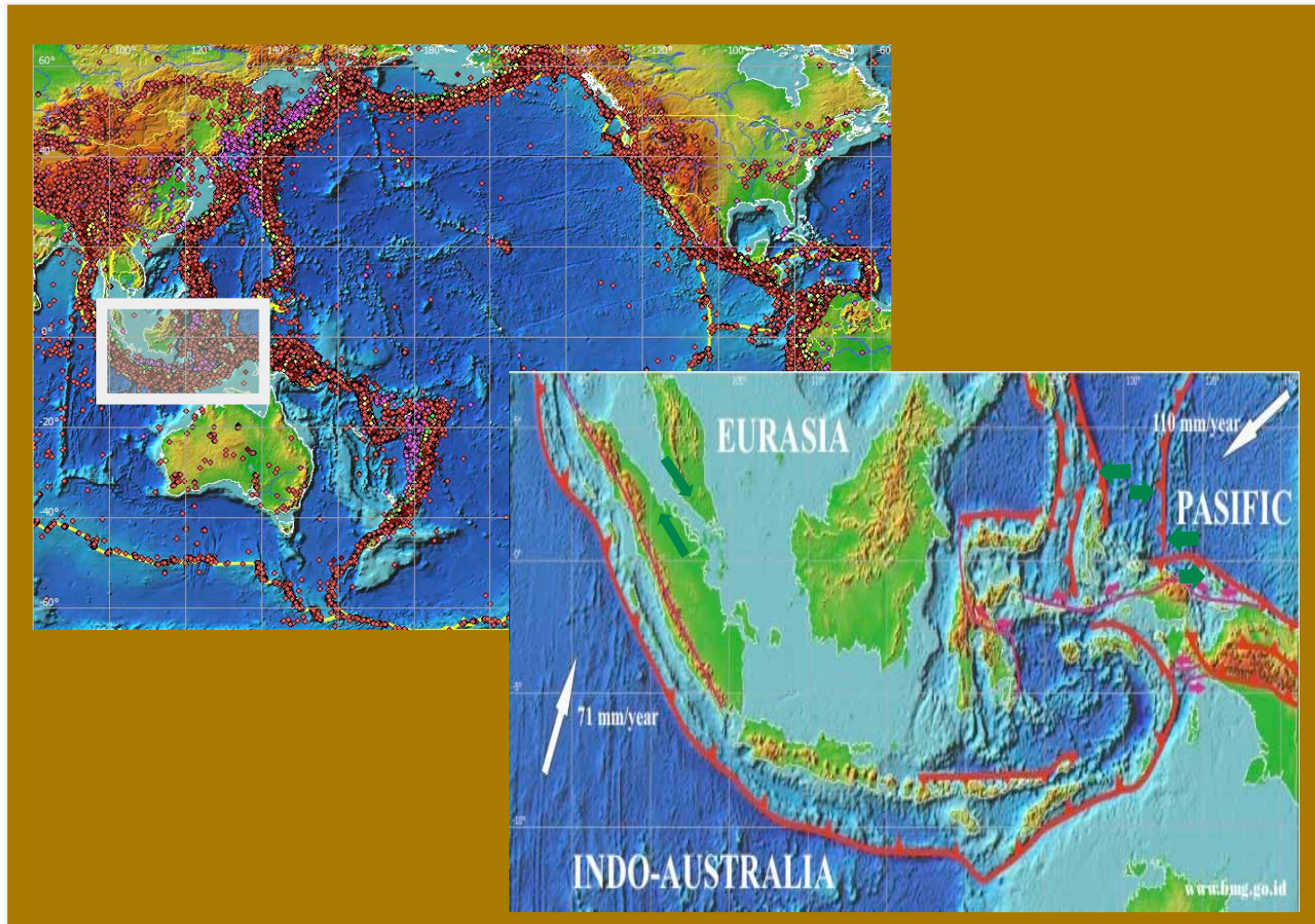
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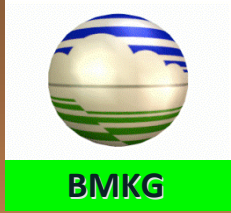
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# CLIMATE CHANGE

## Precipitation

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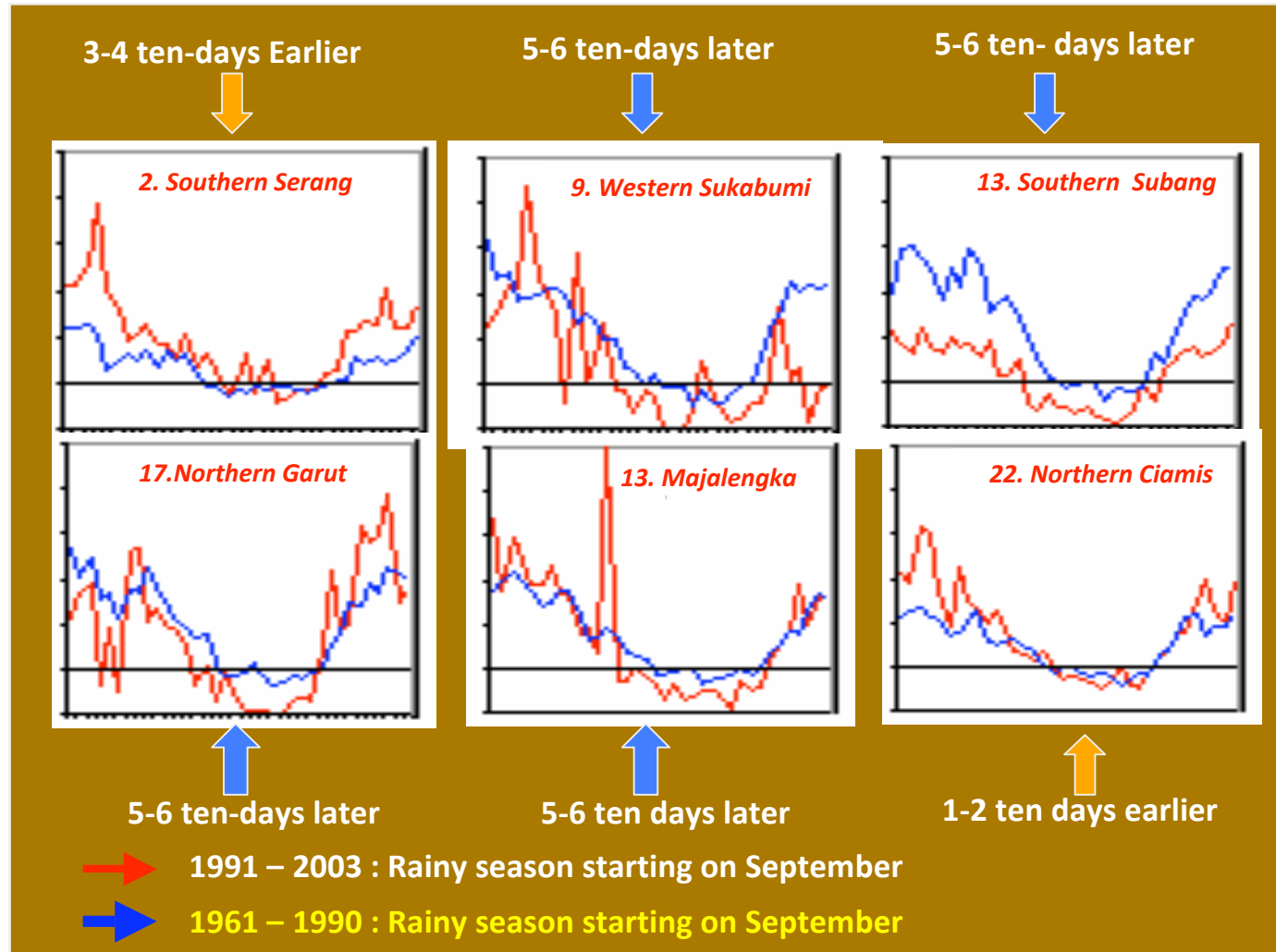
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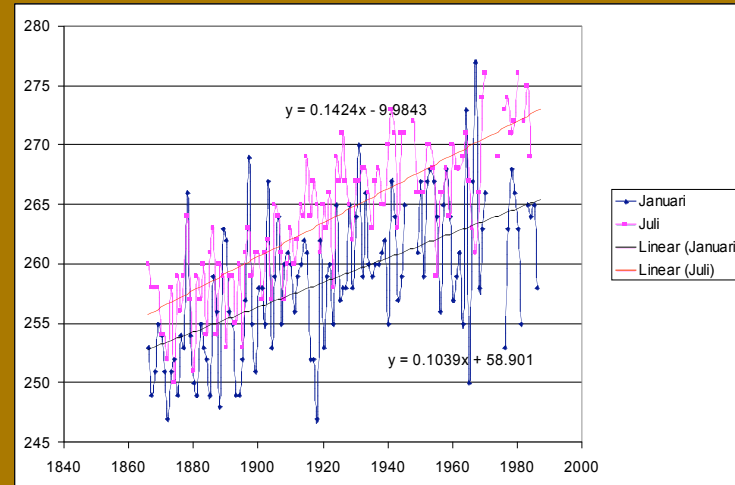
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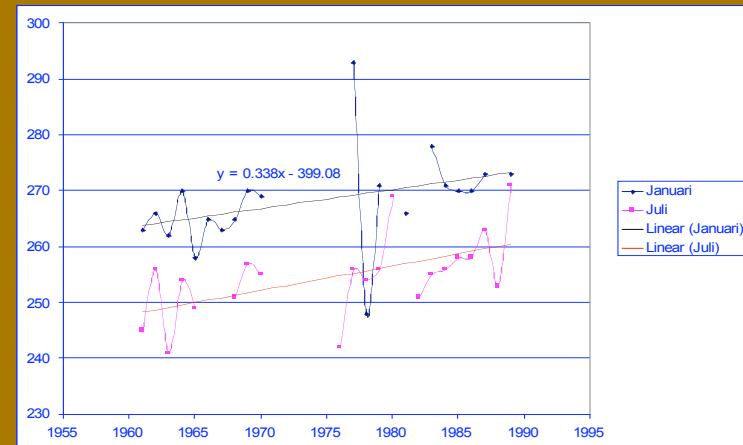
## Surface Temperature

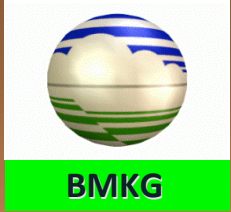


Jakarta

1870 – 1980

Cilacap





# CLIMATE CHANGE

## Surface Temperature

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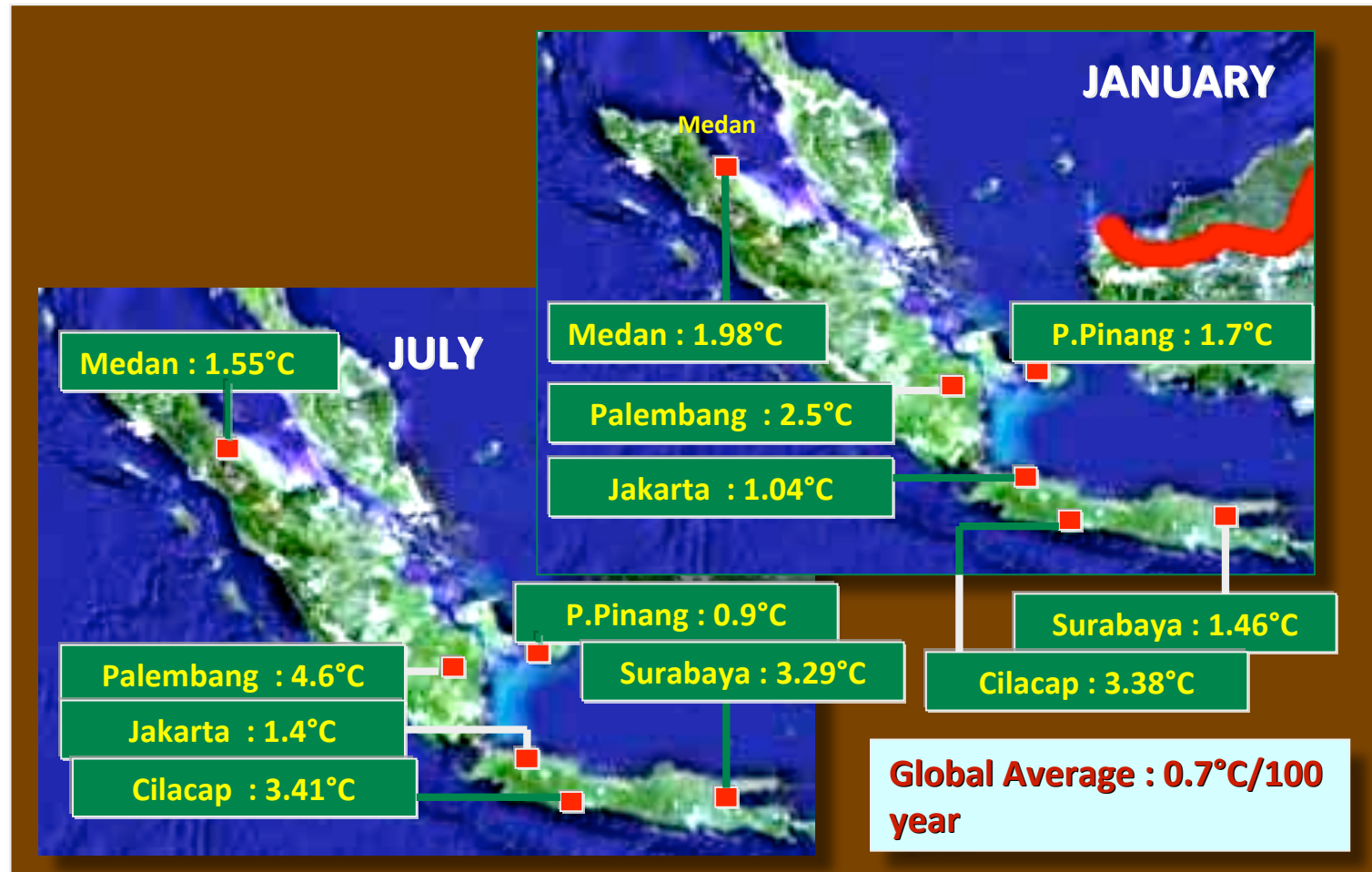
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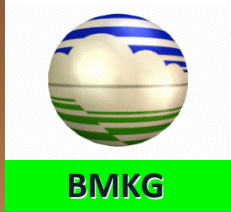
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Averaged temperature rise 1870 – 2000 at several cities in Indonesia



# CLIMATE CHANGE

## CO<sub>2</sub> Concentration

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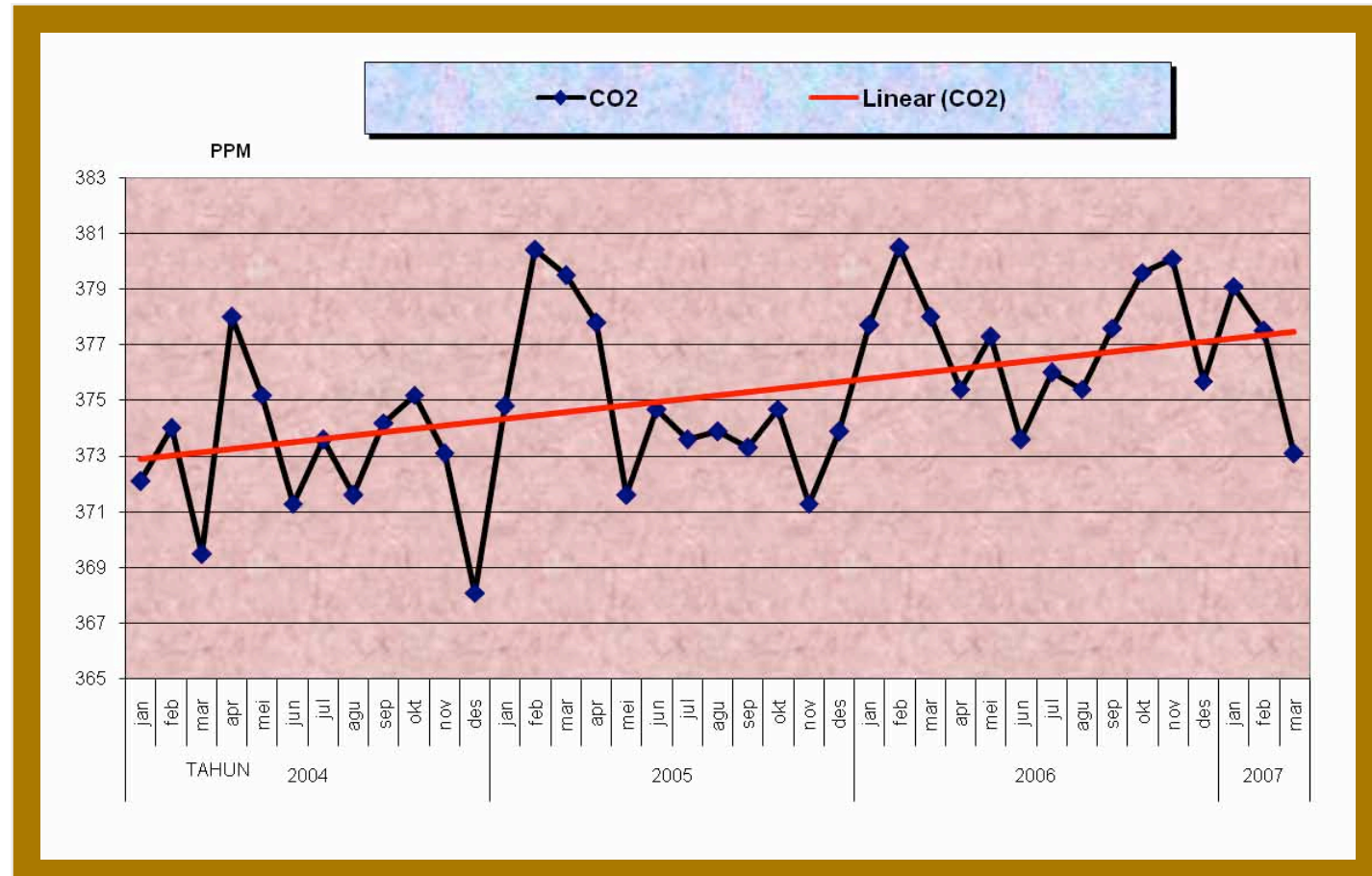
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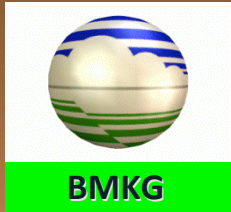
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Measure through GAWS Kototabang 2004 - 2007



# CLIMATE CHANGE

## Sea Level Rise

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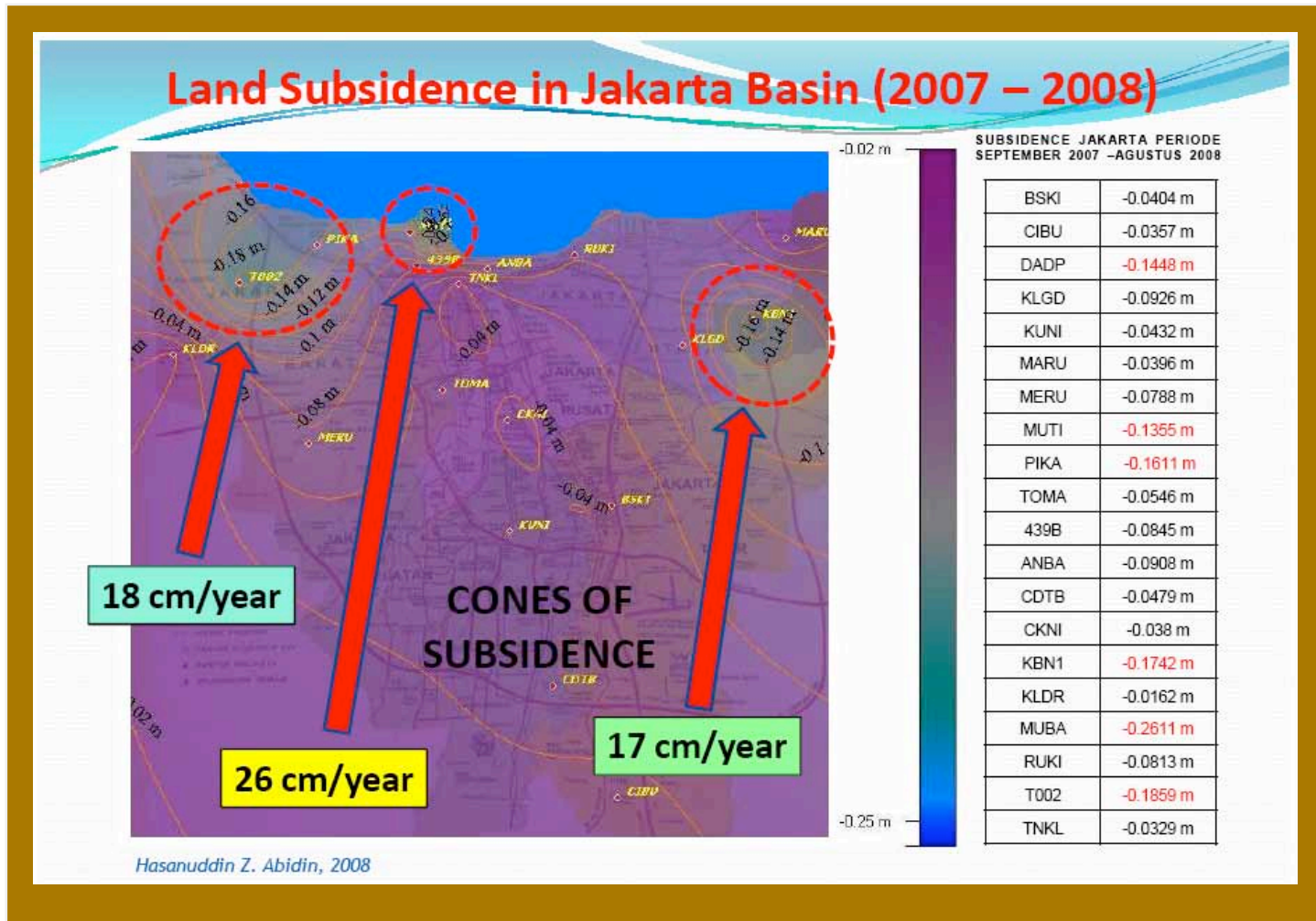
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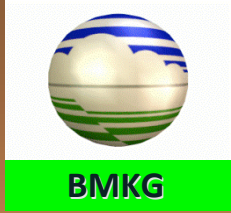
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Courtesy of Pusair, 2008



# CLIMATE CHANGE

## Sea Level Rise

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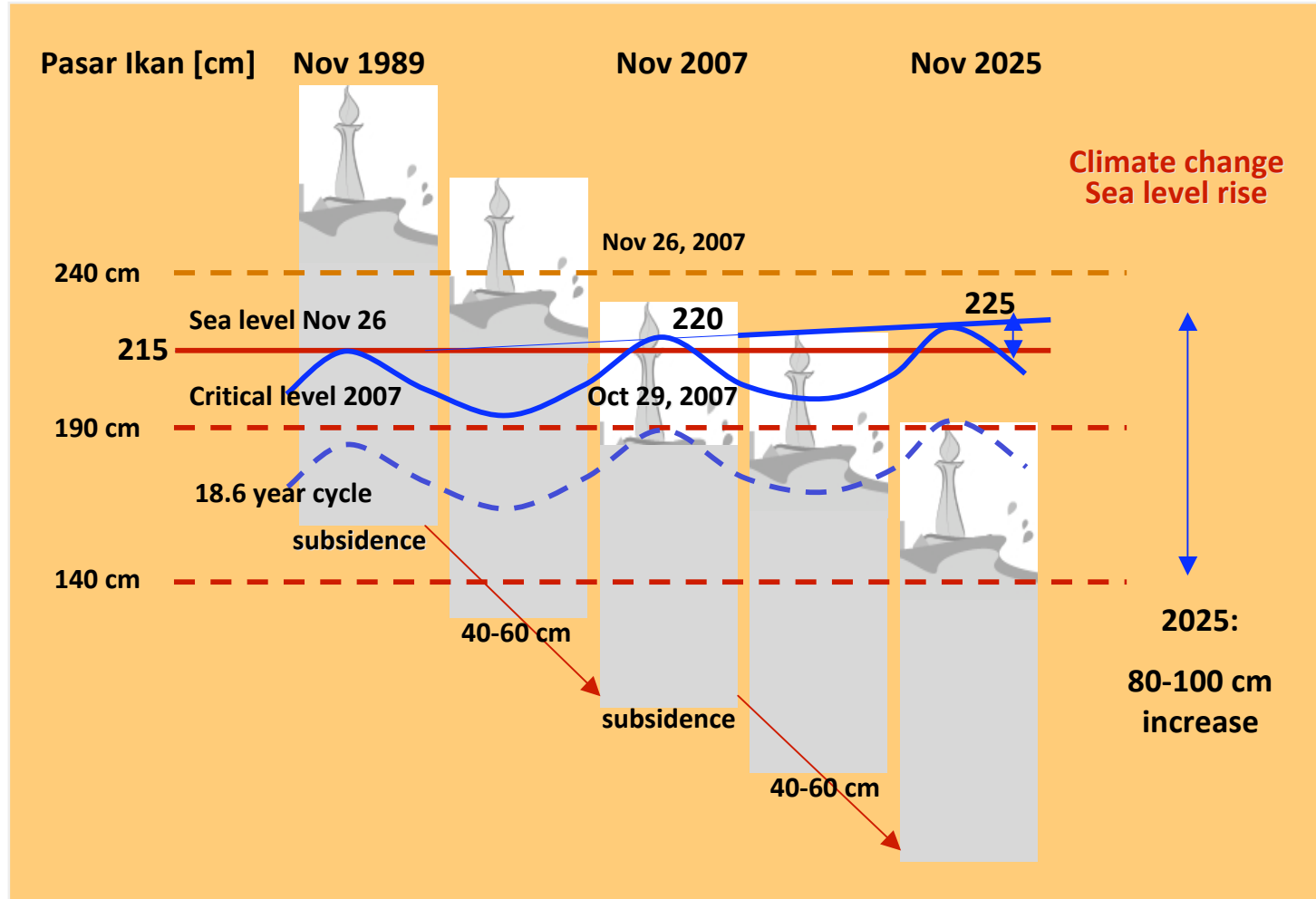
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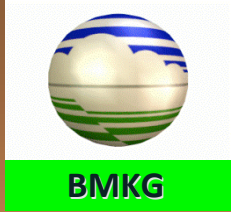
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Courtesy of BMKG, KNMI, PUSAIR, and DELTARES, 2008



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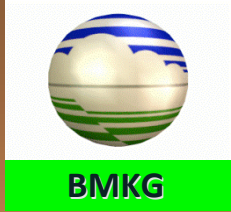
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# CLIMATE CHANGE

## Vulnerability

- Based on observation made by Dept of Marine and Fishery (DMF) and National Coordination Survey and Mapping (Bakosurtanal) → average **rise of sea level** reaches **5 – 10 mm/year**;
- Climate change impact in Indonesia, especially in the coastal area, is complicated by **land subsidence, tidal bore, storm surge, swell and coastal inundation, as well as extreme weather**;



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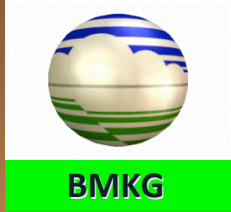
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# CLIMATE CHANGE

## Vulnerability

- By 2030, **SLR reaches 8 ~ 29 cm** sinking 2000 small islands, and potentially 3500 islands will be submerged by 2050 (24 island notified sank by 2005 – 2007);
- Coastal front line moves draws back hundred meters  
→ the area of land loss reaches ~ **4,759 Ha/year**;
- Climate refugees in the coastal area reaches **41,610,00 people** (IIED, 2007).



# CLIMATE CHANGE

## Simulation

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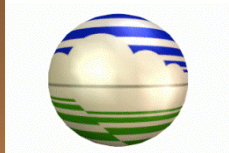
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1980s Temp [°C]	1990s Temp [°C]		2020s			2050s			2080s		
			CO <sub>2</sub> [ppmv]	Temp [°C]	Sea- Level [cm]	CO <sub>2</sub> [ppmv]	Temp [°C]	Sea- Level [cm]	CO <sub>2</sub> [ppmv]	Temp [°C]	Sea- Level [cm]
0.13	0.28	B1- low	421	0.6	7	479	0.9	13	532	1.2	19
0.13	0.28	B2- mid	429	0.9	20	492	1.5	36	561	2.0	53
0.13	0.28	A1- mid	438	1.0	21	555	1.8	39	646	2.3	58
0.13	0.28	A2- mid	440	1.4	38	559	2.6	68	721	3.9	104

Ref: Climate Change Scenario for Indonesia, <http://www.panda.org/climate/>



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# CLIMATE CHANGE

## Simulation

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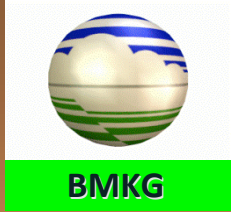
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YEAR	GDP / CAPITA [\$]	LAND VALUES [10 <sup>6</sup> \$/km <sup>2</sup> ]	AREA OF LOSS [km <sup>2</sup> ]	TOTAL POTENTIAL LOSS [10 <sup>6</sup> \$]
2010	1,592.43	0.074	7.408	545.97
2050	3,453.13	0.147	30,120	4,433.66
2100	8,018.23	0.283	90,260	25,561.63

- **Susandi, A., Firdaus, Y., and Herlianti, I., *Impact of Climate Change on Indonesian Sea Level Rise with Reference to It's Socioeconomic Impact*, 2009.**
- **The simulation is conducted based on DEM SRTM 90m established from TOPEX and JASON data using B2 AIM scenario . The global SLR found within this simulation is ~ 7.78 mm/year from 2010 to 2100.**



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# OBSERVATION

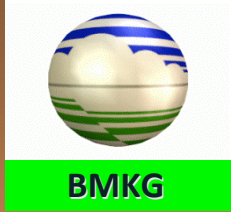
## Challenge



1. How to acquire climate parameter including SLR data from every single inhabitable island and disseminate back the post-processed information in a **quick, accurate and comprehensible way?**;

2. How to translate the **threshold value of the parameters into comprehensible early warning message** that awake people and encourage them to take precautionary decision anticipating the potential disaster?





# LESSON LEARNED

## InaTEWS

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**Devastated Area in Aceh**

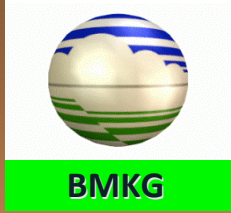


**Teleconference**



**InaTEWS Inauguration**

- The 1<sup>st</sup> phase of InaTEWS is developed from 2005 – 2008 after Aceh Tsunami, and launched in Nov 11, 2008;
- It involved more than 16 national institutions and 5 international countries;
- 148 BB SS, 500 AC, 30 SLSS, 23 TA, DSS

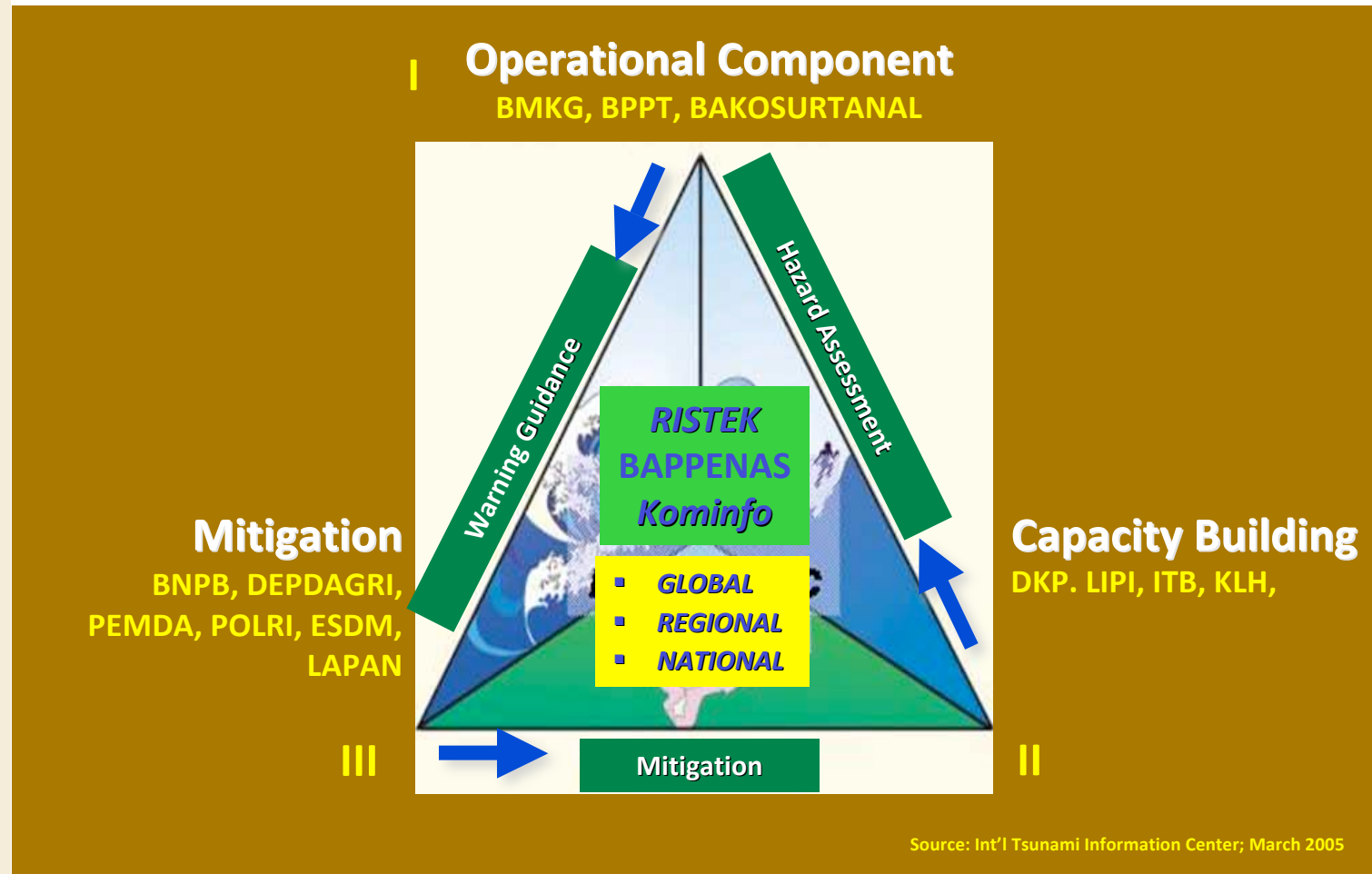


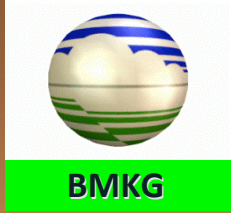
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# LESSON LEARNED

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# LESSON LEARNED

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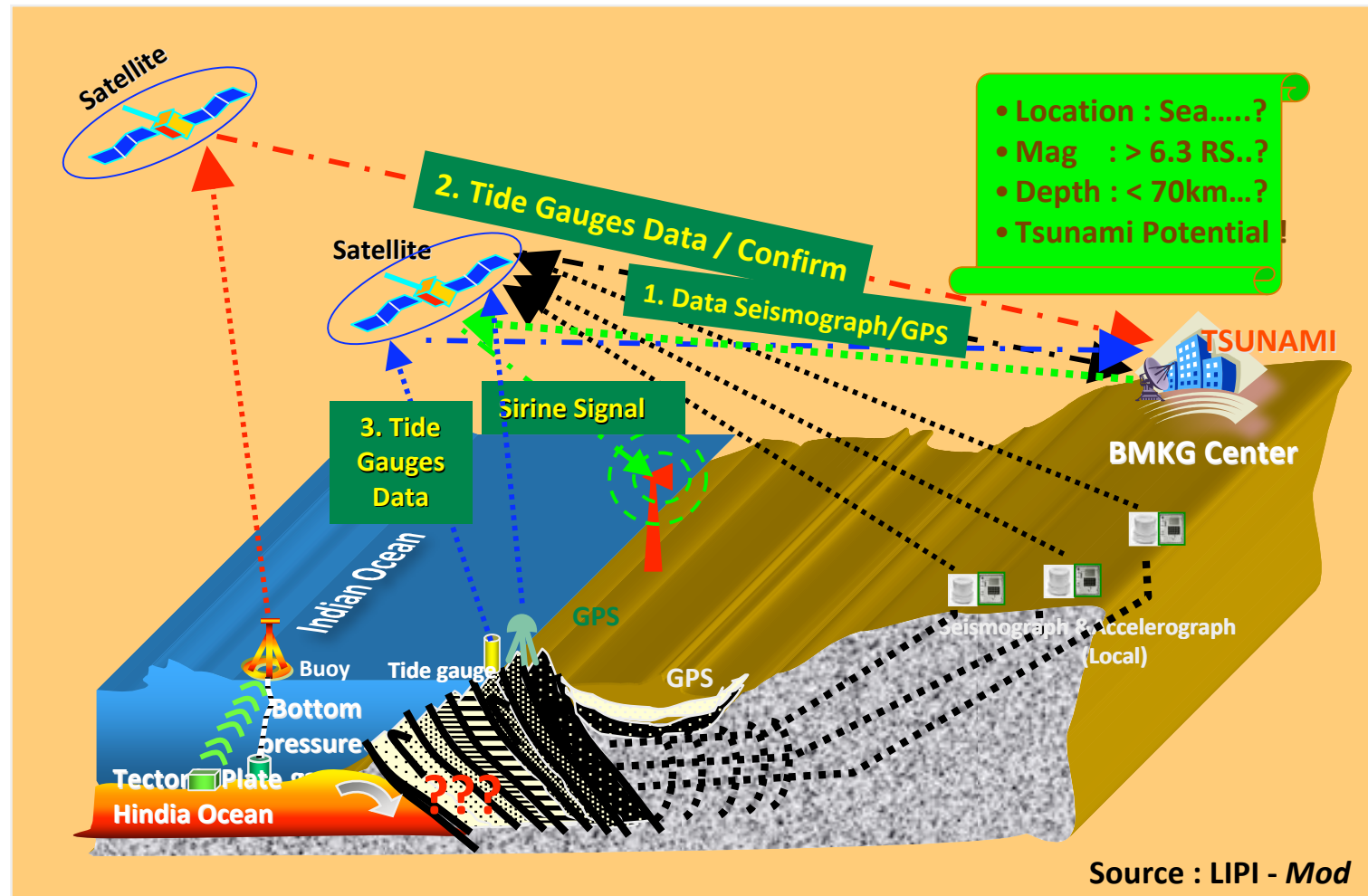
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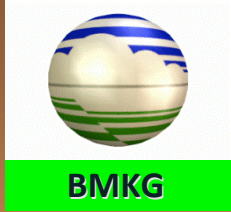
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Flow of Data and Information



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## InaTEWS



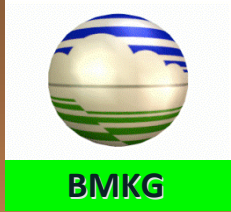
### A. Structural Approach:

To establish integrated observation system provided by DSS based on local characteristic area;

### B. Societal Approach

- To educate and internalize warning awareness ;
- To provide and equip people adaptation guidance based on local characteristics.





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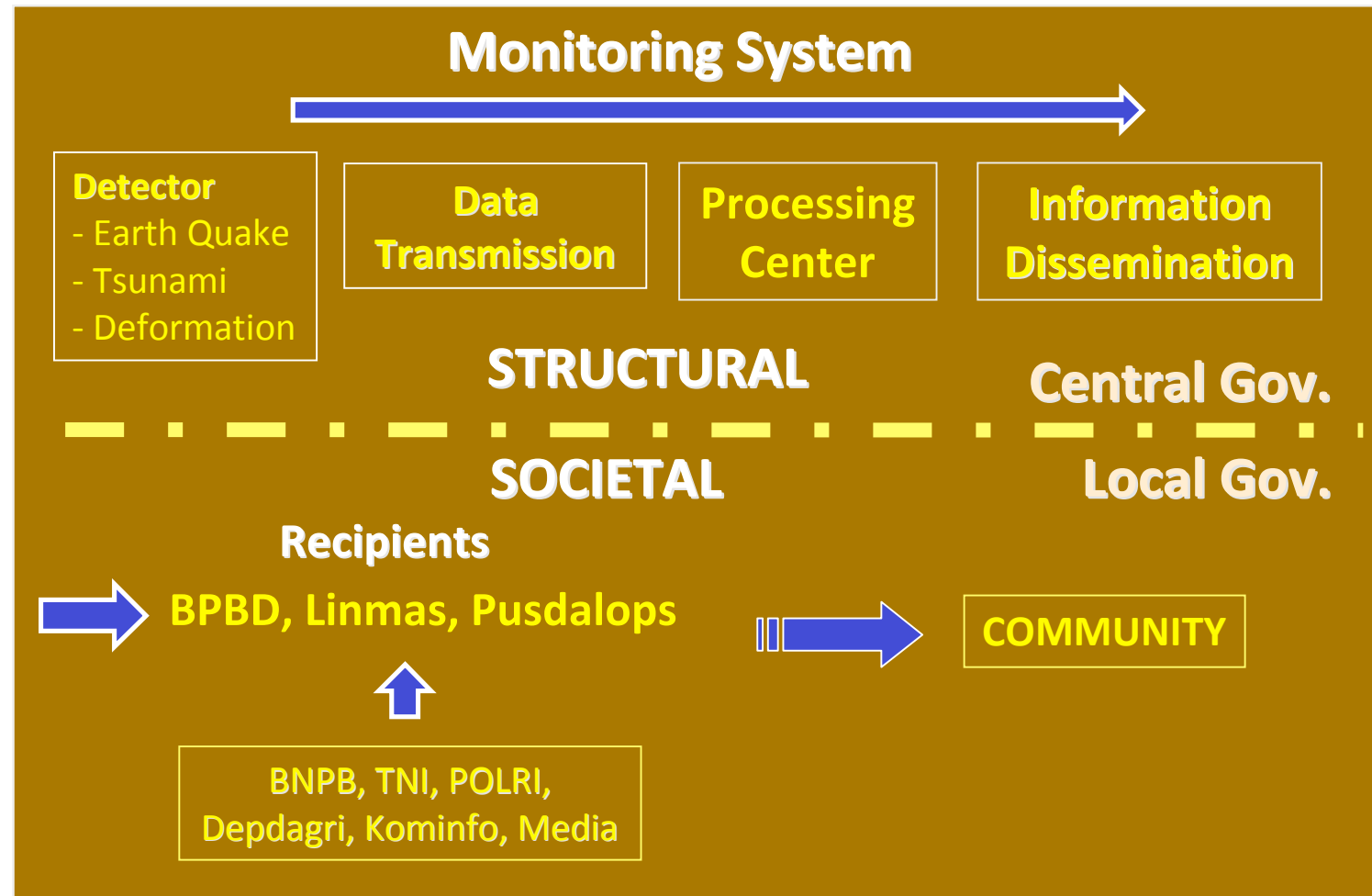
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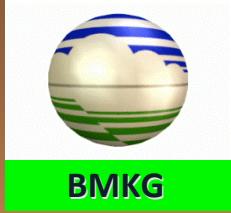
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## InaTEWS



**Development Approach**



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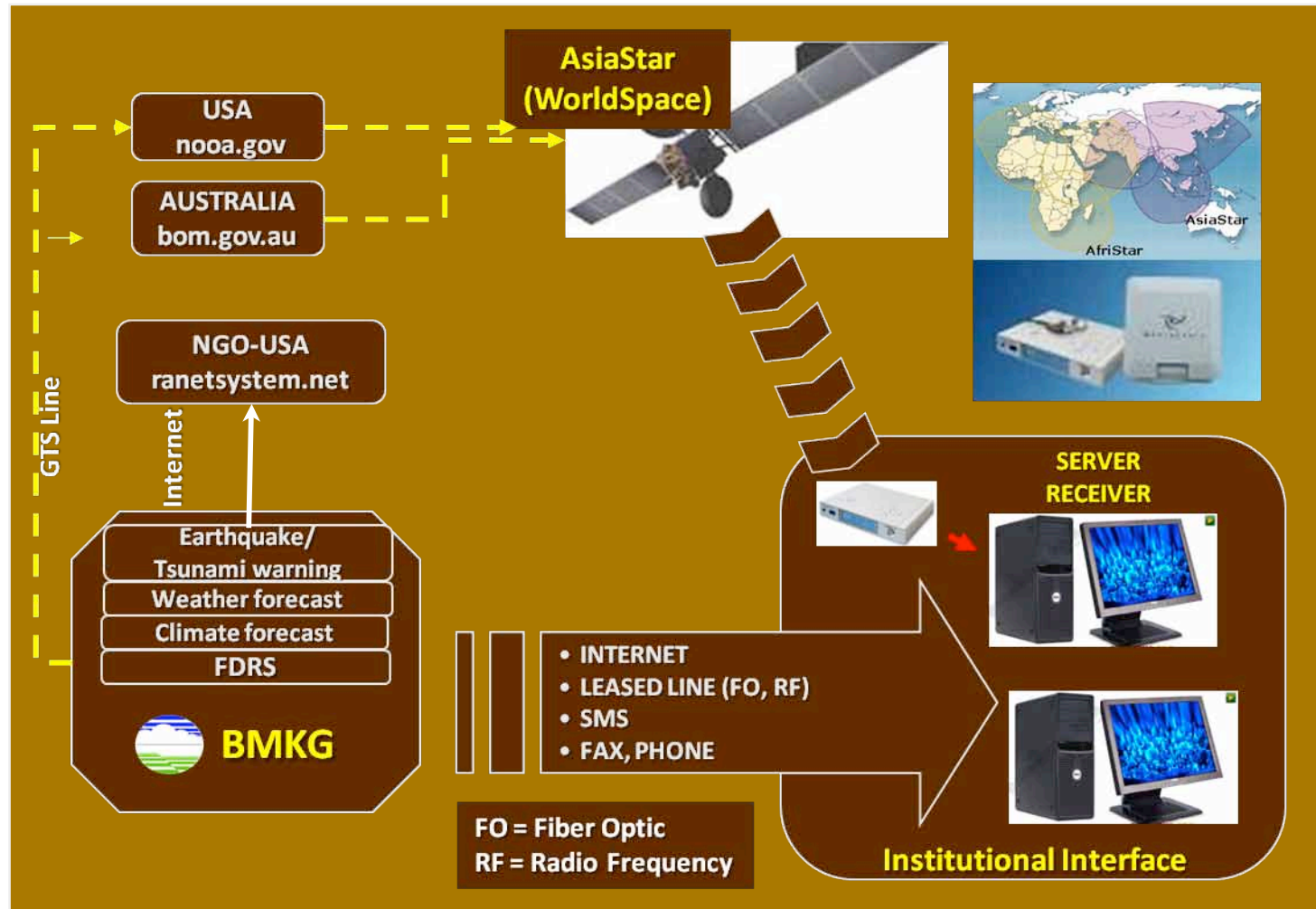
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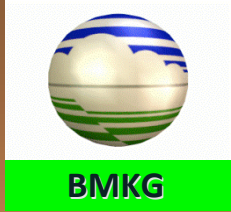
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## InaTEWS



Information Diagram 22



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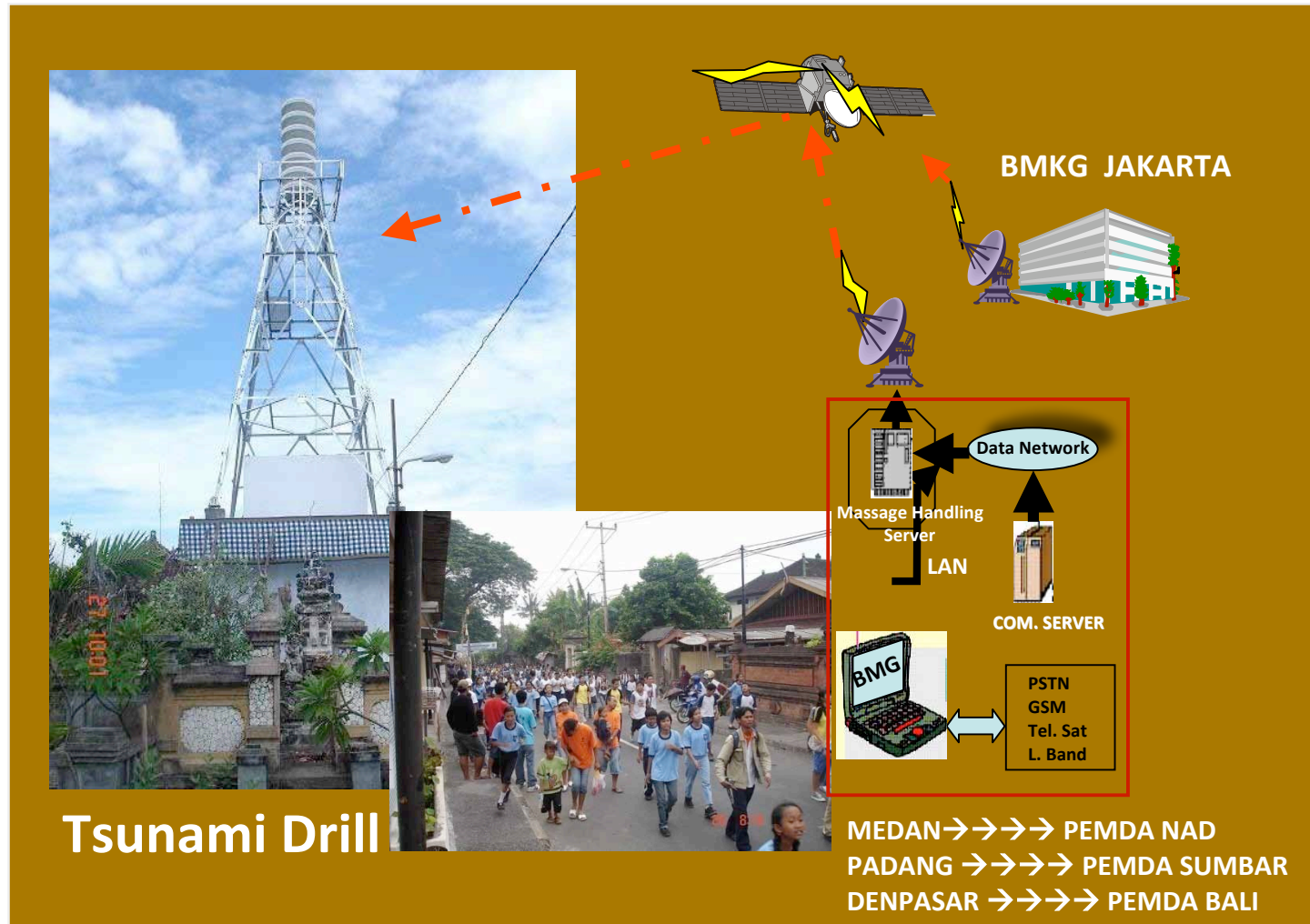
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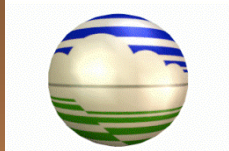
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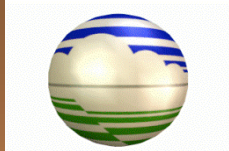
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## CONCLUSION

### Remarks .....

1. **Indonesia**, as an archipelagic country and lays right on the tropical line, is **highly vulnerable** to CC, and none the less the sea level rise;
2. The **coastal low lying regions** are very vulnerable due to not only SLR but also **land subsidence, tidal bore, storm surge, swell and coastal inundation, as well as extreme weather**;
3. The numerous islands condition and large variation of gap in education background pose difficulty, constraint and challenge for establishing an **Integrated Climate Observation System (ICOS)**;



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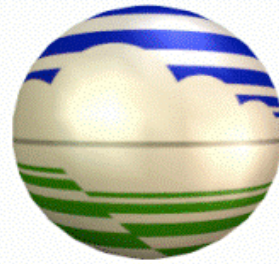
**CONCLUSION**

## CONCLUSION

### Remarks .....

4. The successful establishment of InaTEWS gives a good lesson learn:

- (i) structural and societal systematic approach;**
- (ii) the integration of three components: operational, mitigation and capacity building on implementing institutional cooperation, and**
- (iii) active participation of the people in the last resort capacity building**



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**THANK YOU**

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