

#### Plan of Indonesia Airborne Observation for YMC

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#### Centre of Atmospheric Science and Technology

#### LAPAN

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### **About LAPAN**

- The National Institute of Aeronautics and Space (LAPAN) is a government research & development agency under the President and coordinated by The Ministry of Research and Technology.
- LAPAN activities include:



#### NATIONAL AIRCRAFT DEVELOPMENT PROGRAM



#### Sounding Rocket Development



Pameungpeuk-Garut



### Research activities in Atmospheric Science and Technology

- Conducts research and development in atmospheric science and technology and its application
- The centre's activities include:

#### Atmospheric Atmospheric **Atmospheric Modeling:** Composition: • Dynamics & Processes Technology: Ozone & Radiation • Variability & Change Observation • Green House Gases Modeling Instrument Aerosol Simulation & Data Management $\bullet$ • Pollution & Air Quality Prediction Information System Acid Deposition ADEWAJE



#### Laboratorium Kimia (Analisis Air Hujan)





Ion Cromatography



### Radiosonde balloon experiment





#### Surface Observation of CO<sub>2</sub> 5 Locations (Kototabang, Bandung, Watukosek, Palembang, Pontianak)



	Sistem Data Logger CO <sub>2</sub> (LPN 1B)	
Jenis	Spesifikasi	
Sensor	Sensor CO <sub>2</sub> NDIR	
	Range Ukur 0 – 2000 ppm	
Data Logger	Mainboard : Sistem ATMEGA128	
	Memori: SD Card 2 GB	STRATTICE.
	Komunikasi data : RS485, RS232	eta
	- Optional TCP/IP : - Modern GPRS	
	- Jaringan LAN	
	Sistem TCP/IP : FTP Client, Web Client	
Pemantau	Komputer (optional) minimum Pentium 4	and the second
Lokal		
Power Supply	Solar Cell (PV) 12 V, 50 watt, plus Solar Charge	at the second se
	Controller	CEEEEEEEEEEEEEEEEEEEEEEEEEEEEEE
	Baterai : 12 V, 18 Ah	LITT ATIM IT
Tower	Triangle 12m plus penangkal petir	
Software	CO <sub>z</sub> Monitoring	
Web & FTP	Sistem Operasi : Linux Debian	
Server		
	Server Web : LAMPP	
	Server FTP : Proftp	
	Server Database : MvSQL	A COLORED OF THE OWNER
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#### LEMBAGA PENERBANGAN DAN ANTARIKSA NASIONAL

#### LOKASI FASILITAS



### LAPAN Contribution to YMC

- Ground and radar observation at LAPAN's stationts
- Satellite operation (NPP, Metop, Aqua, Terra)
- Routine daily 24 hours NWP over Indonesia region (95E-140E,10S-10N)
- Possible use of LAPAN's Aircrafts for Airborne Observation
- Maritime continent atmospheric research program.

### Purposes

- 1. Develop Human Resouces
- 2. Procurement atmospheric observation instruments and infrastructure.
- 3. Atmosphere and ocean dataset observation over Indonesia
- 4. International publication journal.
- 5. Involve in Indonesia into international collboration research.
- 6. Improve accuracy of atmospheric prediction over Indonesian maritime.

### **Scope of Activities**

- 1. Human Capital Development
- 2. Campaign observation
- 3. Research and development, including observation instruments
- 4. Scientific Meeting
- 5. Collaboration and permit

### Human Resources Development

- Master's (5 persons) & Doctorate's Degree (5 persons)
- Training
  - Research aircraft (1 times)
  - Atmospheric Science (3 times)
- Visiting scientist (3 times)
- Guest lecture (3 Event @2 guest)

### **Procurement of Instrument and Equipment**

- Develop Research Aircraft/LAPAN Surveillance Aircraft (LSA) and Sensors
  - Measure:
    - cloud structure, trace gases, aerosol, meteorological condition (P, T, Relative Humidity and wind)
    - Aircraft dynamic
  - Instruments: Cloud Droplet Probe 2-50µm, 2D Cloud Imaging Probe 25-1550µm, Precipitation Imaging Probe 100-2600µm, Cloud-Aerosol Precipitation Spectrometer, Cloud Condensation Nuclei Counter, Chemical Ionization Mass Spectrometer, dropsonde.
- Develop HPC 1200nodes to 4000 nodes
- Develop datastorage server system from 700TB to 1500TB



### Why Research Aircraft?

- Atmospheric Science
  - Provide microphysis and dynamics of cloud data.
  - Observe trace gases and aerosol in vulcanic ash.
  - Improve parameterisation in numerical model.
- Aircraft Technology
  - Menguasai teknologi dan operasional pengamatan atmosfer dengan pesawat terbang
- Implementation
  - Monitoring disaster such as vulcanic eruption, flood, drought

#### No Research Aircraft in Indonesia

## **Campaign Observation**

- Research Aircarft (LSA) (1-2 months)
- Radiosonde (720 balloons)
- Rocketsonds (2)
- Ground based station (Kototabang, Pontianak & Biak) dan mobile
- Remote Sensing of the atmosphere

### Flight Path



### Focus Research

- Convective process, cloud and rain formation
- Sea/Land-Breeze, MJO, Monsoon, IOD, ENSO Modulation & Multi-Scale Interaction
- Atmosphere-Ocean-Land Interaction
- Atmospheric chemistry (trace gases and Aerosol)
- Data assimilation
- Convection parameterisation to improve NWP performance

### **Collaboration and Permit**

- Foreign Research Permit (15 countries) (Ristekdikti, Kementrian Perhubungan dan TNI-AU)
  - LAPAN can be Indonesia counterpart related to airborne observation
- Notice to Airmen (NOTAM)
- Flight permit & airbase
- Perizinan keluar masuk barang (bea cukai)

# Thank you very much....