Study Geomagnetic in Meteorological, Climatological and Geophysical Agency, BMKG

By

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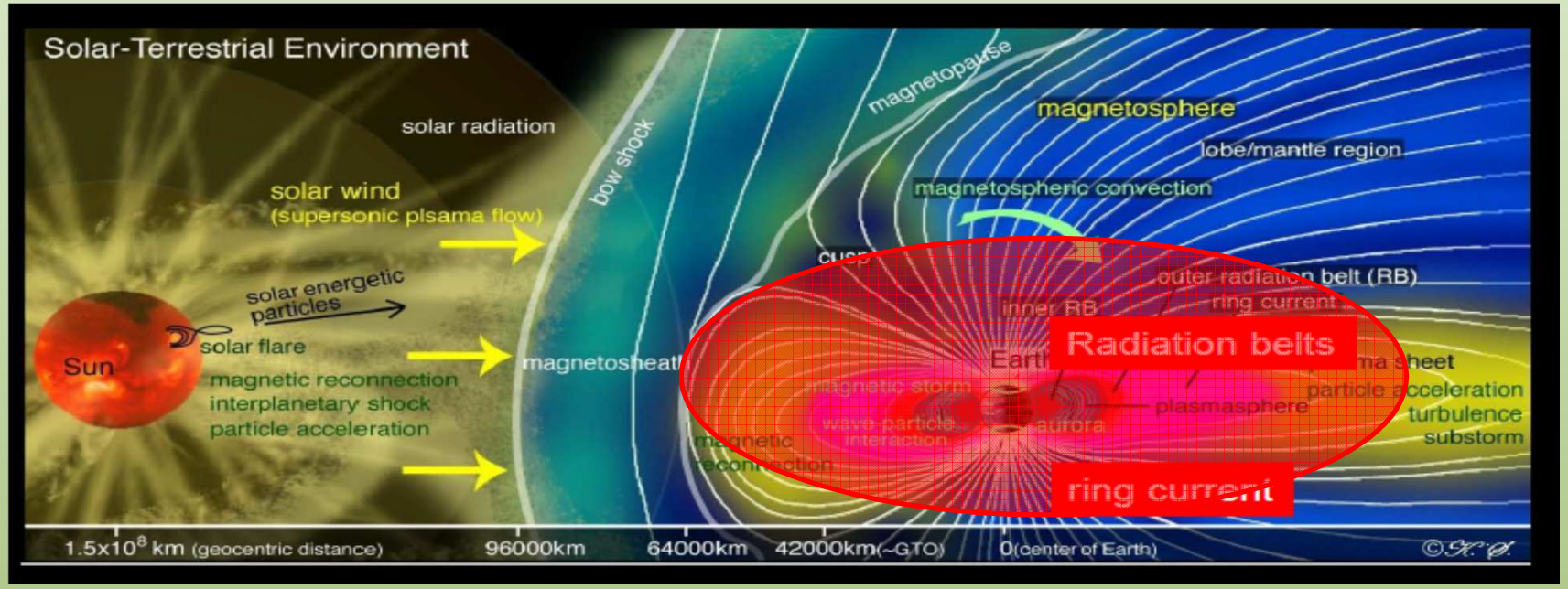
Meteorological, Climatological and Geophysical Agency

Out line

- Motivation Geomagnetic Study in BMKG
- History Geomagnetic Observatory in BMKG
- Overview Geomagnetic Observatory
- Geomagnetic activity in BMKG
  - Observation Geomagnetic in Observatory
  - Research Study: Earthquake Precursor with ULF-EM

Motivation

Scope Activity
Geomagnetic Observatory in BMKG, block red



Duties and functions BMKG by 31 BMKG legislation.

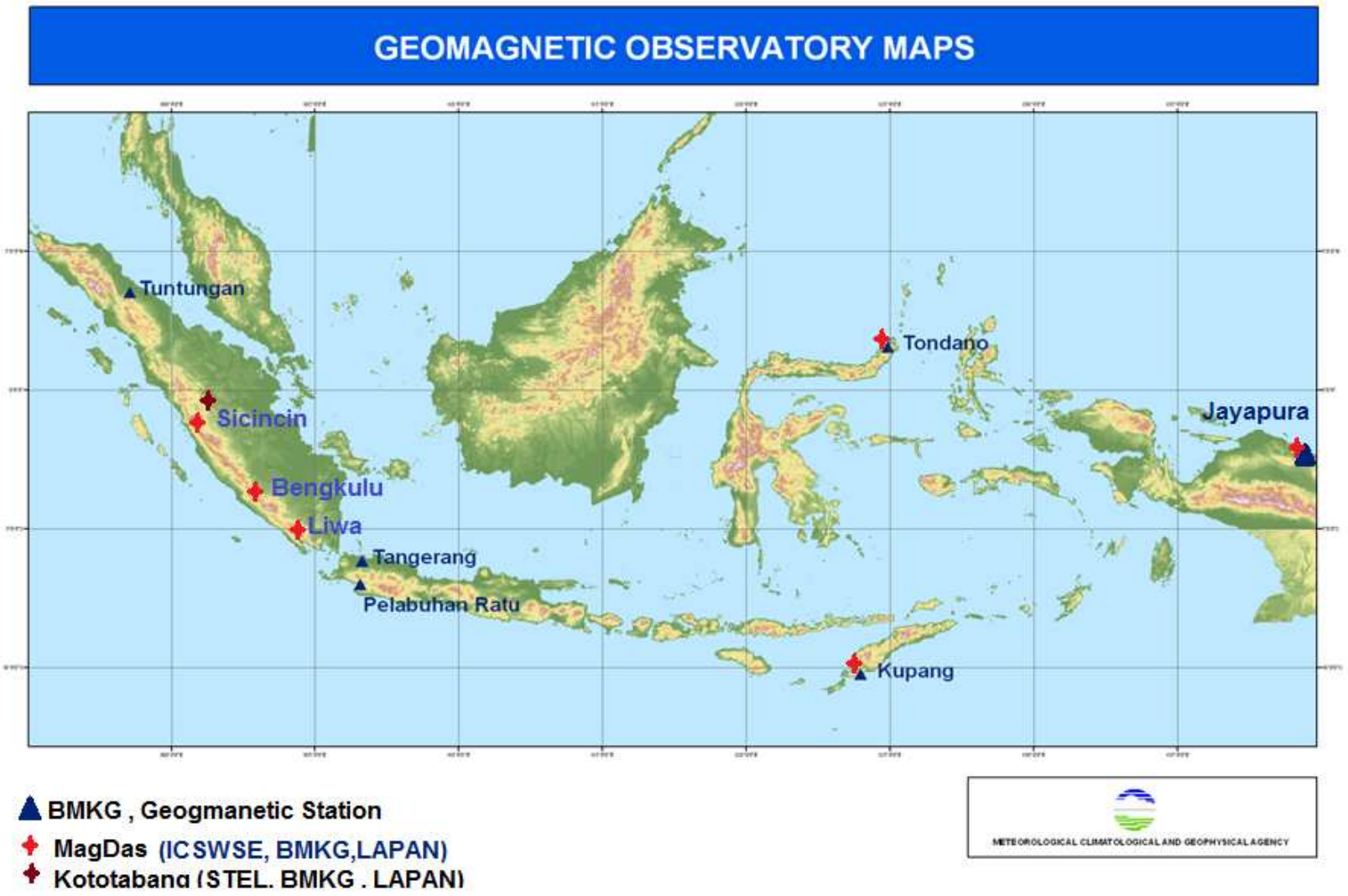
to observe, collect, acquisition and analyze data from the geomagnetic Observatory (ground base) in BMKG

History Geomagnetic Observatory in BMKG

1866 -1883: Magnetograph Photo (Germany)
1883 -1937: Magnetograph Photto Adie's
1937 -1942: Magnetograph Photo Topfer-Schulze's
3-Component in Keeper Island North ward Jakarta
Before INDONESIA

1964-now : Magnetograph Ruska and La Coeur 3-Component Install in Tanggerang
1980- Now : La Coeur 3-Component Tuntungan (Medan) tahun 1980
1991-now : Magnetograph Digital Fluxgate (EDA Variometer)
Install at Tangerang,
1998-now : Magnetograph Digital Fluxgate (EDA Variometer)
2001-now : DMI Three Axis Fluxgate Magnetometer
di Tondano di up grade dengan bantuan
Geoscience Australia
2003-now : Digital Fluxgate Magnetograph install at Tuntungan INTERMAGNET
2005- now : **MAGDAS-2 Install in MANADO**
2007-now : DMI Three Axis Fluxgate Magnetometer
at Pelabuhan Ratu Sukabumi
2008-now : LEMI-018 install in Tuntungan
DMI Three Axis Fluxgate Magnetometer at Kupang
2009 – now: MAGDAS-2 Install in KUPANG
2010-now: DMI Three Axis Fluxgate Magnetometer
di Angkasa Jaya pura
2012 : **MAGDAS-9 Install In Jayapura and MAGDAS-9 Sumatra for Sicincin, Bengkulu and Liwa**

We Have 6 Geomagnetic Observatories are Tuntungan (TUN), Tanggerang (TNG), Pelabuhanratu (PEL), Tondano (TON), Kupang (KUP) and Jayapura (JAY) .
and Workgoup LAPAN and ICSWSE for MagDas (MND,KGP, JAY)
and MagDas-9 Sumatra (SCN,BKL and LWA)



1. Geomagnetic Observatoy Tangerang

Variometer Hut

Geomagnetic Observatory Tangerang

Lat	: 06° 10’ 29 ‘’S
Lon	: 106° 38 ‘79 ‘’E
Elevation	: 14 m
Environtment	: Rice fields and houses
Baserock	: Sandstone

Geomagnetic observatory at beginning 1964

Geomagnetic Instrument:

DIM (Declination Inclination Magnetometer)
- 100 for declination and inclination component

BMZ (BALANCE MAGNETOMETER ZERO)
- 436 for vertical component

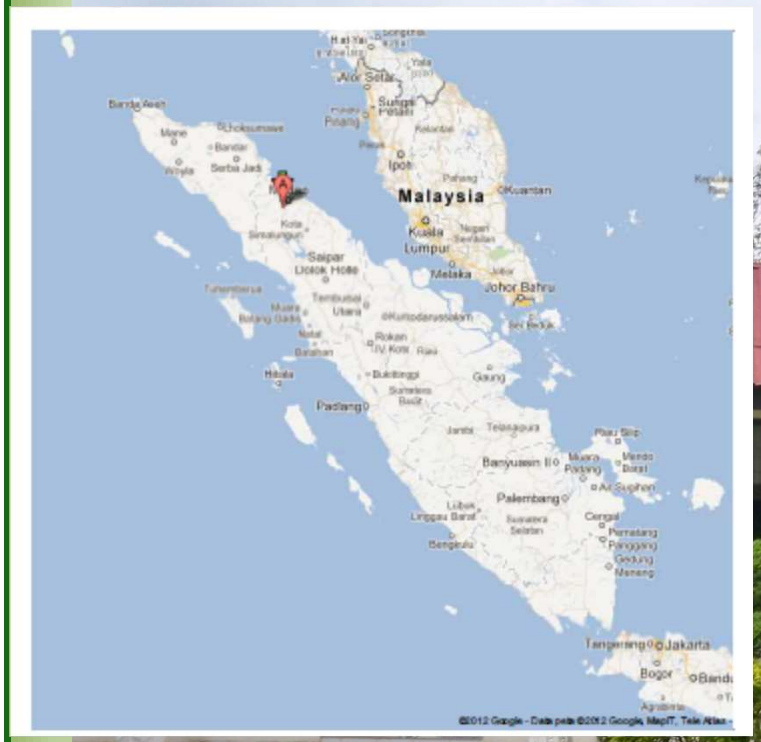
QHM (QUART HORISONTAL MAGNETOMETER)
- 971 for horizontal component (Broken)

Proton PrecissionMagnetometer (PPM) (Broken)

Geomagnetic Instruments in Tanggerang

VARIOGRAPH, QHM AND PPM IS BROKEN

2. Geomagnetic Observatory Tuntungan, Medan



JL. Geofisika No.1 Tuntungan Pancurbatu Medan, West Sumatra

Geomagnetic Observatory Tuntungan

Observation at beginning 1982

Close to Medan City and 20 km from Medan

Lat	**: 03º 03’ 01.4” N**
Lon	**: 98º 33’ 51.6” E**
Elevation	**: 86 M**
Environtment	**: Rice and Plantation field**
Baserock	**: Marine sediment**

Intrument for Absolute Observation :

- **Theodolite with Fluxgate Magnetometer 1 Axis**
- **Proton Precission Magnetometer Geometrics**
- **Diflux Ruska and DIM-100**

Instrument for Geomagntic Variation:

- **The DMI Triaxial Fluxgate Magnetometer , 2003**
- **Proton Precission Magnetometer GSM Overhouser**
- **Digital Variograph LEMI-018 and PPM Geometric 856 , 2008 (New Instruments)**

Variometer Hut

Peralatan Geomagnetik

Analog Variograph
- Variometer Analog
- BMZ
- QHM
- DIM 100
- PPM Geometric 826

Digital DMI
- Fluxgate Magnetometer
- Theodholite Ruska
- PPM Elsec

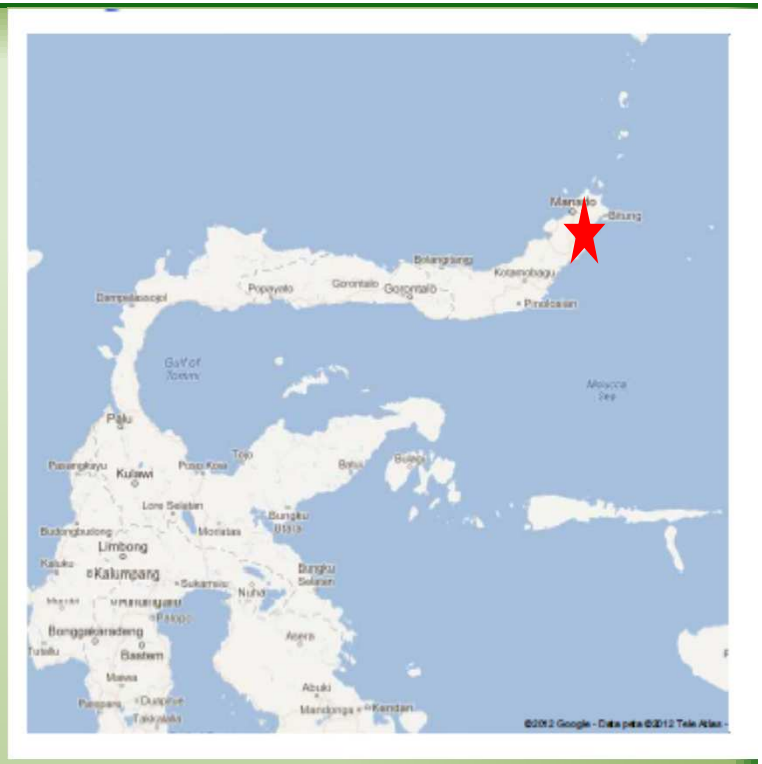
LEMI-018

- Digital LEMI-018
  - Fluxgate Magnetometer (1 second Sampling Rate)
  - Theodolite YOM3

PPM Geometric 856

3. Geomagnetic Observatory Tondano, Manado

Stasiun Geofisika Manado



Variometer Hut, Tondano

3. Geomagnetic Observatory Tondano, Manado

Observation at beginning 1995

Location close to Tondano Lake, accomplished area : 30 Km from Manado City

Lat	**: 01° 17’ 42” N**
Lon	**: 124°55’ 30” E**
Elevation	**: 704 m**
Environtment	**: Rice fields and houses**
Baserock	**: Sandstone**

Instrument for Absolute Observarion:

- **Theodolite DIMagnetometer**
- **Proton Precission Magnetometer**

Observation for Variation

- **The DMI Triaxial Fluxgate Magnetometer (5 second Sampling Rate)**
- **Ruska Variograph**
- **MAGDAS-2**

Geomagnetic Instrument at Tondano

SENSOR PPM STATIONERY

FLUXGATE SENSOR

FLUXGATE MAGNETOMETER ABS

SENSOR PPM MOBILE

FLUXGATE MAGNETOMETER MOBILE

THEODOLITE

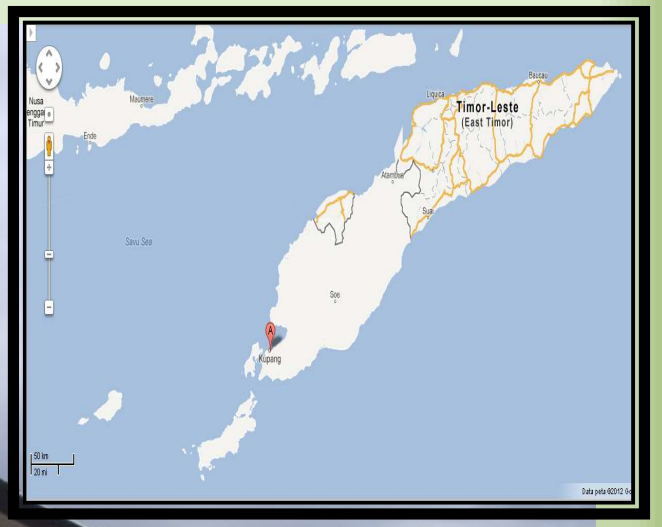
Variometer Hut

Absolute Hut

Absolute Measurement

Data Processing

4. Geomagnetic Observatory Kupang



STASIUN GEOFISIKA KLAS I KUPANG, NTT

Geomagnetic Observatory Kupang

Observation at benginning 2007
At Desa Bonen, Baumata Kec Fenpiu, Kupang

Lat	**: 10°11`58.7`` S**
Lon	**: 123°40`12.7`` E**
Elevation	**: 100 m**
Environment	**: Fields and Houses**

Instrument for Absolute Observation:
Theodolite DIMagnetometer
Proton Precission Magnetometer GSM 19

Instrument for Geomagnetic Variation :
The DMI Triaxial Fluxgate Magnetometer
(5 second Sampling Rate)
Proton Precission Magnetometer GSM Overhouser
MAGDAS-2

Geomagnetic Instrument at KUPANG

The DMI Triaxial Fluxgate dan DI Magnetometer

Variometer Hut

5. Geomagnetic Observatory at Pelabuhan Ratu

Stasiun Pengamatan Geomagnetik Pelabuhan Ratu

Observation at beginning 2007

Lat	**: 06º 58’ 48” S**
Lon	**: 106º 32’ 59” E**
Elevation	**: 54 m**
Environtment	**: Rice fields and houses**

Instrument for Absolute Observation :

DI Magnetometer

Proton Precission Magnetometer GSM 19

Instrument for Geomagntic Variation :

The DMI Triaxial Fluxgate Magnetometer

(5 second Sampling Rate)

Proton Precission Magnetometer GSM Overhouser

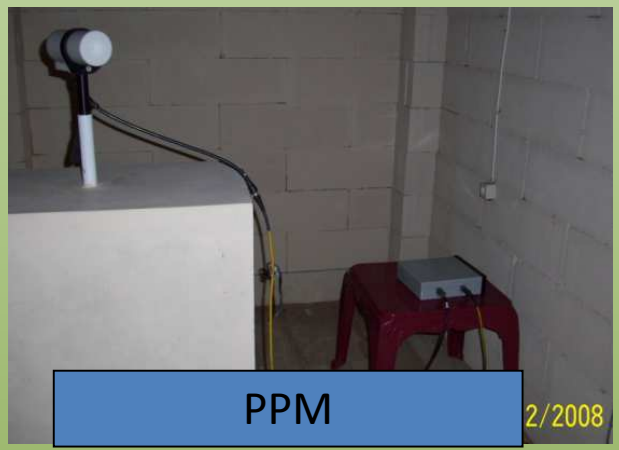
Peralatan Geomagnetik

Sensor Fluxgate

Digital Fluxgate

DIMagnetometer

Display DIM



PPM


Variometer Hut
Absolute Measurement


Processing Room
06/12/2008

6. Geomagnetic Observatory Jayapura

Geomagnetic Observatory Jayapura

MagDas-9 Tilt Setting

Close to Medan City and 20 km from Medan

Lat	**: 03º 03’ 01.4” N**
Lon	**: 98º 33’ 51.6” E**
Elevation	**: 86 M**
Environtment	**: Rice and Plantation field**
Baserock	**: Marine sediment**

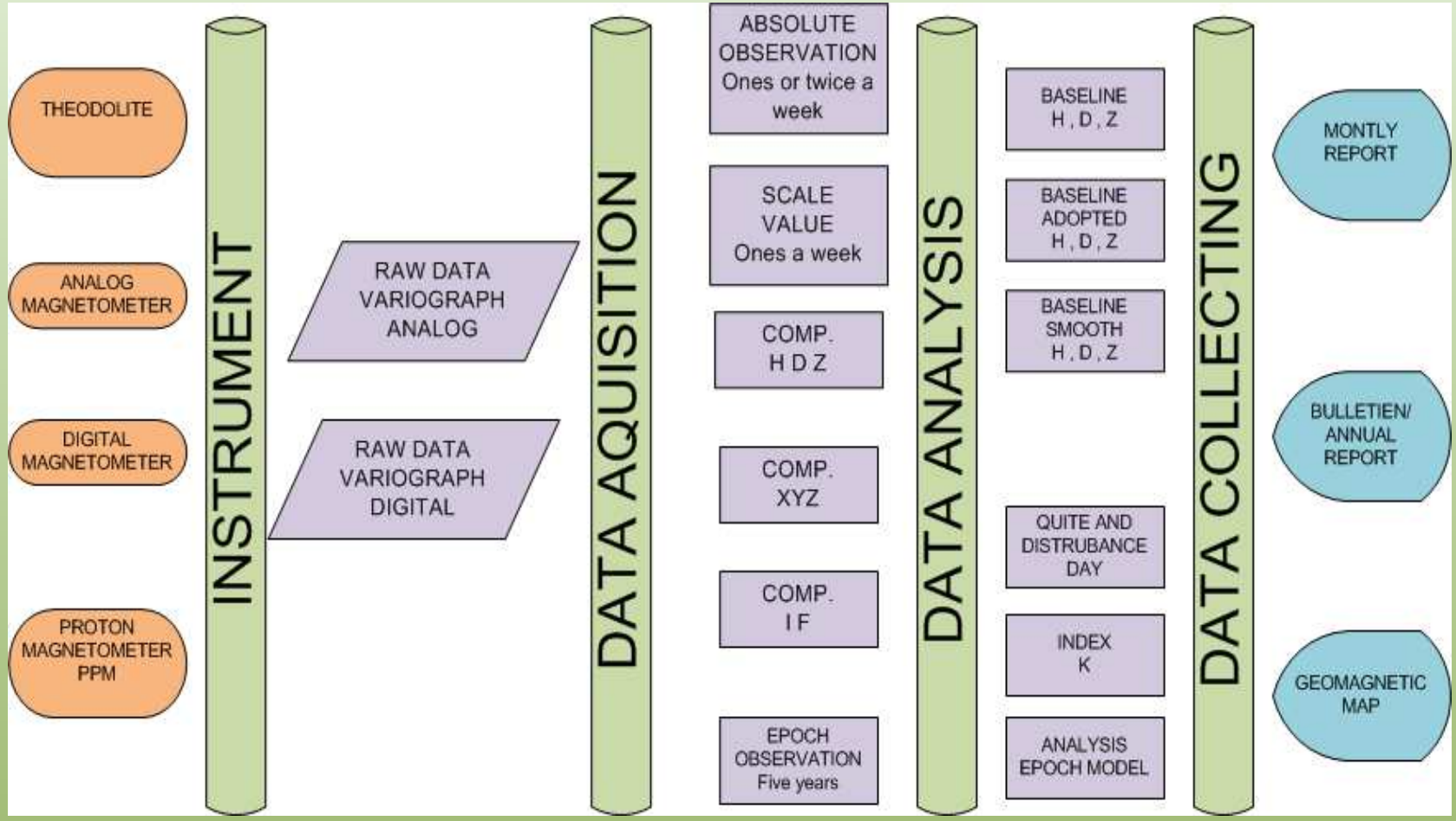
Instrument for Geomagntic Variation:

- **Digital Variograph LEMI-018 and PPM Geometric 856 , 2010**
- **MAGDAS-9 Install 2012**

LEMI -18 (sensor and Data Logger)

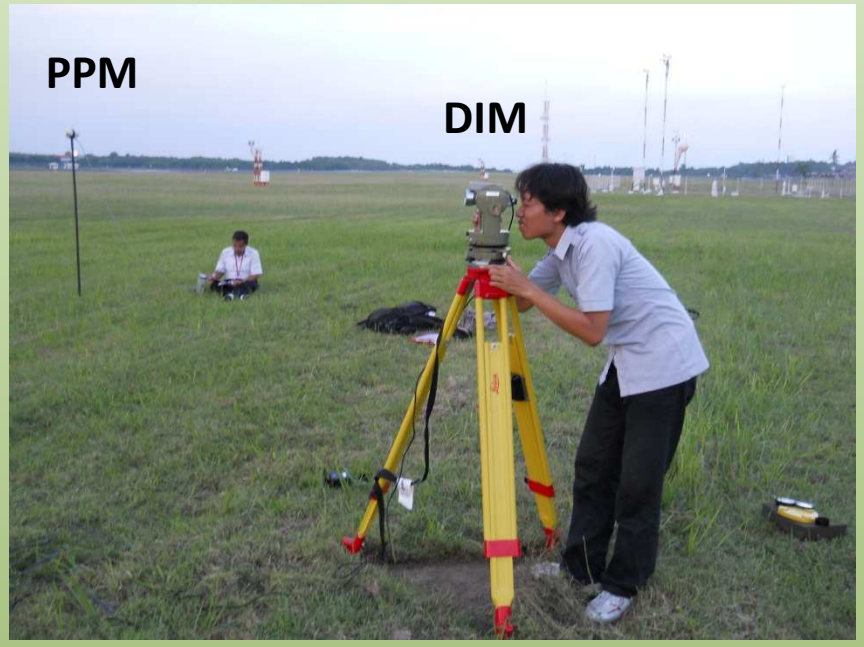
MagDas-9 (Sensor and Data Logger)

Geomagnetic Work in BMKG

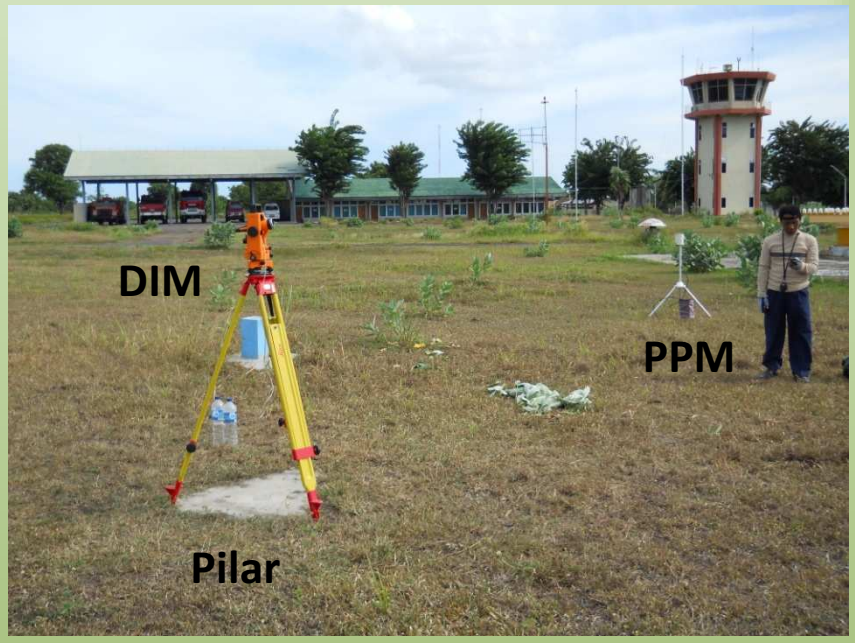


Repeat Station

Repeat station measurement every 5 year (epoch Magnetic) for correction value Declination, Inclination in the Point (city) and We have 103 site for make geomagnetic Epoch

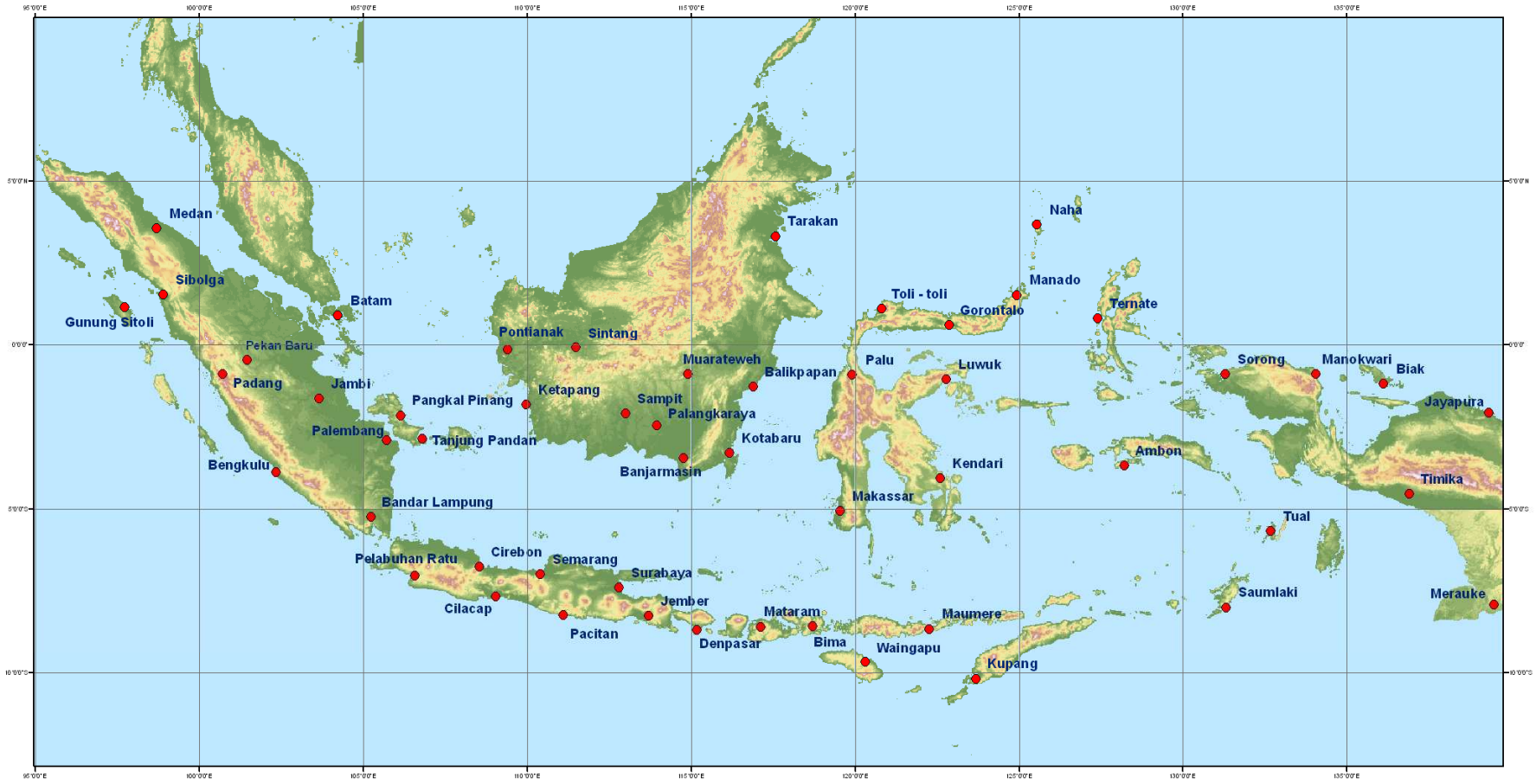


Measurements Declination and Inclination
Ngurah Rai airport Denpasar
(Epoch 2010)



Measurements for Repeat Station
Wai Oti air port **Maumere**
(Epoch 2010)

REPEAT STATIONS MAP for Epoch (Annual MAGNETIC MAP)



Legend :

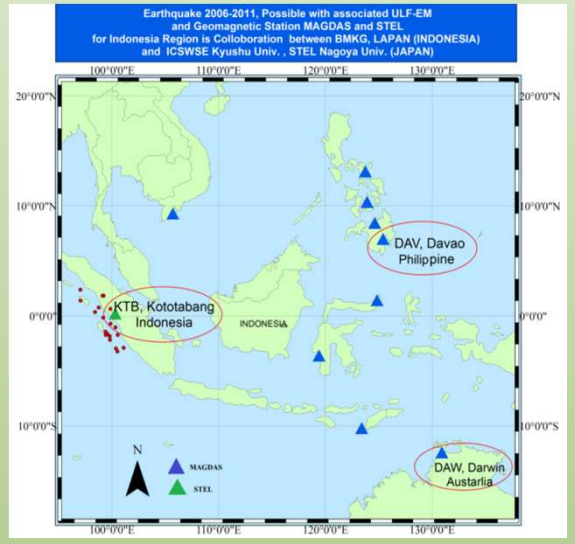
- Repeats Stations

METEOROLOGICAL CLIMATOLOGICAL AND GEOPHYSICAL AGENCY

MAGDAS-9 Sumatra, for Monitoring Earthquake precursor

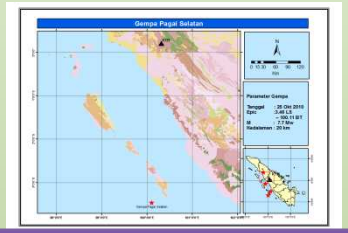
Characteristic of ULF Emission for Determination Earthquake Precursor for Strong Earthquake Sumatra period 2006-2011

Data Collecting

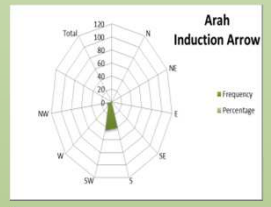


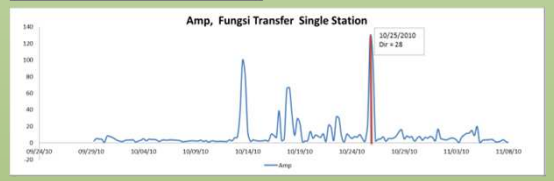
Analyze

Mentawai Eq. Mw = 7.8 Hypo- Distance to KTB 358 km



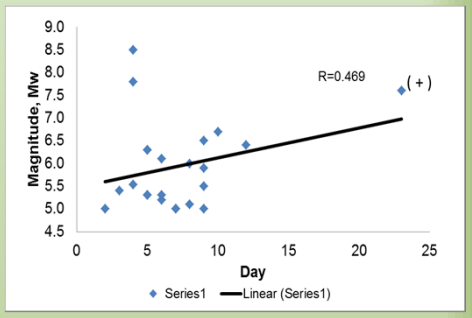
Transfer Function-Single Station



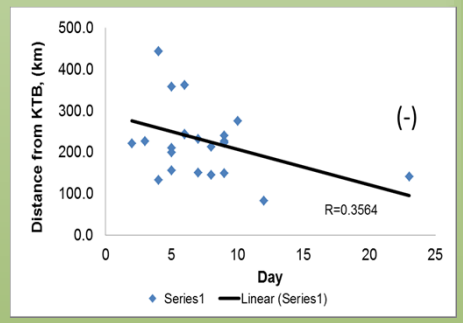


Polarization power ratio Z/H

Result

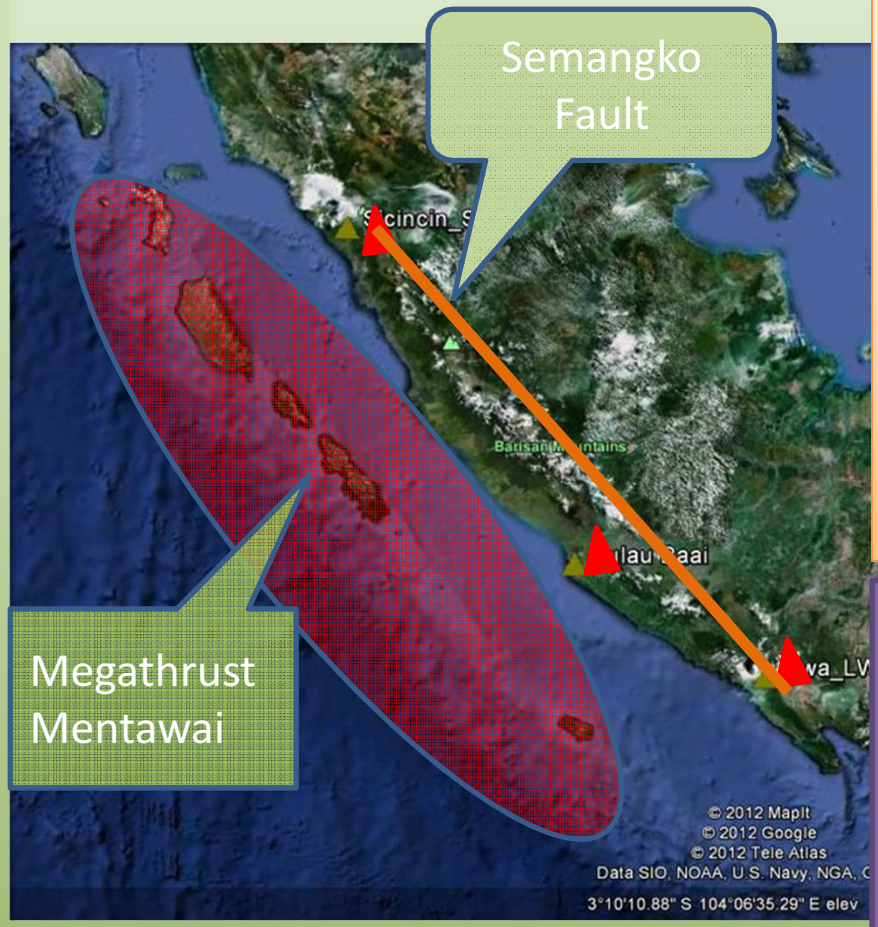


Trend (+) for Magnitude and Anomaly ULF



Trend (-) for Distance Hypo and Anomaly ULF

Research Earthquake Precursor associated ULF emission based on MAGDAS-9 Sumatra Cluster



Data:
MAGDAS-9 Sumatra
a. Sicincin, SCN
b. Bengkulu, BKL
c. Liwa, LWA

Stage-1
Target : Study and Monitoring ULF emission earthquake precursor in Seismic Gap Megathrust Mentawai and Semangko Fault

PhD Research and Collaborations BMKG, ICSWSE, LAPAN and ITB
Suaidi Ahadi
Promotor
Prof G. Ibrahim, Prof. K. Yumoto and Prof. S. Saroso

TERIMA KASIH
THANK YOU

Who..?