Case Study on Manado Earthquakes in 2008 using Polarization and Comparison between MAGDAS/CPMN observatories Method

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Introduction :
space weather research in Space Science Center LAPAN

- The Sun
- Space Environment
- Ionosphere
- Geo and Space Magnetism

The sun and space environtment

- Solar flare prediction based on sunspot number, magnetic class, area, position on solar hemisphere
- Geoeffective of solar activity
- Solar radio burst
- Satellite anomaly due to energetic particles → SIAS (satellite anomaly information system) As a tool of early warning system for satellite operation by using energy and flux of energetic proton and electron and Kp indices
- monitoring of fallen space objects → http://foss.dirgantara-lapan.or.id/orbit/index.php

Ionosphere

Regional Ionospheric Research:

Ionospheric dynamics and its impact to

- Terrestrial communication
- Satelitte comunication
- Navigation; satellite-based position determination

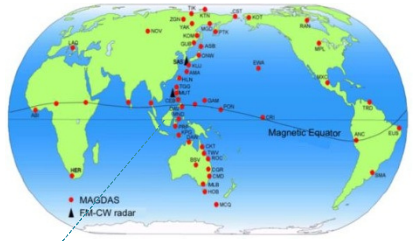
To do so we do researches about:

1. Models to predict the condition of the ionosphere
2. Software for predicting the condition of ionosphere .
3. Information for mitigation of ionospheric dynamics

Geo and space magnetism observation and research

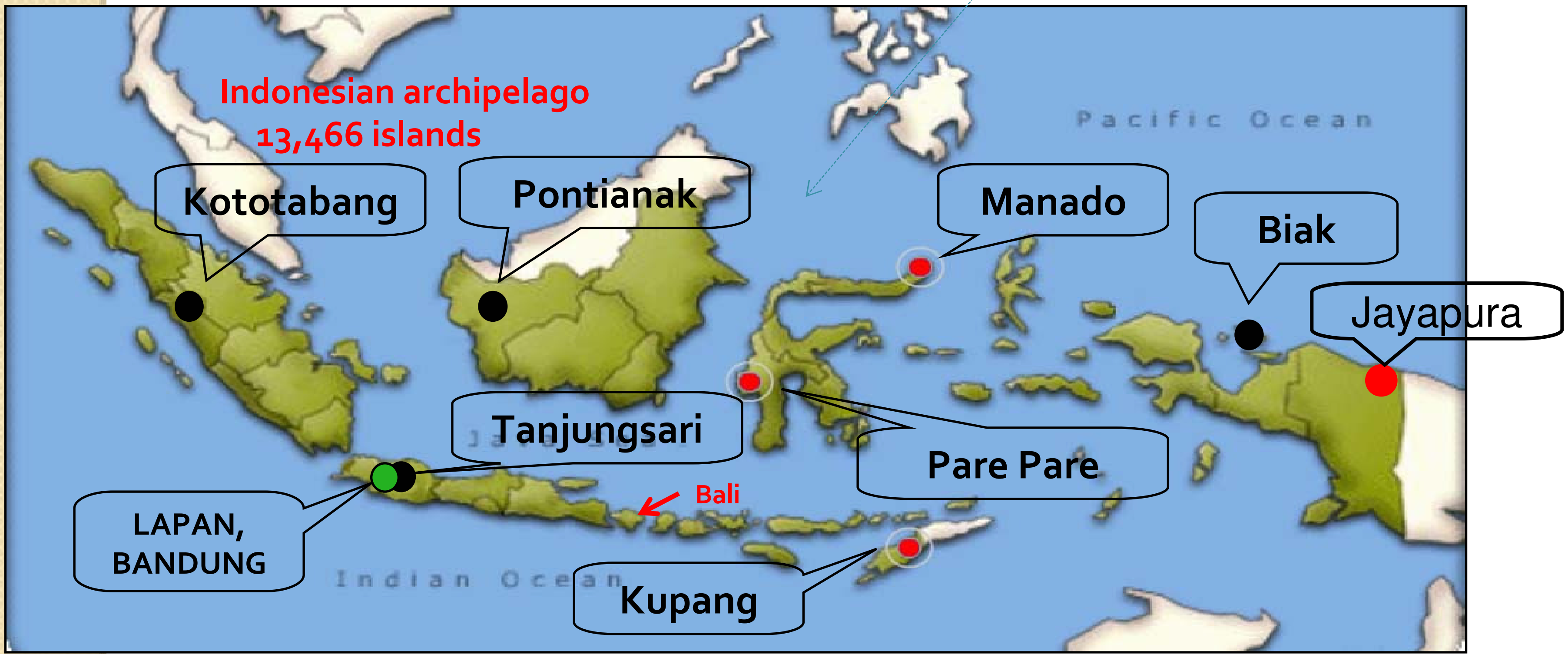
- Research on magnetic micropulsations (Pc3, Pc5, Pi2)
- Modelling on variation of diurnal regional magnetic disturbances
- Study on earthquake precursor using some methods (WTMM, Flicker Noise Spectroscopy, Polarization, Box Counting, etc)
- Study of the relation of geomagnetic storm with Geomagnetic Induced Current (GIC)

MAGDAS NETWORK IN INDONESIA



International Collaboration Research between LAPAN (National Institute of Aeronautics and Space), Indonesia and SERC (Space Environment Research Center), Kyushu University.

MAGDAS has been installed since 2005 at three sites in Indonesia: PRP (Pare-Pare, South Sulawesi), MND (Manado, North Sulawesi) and KPG (Kupang, East Nusa Tenggara).



Manado Station

Magdas was installed in Manado since July 26^{th}, 2005, and replaced with Magdas II on January, 2010.

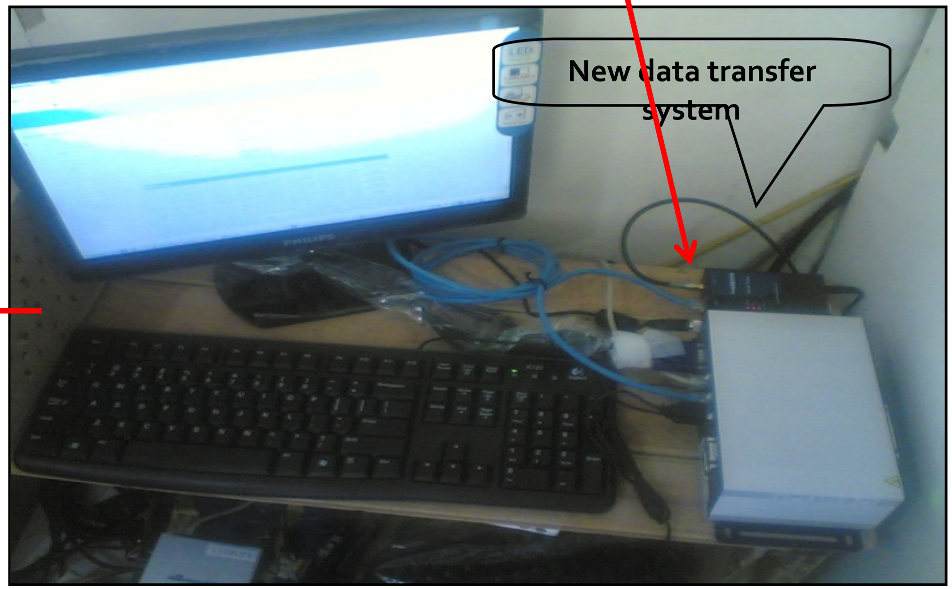
GMB Magnetometer records 3 component i.e H-component, D-component, Z-component.

and 1 Hz sampling.

GLat	GLon	MLat	MLon
1.44	124.84	-6.91	196.06

GPRS - GSM Modem

3G GSM Router



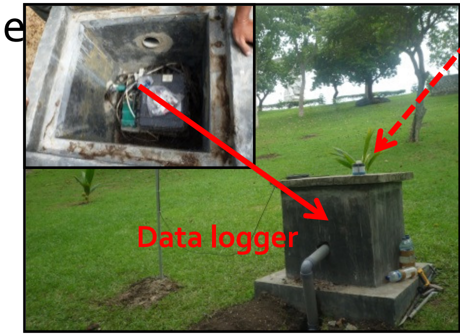
Pare Pare Station

Magdas was installed in Pare-Pare since July 24th, 2005, *and* replaced with Magdas II on January, 2010.

GMB Magnetometer records 3 component i.e H-component, D-component, Z-component.

and 1 Hz sampling.

GLat	GLon	MLat	MLon
-3.60	119.40	-12.38	190.75



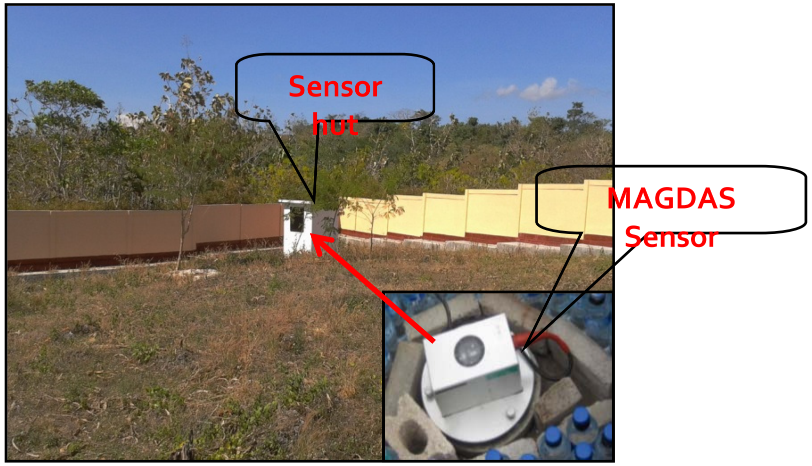
Kupang Station

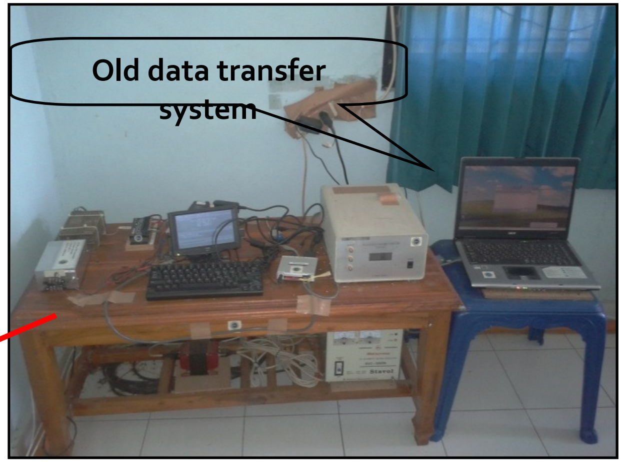
Magdas was installed in Kupang since July 21th, 2006, *and replaced with Magdas II on January, 2010.*

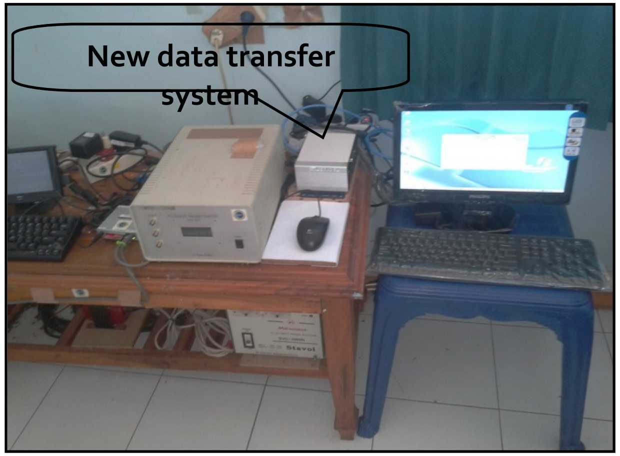
FRG-601 Magnetometer records 3 component i.e H-component, D-component, Z-component.

and 1 Hz sampling.

GLat	GLon	MLat	MLon
-10.20	123.40	-19.58	194.95

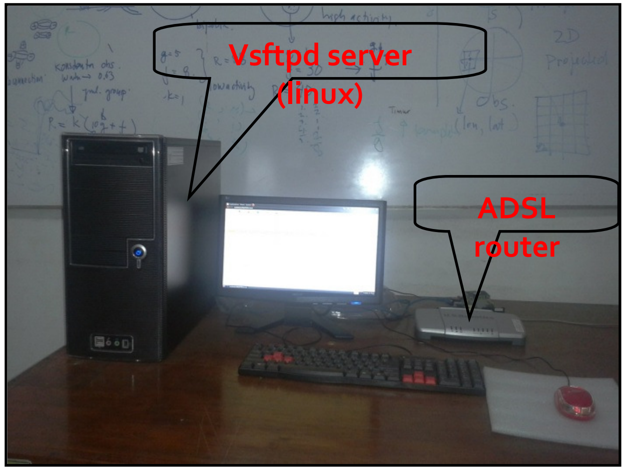




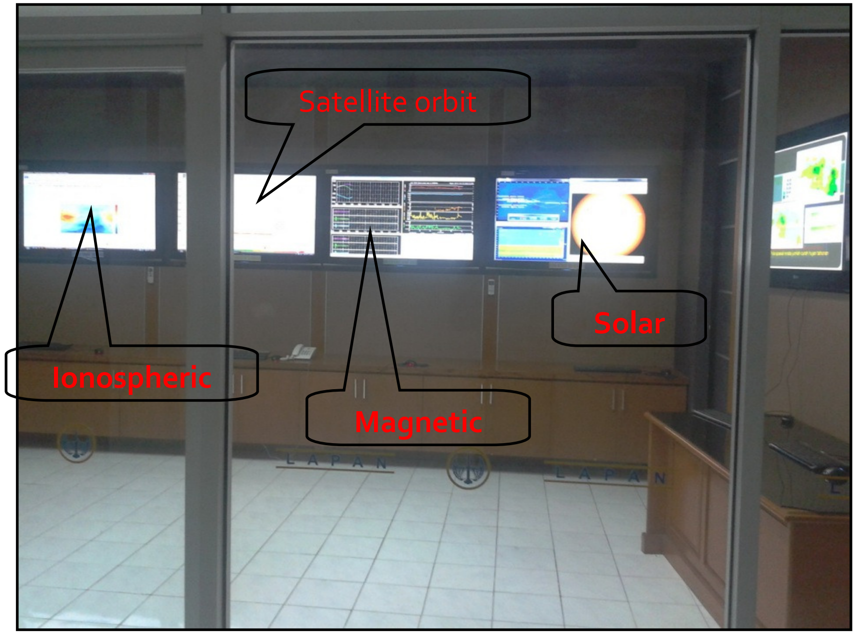


The data is transferred continuously to our server (Bandung). We also setup another server as backup when our main server down.

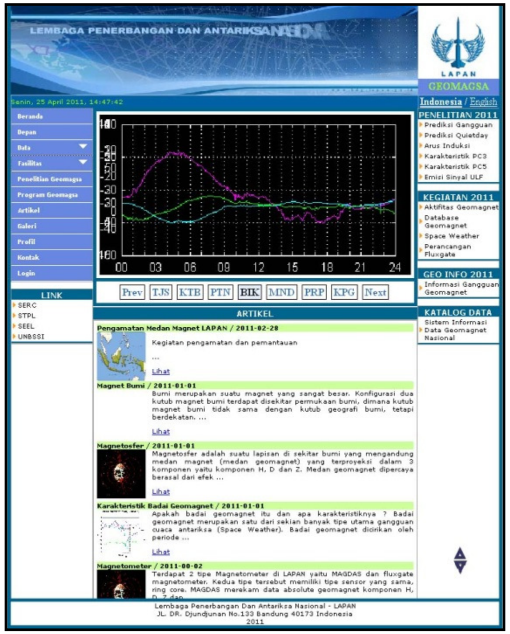
Data is transfered to primary server <host: 118.97.186.27> (left), or to secondary server <host: 110.136.145.80> (right)



To monitor performance of the data transfer system we developed a near real-time data quick look at Space Science Center (LAPAN).

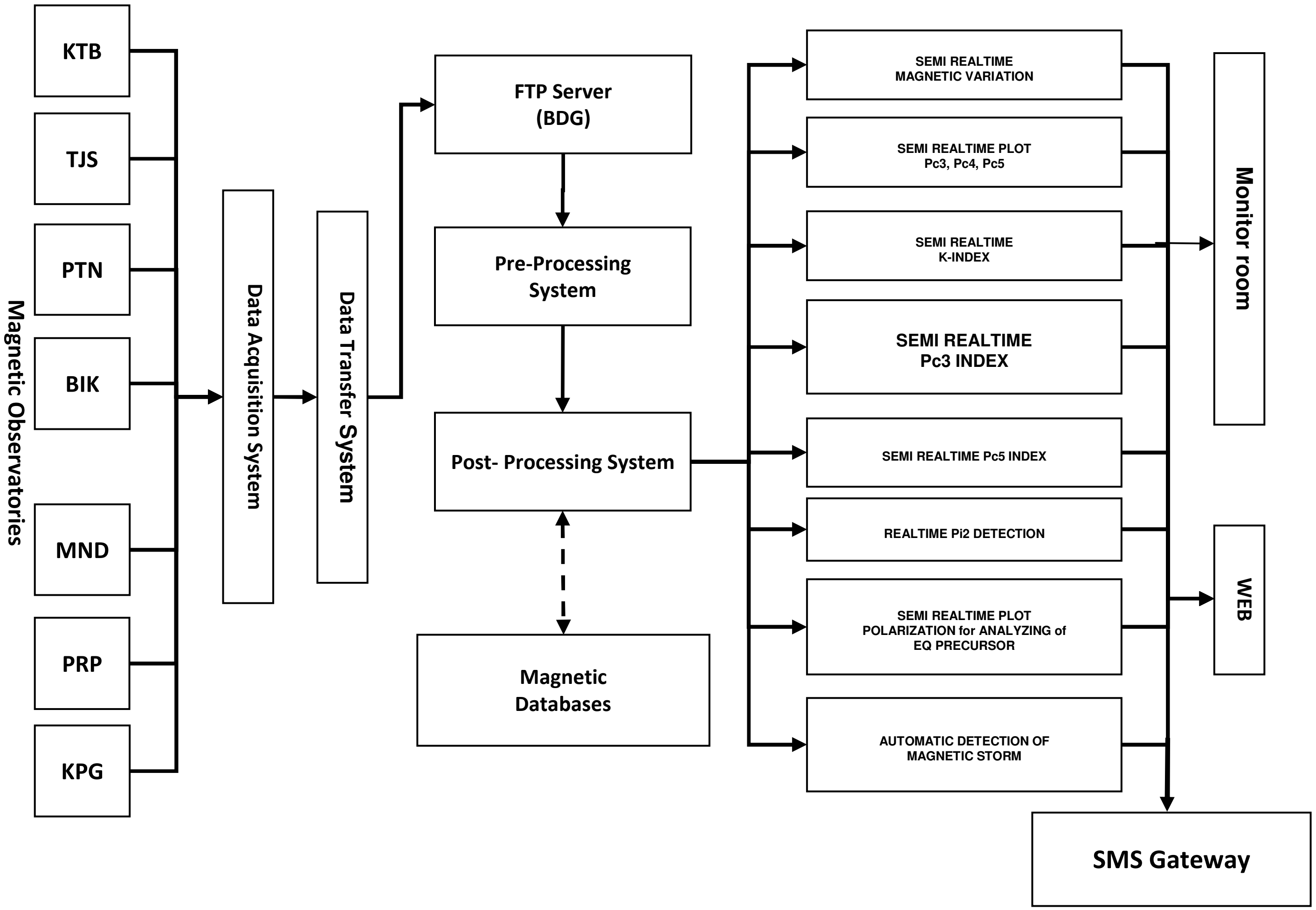


Monitor Room



http://www.bdg.lapan.go.id/

Space weather services (geo and space magnetism)

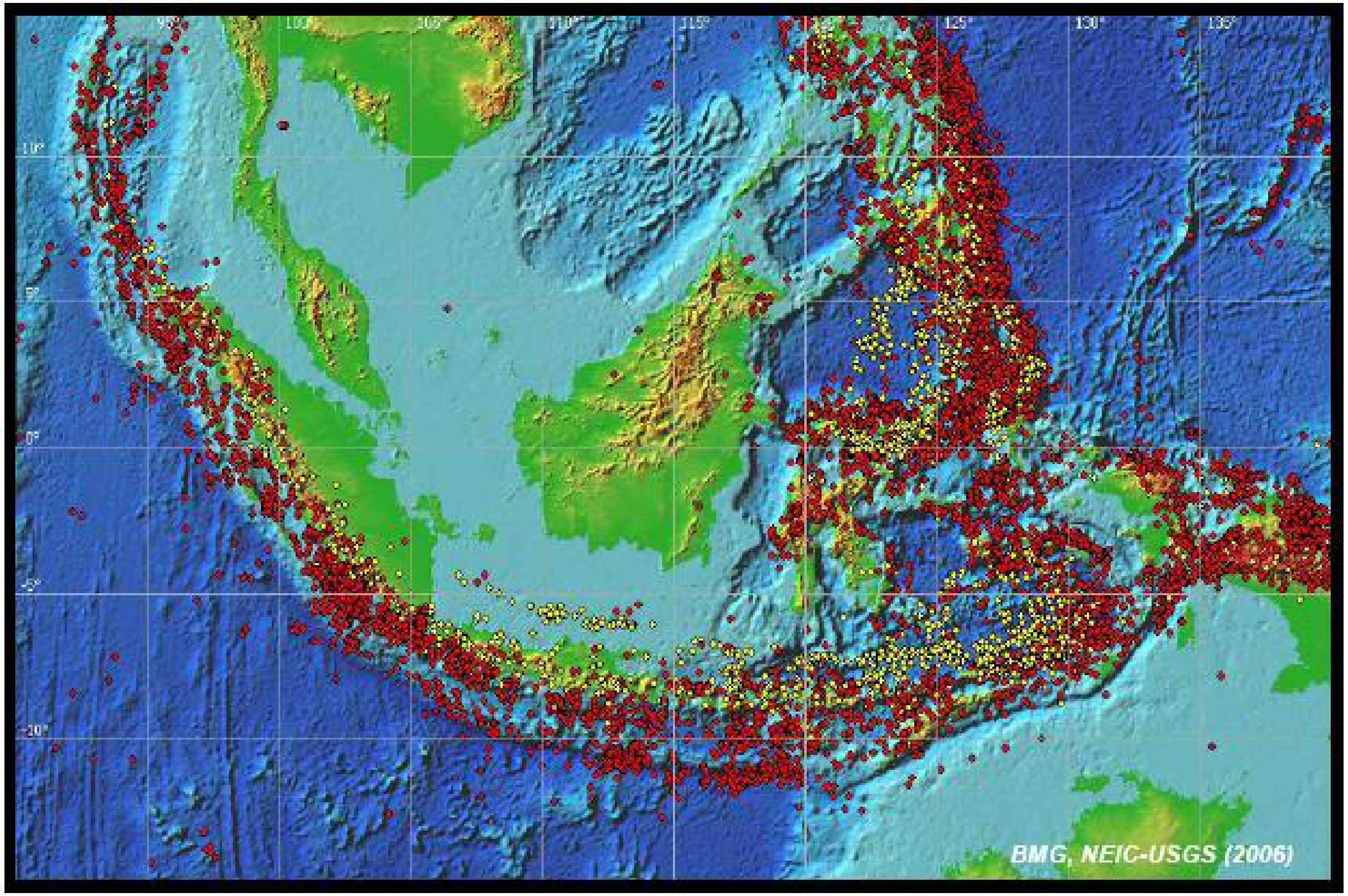


Case study of earthquakes around Manado on 2008

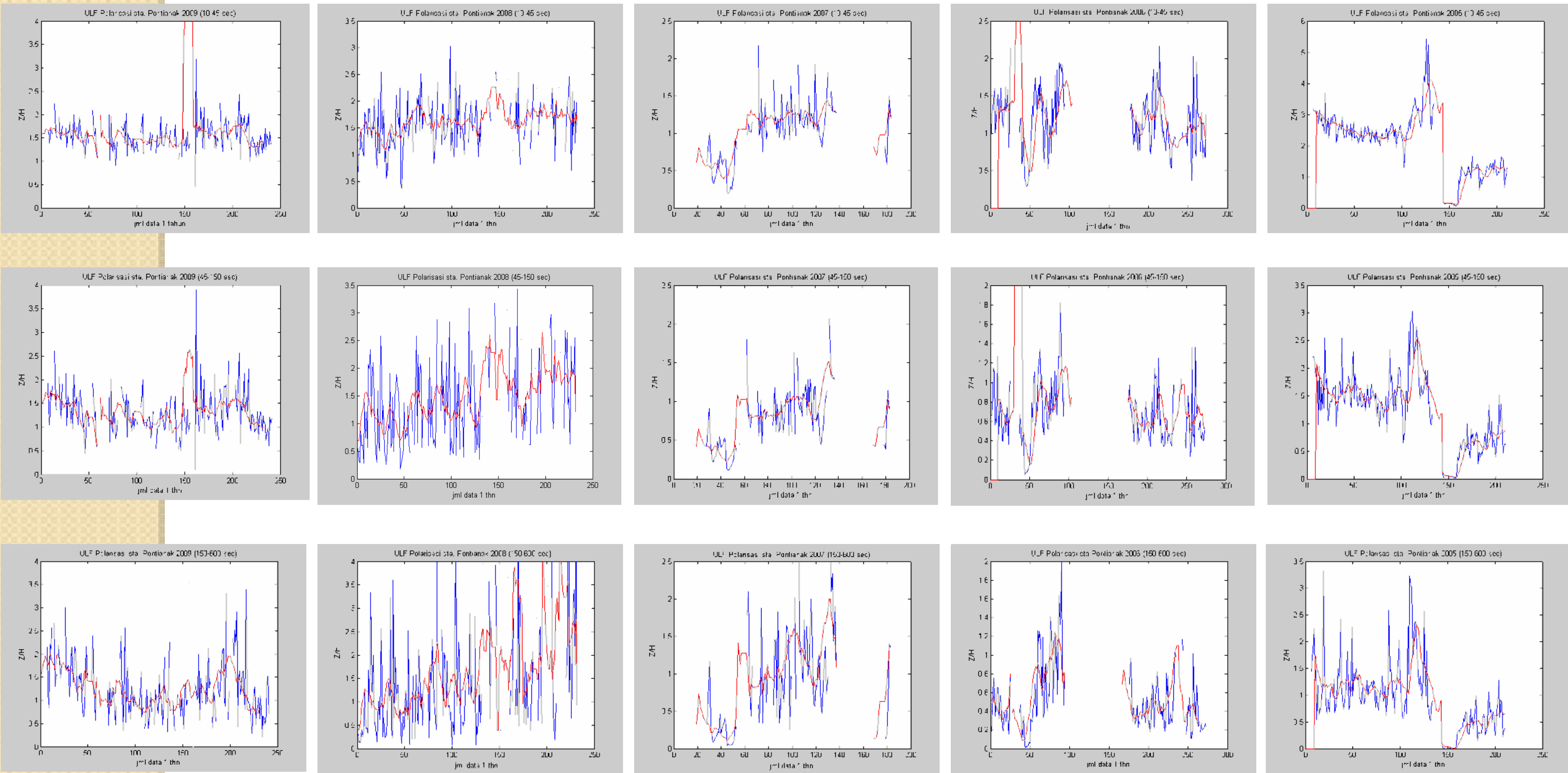
tanggal	Lat (N)	Long (E)	magnitude	distance	observatory
16/4/2008	0.83	126.08	5.7 Mw	153.62 km	MND
13/5/2008	1.37	125.69	5.1 Mw	94.92 km	MND
10/7/2008	0.94	125.96	5.1 Mw	136.37 km	MND

- Problems : how to distinguish anomaly come from space or lithosphere ?
- Hypothesis : geomagnetic activity come from space will make global effect to all geomagnetic components in every observatories so comparing the polarization data between 2 observatories will leave the local anomaly only.
- Methods : ULF polarization → Z/H , compare 2 observatories
- Data : H and Z component of MAGDAS/CPMN data

Seismicity in Indonesia 1600 -2004



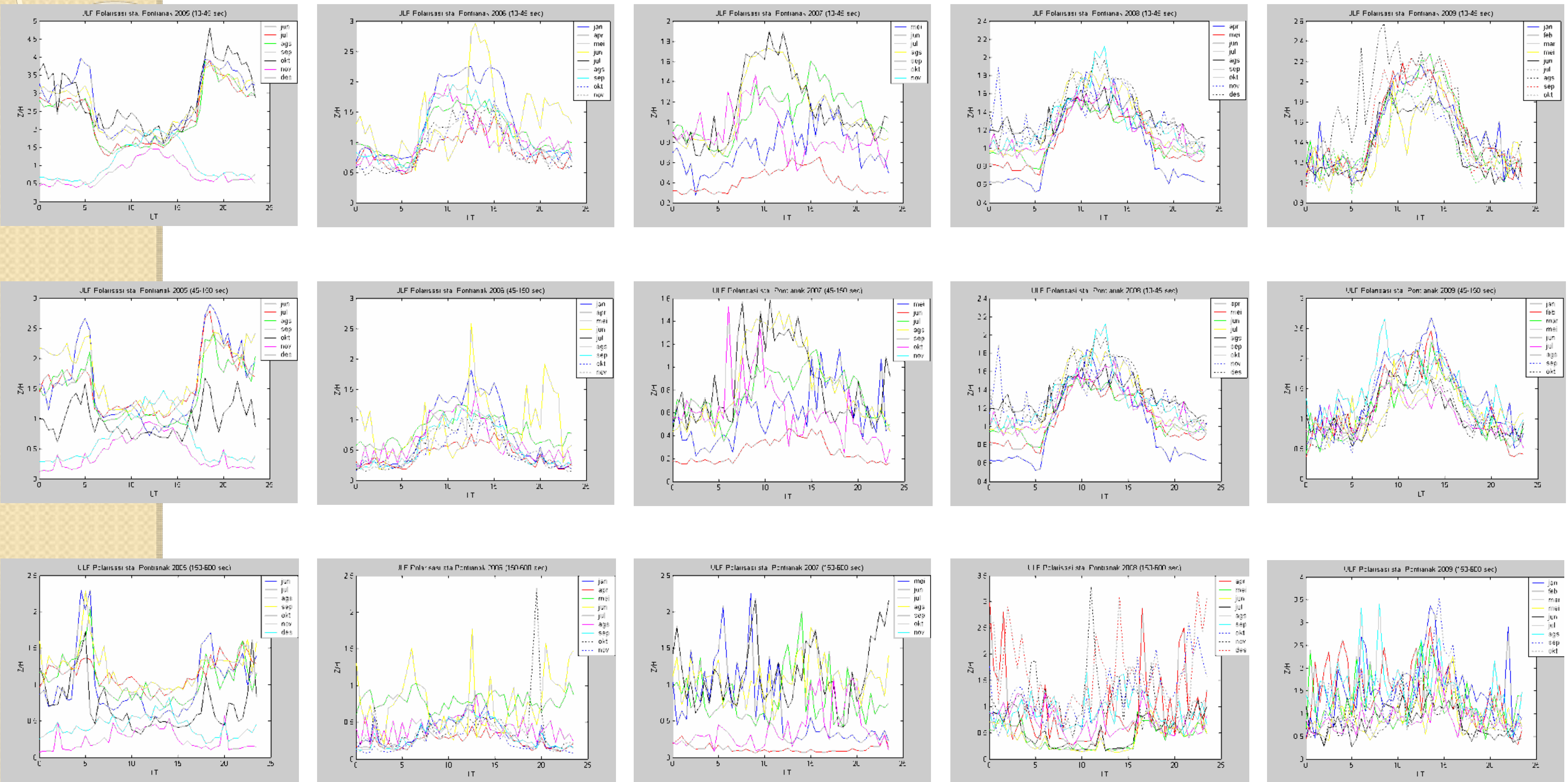
Annual ULF polarization(Z/H) at PTK 2005 - 2009

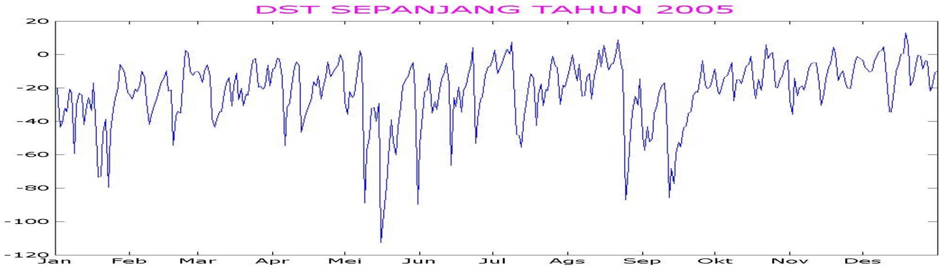


2009 2008 2007 2006 2005

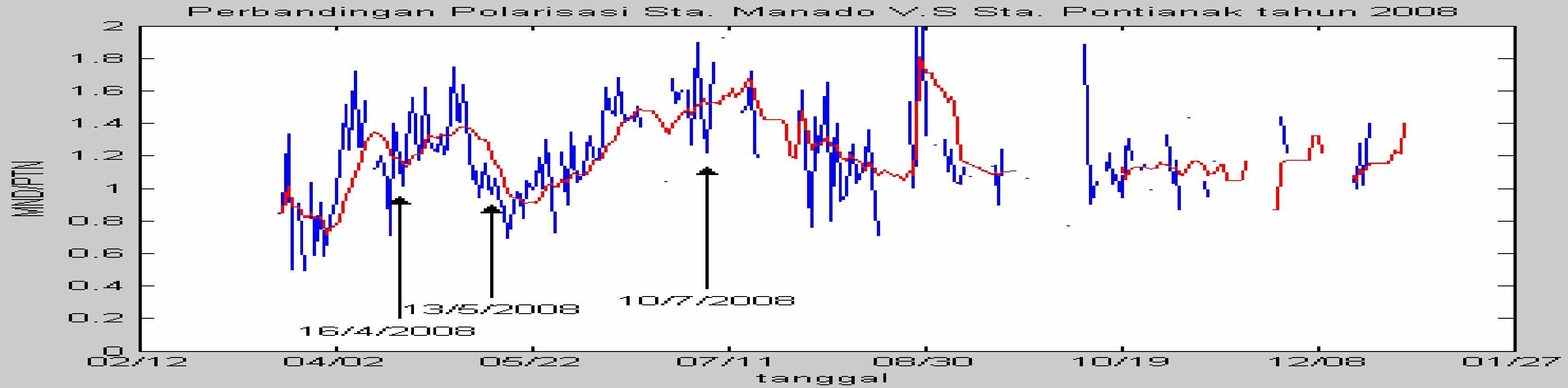
ULF polarization(Z/H) monthly at PTK 2005 - 2009

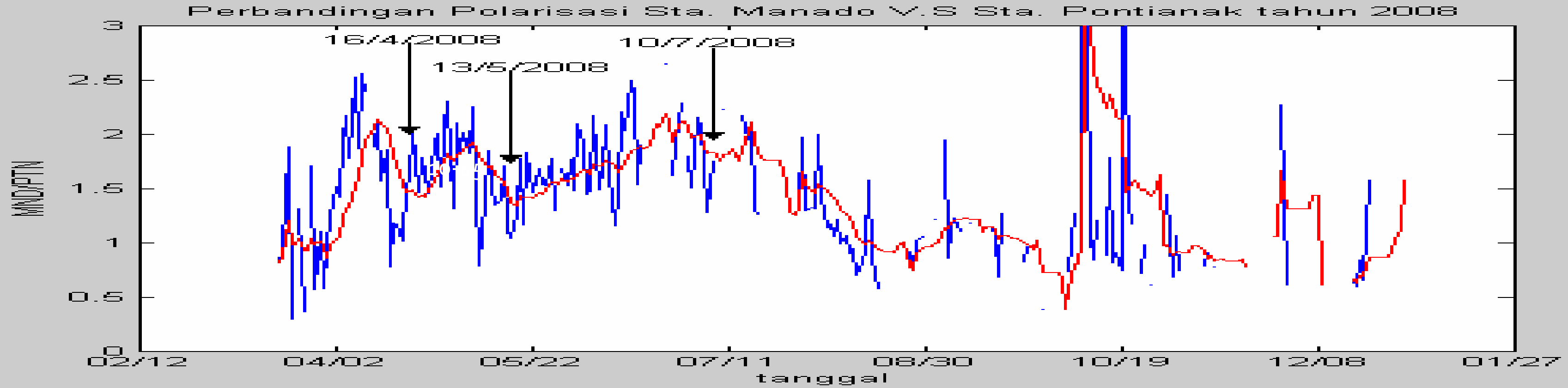
2005 2006 2007 2008 2009

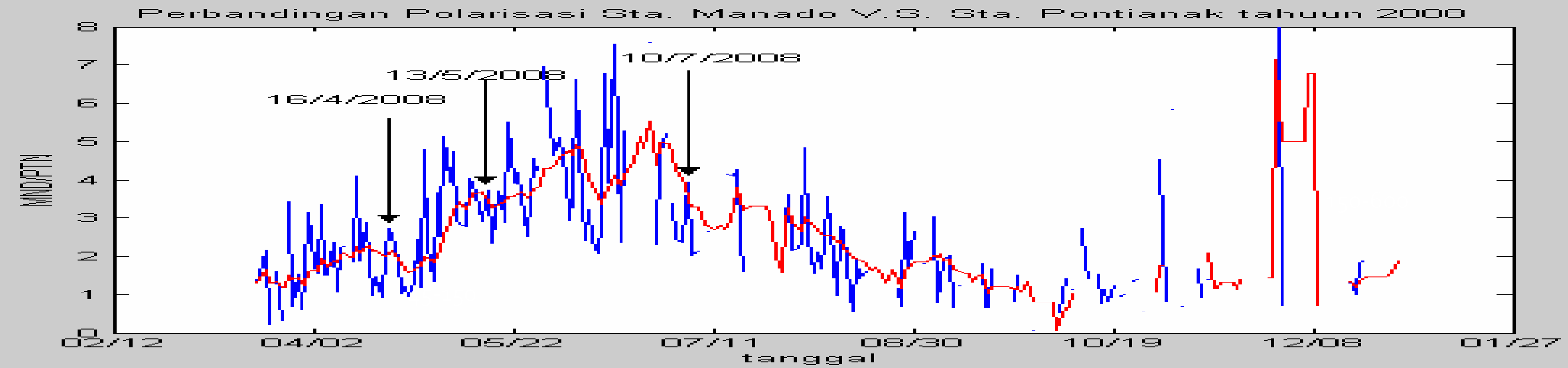




Sta. Manado v.s Sta. Pontianak 2008



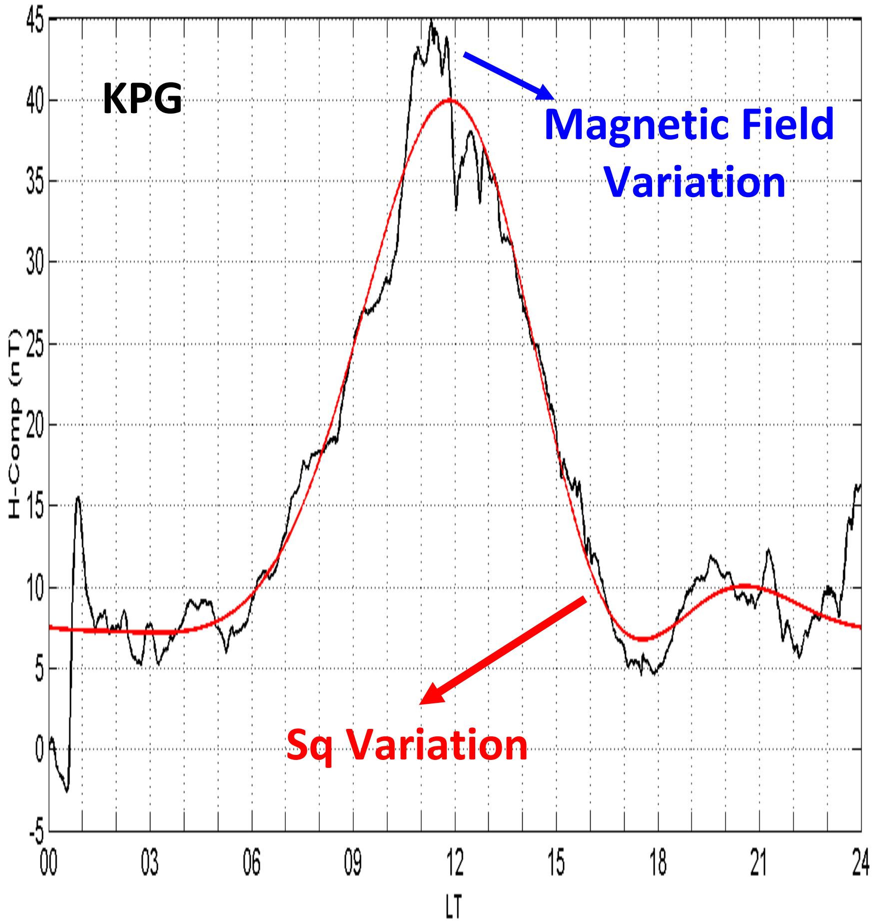




Study of Sq Variations and Geomagnetic Disturbance

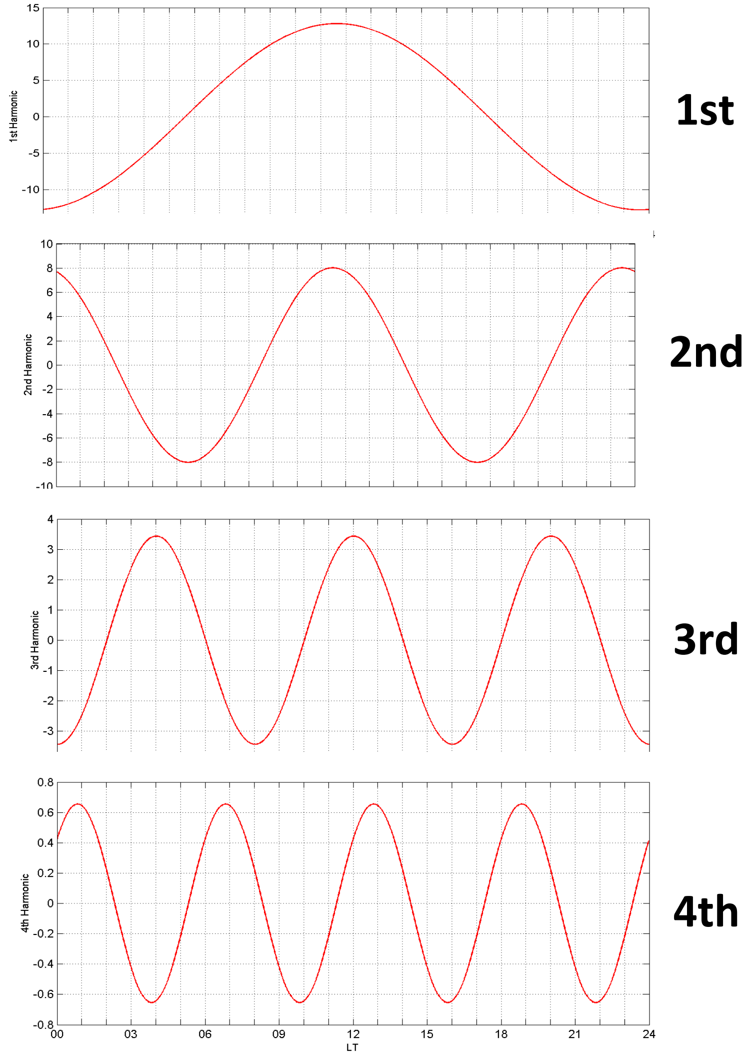
Local Time Variation and Its Fourier Decomposition

Magnetic Variation, 5 May, 2011

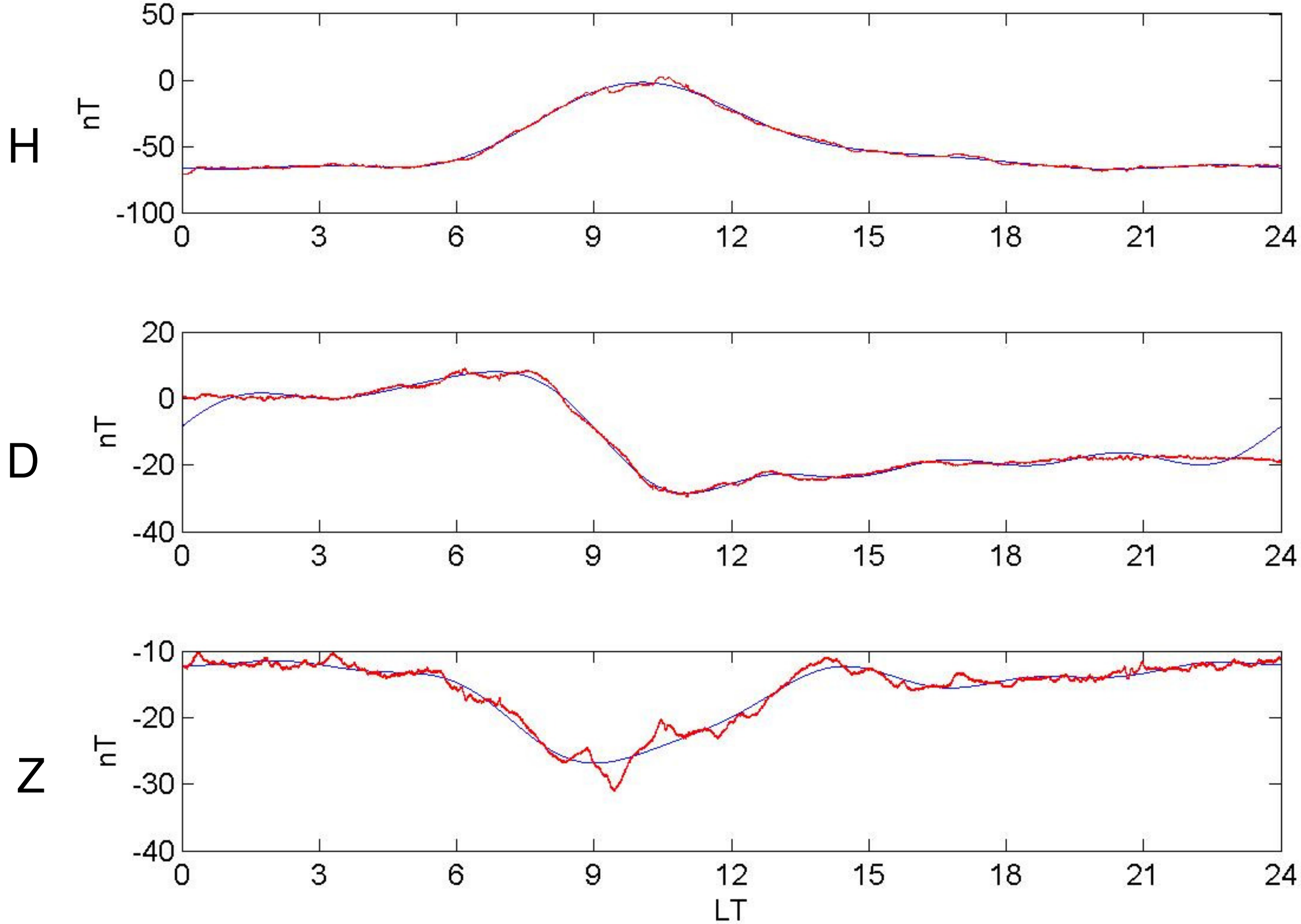


(Musafar,2010)

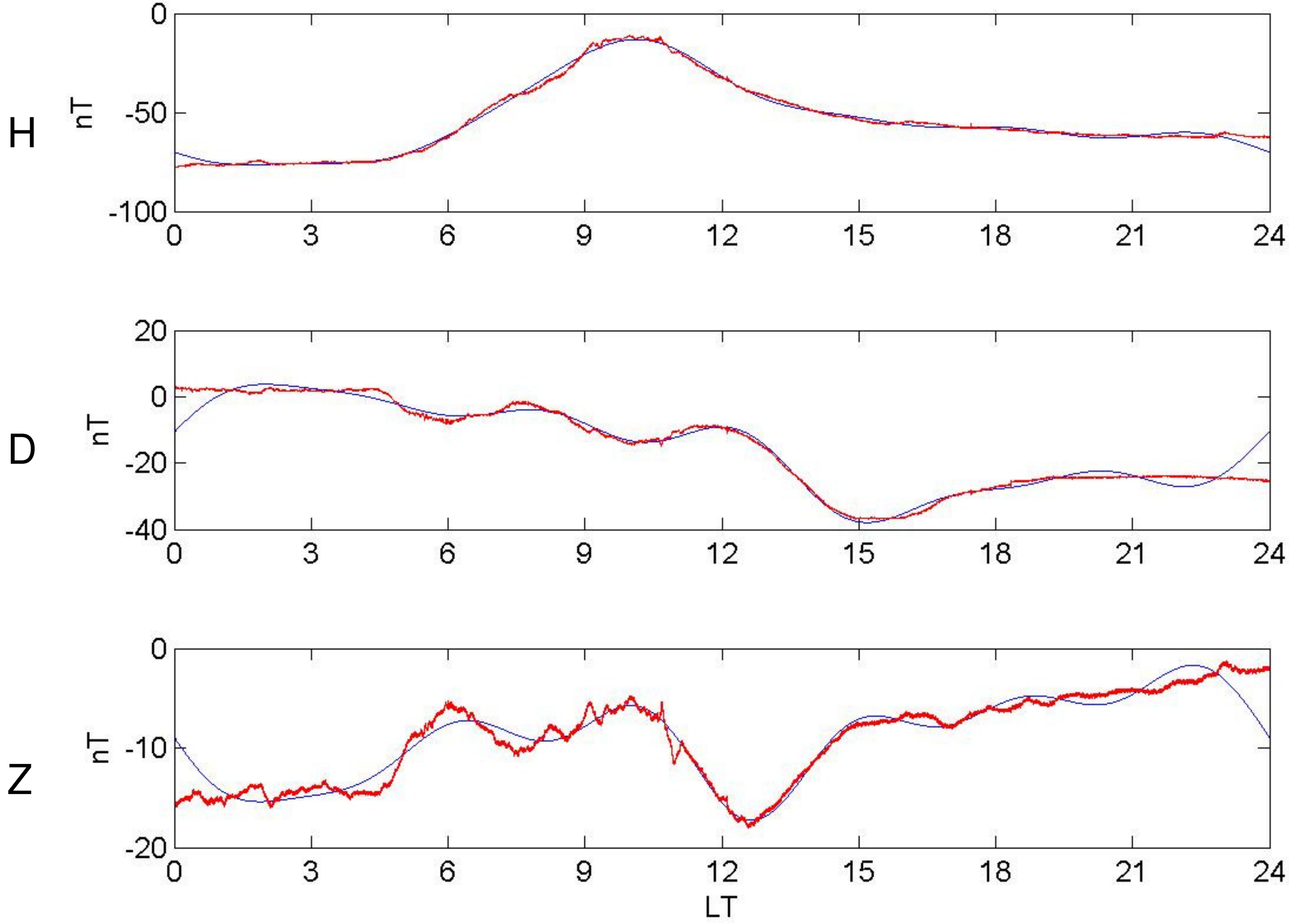
Fourier Harmonics

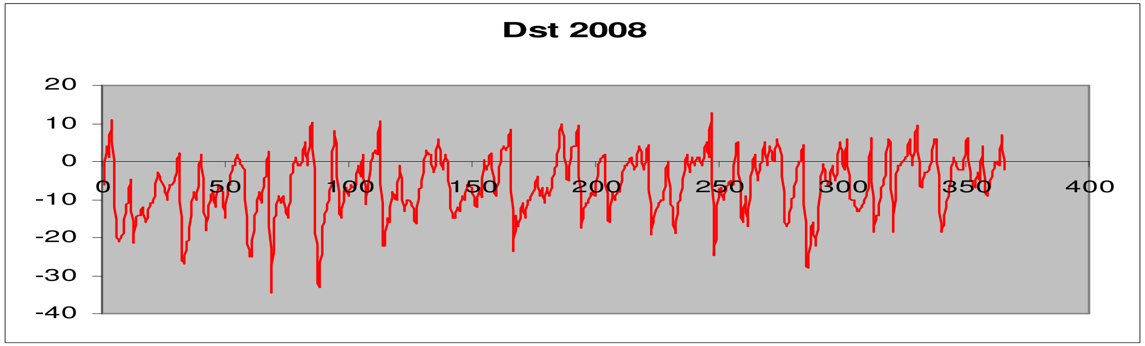


Manado 25 3 2008



Manado 14 4 2008




Dst 2008
20
10
0
-10
-20
-30
-40
0
50
100
150
200
250
300
350
400

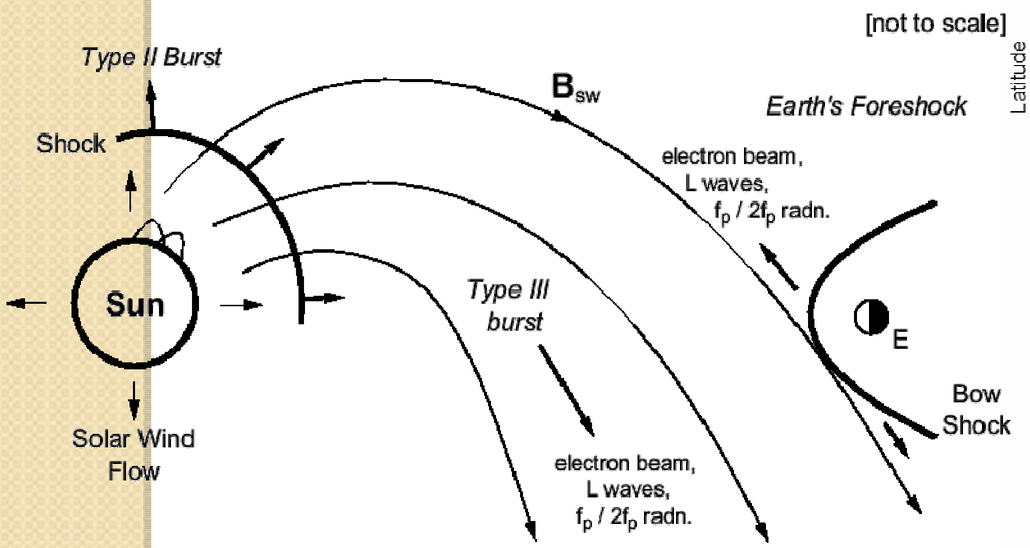
Acknowledgement

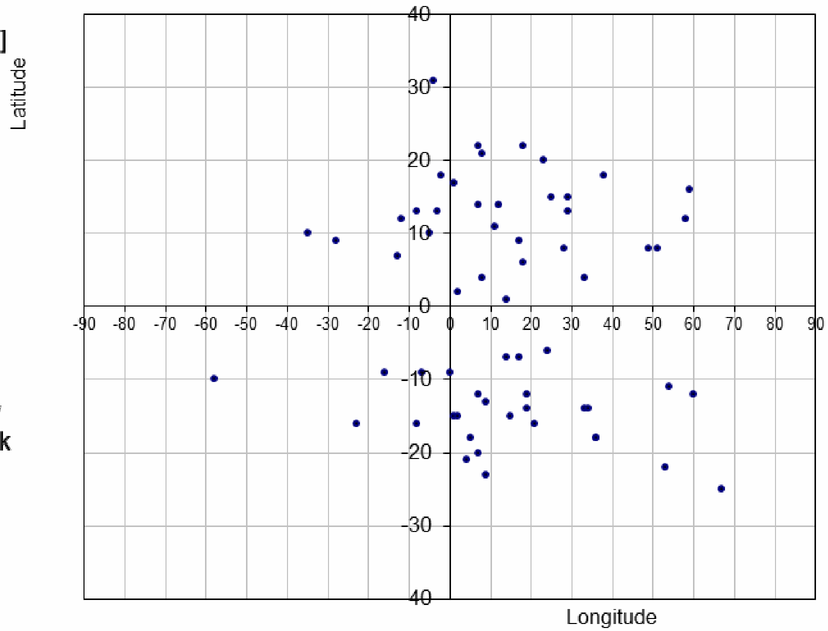
- MAGDAS/CPMN team
- International and local committee of ISWI 2012, Quito,Ecuador
- Researcher of Space Science Center LAPAN

THANK YOU

Geoeffective Solar Activity

- CME/flare position – major geomagnetic storm



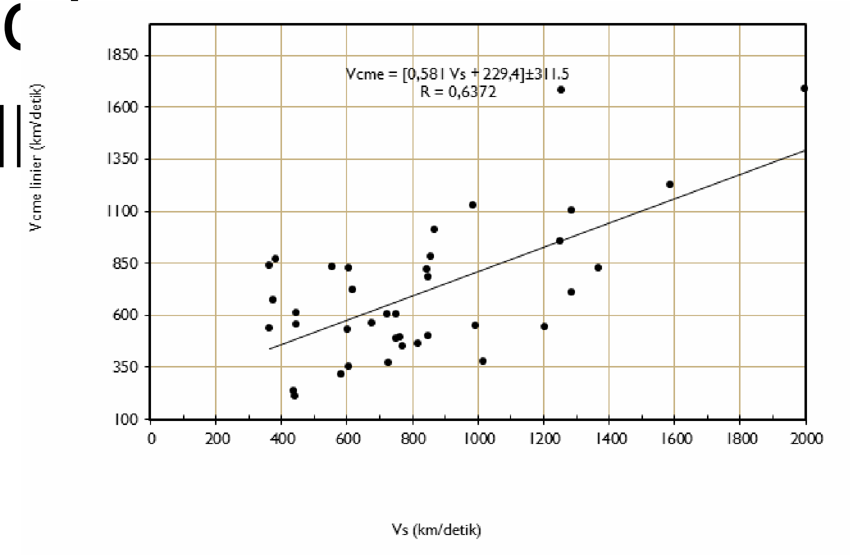


The Sun

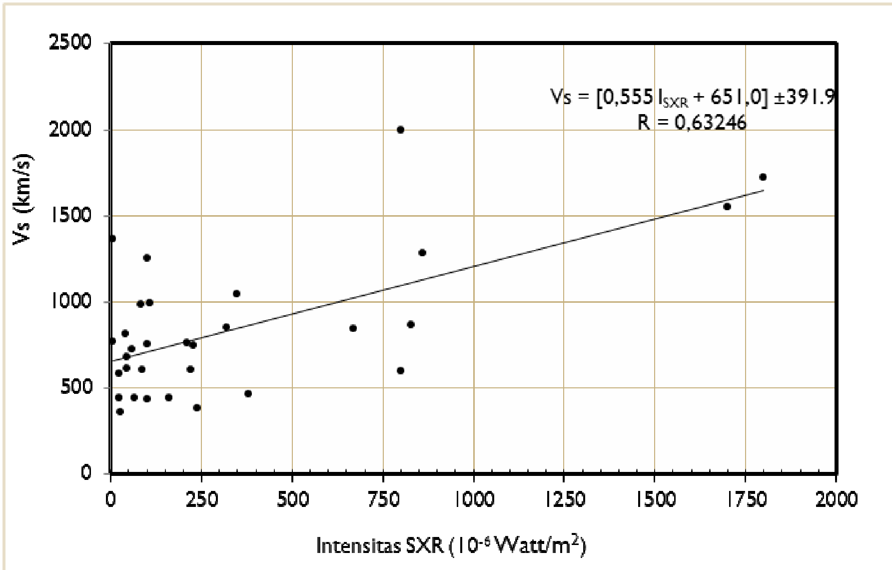
Solar Radio Burst

Shock wave veloc

- - velocity of CME



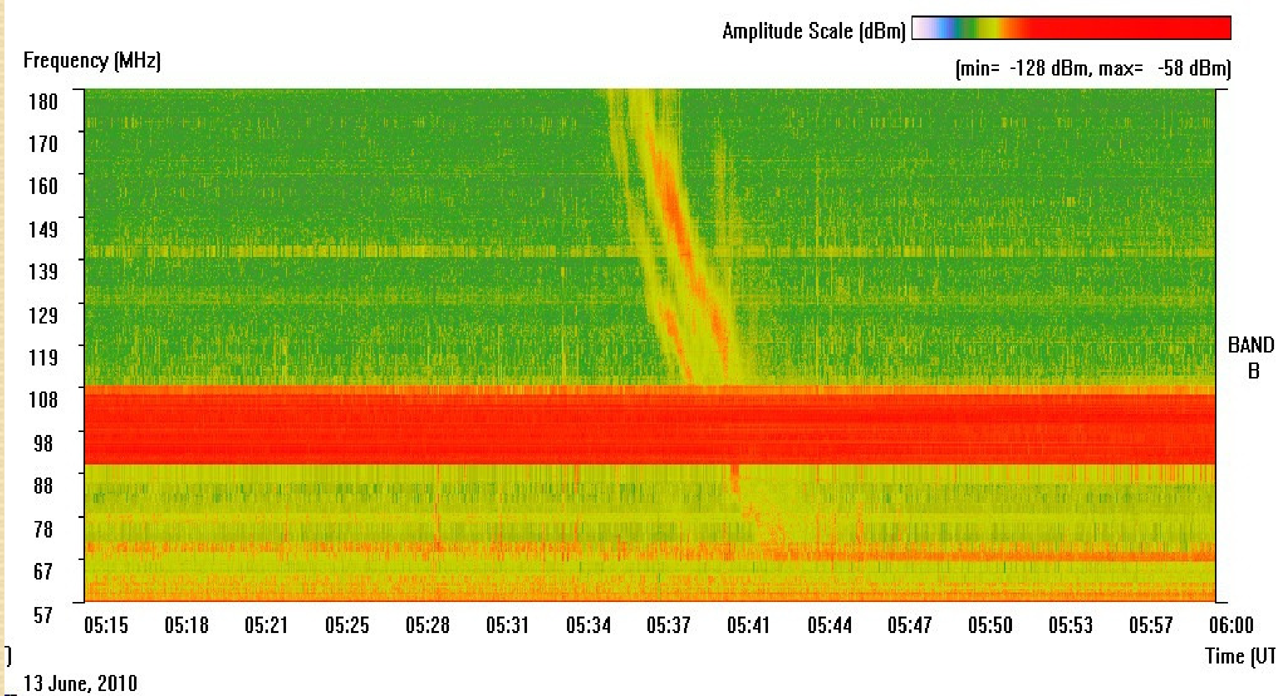
- - X-ray intensity



The Sun

Solar Radio Burst;

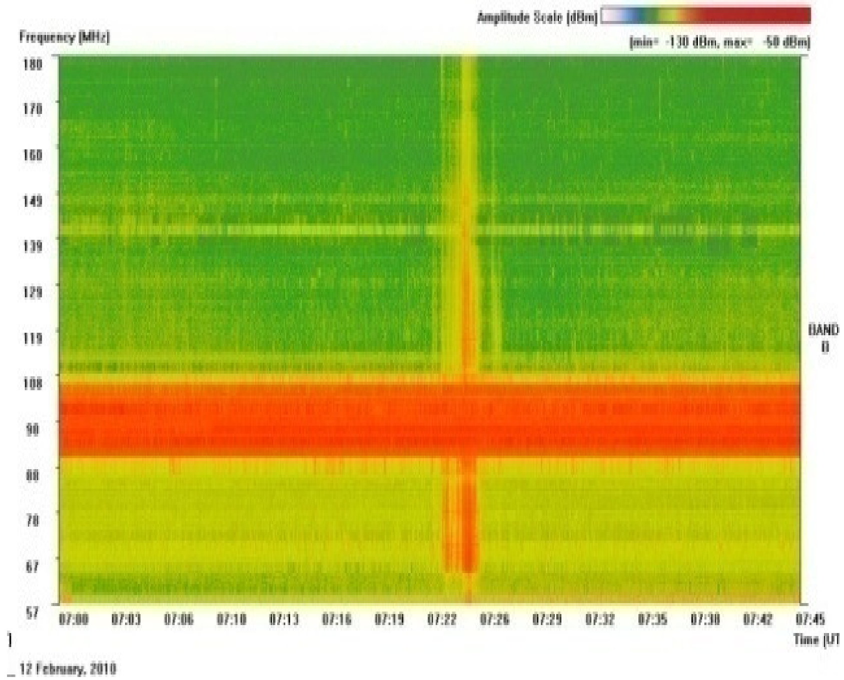
- - velocity from solar spectra
- - precursor of geomagnetic storm, travel time

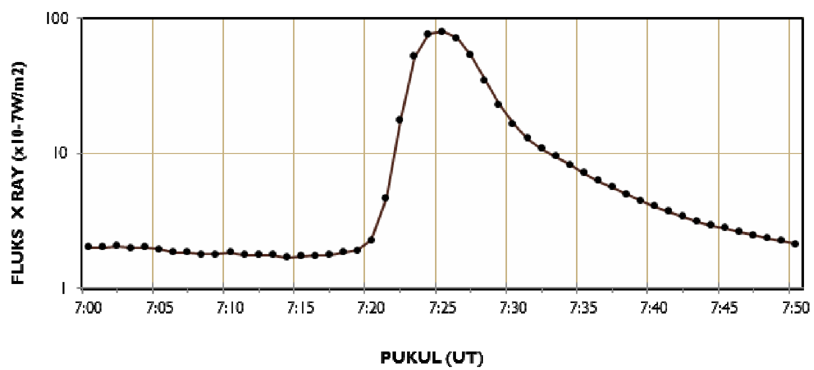


Type II Radio Burst on June 13, 2010
V = 700 km/s

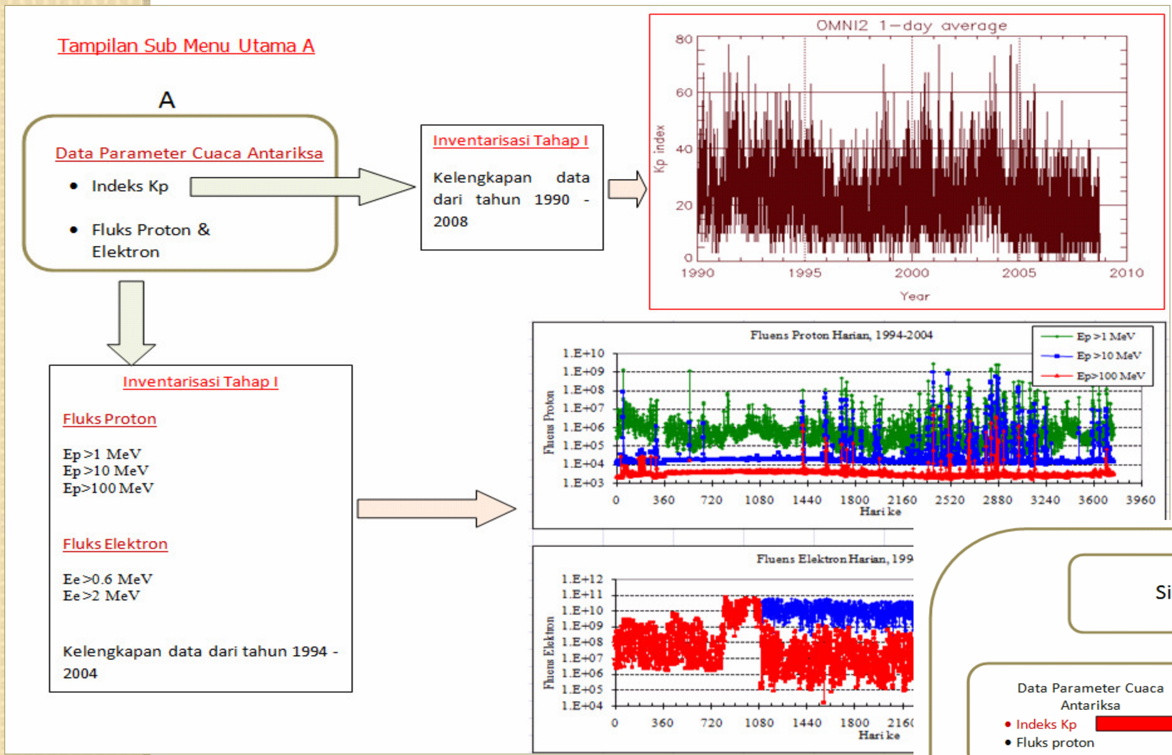
- Type III radio burst
- Shows the movement of energetic electron after flare

Type III solar radio burst, Feb 12, 2010

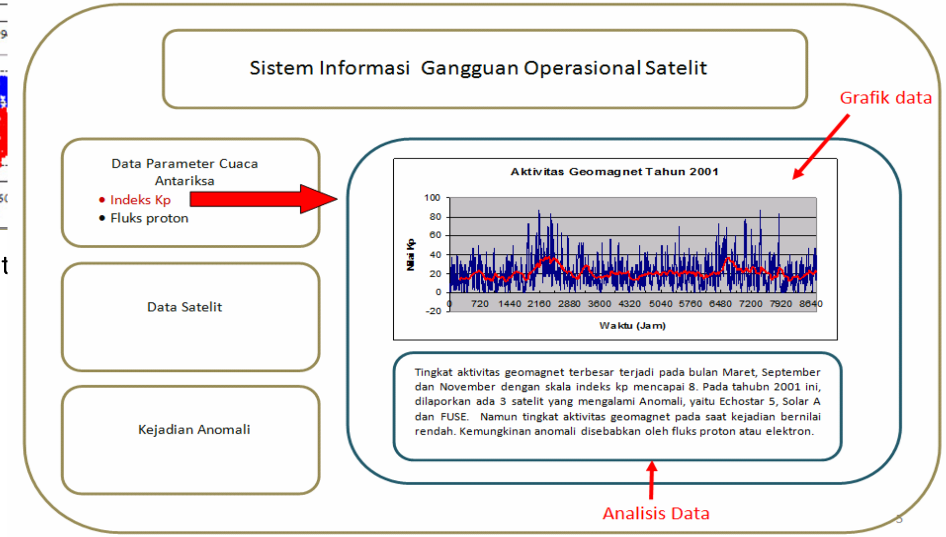




X-ray flux



Gambar 3-6 : Tampilan sub menu utama A (parameter cuaca ant



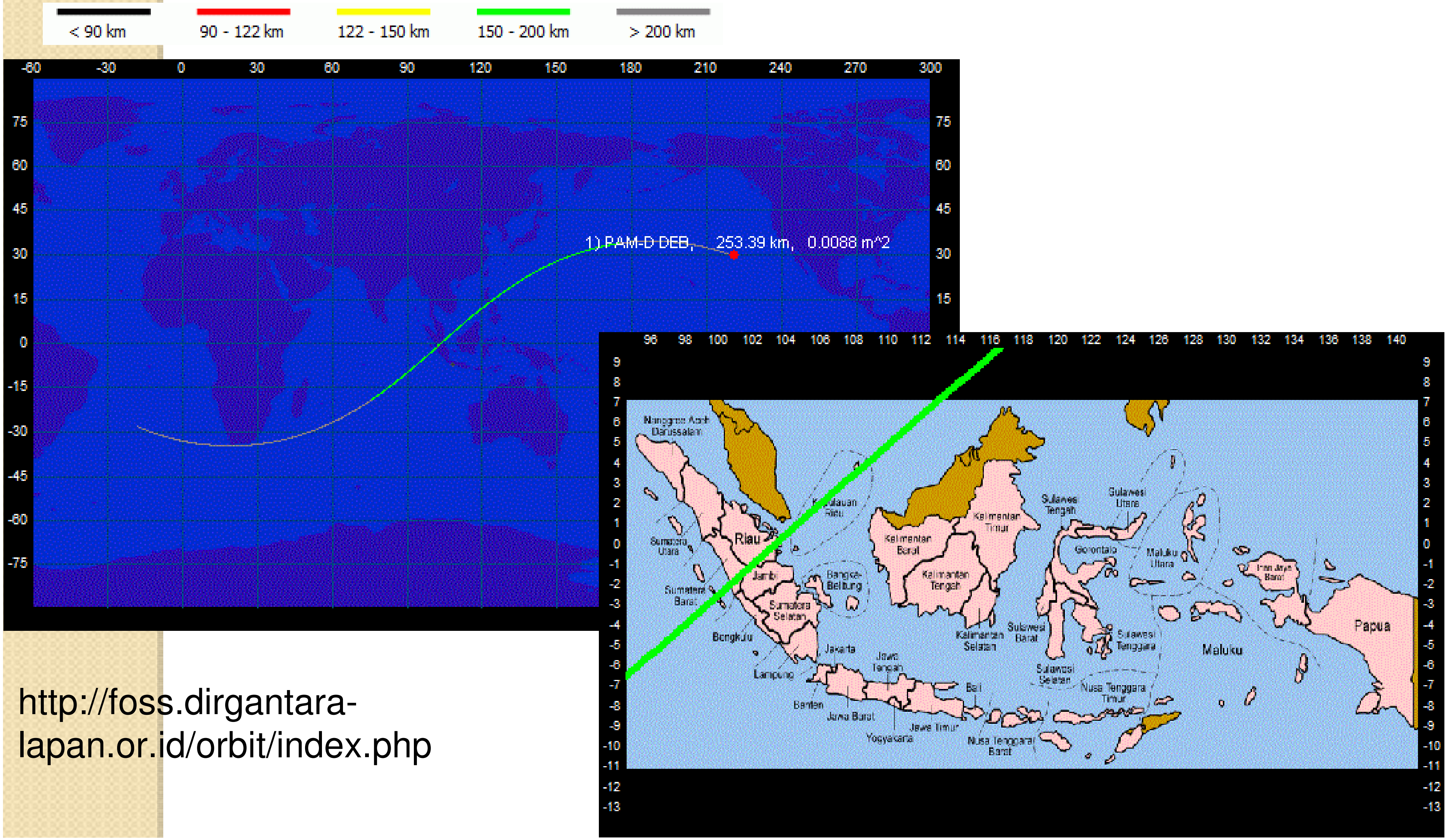
Gambar 3-7 : Tampilan sub menu indeks Kp

Pemantauan benda jatuh antariksa

LAPAN

Sejak 1 jam yang lalu hingga 1 jam ke depan sebanyak 1 benda antariksa melintasi Indonesia dengan ketinggian kurang dari 200 km. Pada umumnya suatu benda dikatakan jatuh jika ketinggiannya mencapai 122 km.

Last update: 2011-06-01 08:06:51 WIB



http://foss.dirgantara-lapan.or.id/orbit/index.php