



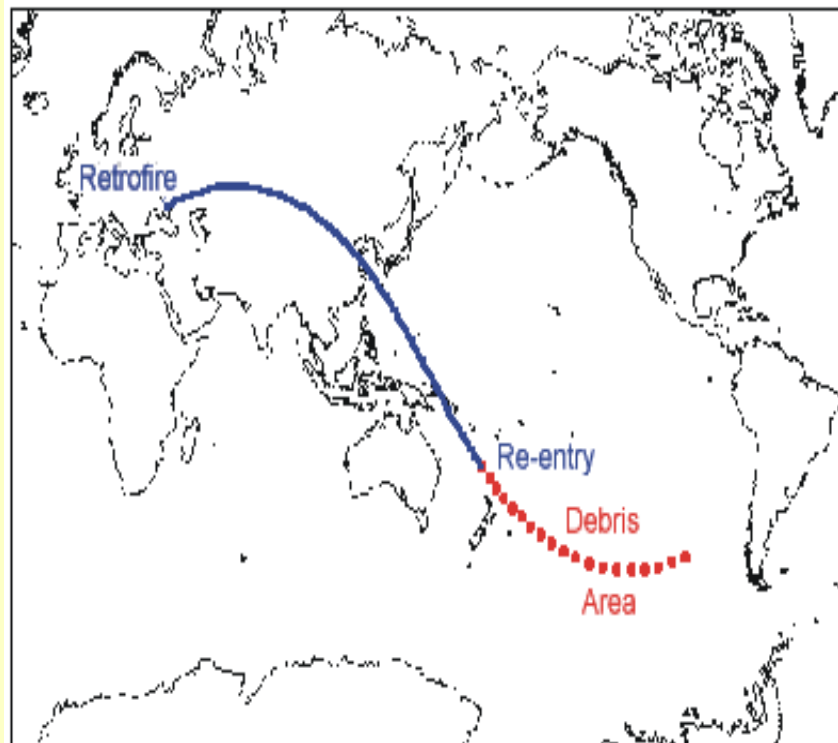
**SPACE DEBRIS, NEAR EARTH OBJECTS,
AND SPACE WEATHER RESEARCH AND
OBSERVATION IN INDONESIA**

SPACE DEBRIS AND NEAR EARTH OBJECTS

- Research on satellite orbital perturbation and space debris
- Identification of reentry objects

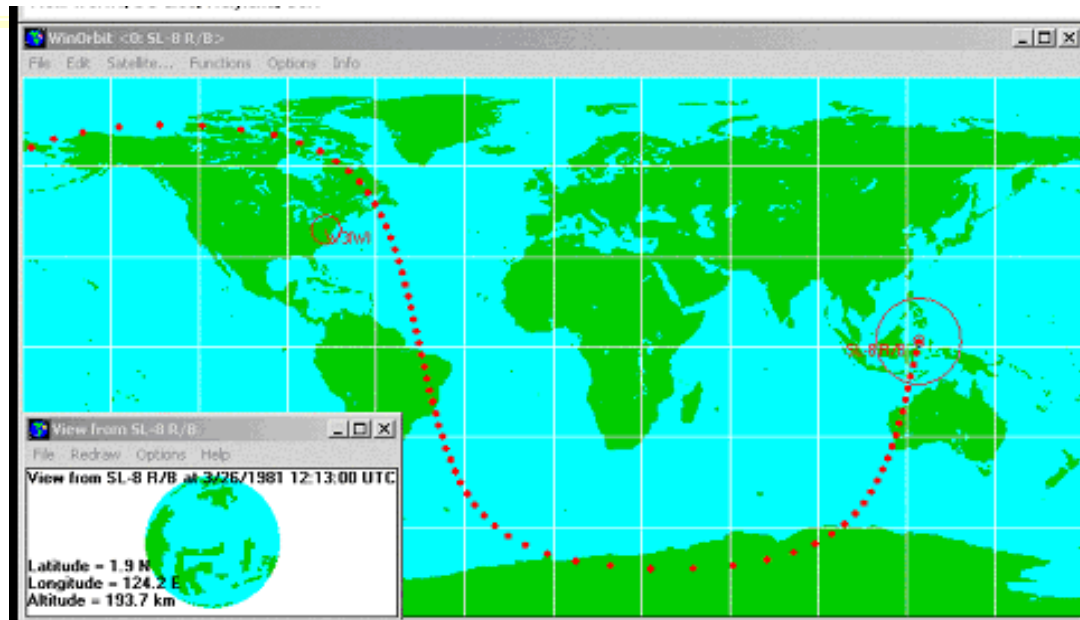
RESEARCH ON SATELLITE ORBITAL PERTURBATION AND SPACE DEBRIS

- **ORBITAL INFORMATION SYSTEM USING HARDWARE AND SOFTWARE FOR SATELLITE TRACKING AND PRELIMINARY DATABASE ON ORBIT OF SATELLITE AND ITS USE (ORBITRON)**
- **SATELLITE ORBIT INFORMATION SYSTEM (SPACE TRACK, HEAVENS ABOVE), MAINLY ORBITAL INFORMATION FOR INDONESIAN PURPOSES**



- Study of satellite orbit and its perturbation
- Study of satellite's anomaly (related with the space weather)

IDENTIFICATION OF REENTRY OBJECTS



**SATELLITE DEBRIS, FALL IN
BENGKULU OCT. 13, 2003**



**ROCKET DEBRIS, FALL IN
GORONTALO, MARCH 23, 1981**

NEAR EARTH OBJECTS

- Meteorite fall on Bali, January 1st 2008
- Meteorite fall on Bone, October 8th 2009
- Meteorite fall on Pontianak, April 2nd 2003



- Information of the reentry objects
(including the artificial and natural objects)
- Information System of Reentry Objects

SPACE WEATHER

Research and Observation:

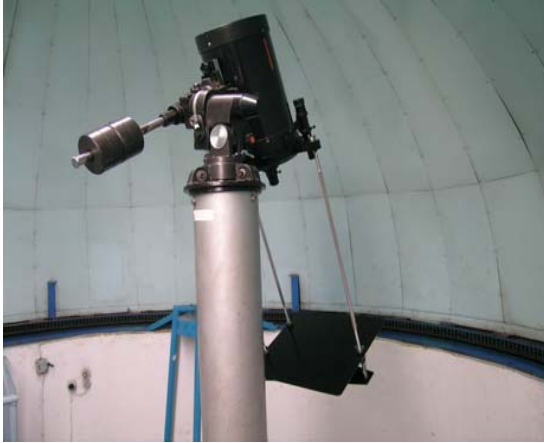
- Solar Activity
- Geomagnetism and Magnetosphere
- Ionosphere

SOLAR ACTIVITY

- **Long term solar activity prediction and the identification of the nature and mechanisms of flares, CMEs, etc.**
- **Preliminary model and the prediction of the impact of solar activity to the Earth (Sun-Earth connection), including the impact on ionosphere, geomagnetic field and climate parameters**
- **Ground based solar observation**

TELESCOPES

**CELESTRON 8 INCH FOR
SUNSPOT SKETCH**



**Refractor VIXEN 10,5 CM
and Coronado Ca K**



**Refractor CELESTRON NEXSTAR
8 INCH for solar observation**

OBSERVATION OBJECTS:

- SUNSPOT
- FLARE
- PROMINENCE ----→ H α filter
- CHROMOSPHERE -→ Ca filter



SOLAR RADIO SPECTROGRAPH - SN 4000
RADIO SPECTRUM : 18 MHz – 1.8 GHz
OPERATING NOW: 56 MHz – 1.8 GHz

GEOMAGNETISM AND MAGNETOSPHERE

- **DEVELOPMENT OF REGIONAL MAGNETIC FIELD MODELLING**
- **GEOMAGNETIC ACTIVITY PREDICTION AND ITS IMPACT**
- **GEOMAGNETIC ACTIVITY PREDICTION MODEL AND STUDY ON COUPLING OF LITOSPHERE - ATMOSPHERE- TERMOSPHERE – IONOSPHERE**
- **INFORMATION ON GEOMAGNETIC DISTURBANCE (MICROPULSE, K INDEX) AND INFORMATION ON CHARACTERISTICS OF GEOMAGNETIC PERIODICITY**

FLUXGATE MAGNETOMETER

LOCATION :

- BIAK
- PONTIANAK
- TANJUNGSARI
- KOTOTABANG
- PARE-PARE
- KUPANG
- MENADO

COLLABORATION UNDER PROJECT
MAGDAS (MAGNETIC DATA ACQUISITION
SYSTEM --→ Kyushu univ)

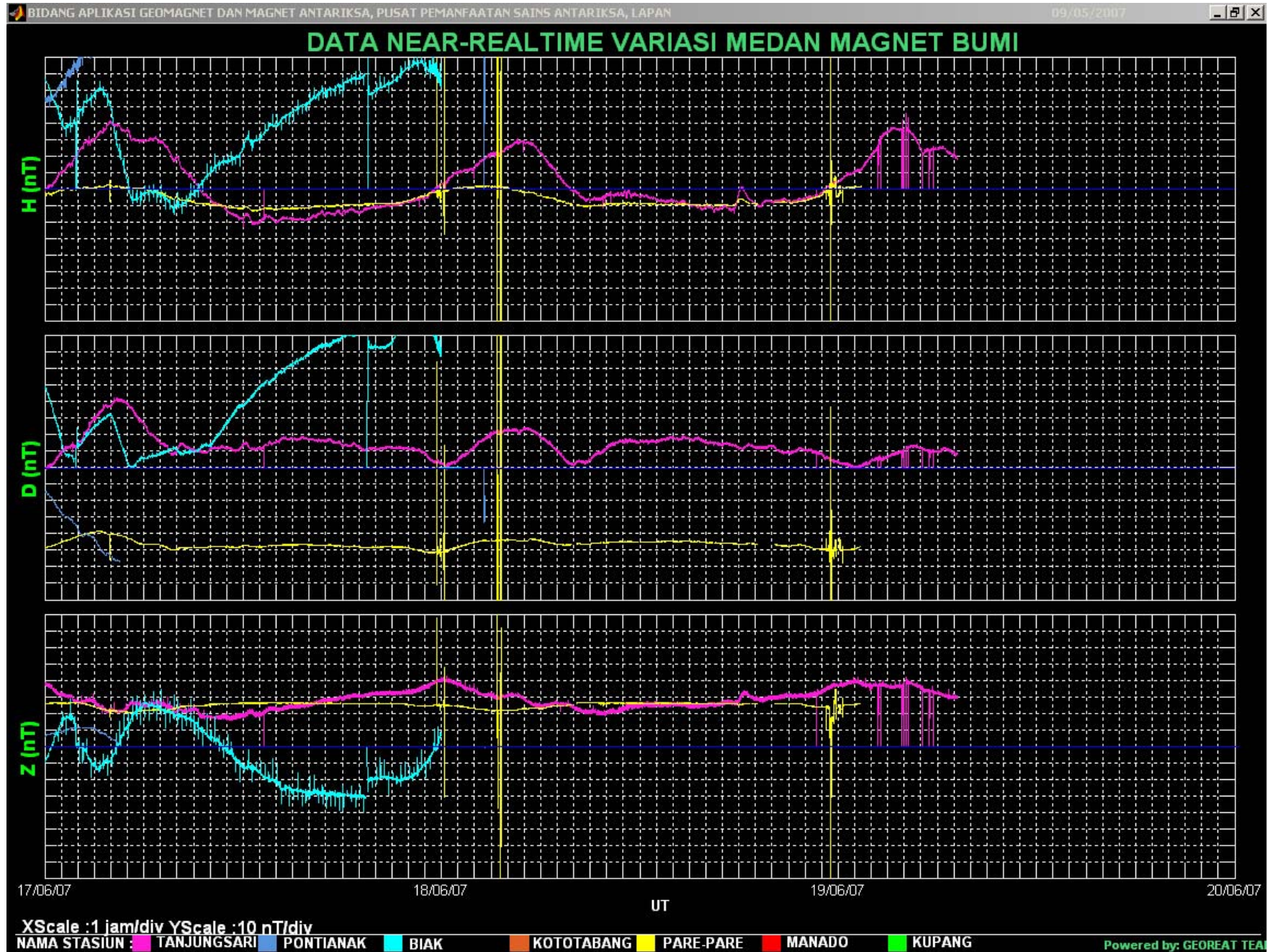
- RESOLUTION 1 SEC
- NEAR REAL TIME → SYSTEM GPRS



OBJECT OBSERVATION

- Magnetic field component : D, H, Z
- Pi 2, Pi 3
- Pc 3, Pc 4, Pc 5

Geomagnetic Near Real Time Data



REGIONAL IONOSPHERE

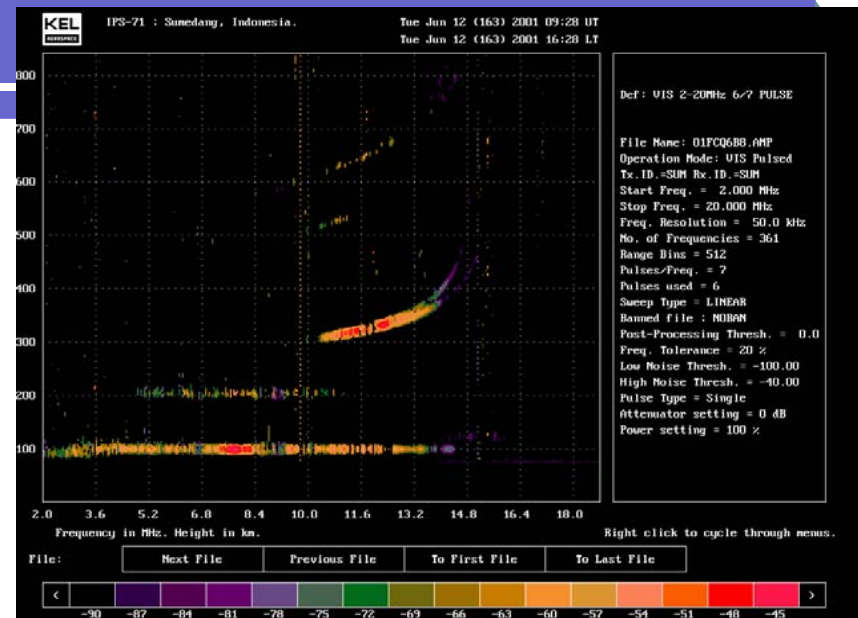
- **IONOSPHERIC DISTURBANCES ON SATELLITE COMMUNICATION AND POSITION DETERMINATION (SCINTILLATION, TEC, INTEGRATION ON DISTURBANCES IN SOLAR ACTIVITY AND GEOMAGNETIC)**
- **MODEL AND METHOD ON IONOSPHERIC PARAMETER PREDICTION OF INDONESIAN REGIONAL IONOSPHERE**
- **STUDY ON EQUATORIAL (INDONESIA) SCINTILLATION AND REGIONAL TOTAL ELECTRON CONTENT (TEC) MODELLING**
- **HIGH FREQUENCY (HF) COMMUNICATION PREDICTION SERVICE, PREDICTION AND REAL TIME RADIO FREQUENCY MANAGEMENT SYSTEM**

RESEARCH ON EQUATORIAL UPPER ATMOSPHERE

- **STUDY ON SEASONAL VARIABILITY OF WAVES AND WAVES INTERACTION**
- **MODELLING OF REGIONAL DYNAMICAL UPPER ATMOSPHERE OVER INDONESIA (GRAVITY WAVE, DISTURBANCE PROPAGATION, NEUTRAL WIND, PERIODICITY ANALYSIS ON ATMOSPHERE)**
- **SPECTRUM OF TROPOSPHERE -TERMOSPHERE - IONOSPHERE OVER INDONESIAN EQUATORIAL REGION**

IONOSONDE

- IPS -51
Pameungpeuk, Menado
- IPS - 71
Tanjungsari
- CADI
Biak, Pontianak
- FMCW (NICT, Japan)
Kototabang

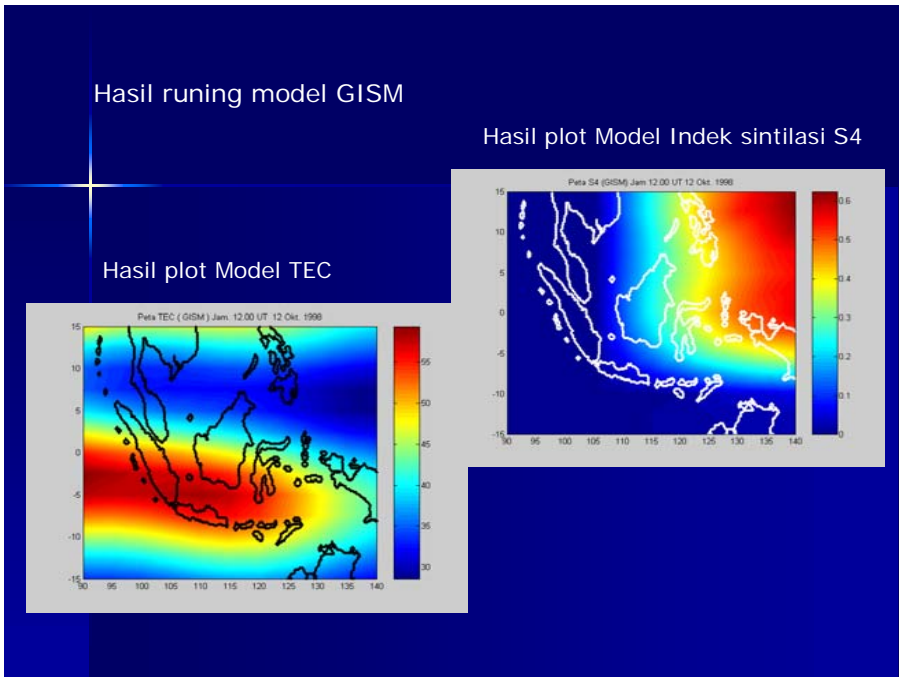
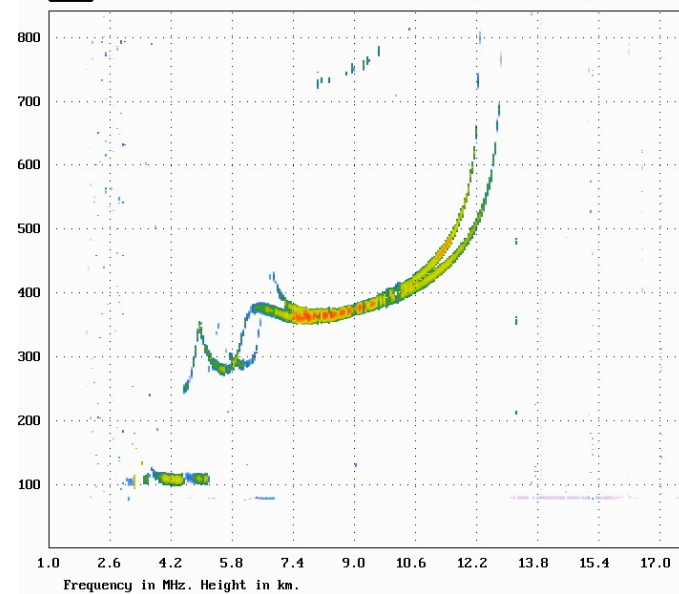


PREDICTION :

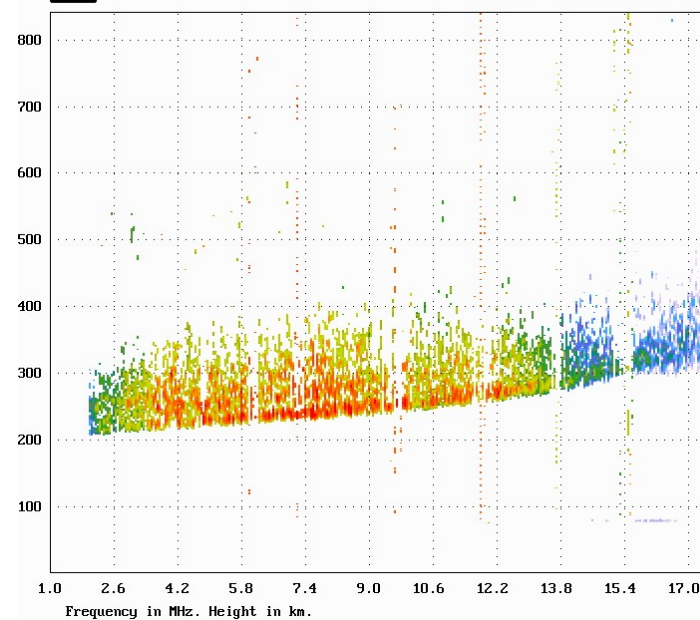
- LUF, MUF --→ software ASAPS (Advanced Stand Alone Prediction System → version under windows, 2004)
 - input : - Indonesia regional ionospheric index (calculated from global ionospheric index)
 - latitude, longitude, month etc
- Skip zone -→ software GWPS 2004 (Ground Wave Prediction System)



KEL
RESPIRICE
IPS-71 : Sumedang, Indonesia. Tue Nov 6 (310) 2001 07:58 UT
Tue Nov 6 (310) 2001 14:58 LT

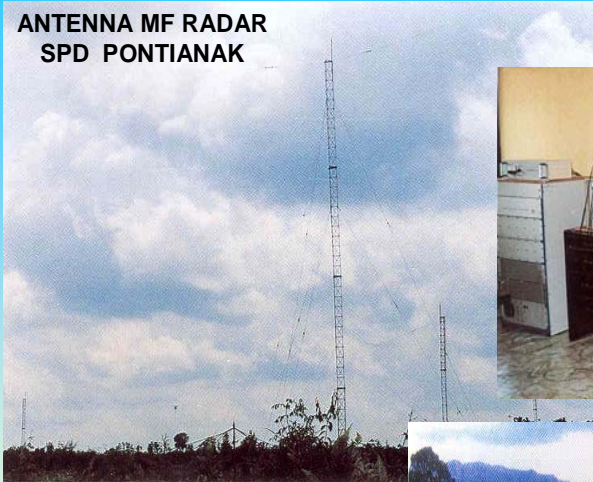


KEL
RESPIRICE
IPS-71 : Sumedang, Indonesia. Fri Nov 9 (313) 2001 15:58 UT
Fri Nov 9 (313) 2001 22:58 LT

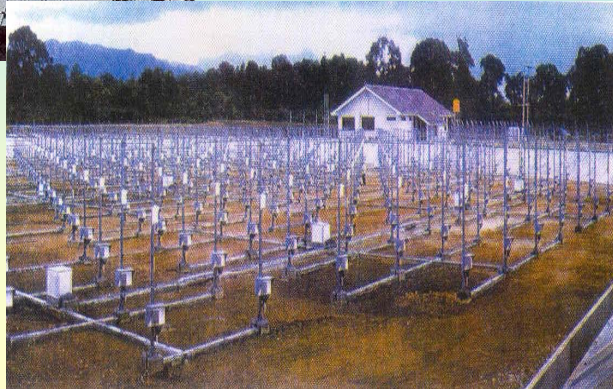


OBSERVATION AND STUDY OF EQUATORIAL MIDDLE AND UPPER ATMOSPHERE

ANTENNA MF RADAR
SPD PONTIANAK



ANTENNA EAR
SPD KOTOTABANG

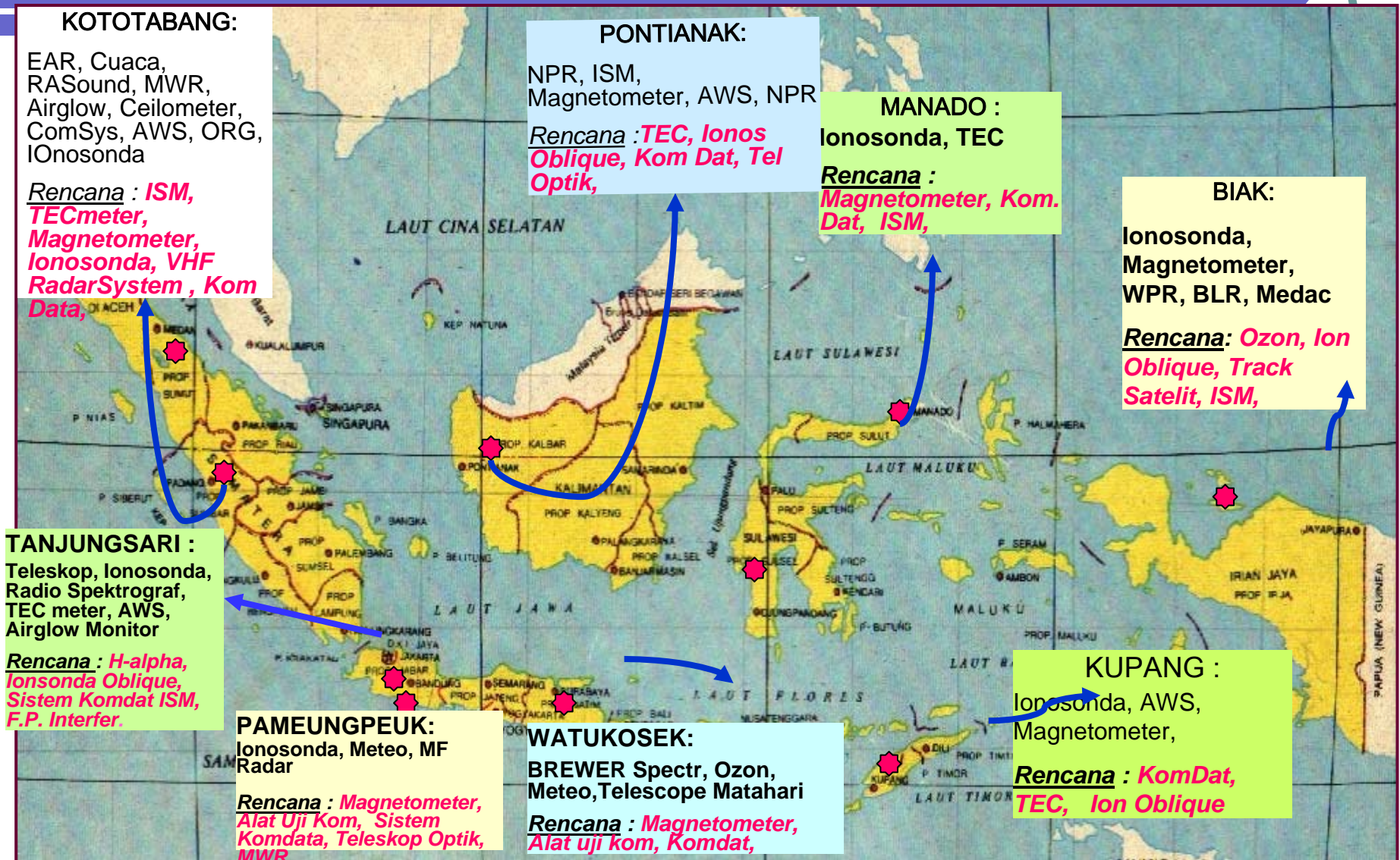


Airglow observations at
Tanjung Sari dan Kototabang

Observations of middle and upper Atmosphere
dynamics at Pontianak dan Kototabang

INSTRUMENTATION NETWORK

SOLAR, SPACE DYNAMICS, DAN ATMOSPHERE OBSERVATION





SPACE WEATHER MONITORING ROOM

COLLABORATION

ACTIVITY :

- **IONOSPHERIC OBLIQUE**
- **T E C**
- **IONOSPHERE OBSERVATION**
- **UPPER ATMOSPHERE (MF RADAR)**
- **GEOMAGNETIC**

INSTITUTION :

DSTO (AUSTRALIA)
D L R (GERMANY)
NICT (JAPAN)
RISH (JAPAN) -
ADELAIDE UNIV
KYUSHU UNIV (JAPAN)



Information and Services

INFORMATION AND SERVICES

WEBSITE : <http://bdg.lapan.go.id/>

- SOLAR ACTIVITY (SUNSPOT, FLARE)
- IONOSPHERIC PARAMETERS (FoF2 , HF2, etc)
- GEOMAGNETIC ACTIVITY (Pi, Pc)
- METEORITES AND SPACE DEBRIS
- FREQUENCY PREDICTION FOR RADIO COMMUNICATION

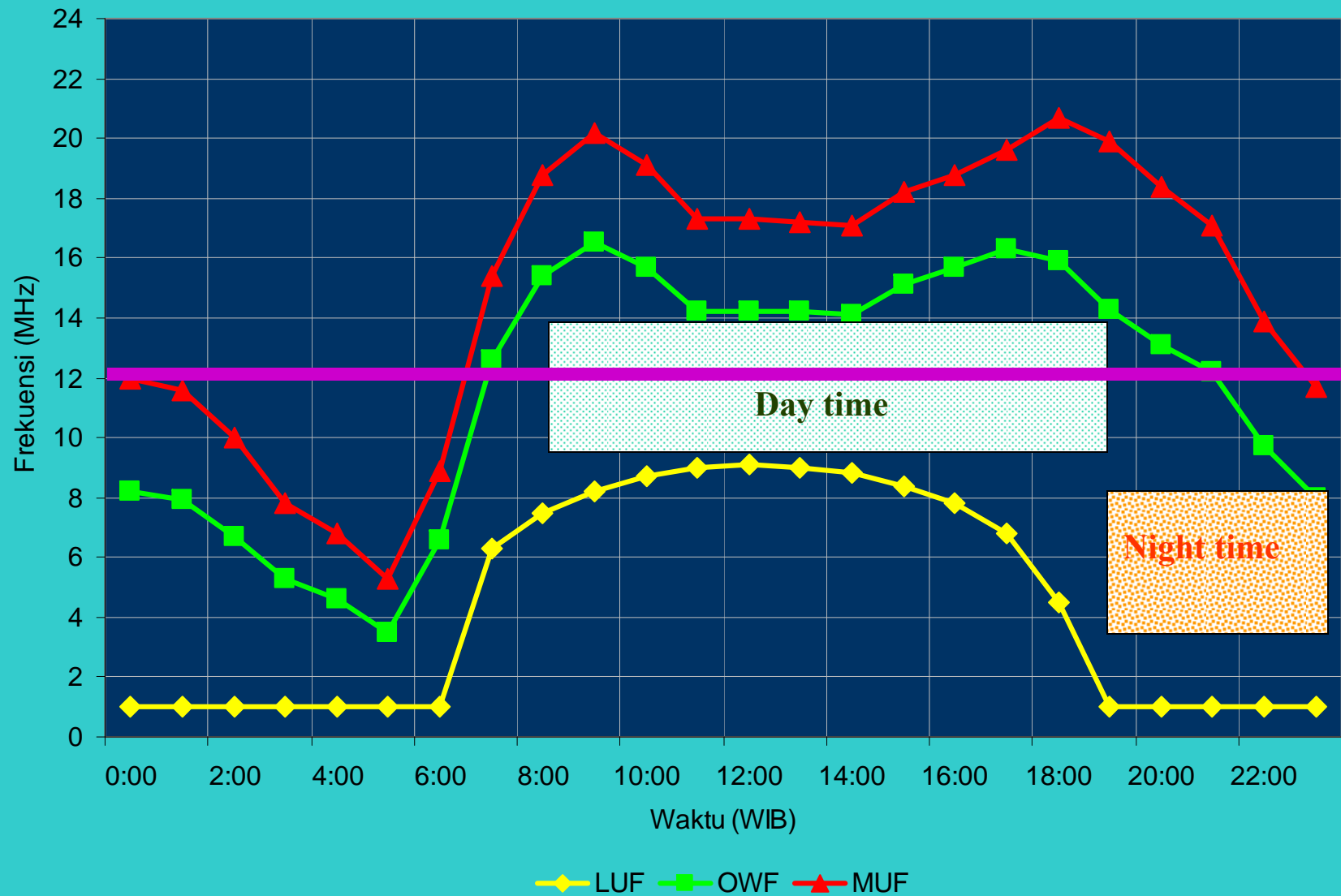
RADIO FREQUENCY COMMUNICATION PREDICTION:

ROUTINE :

- ❖ QUARTERLY PREDICTION : --→ REGIONAL GOVERNMENT (REGENCY etc)
- ❖ MONTHLY PREDICTION : MILITARY , POLICE

Public Outreach: Space Weather Seminar, Public Speaking, Training, Bulletin (Quarterly), Open House, Stargazing

Prediction of Frequency of Pontianak – Banda Aceh on May 2006



BULLETIN OF RADIO HIGH FREQUENCY PREDICTION



Edisi TRIWULAN III 2007 (Juli, Agustus, September)

Suplemen

Prediksi Frekuensi Komunikasi Radio HF



- Telaah Transceiver: ICOM IC-706MKIIG
- Pojok Operator: Prinsip Dasar Antena bag. III
- Pojok Alamat
- Matahari: Evaluasi Aktivitas Matahari Selama Maret-Mei 2007
- Berita Komrad: Agenda Pelatihan Manajemen Frekuensi dan Teknis Komunikasi Radio

PUSAT PEMANFAATAN SAINS ANTARIKSA

Jl. Dr. Djundjuran 133 Bandung 40173, Tlp. 022-6012602, 022-6038005,
Hp. 0813-21210002, Fax. 022-6014998, 022-6038005

TRAINING ON FREQUENCY MANAGEMENT & RADIO COMMUNICATION



KUPANG JULY 2004



PALEMBANG AUGUST 2004



DEVELOPING SPACE WEATHER EARLY WARNING SYSTEM

Observation and Information of Space Weather.

Needs:

- Real time solar data
- Real time space-based solar and interplanetary data
- Knowledge in predicting the solar activity
- Knowledge in predicting the space weather and its impact

Collaboration between researchers, and technical training
(Sun and Sun-Earth connection)



Thank You