

**Second UN//NASA Workshop  
on International Heliophysical Year (IHY)  
and Basic Space Science**

**Bangalore INDIA, 27 Nov – 1 Dec 2006**

**Preparation of IHY 2007 in Indonesia:  
Local Observational Facilities, International Collaborations,  
and the Use of International Data**

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Indonesia IHY National Coordinator



**National Institute of Aeronautics and Space (LAPAN)  
INDONESIA**




# Participating Institution

## IHY Research Activities:


- Center for Space Science, LAPAN
- Center for Atmospheric Science, LAPAN
- Department of Astronomy & Bosscha Observatory, ITB
- Department of Meteorology and Geophysics, ITB
- School of Life Science and Technology, ITB
- Indonesian Institute of Science (LIPI)
- National Coordinating Agency for Survey and Mapping (Bakosurtanal)
- Meteorology and Geophysics Agency (BMG)

## IHY Public Education (Outreach):

- Bureau for Aerospace Public Relation and Cooperation, LAPAN
  - Bosscha Observatory, ITB
  - Jakarta Planetarium and Observatory
  - Exhibition Center for Science and Technology, TMI I
- 



# Research Activities From the Sun to Ionosphere

- Solar Physics
  - Sun – Earth connection
  - Geomagnetism and seismoelectromagnetism
  - Ionosphere and upper atmosphere
- 

# Research Activities From the Sun to Ionosphere

Other facilities belong to other participating institutions: Solar telescope at Bosscha Observatory at Lembang,  
GPS receivers Network belong Bakosurtanal and ITB, Magnetometers belong to BMG

**KOTOTABANG:**  
*Ionosonde FMCW*  
*Magnetometer*  
*Atmospheric Radars*

**PONTIANAK:**  
*Ionosonde CADI*  
*Magnetometer*  
*ISM/GPS*  
*MF radar*

**MANADO:**  
*Ionosonde IPS-71*  
*(oblique)*  
*MAGDAS*

**BIAK:**  
*Ionosonde CADI*  
*Magnetometer*

**BANDUNG:**  
*Solar Obs C-8 +*  
*H-Alpha filter*

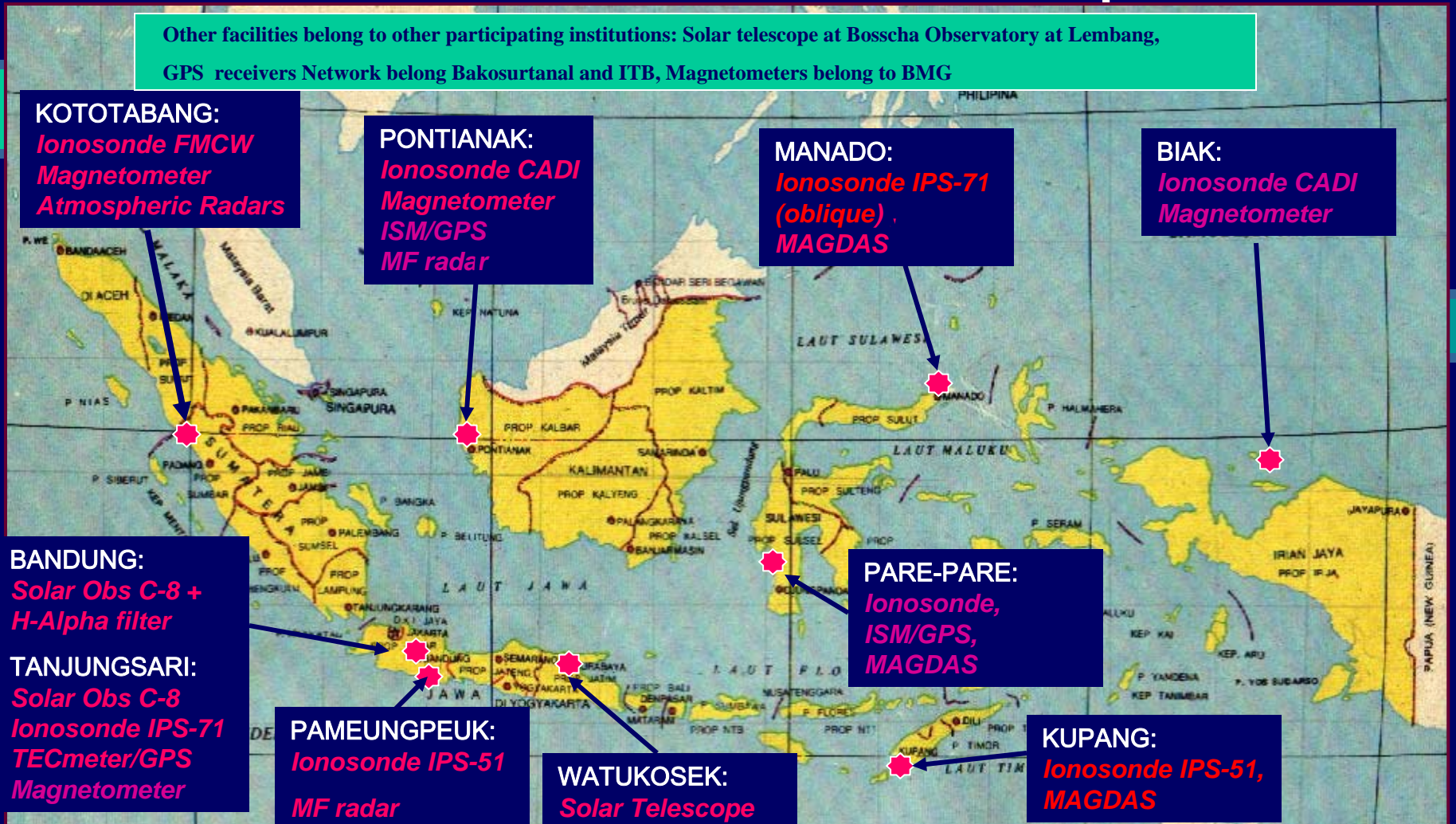
**TANJUNGSARI:**  
*Solar Obs C-8*  
*Ionosonde IPS-71*  
*TECmeter/GPS*  
*Magnetometer*

**PAMEUNGPEUK:**  
*Ionosonde IPS-51*  
*MF radar*

**WATUKOSEK:**  
*Solar Telescope*

**PARE-PARE:**  
*Ionosonde,*  
*ISM/GPS,*  
*MAGDAS*

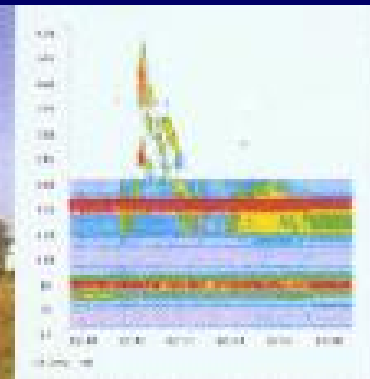
**KUPANG:**  
*Ionosonde IPS-51,*  
*MAGDAS*



# Solar physics

especially geo-effective solar activity

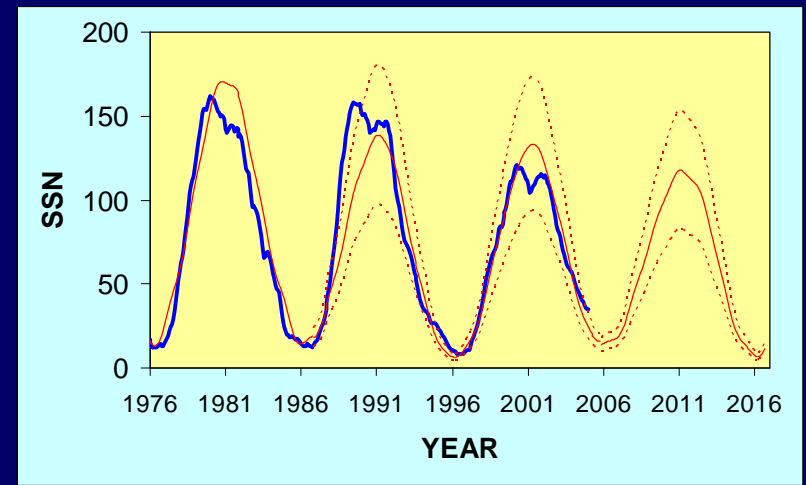
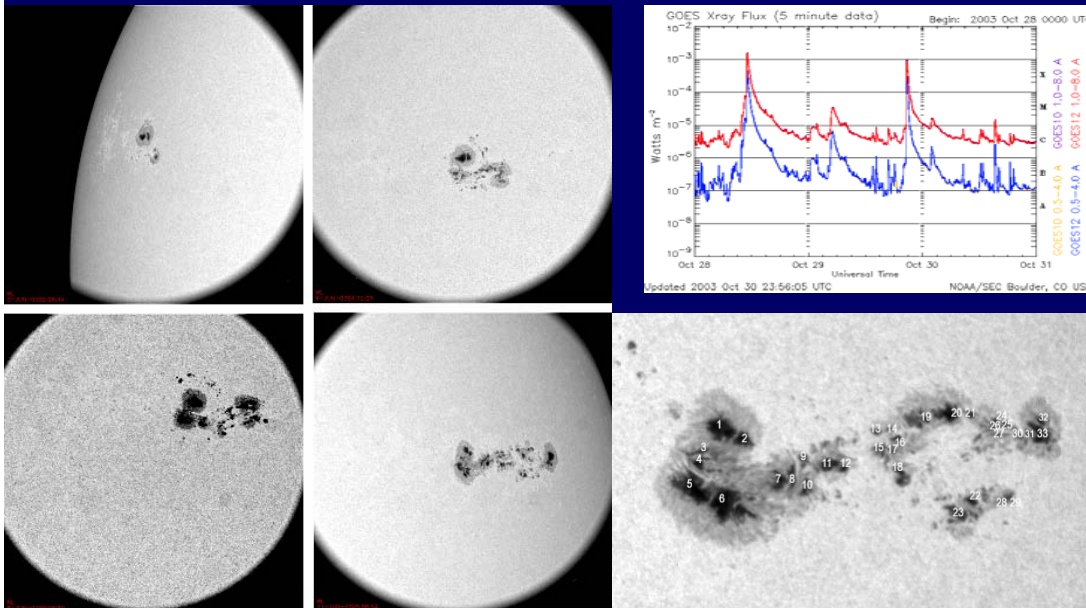
- Observation: Small optical telescopes for daily observation of sunspot number and using coronado H $\alpha$  filter for flare observation and solar radio spectrograph (out of order, will be replaced by a new IIA-type-like dipole system)



# Solar physics

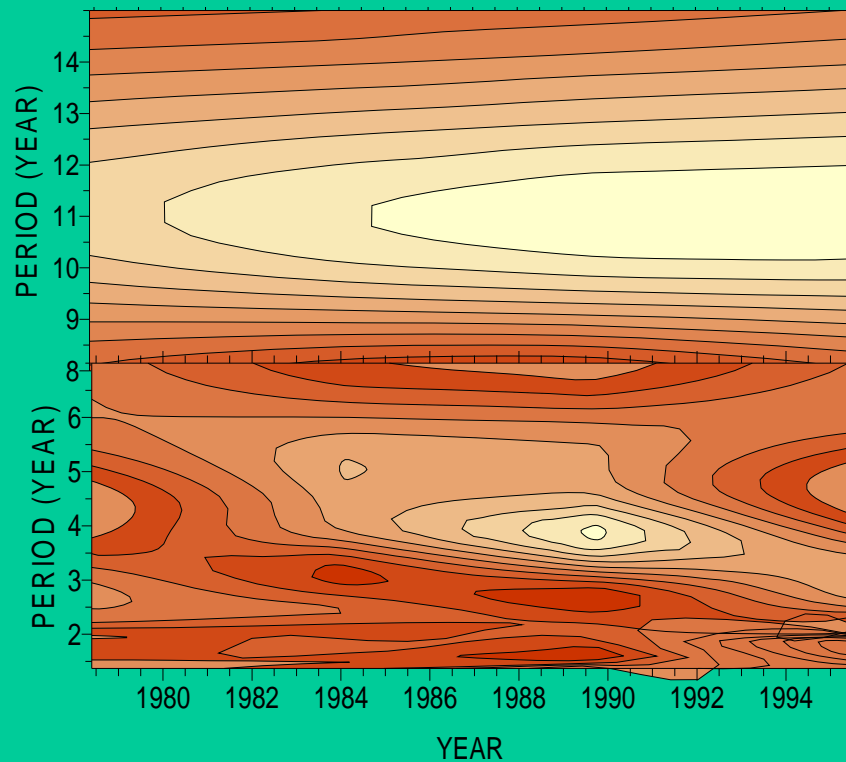
## especially geoeffective solar activity

- Using international data available in the internet (SIDC, TRACE, SOHO, GOES, etc.) to predict solar cycle, sunspot evolution and motion related to flare events

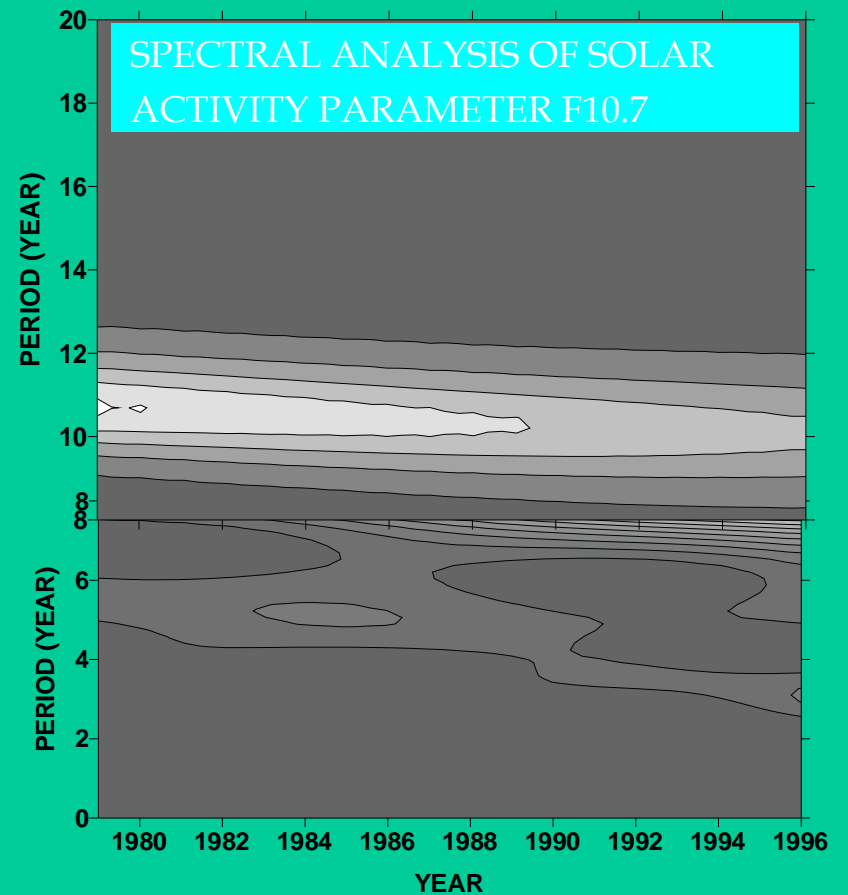


# Sun – Earth Connection

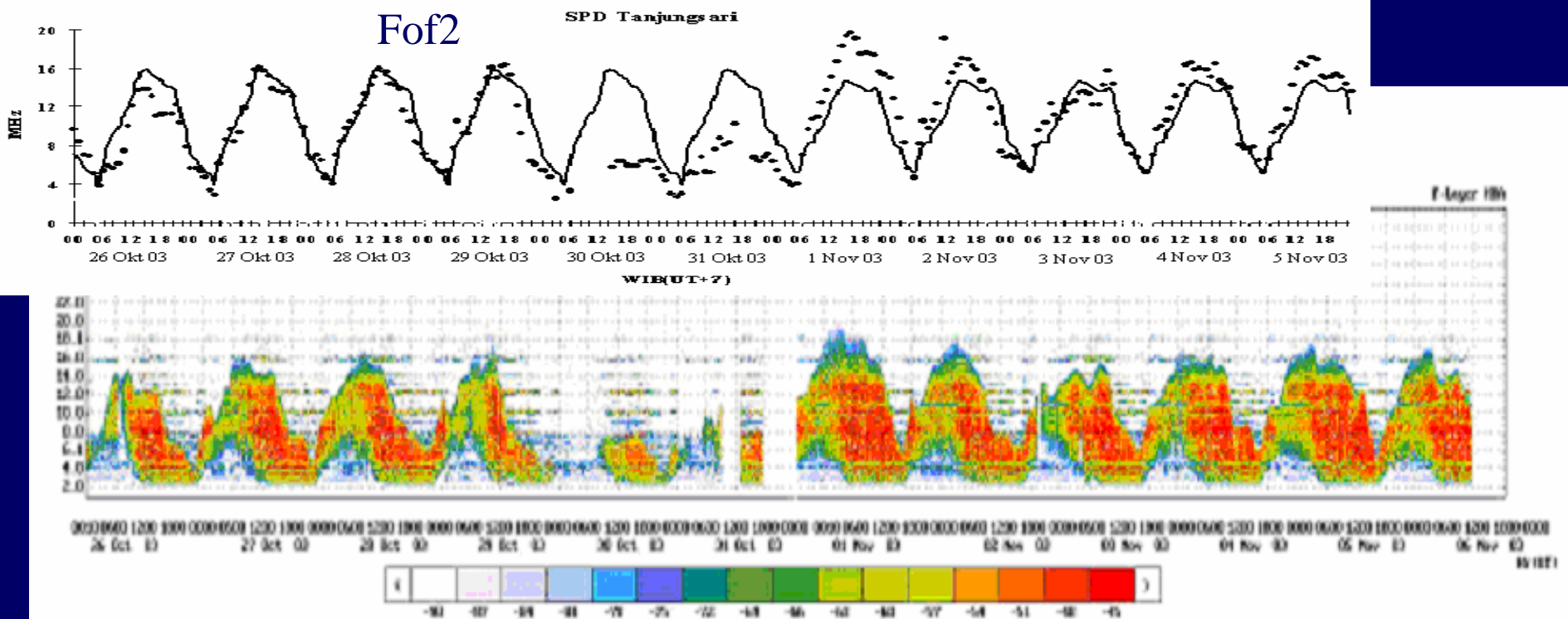
SPECTRAL ANALYSIS of TOTAL CLOUD COVER  
OVER INDONESIA ON DRY SEASON



SPECTRAL ANALYSIS OF SOLAR  
ACTIVITY PARAMETER F10.7



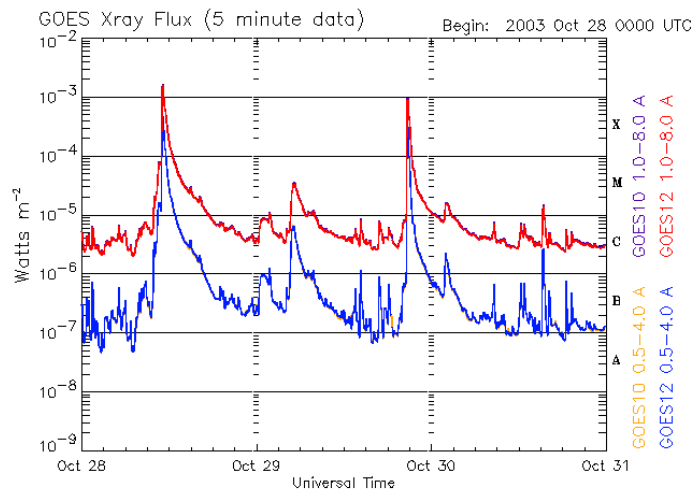
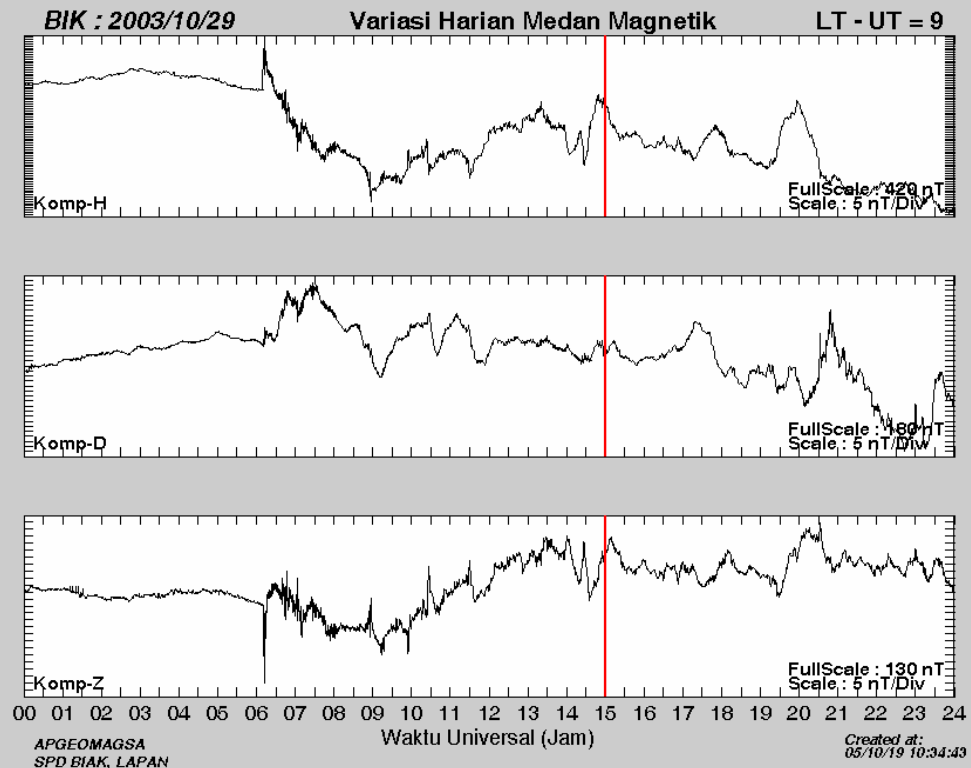
# Sun – Earth Connection



foF2 and range of frequency selected by ionosphere over Tanjung sari during 26 Oct - 6 Nov 2003. On 30 Oct there was blackout affected by super flare 28 Oct 2003

# Sun – Earth Connection

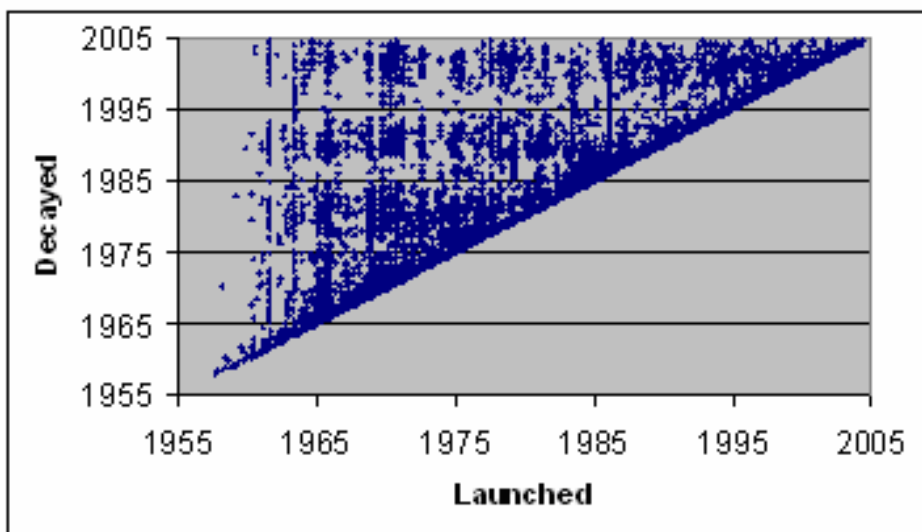
Geomagnetic (H, D, Z) variation on 29 Oct 2003



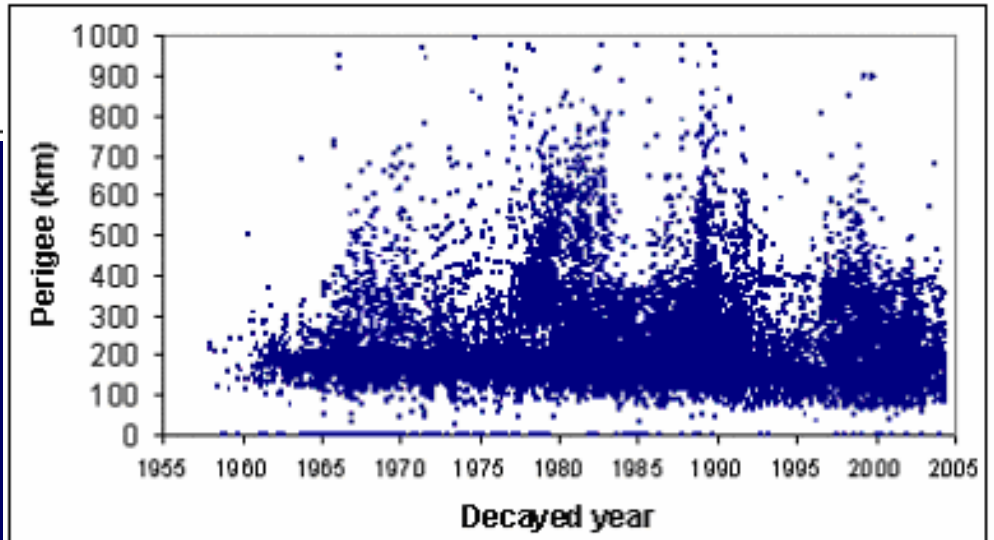
Updated 2003 Oct 30 23:56:05 UTC

NOAA/SEC Boulder, CO USA

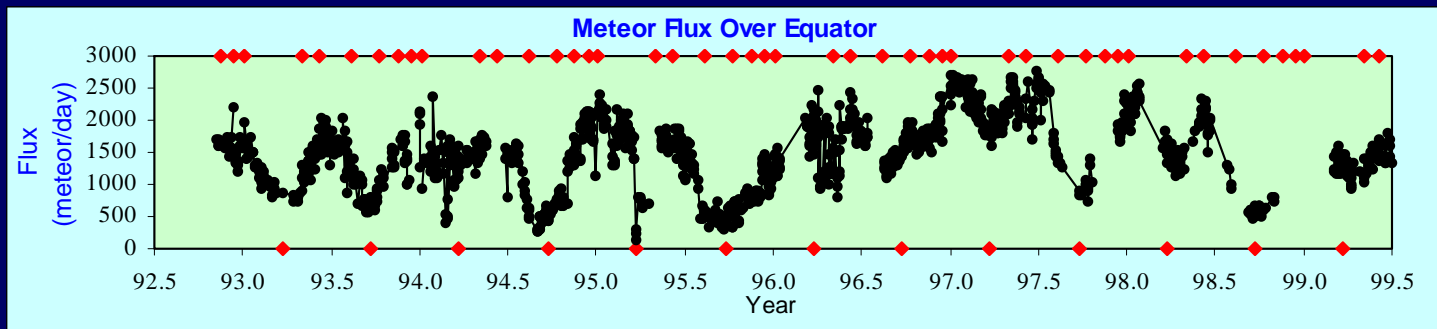
# Sun – Earth Connection



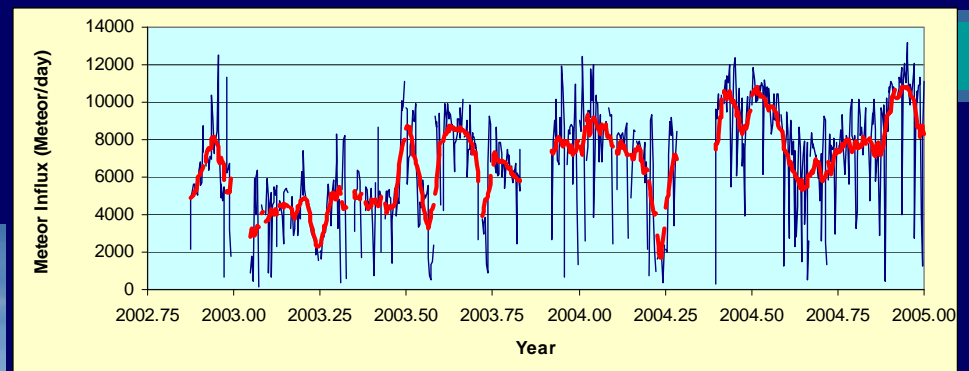
~ 9.200 Earth orbiting objects  
(launched/ decayed 1957 -  
Mar 2004). Decayed objects  
enhance during solar active



# Sun – Earth Connection

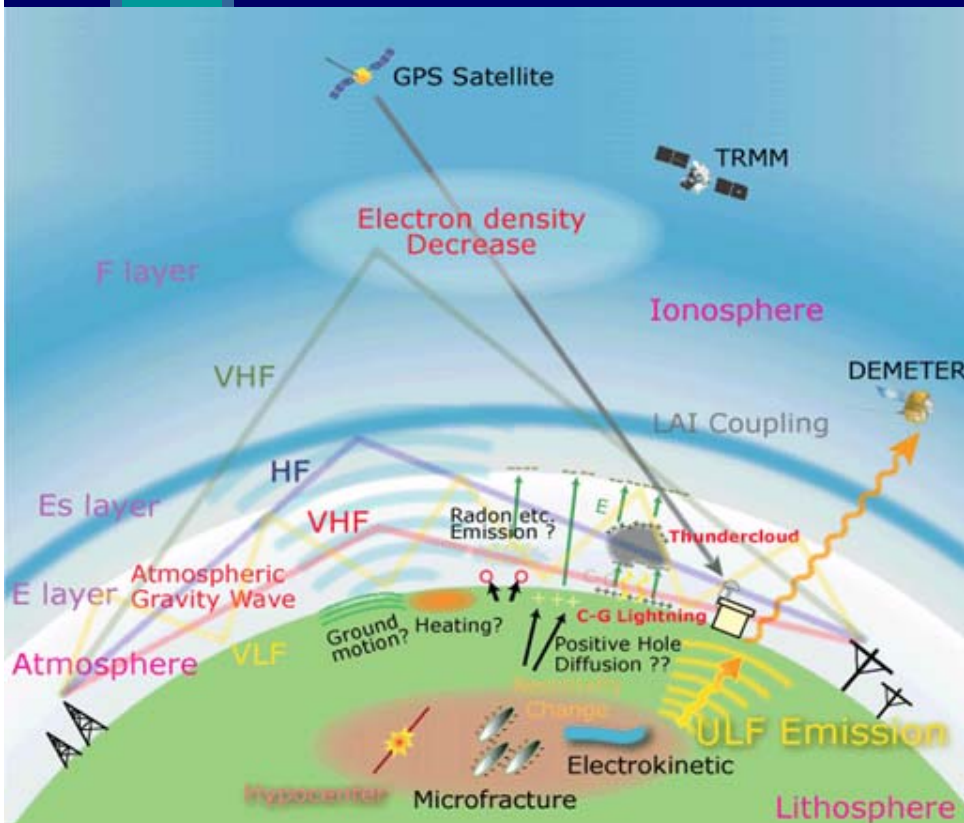


## Meteor Wind Radar

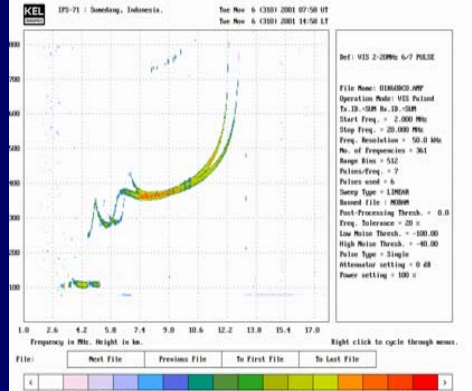
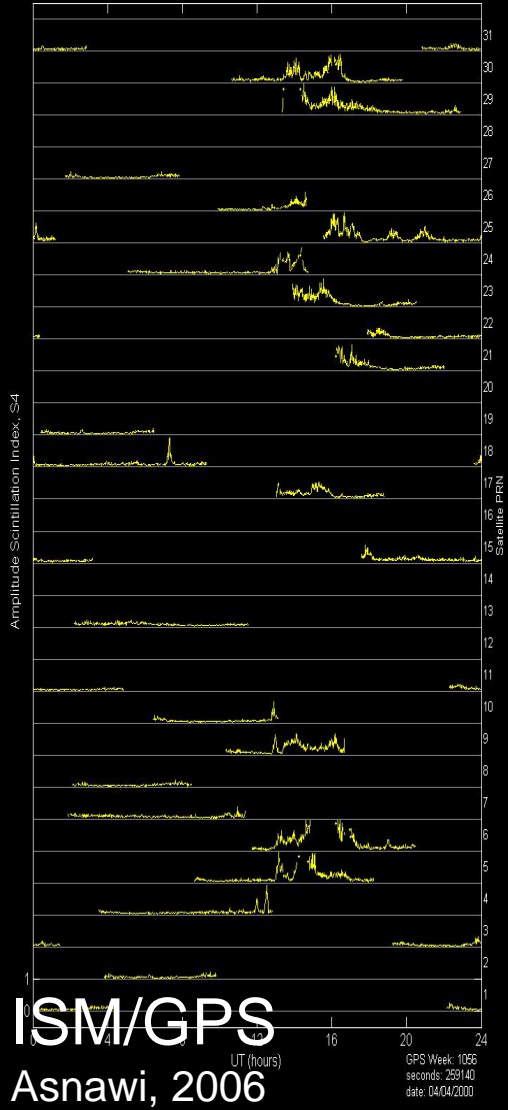


# Geomagnetism and Seismoelectromagnetism

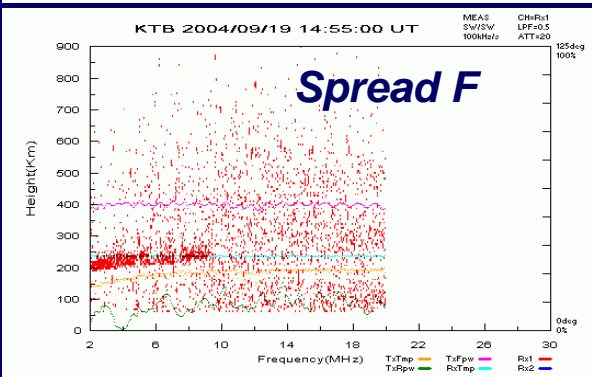
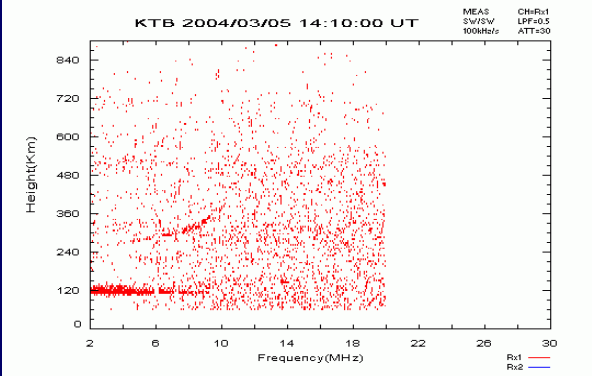
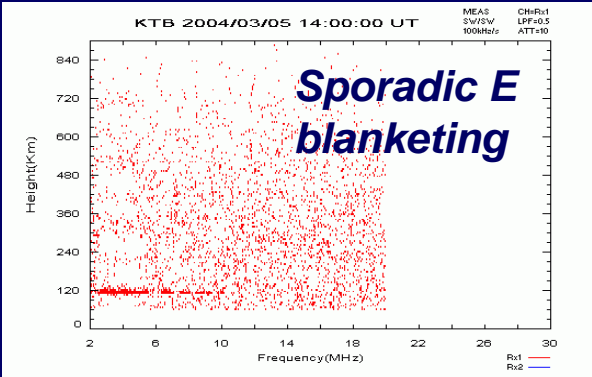
Sarmoko et al., 2006, "ULF geomagnetic anomaly associated with the Sumatra earthquakes" – found that ... variations at Kototabang exhibit an anomalous changes a few weeks before the larger earthquakes with  $M > 6.5$ , while there are no apparent changes in Biak data. This suggests that the anomalous change might be a possible signal related with the earthquake preparation phase of Sumatra earthquakes.



# Ionosphere and Upper Atmosphere



Ionosond

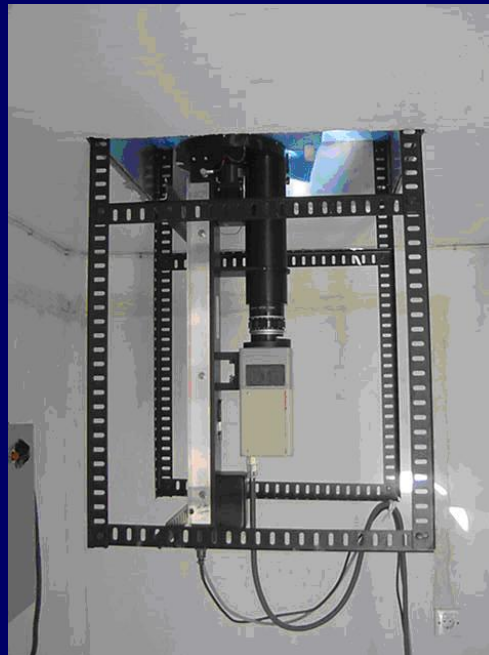


# Ionosphere and Upper Atmosphere

GPS receiver to measure TEC or scintillation



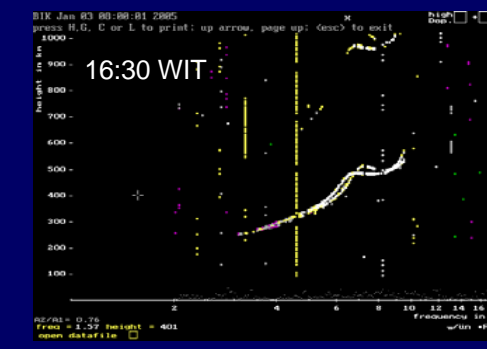
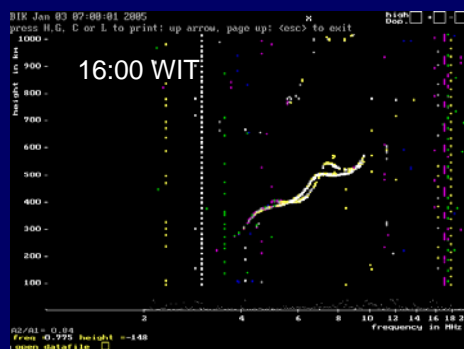
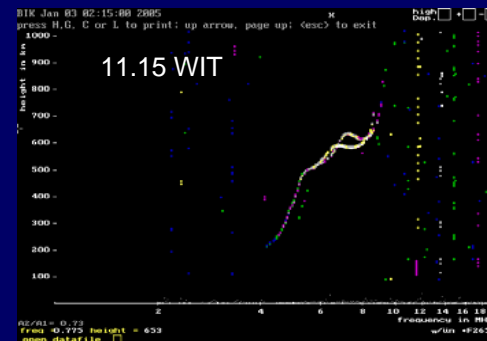
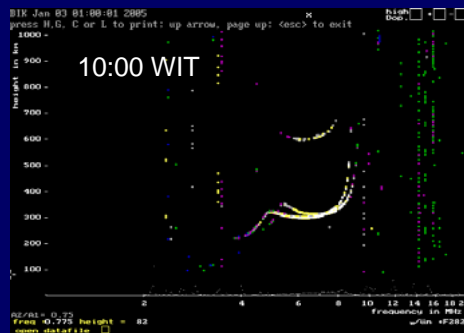
All sky airglow imager can observe ionospheric plasma bubble at 630 nm



Equatorial Atmospheric Radar (EAR) can be used to observe ionosphere (backscatter at 250 km altitude)



# Ionosphere and Upper Atmosphere

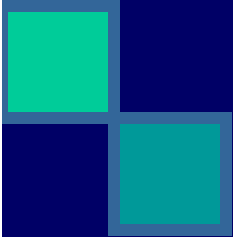



(Suhartini, 2005), The appearance new F3 layer at low latitude, Biak.

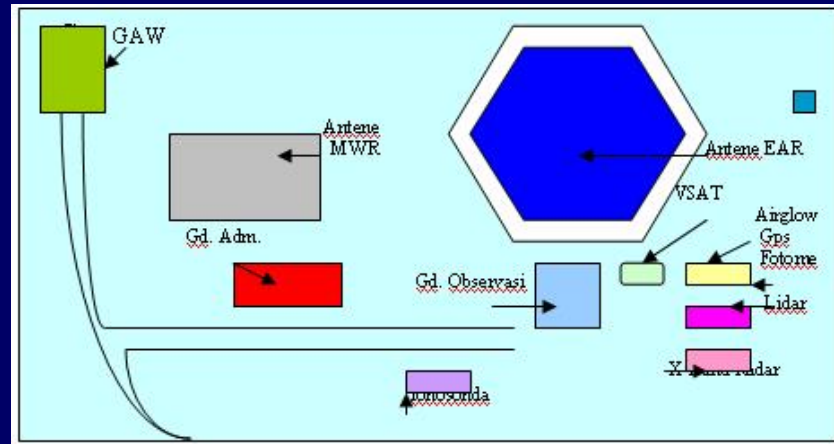
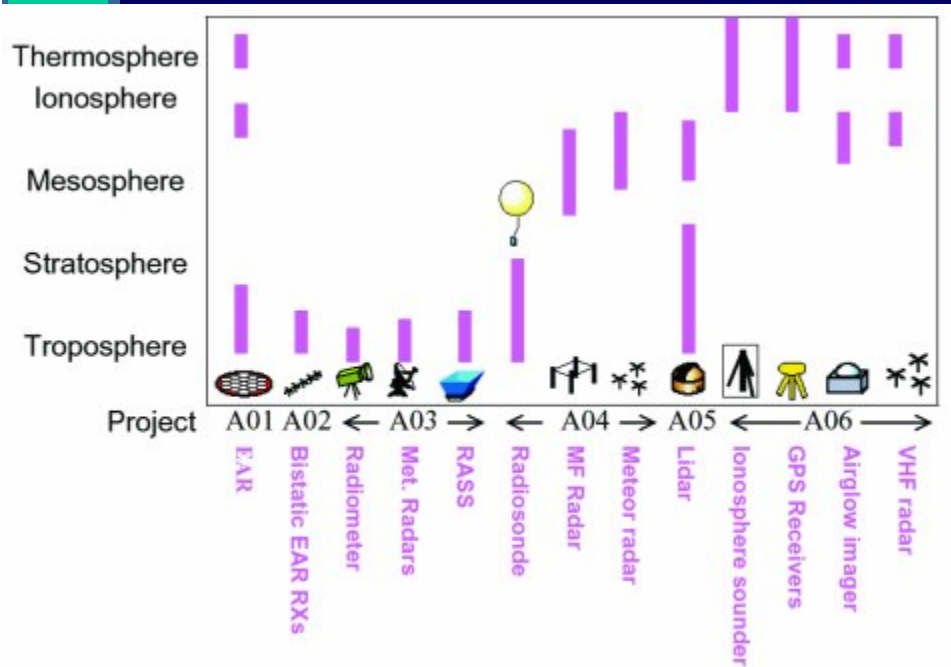




# International Collaboration

- 
- Kyoto University, Japan, on Equator Atmosphere research, related to upper atmosphere and space environment impacts.
  - NAO (National Astronomical Observatory)/University of Tokyo, Japan on solar physics.
  - Kyushu University, Japan, on geomagnetism, especially on MAGDAS (The Magnetic Data Acquisition System) .
  - Adelaide University, on upper atmosphere over equator regions.
  - National Central University, Taiwan, on Ionosphere and seismo-electromagnetism.
  - Chiba University, Japan, on seismo-electromagnetism.
  - DLR and related university in Germany, in developing atmosphere – ionosphere radar.
  - Indian Institute of Astrophysics, in developing Solar Radio Spectrograph (proposed – we have LAPAN – ISRO as part of Indonesia – India cooperation)
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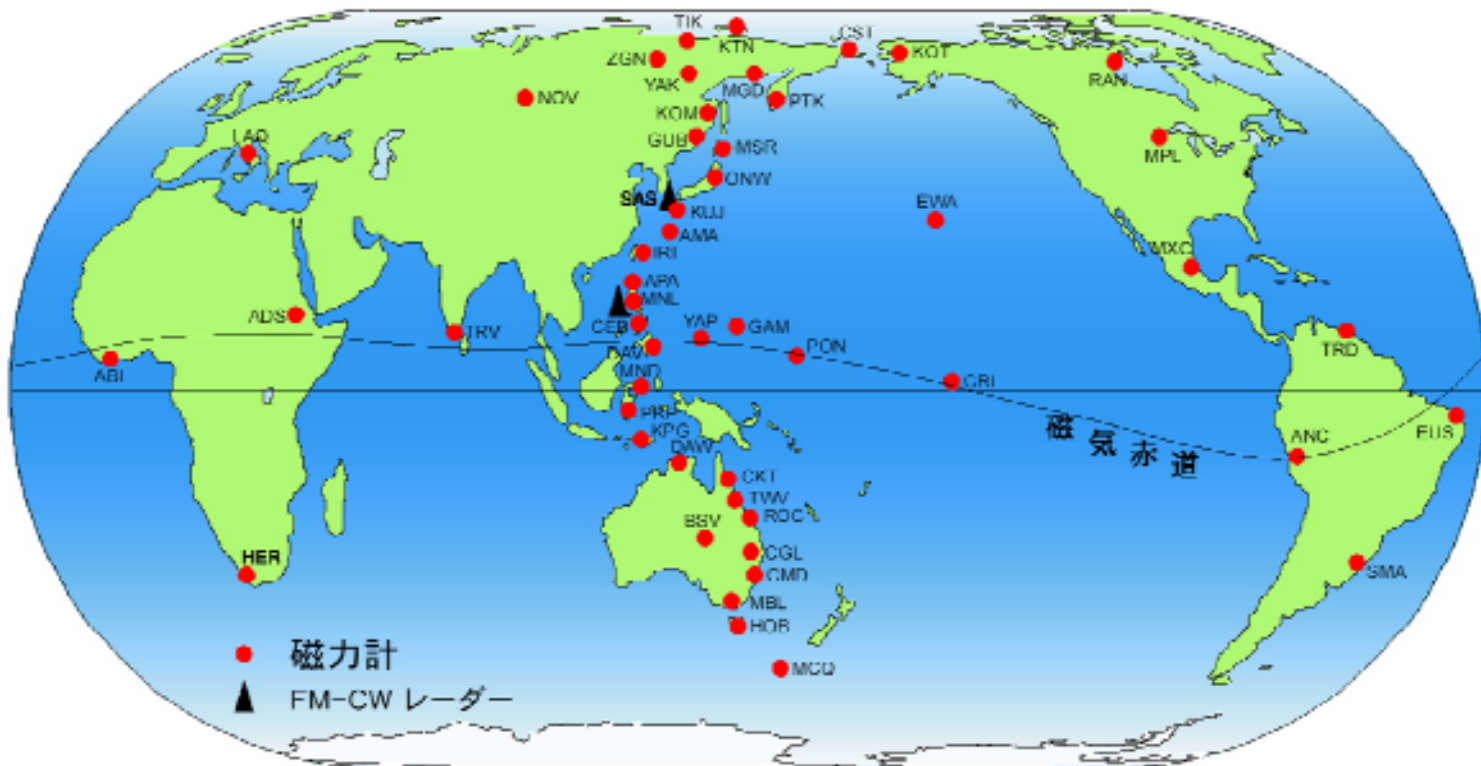
# International Collaboration



Kyoto University and related university in Japan make collaboration with LAPAN on Coupling Processes in the Equatorial Atmosphere (CPEA) by installing atmospheric radars in Kototabang, Sumatra



# International Collaboration



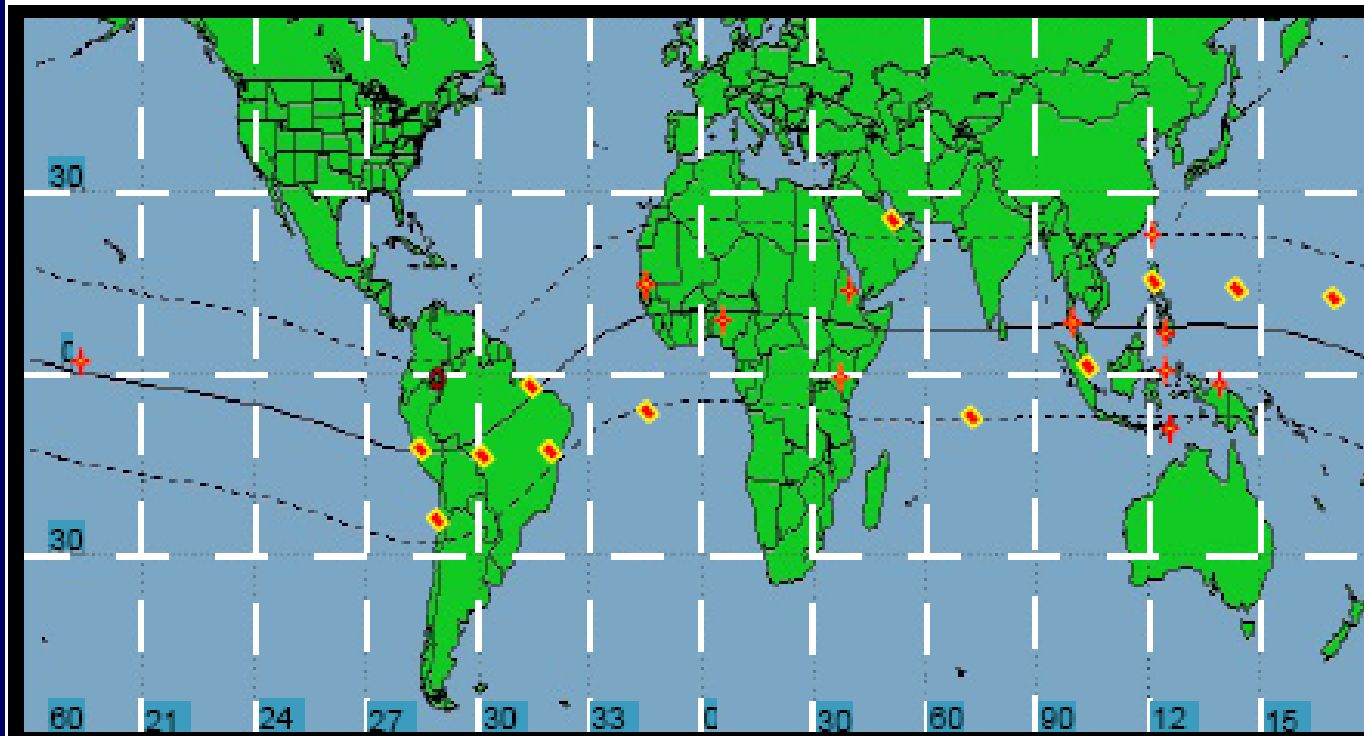
**MAGDAS/CPMN**  
(MAGnetic Data Acquisition System/Circum-pan Pacific Magnetometer Network)

**Magnetometer network in Indonesia: Manado (MND), Pare-pare (PRP), Kupang (KPG)**

# International Collaboration

Expected: Callisto, SCINDA, AWESOME

Existing and proposed stations of the Scintillation Network Decision Aid system



Real-time      Data Logging      Proposed Site

**There was preliminary discussion.  
We hope to be realized the sites at Manado and Kupang**



# Preparation of IHY 2007

Participate in Coordinated Investigation Programs through 5 working groups:

- (1) Solar Physics and Heliophysics,
- (2) Sun-Earth Connection,
- (3) Geomagnetism,
- (4) Ionosphere,
- (5) Instrumentation and Database.



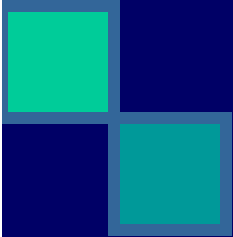
# Preparation of IHY 2007

Working Group (6) "IGY Anniversary and Public Education" will make coordination with related institution to

1. do activities for 50 year anniversary IGY (e.g. identify Indonesian people participated on IGY 1957),
2. do public education on the role Earth and Space Sciences that is IHY focus, and
3. do effort to ask 'Pos Indonesia' to issue stamps on 50 year IGY anniversary and IHY 2007.



# Concluding Remarks

- 
- We aware that many our research activities are still analyzing local characteristics and trying find out the physical mechanism by correlating some related available parameters, but it is still far from universal processes approach, due lack of data.
  - Through local observational facilities and international collaborations, Indonesian scientists do efforts to participate in IHY's CIPs in understanding heliophysical universal processes.
  - International data exchange, open database, free/low cost analysis software, and research collaboration during IHY 2007 – 2008 and beyond are expected to promote basic space science research in developing countries like Indonesia for national capacity building.
- 