DEVELOPING THE SPACE WEATHER MONITORING AND INFORMATION SYSTEM IN INDONESIA

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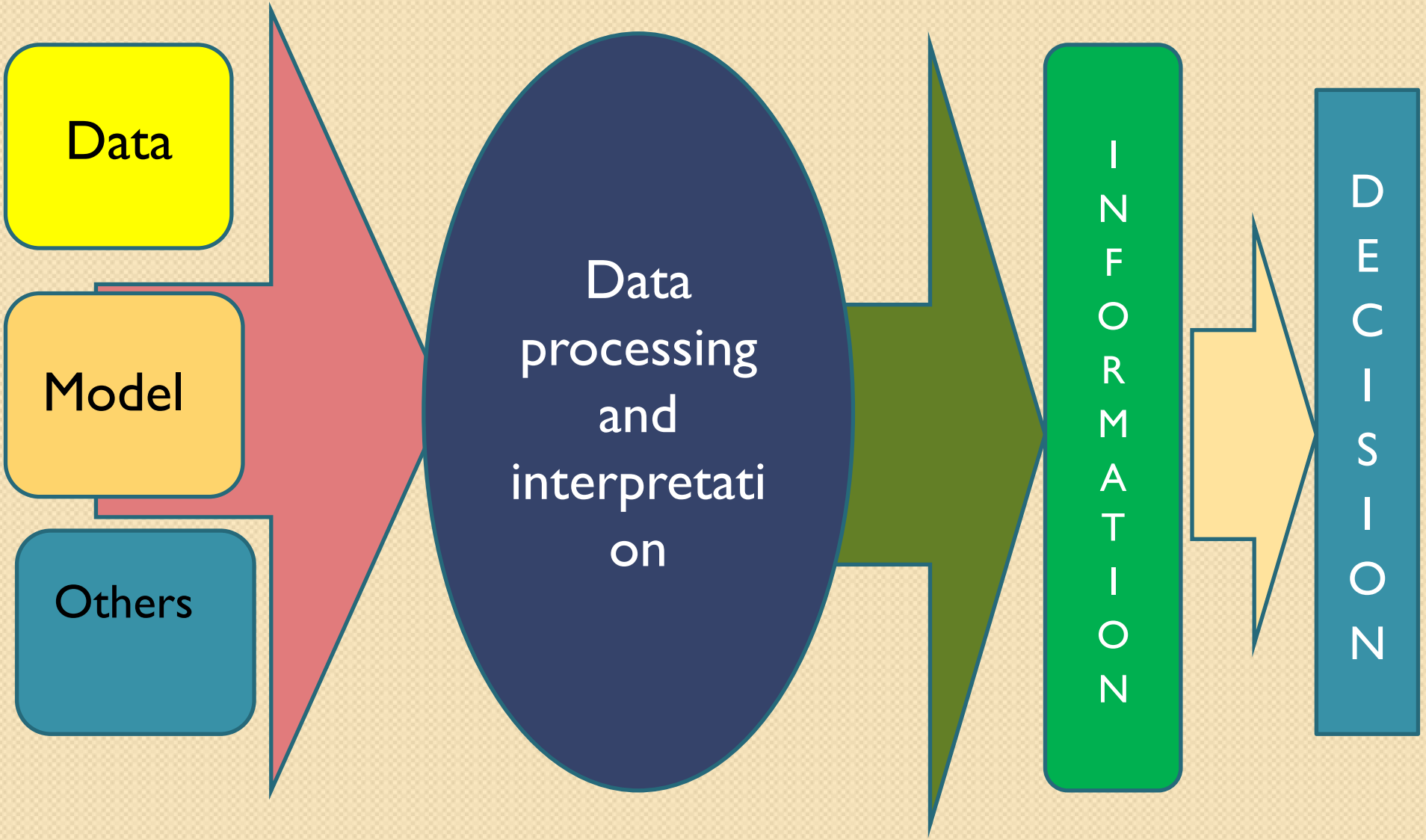
Background

- The use of space-based technology.
- LAPAN conducts the research and observation related with space weather parameters, including the Sun, ionosphere, geo and space magnetism, and space environment.
- An observation network has been established, operates several optical and radio-based observation equipments located over Indonesia.

DECISION SUPPORT SYSTEM



Geomagnetic Observation

- Magnetometer:
- Fluxgate Magnetometer: 5 (1 STELAB)

  Sumedang, Pameungpeuk, Watukosek, Biak, Kototabang
- MAGDAS: 5 (ICSWSE)

  Pontianak, Manado, Parepare, Kupang, Jayapura
- Induction Magnetometer: 1

  Bali

Ionospheric Observation

- Ionosonda: 7 (1 NICT)

  Kototabang, Sumedang, Pameungpeuk, Pontianak, Manado, Kupang, Biak

- GPS-TEC: 5

  Sumedang, Pontianak, Manado, Kupang, Biak

- GRBR: 7

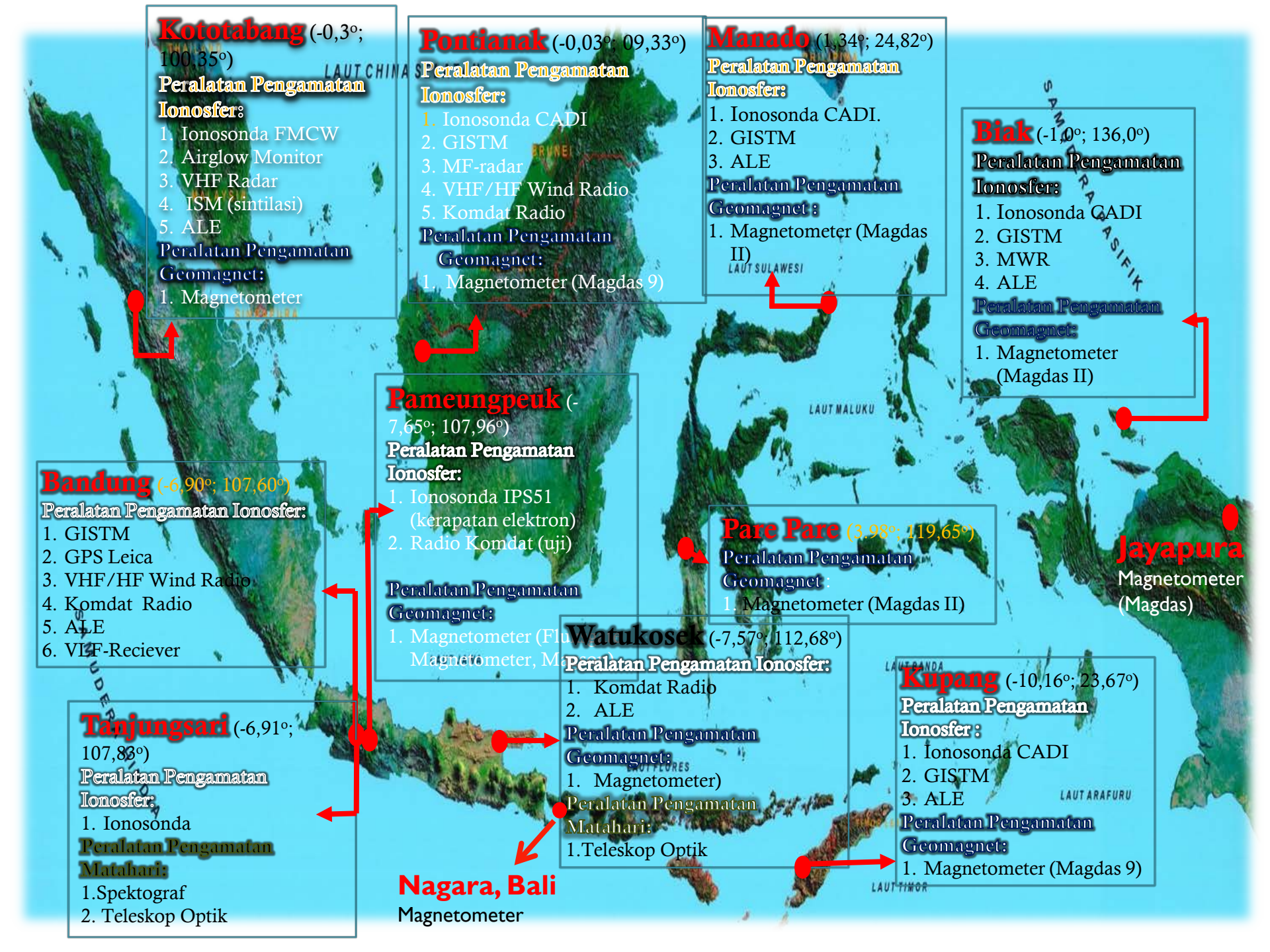
  Kototabang, Sumedang, Yogyakarta, Watukosek, Pontianak, Manado, Biak.

Solar Observation

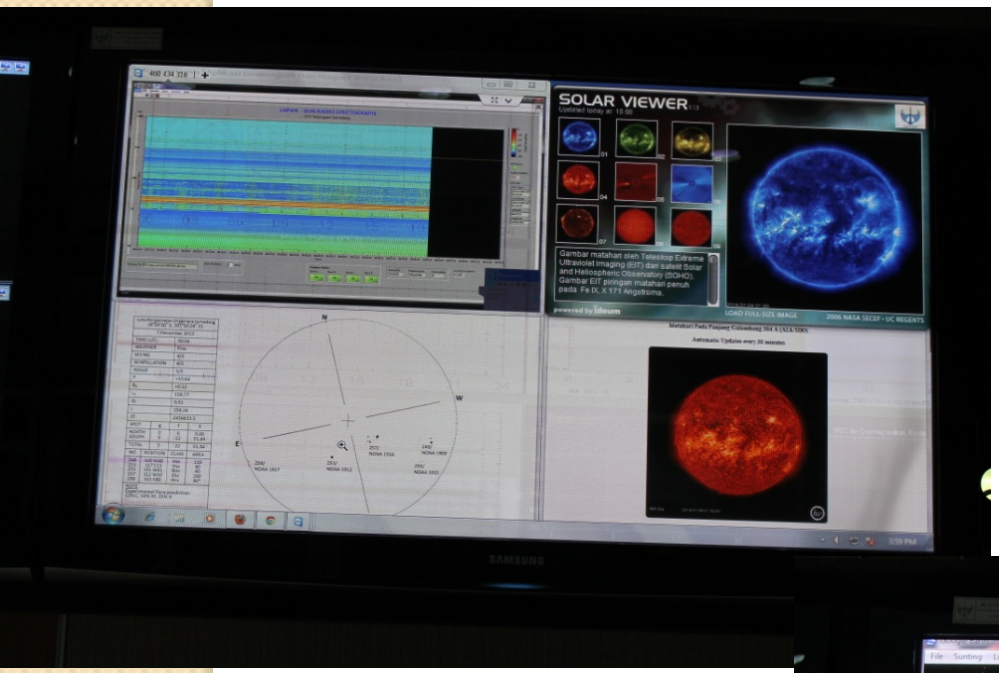
- Optical telescope: 2

  Sumedang, Watukosek
- Radio Telescope:

- Solar Radio Spectrograph (Sumedang)
- Callisto (Sumedang)


Kototabang (-0,3°; 100,35°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda FMCW
2. Airglow Monitor
3. VHF Radar
4. ISM (sintilasi)
5. ALE
Peralatan Pengamatan Geomagnet:
1. Magnetometer
Pontianak (-0,03°; 09,33°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda CADI
2. GISTM
3. MF-radar
4. VHF/HF Wind Radio
5. Komdat Radio
Peralatan Pengamatan Geomagnet:
1. Magnetometer (Magdas 9)
Manado (1,34°; 24,82°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda CADI.
2. GISTM
3. ALE
Peralatan Pengamatan Geomagnet :
1. Magnetometer (Magdas II)
Biak (-1,0°; 136,0°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda CADI
2. GISTM
3. MWR
4. ALE
Peralatan Pengamatan Geomagnet:
1. Magnetometer (Magdas II)
Pameungpeuk (-7,65°; 107,96°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda IPS51 (kerapatan elektron)
2. Radio Komdat (uji)
Peralatan Pengamatan Geomagnet:
1. Magnetometer (Flu
Magnetometer, Ma
Bandung (-6,90°; 107,60°)
Peralatan Pengamatan Ionosfer:
1. GISTM
2. GPS Leica
3. VHF/HF Wind Radio
4. Komdat Radio
5. ALE
6. VLF-Reciever
Pare Pare (3,98°; 119,65°)
Peralatan Pengamatan Geomagnet :
1. Magnetometer (Magdas II)
Jayapura
Magnetometer (Magdas)
Watukosek (-7,57°; 112,68°)
Peralatan Pengamatan Ionosfer:
1. Komdat Radio
2. ALE
Peralatan Pengamatan Geomagnet:
1. Magnetometer)
Peralatan Pengamatan Matahari:
1.Teleskop Optik
Kupang (-10,16°; 23,67°)
Peralatan Pengamatan Ionosfer :
1. Ionosonda CADI
2. GISTM
3. ALE
Peralatan Pengamatan Geomagnet:
1. Magnetometer (Magdas 9)
Tanjungsari (-6,91°; 107,83°)
Peralatan Pengamatan Ionosfer:
1. Ionosonda
Peralatan Pengamatan Matahari:
1.Spektograf
2. Teleskop Optik
Nagara, Bali
Magnetometer
LAUT CHINA
BRUNEI
LAUT SULAWESI
LAUT MALUKU
SAMUDERA PASIFIK
LAUT BANDA
LAUT FLORES
LAUT ARAFURU
LAUT TIMOR

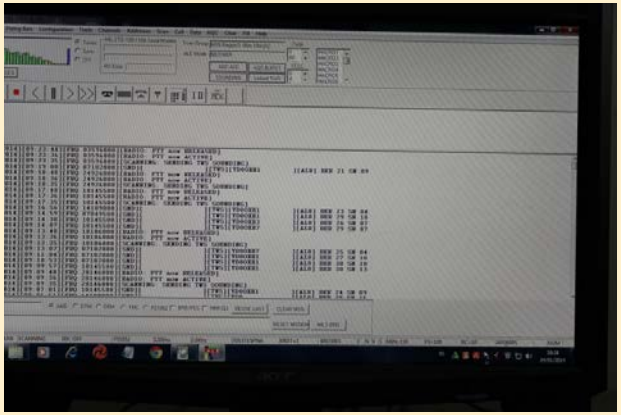
Space Weather Monitoring and Information System (SPICA)

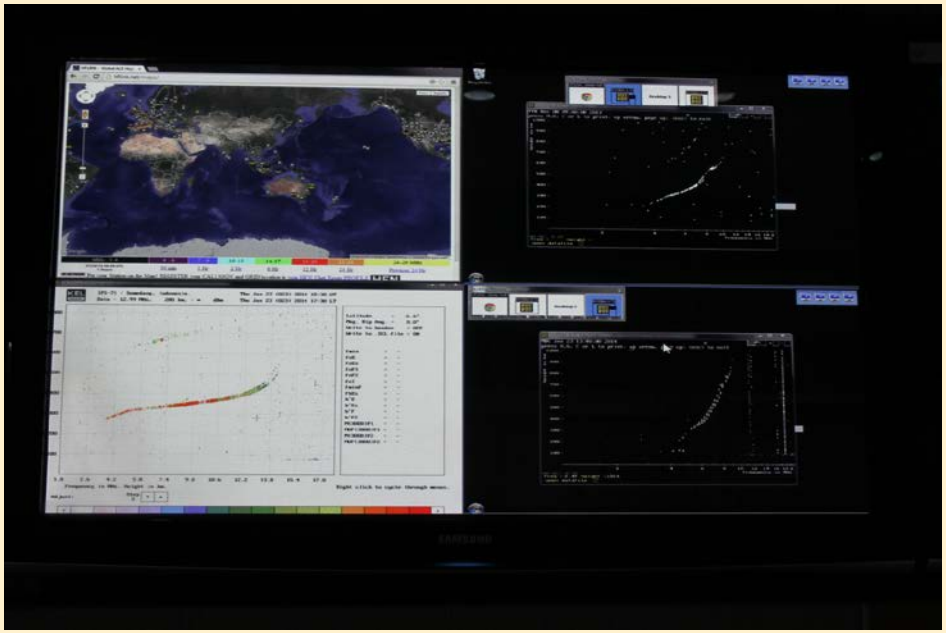


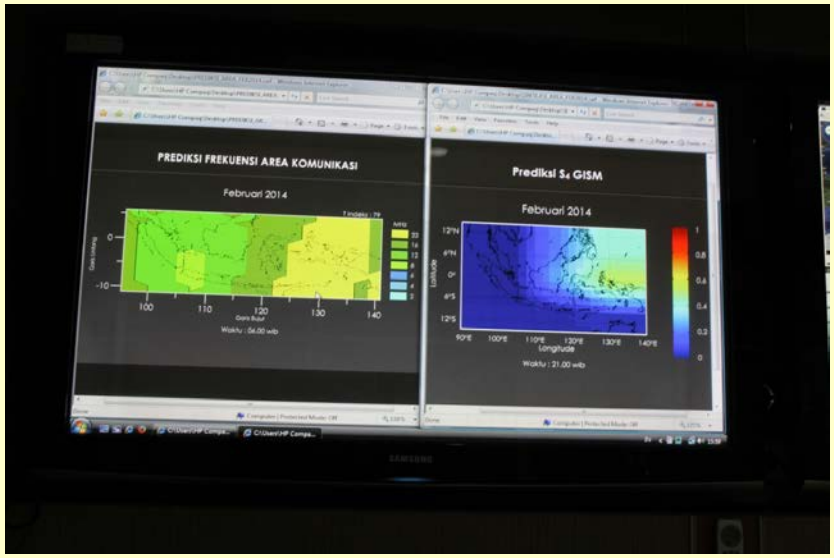
-Solar radio burst and sunspot

Monitoring the orbit of satellite crossing over Indonesia region (updated 1 – 5 min)

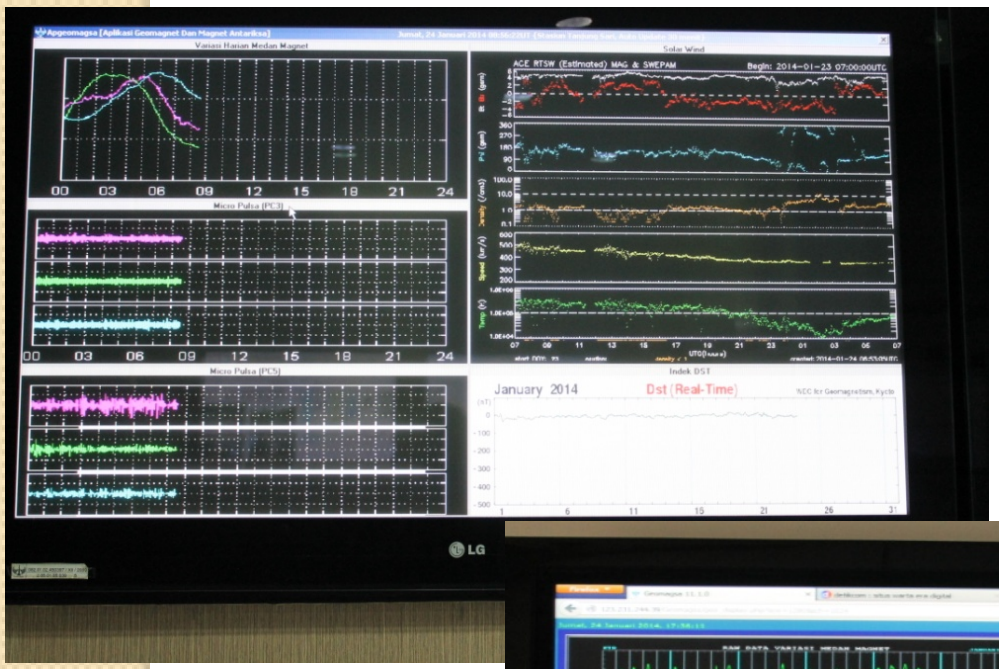
-Radio frequency monitoring (real time)
-Near real time Ionogram







Prediction of radio communication frequency
Prediction of scintillation



-Geomagnetic variation monitoring (near real time, delay 5 dan 10 min)

Berita Cuaca Antariksa Mingguan: 28 Juni 2013 – 5 Juli 2013

Info Cuaca Antariksa 28 Juni 2013 – 5 Juli 2013

Pada akhir Juni 2013 aktivitas matahari berada pada level rendah. Daerah aktif AR1785 di tepi timur matahari menjadi sumber beberapa peristiwa flare flare kelas C7.1 pada pukul 17:49 UT, C7.2 flare pukul 23:58 UT (rendah) dan beberapa flare C lainnya yang lebih rendah serta terjadi flare kelas M1.5 (menengah) pada tanggal 03 Juli 2013 pukul 07:08 UT yang bersumber dari AR1787. Peristiwa flare M1.5 ini juga menjadi sumber peristiwa prominensa, CME dan diikuti oleh semburan radio tipe II dan beberapa bursts tipe III.

Terjadi badai kuat tanggal 29 Juni 2013 ditunjukkan oleh nilai Dst terendah mencapai -99 dengan nilai Kp 7 sebagai akibat adanya CME pada beberapa hari sebelumnya tanggal 27 Juni 2013. Terjadi aurora pada bagian selatan Bumi,

Indeks T pekan ini normal, berada disekitar indeks T bulanan, hal ini mengindikasikan kondisi Ionosfer diatas wilayah Indonesia pada pekan ini 29 Juni 2013 - 05 Juli 2013 normal, maka Frekuensi HF yang dipantulkan stabil, demikian juga foF2 dan TEC

(Info Lengkap: www.dirgantara-lapan.or.id)

PREDIKSI CUACA ANTARIKSA

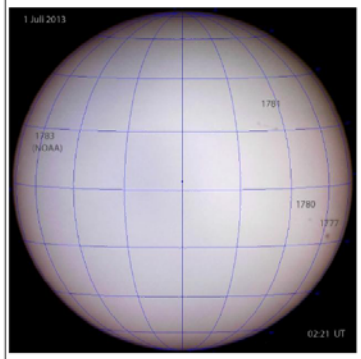
(28 Juni 2013-5 Juli 2013)

Matahari: Menengah dan Kuat

Geomagnet: -

Ionosfer:
Prediksi Indeks T Regional Juli 2013: 77

Hasil Pengamatan Matahari 1 Juli 2013



Daerah Aktif	Lokasi	Klasifikasi Magnetik	Jumlah Bintik	Flare
1777	S18W75	α	1	-
1780	S13W40	β	6	C2.7 C1.3 C2.0
1781	N19W43	βγ	12	-
1783	N04E43	β	2	-

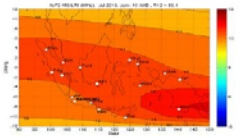
Hasil Pengamatan Geomagnet

- Nilai Dst terendah -99 dengan indeks Kp 7 (badai kuat) tanggal 29 Juni 2013

Hasil Pengamatan Kondisi Ionosfer di Atas Indonesia

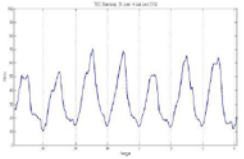
Indeks T Regional 5 Juli 2013 jam 10.00 LT : 70

Prediksi foF2 Juli 2013 diatas wilayah Indonesia maksimum : 12 MHz



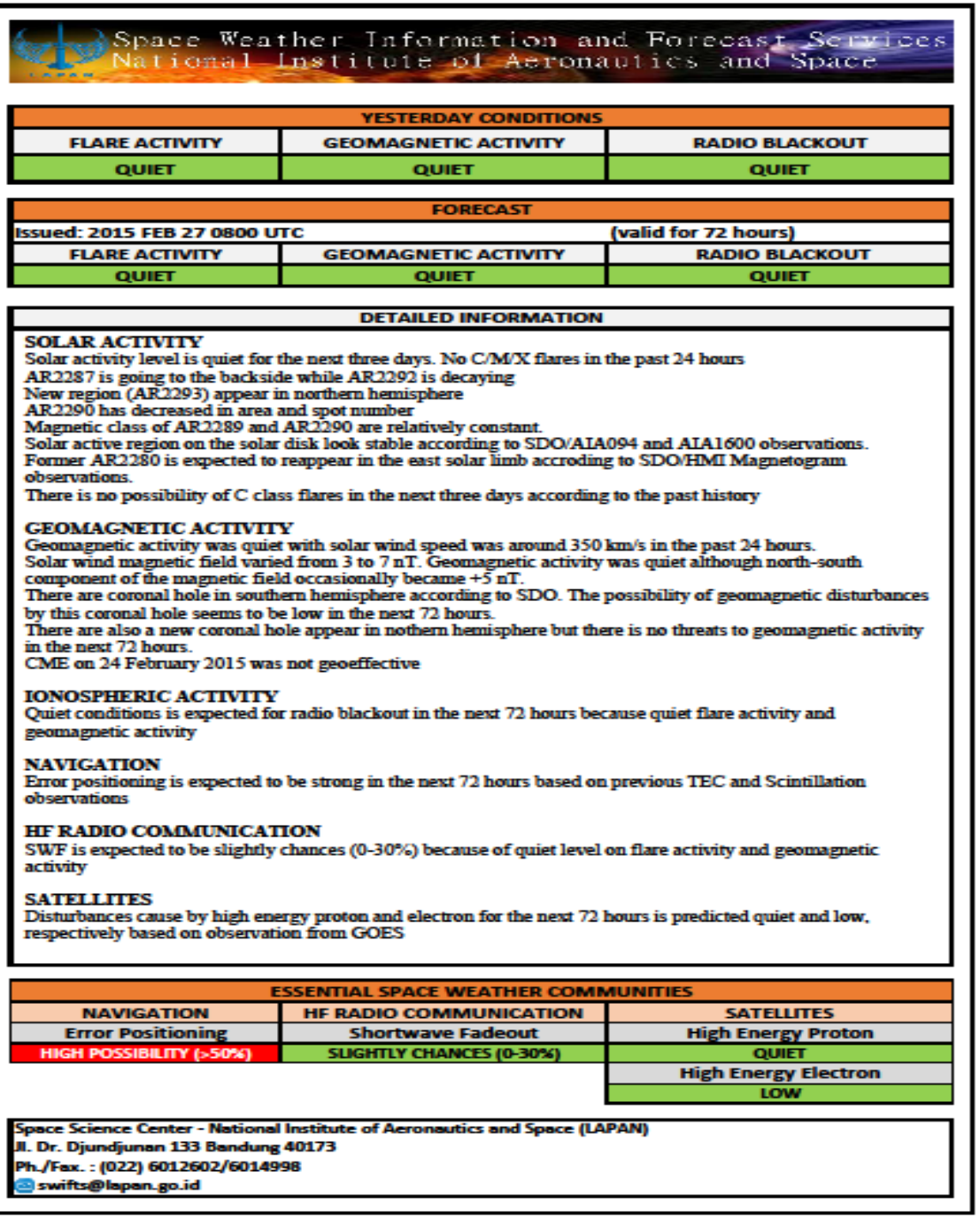
Prediksi TEC diatas wilayah Indonesia Juli 2013 : 66 TECU

TEC maksimum pekan ini : 70 TECU



Pusat Sains Antariksa – Lembaga Penerbangan dan Antariksa Nasional - www.bdg.lapan.go.id
Jl. Dr. Djundjunan 133 Bandung 40173 Telp. 022-6012602 Fax
Email: ppid.pussainsa@lapan.go.id

Weekly information:
- Sunspot
- Flare prediction
- Geomagnetic condition
- T index
- Prediction of foF2, TEC, T index



Space Weather Information and Forecast Services
National Institute of Aeronautics and Space

YESTERDAY CONDITIONS		
FLARE ACTIVITY	GEOMAGNETIC ACTIVITY	RADIO BLACKOUT
QUIET	QUIET	QUIET

FORECAST		
Issued: 2015 FEB 27 0800 UTC		(valid for 72 hours)
FLARE ACTIVITY	GEOMAGNETIC ACTIVITY	RADIO BLACKOUT
QUIET	QUIET	QUIET

DETAILED INFORMATION

SOLAR ACTIVITY
Solar activity level is quiet for the next three days. No C/M/X flares in the past 24 hours
AR2287 is going to the backside while AR2292 is decaying
New region (AR2293) appear in northern hemisphere
AR2290 has decreased in area and spot number
Magnetic class of AR2289 and AR2290 are relatively constant.
Solar active region on the solar disk look stable according to SDO/AIA094 and AIA1600 observations.
Former AR2280 is expected to reappear in the east solar limb accroding to SDO/HMI Magnetogram observations.
There is no possibility of C class flares in the next three days according to the past history

GEOMAGNETIC ACTIVITY
Geomagnetic activity was quiet with solar wind speed was around 350 km/s in the past 24 hours.
Solar wind magnetic field varied from 3 to 7 nT. Geomagnetic activity was quiet although north-south component of the magnetic field occasionally became +5 nT.
There are coronal hole in southern hemisphere according to SDO. The possibility of geomagnetic disturbances by this coronal hole seems to be low in the next 72 hours.
There are also a new coronal hole appear in nothern hemisphere but there is no threats to geomagnetic activity in the next 72 hours.
CME on 24 February 2015 was not geoeffective

IONOSPHERIC ACTIVITY
Quiet conditions is expected for radio blackout in the next 72 hours because quiet flare activity and geomagnetic activity

NAVIGATION
Error positioning is expected to be strong in the next 72 hours based on previous TEC and Scintillation observations

HF RADIO COMMUNICATION
SWF is expected to be slightly chances (0-30%) because of quiet level on flare activity and geomagnetic activity

SATELLITES
Disturbances cause by high energy proton and electron for the next 72 hours is predicted quiet and low, respectively based on observation from GOES

ESSENTIAL SPACE WEATHER COMMUNITIES		
NAVIGATION	HF RADIO COMMUNICATION	SATELLITES
Error Positioning	Shortwave Fadeout	High Energy Proton
HIGH POSSIBILITY (>50%)	SLIGHTLY CHANCES (0-30%)	QUIET
		High Energy Electron
		LOW

Space Science Center - National Institute of Aeronautics and Space (LAPAN)
Jl. Dr. Djundjunan 133 Bandung 40173
Ph./Fax. : (022) 6012602/6014998
swifts@lapan.go.id

Daily information (from March);

1. evaluation of the previous day and prediction for next 24 hours)
-Solar Activity
-Geomagnetic condition
-Radio Blackout

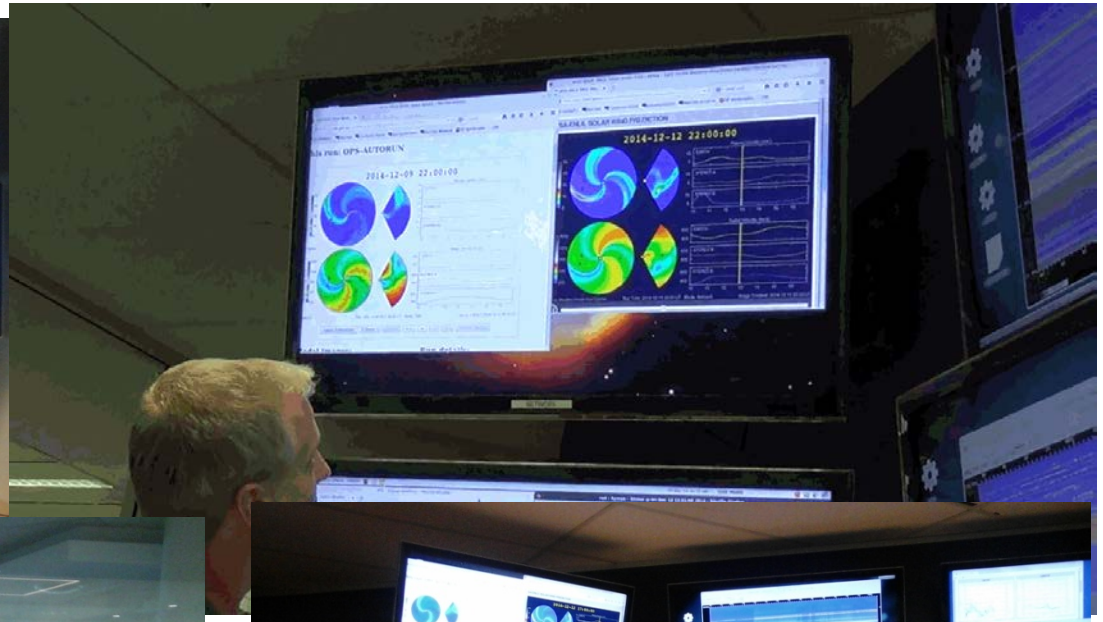
2. Space Weather Communities
-Navigation
-HF communication
-Satellites

http://pussainsa.lapan.go.id/index.php/frontend_forecast
www.swifts.sains.lapan.go.id

- The space-weather related information also delivered to other institutions and telecommunication company. In the future we need to increase the capability by establish the colaboration with other institutions and other countries to improve the capacity building and the space weather information which is needed by the stake holders.

Training on Space Weather Information System in NICT 16 – 18 September 2014

Training in IPS Australia, 6 – 14 December 2014



THANK YOU