Japanese Space Weather Activities and Asia-Oceania Space Weather Alliance

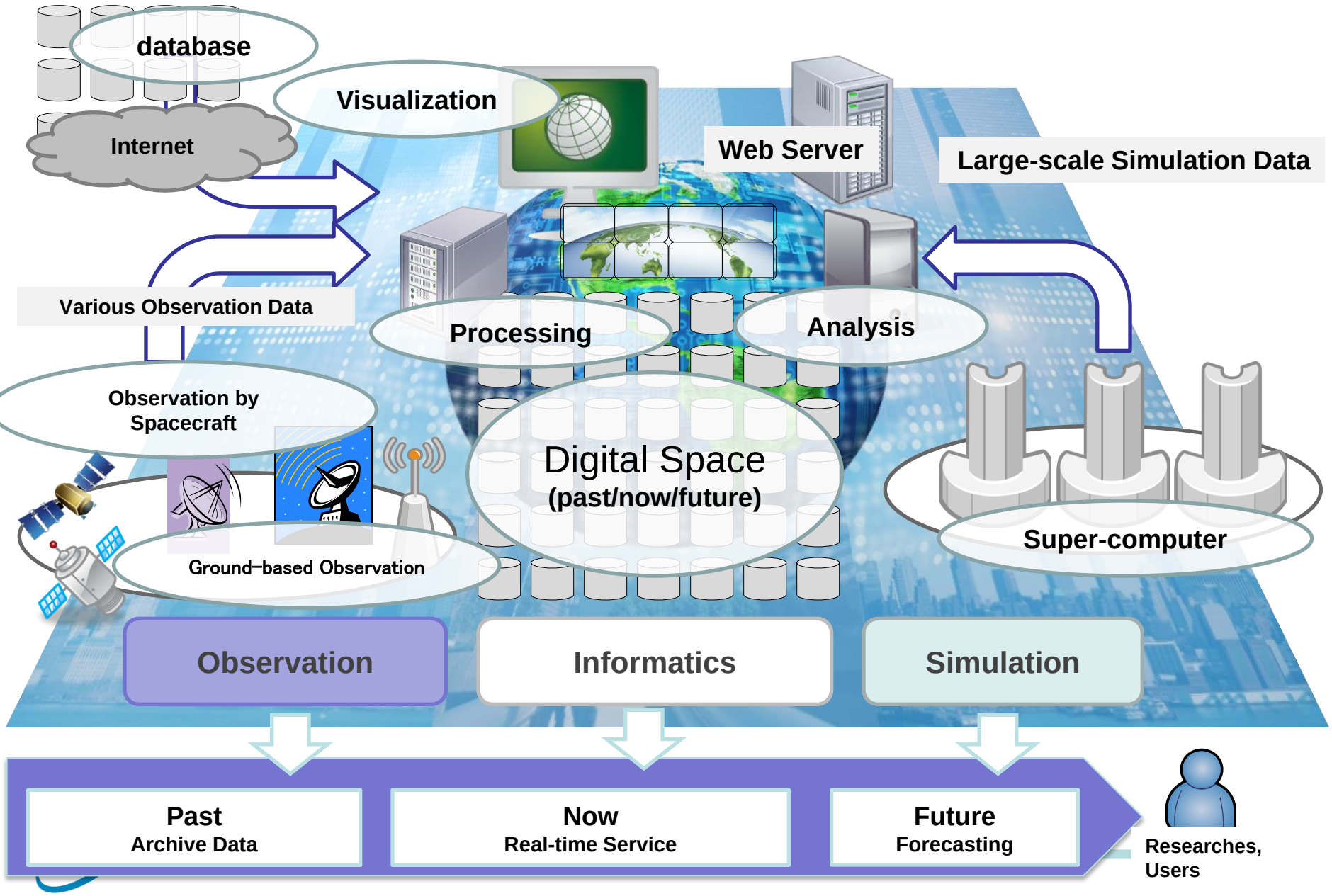
S. Watari, Ken T. Murata, and T. Nagatsuma
National Institute of Information and Communications Technology

Contents

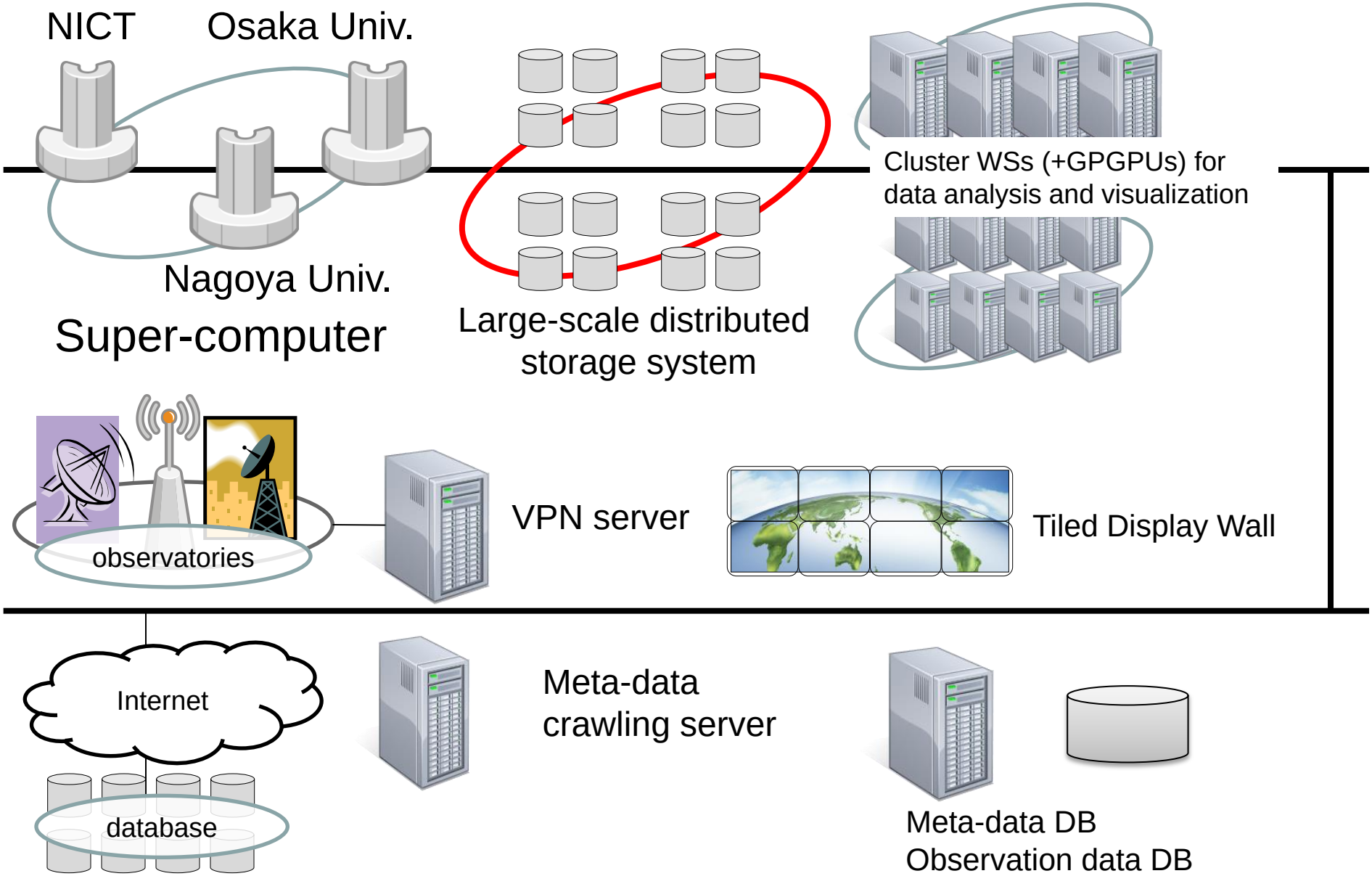
1. Activities of National Institute of Info. & Com. Thech. (NICT)
2. Asia-Oceania Space Weather Alliance (AOSWA)
3. Other activities

1. Activities of NICT

NICT Space Weather Cloud



NICT Space Weather Cloud



Evaluation of ISES forecast centers

ISES forecast centers exchange their forecast using UGEOA code. NICT started evaluation of the forecasts under agreements of each forecast center.

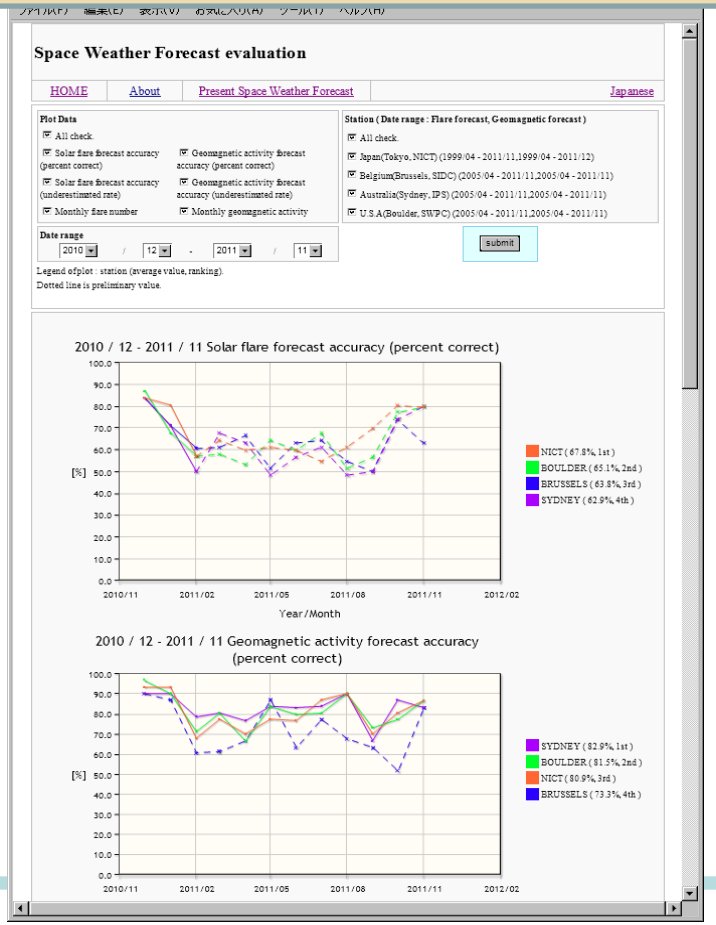
http://www2.nict.go.jp/aeri/swe/swx/swcenter/isesforecast_e.html

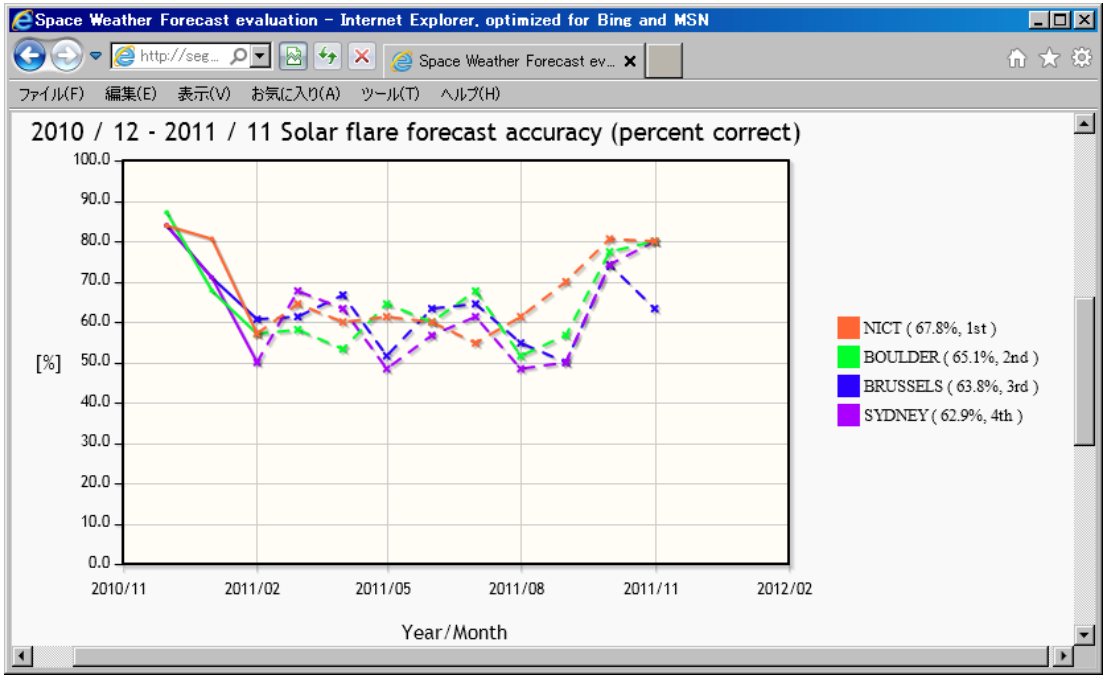
ファイル(F)　編集(E)　表示(V)　お気に入り(A)　ツール(T)　ヘルプ(H)

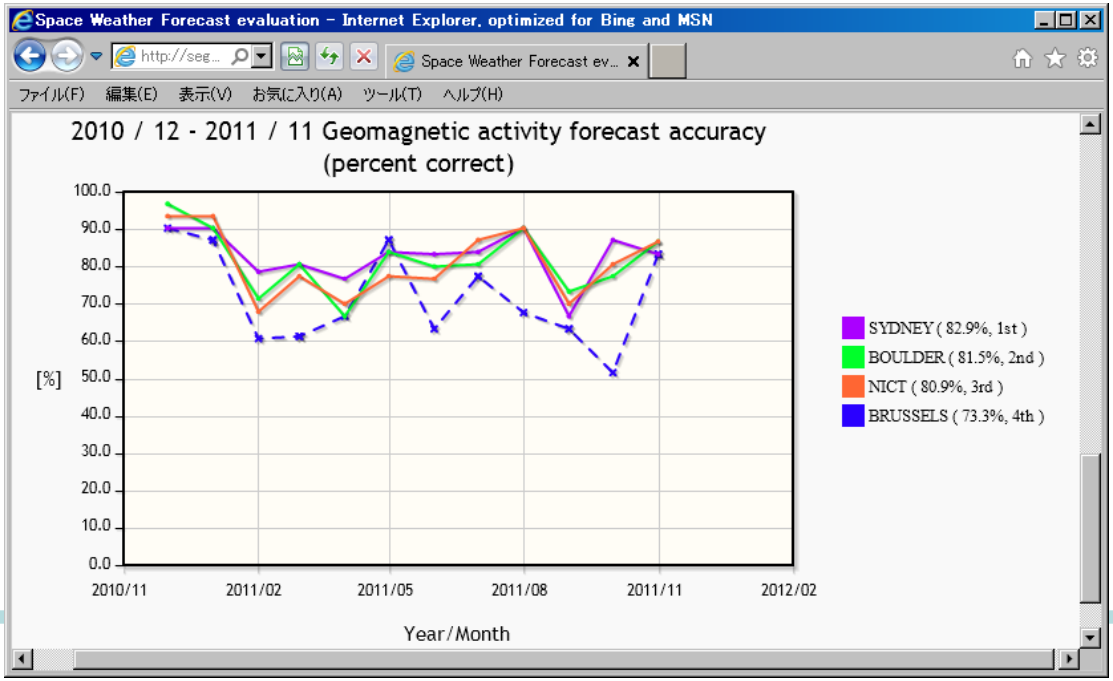
[Present Space Weather Forecast from ISES]

Tokyo[Japan] (1500JST)	Flare forecast on :18(1days)	Eruptive
	Magnetic forecast on :18(/days)	Quiet
	Proton forecast on :18(/days)	Quiet
Beijing[China] (1530JST)	Flare forecast on :17(2days)	Eruptive
	Magnetic forecast on :17(2days)	Quiet
	Proton forecast on :17(2days)	Quiet
Burussels [Belgium] (2010JST)	Flare forecast on :17(2days)	Active
	Magnetic forecast on :17(2days)	Quiet
	Proton forecast on :17(2days)	Quiet
Sydney [Australia] (0900JST)	Flare forecast on :18(1days)	Eruptive
	Magnetic forecast on :18(1days)	Quiet
	Proton forecast on :18(1days)	Quiet
Boulder[USA] (1230JST)	Flare forecast on :18(1days)	Eruptive
	Magnetic forecast on :18(1days)	Quiet
	Proton forecast on :18(1days)	Quiet

http://seg-web.nict.go.jp/cgi-bin/forecast/eng_forecast_score.cgi



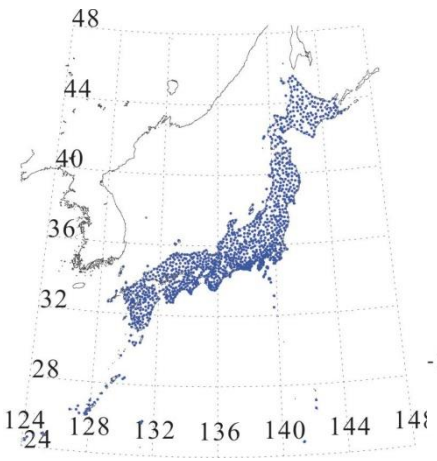

Space Weather Forecast evaluation – Internet Explorer, optimized for Bing and MSN
ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)
2010 / 12 - 2011 / 11 Solar flare forecast accuracy (percent correct)
[%]
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2010/11
2011/02
2011/05
2011/08
2011/11
2012/02
Year/Month
NICT (67.8%, 1st)
BOULDER (65.1%, 2nd)
BRUSSELS (63.8%, 3rd)
SYDNEY (62.9%, 4th)


Space Weather Forecast evaluation – Internet Explorer, optimized for Bing and MSN
ファイル(F) 編集(E) 表示(V) お気に入り(A) ツール(T) ヘルプ(H)
2010 / 12 - 2011 / 11 Geomagnetic activity forecast accuracy
(percent correct)
[%]
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
2010/11
2011/02
2011/05
2011/08
2011/11
2012/02
Year/Month
SYDNEY (82.9%, 1st)
BOULDER (81.5%, 2nd)
NICT (80.9%, 3rd)
BRUSSELS (73.3%, 4th)

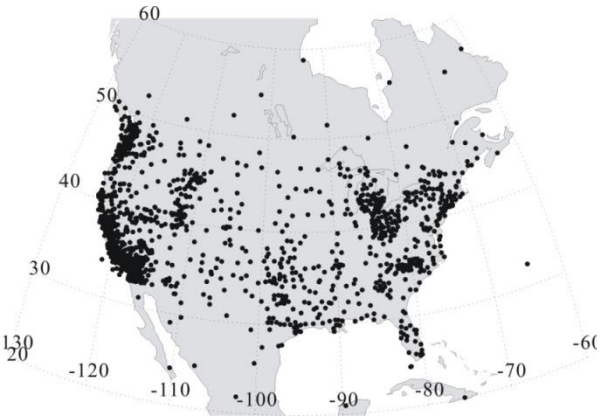
Ionospheric Disturbance via High-Resolution GPS-TEC Maps

Number of GPS Receivers

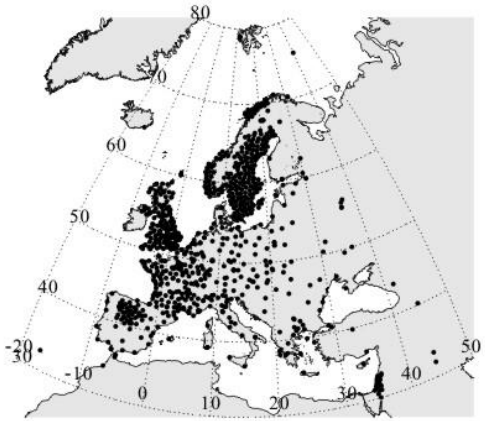
~1,200 receivers



~1,600 receivers

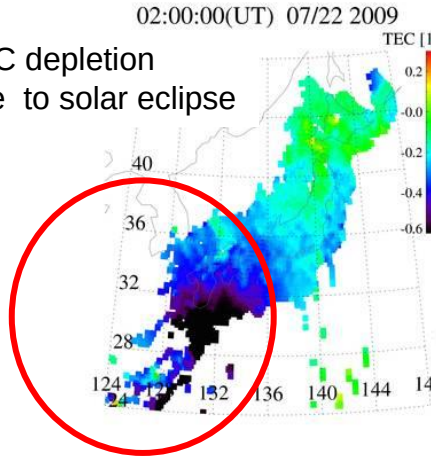


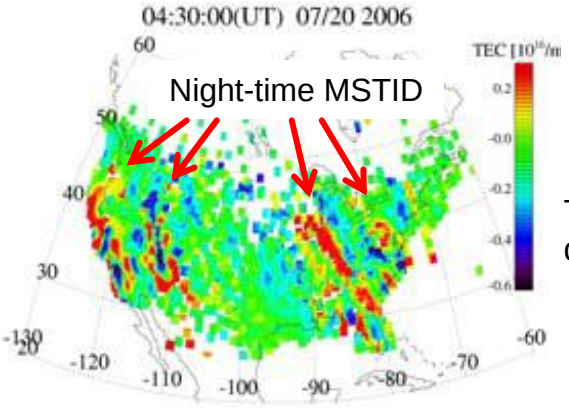
~830 receivers

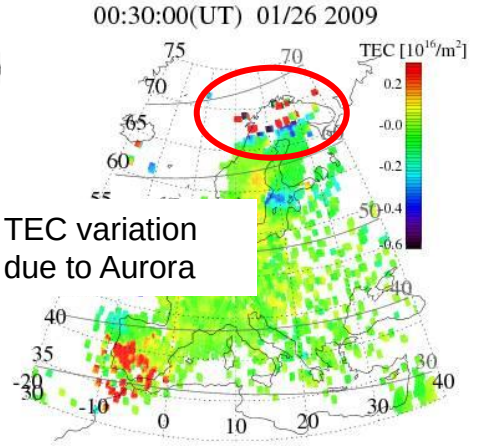


TEC Map
(30sec, 0.15°x0.15°)

TEC depletion
due to solar eclipse







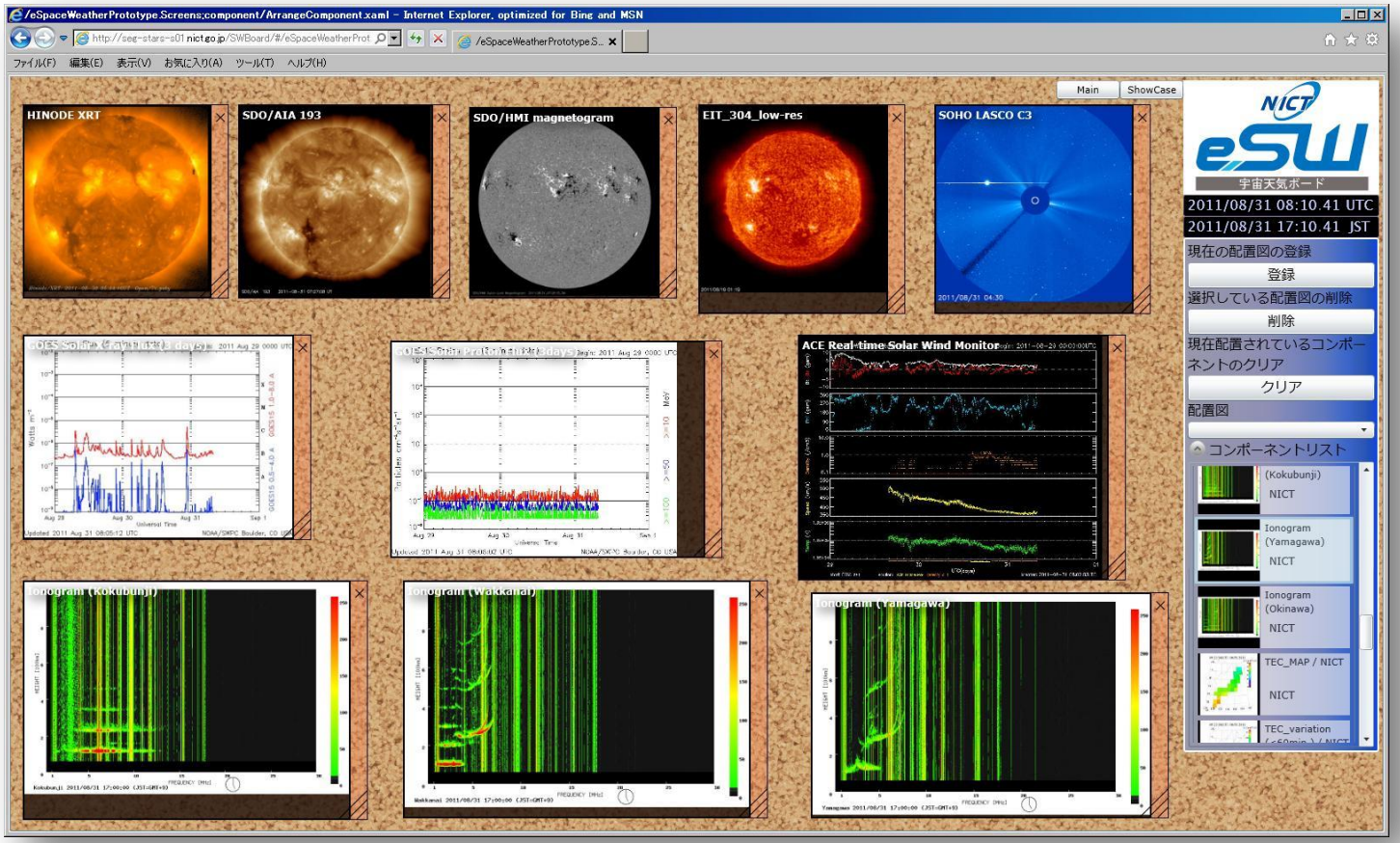
Asia-Oceania GPS-TEC map…

e-SW Web site (in Japanese)
Portal of products provided by NICT Space Weather Cloud

http://e-sw.nict.go.jp

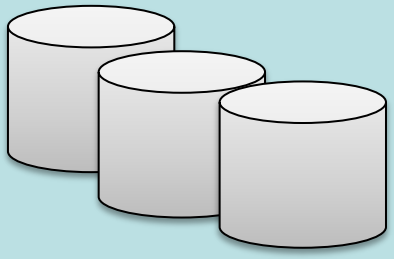
Space Weather Board

Users can arrange their favorite space weather data and can save their original layouts.



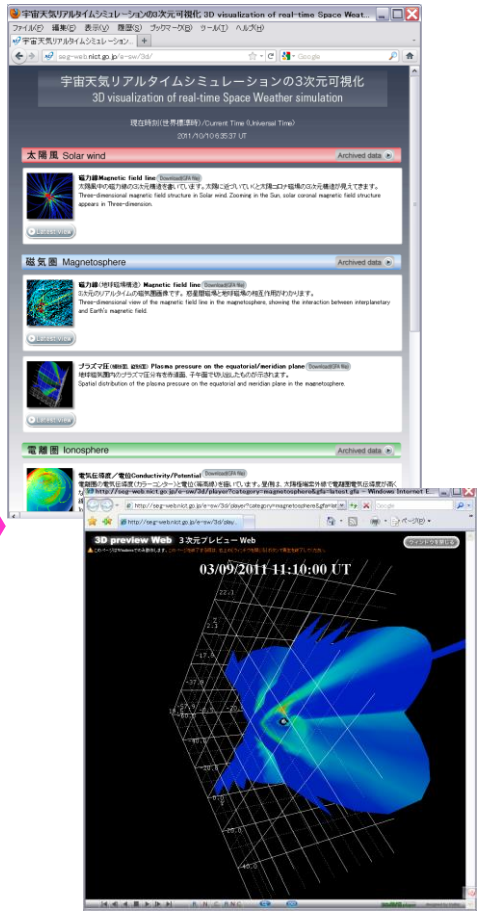
Analysis and Visualization of Space Weather Simulation

Space Weather simulation



large storage

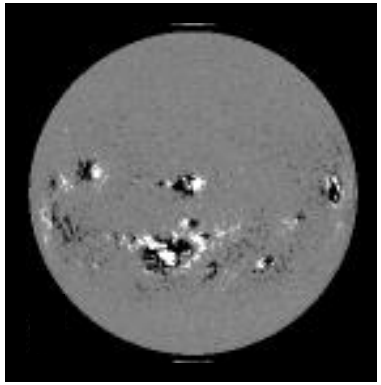
Computer for analysis and visualization

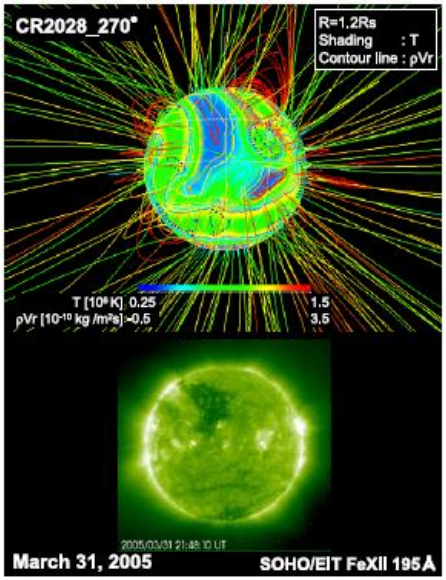


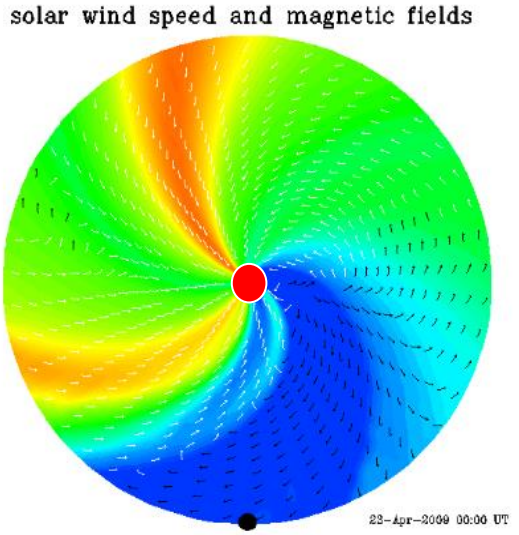
Web service

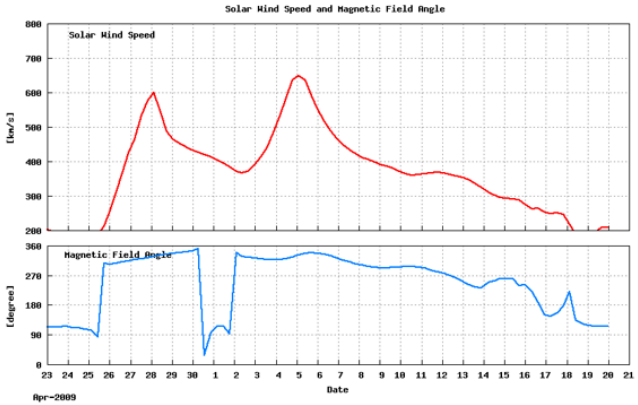
Computer simulation of the Sun and solar wind

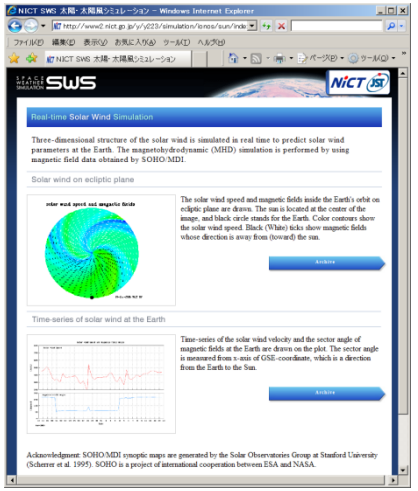
Magnetic field (solar surface) data via SOHO/MDI











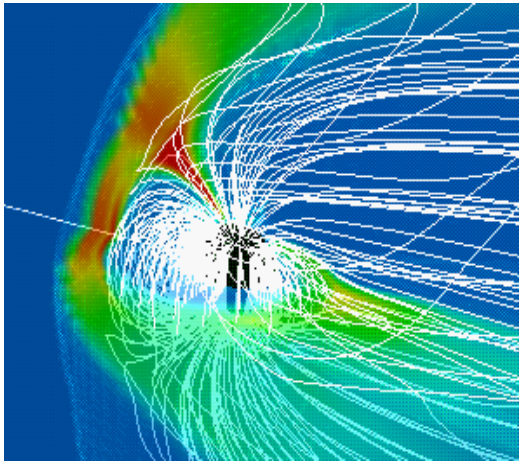
Publication on Web

Computer simulation of Earth's magnetosphere

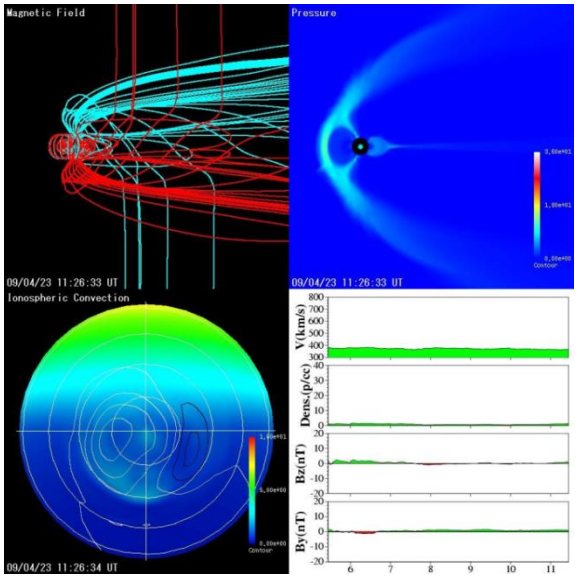
Real-time observation data of solar wind via ACE satellite

Real-time data receiving at NICT (Koganei)

Super computer（NEC SX-8R） at NICT (Koganei)



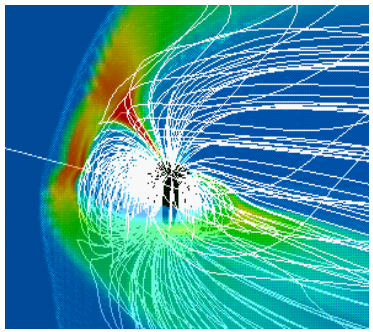
Visualization and database

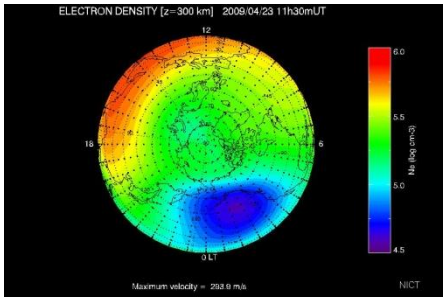


Publication on Web

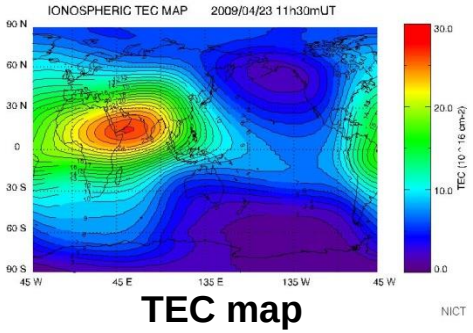
Computer simulation of Ionosphere and Thermosphere

Simulation results from Magnetosphere simulation

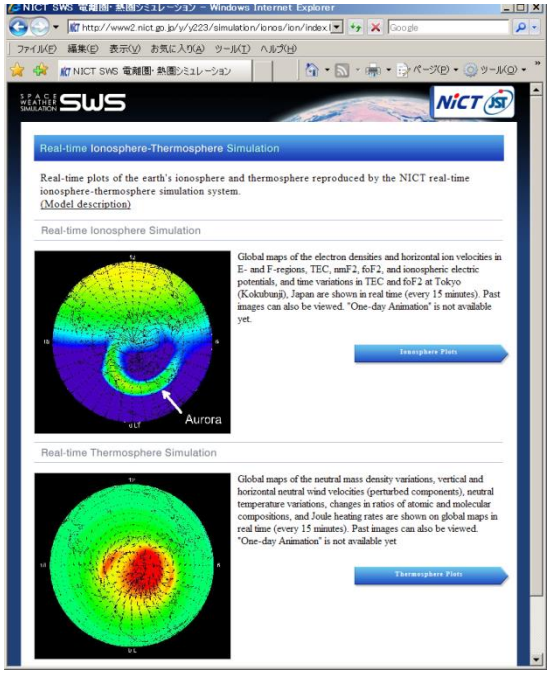




Electron density

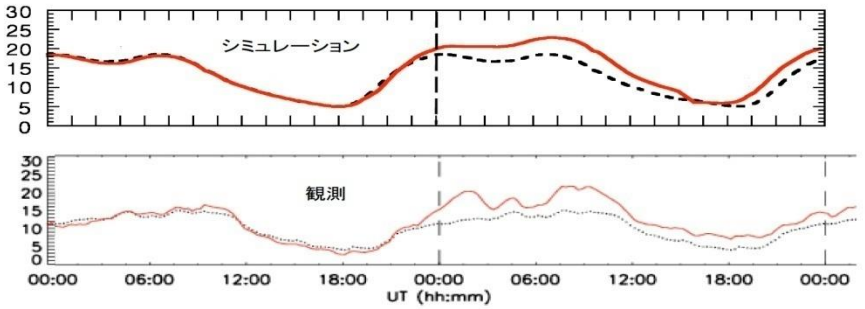


TEC map

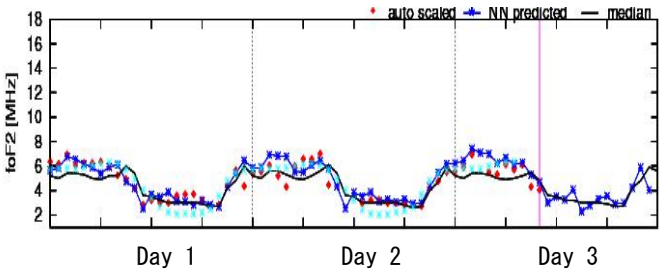


Publication on Web

Example 1



Example 2



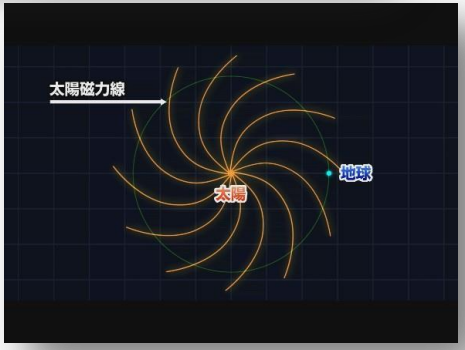
Weekly Space Weather News (in Japanese)

Space weather caster reports week summary of space weather.

http://www.seg.nict.go.jp/wsw/index.html

http://www.youtube.com/user/nictchannel

Brief explanation on Space Weather (in Japanese)



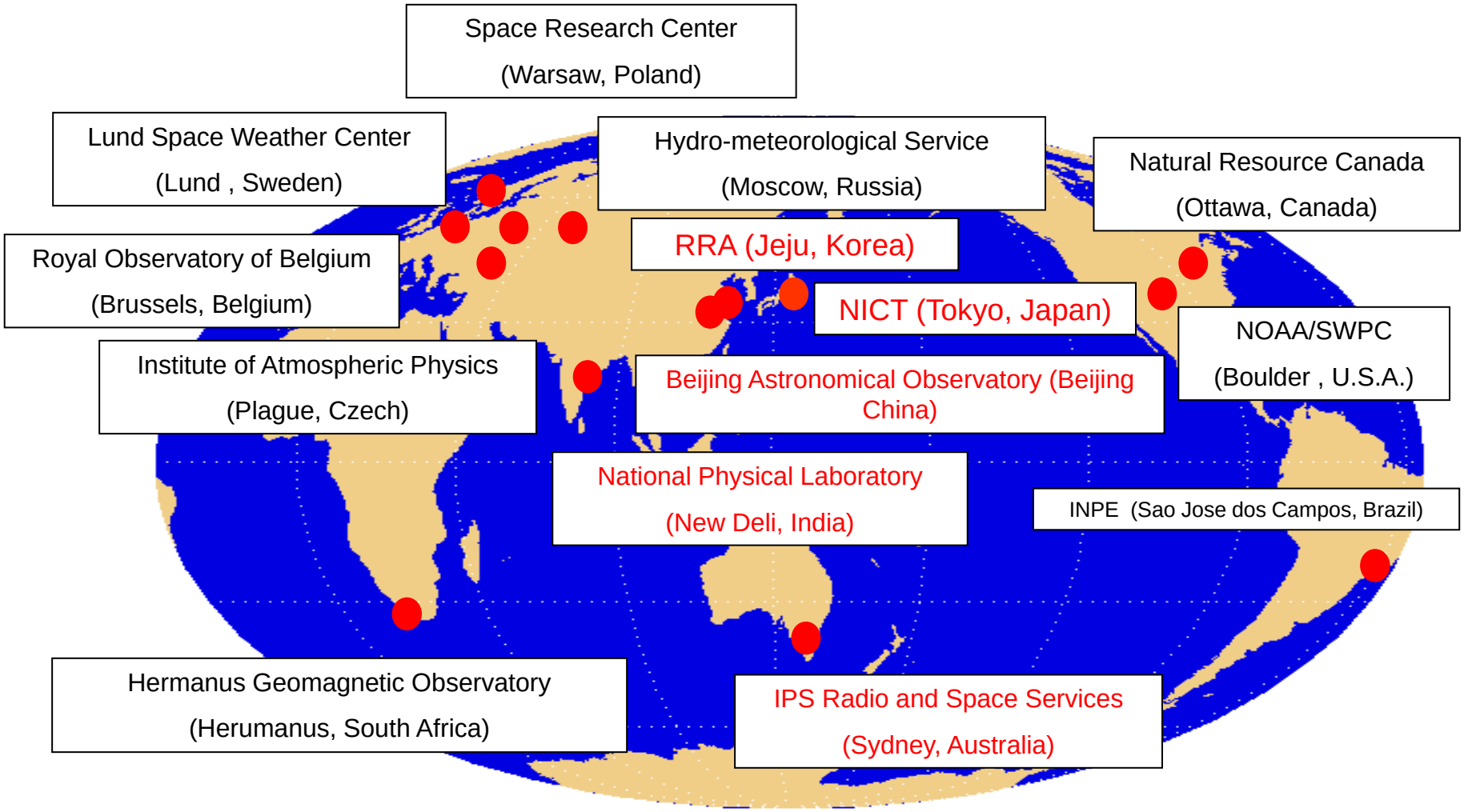
Solar wind

	Titles
1.	Sunspot
2.	Solar cycle
3.	Ionosphere
4.	Ionosonde
5.	SWF
6.	CME
7.	Magnetosphere
8.	SOHO
9.	Aurora
10.	Sporadic E
11.	Solar wind
12.	Proton Event
13.	Radiation belt
14.	F10.7
15.	Solar flare
16.	TEC observation using GPS
17.	Solar radio bursts
18.	Plasma babble
19.	Geomagnetic index
20.	Geomagnetic storm
21.	Ionospheric storm

http://seg-web.nict.go.jp/e-sw/movie/sw-knowledge.html

2. Asia-Oceania Space Weather Alliance (AOSWA)

Regional Warning Centers of International Space Environment Service (ISES)



Indonesia: Space Weather Program in progress at LAPAN

Thailand: Princess Sirindhorn Neutron Monitor with the highest cut-off energy
Plan of Thailand GPS and Ionospheric Data Center in KMITL

Operational Forecast, Data Preservation
(Application and Stewardship)

Workshop/Collaboration/
Data Exchange

Practical Use

Research
Works

AOSWA
Asia-Oceania Space Weather Alliance

Four functions

International
Activities

Education/
Capacity
Building

Information Exchange
(Web site/News Letter)

Space Weather School/
Text book & Contents

NICT

AOSWA Associate Member

Associate member is 16 institutes in 10 countries.

Australia
-Ionospheric Prediction Service (IPS) / RWC Australia

China
-Center for Space Science and Applied Research (CSSAR)
- National Astronomical Observatories of China (NAOC)

India
- National Physical Laboratory (NPL) / RWC India

Indonesia
- National Institute of Aeronautics and Space (LAPAN)

Japan
- National Institute of Info. & Com. Tech. (NICT)
- RISH, Kyoto University
- STEL, Nagoya University

Malaysia
- National Space Agency of Malaysia (ANGKASA)
- Universiti Kebangsaan Malaysia (UKM)

Pakistan
- Pakistan Space and Upper Atmosphere Commission (SUPARCO)

Republic of Korea
- Radio Research Agency (RRA) / RWC Korea
- Korean Astronomy and Space Science Institute (KASI)
- Kyung Hee University

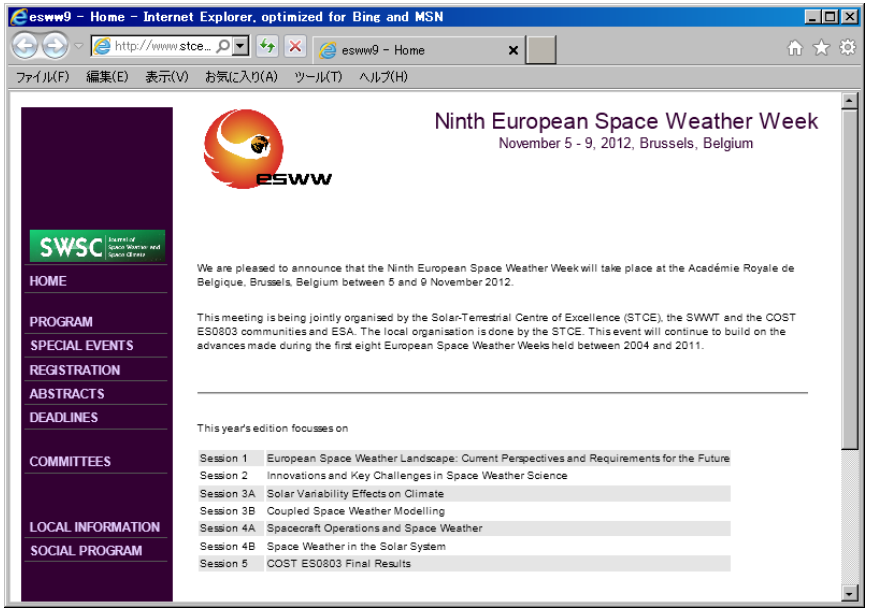
Thailand
- ICAO Asia and Pacific Office

Vietnam
-Institute of Geophysics

Regional Space Weather Workshop

Space Weather Workshop @ USA since 1999

European Space Weather Week since 2004



AOSWA
Asia-Oceania Space Weather Alliance

Asia-Oceania regional space weather workshop since 2012

NICT

The 1st AOSWA Workshop

(22-24 February 2012, Imperial Mae Ping Hotel, Chiang Mai, Thailand)

Asia-Oceania Regional Space Weather Workshop

Next workshop is in China hosted by NAOC, CSSAR, and CMA

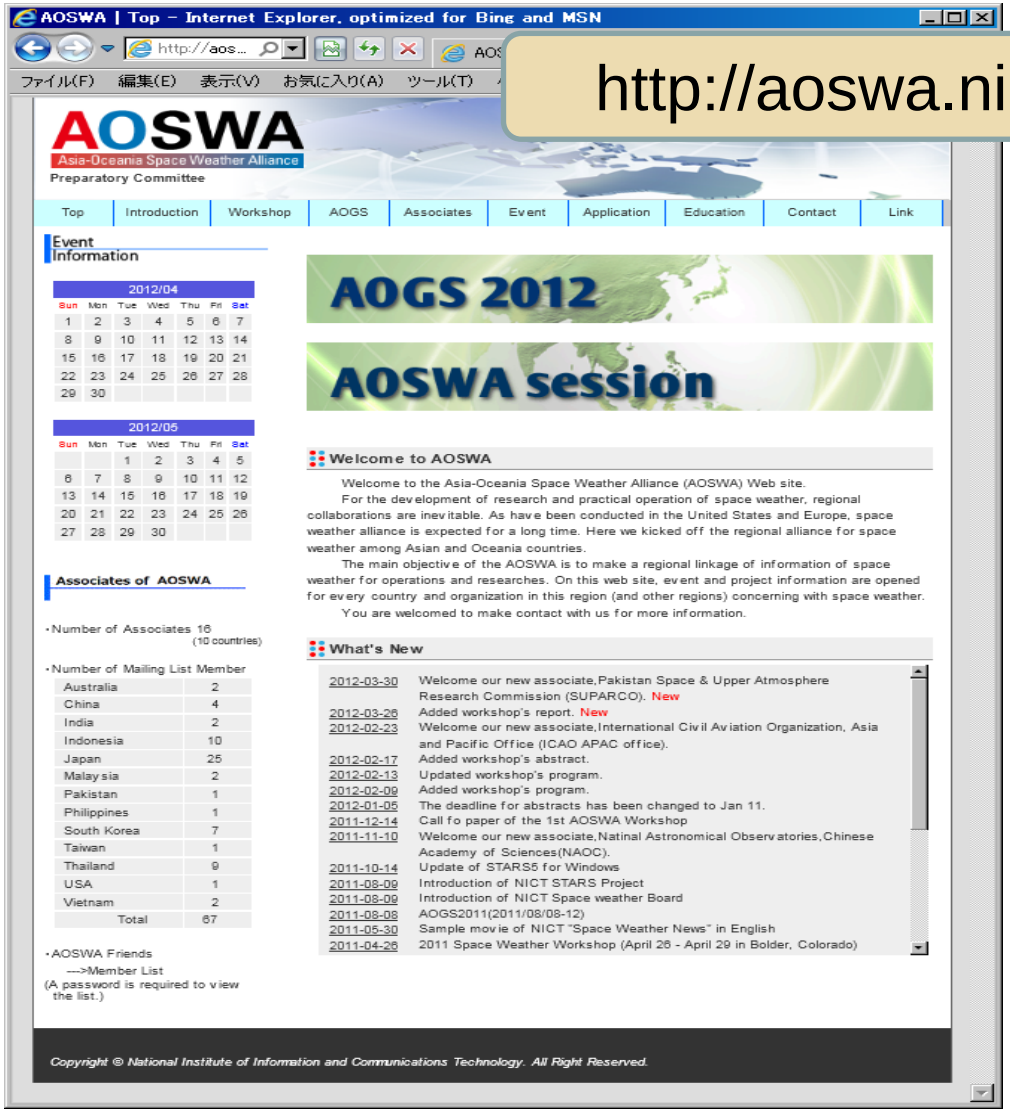
AOSWA

Asia-Oceania Space Weather Alliance

Approximately 80 peoples from 30 institutes in 10 countries including the ICAO Asia and Pacific Office in Bangkok, Thailand

NICT

AOSWA Web site



http://aoswa.nict.go.jp

3. Other Activities

International Council for Science (ICSU)

NICT hosts the International Program Office (IPO) of the ICUS/WDS.

- **World Data Centre (WDC)**

  - WDC for Solar Terrestrial Physics (NOAA/NGDC)
  - WDC for Solar-Terrestrial Science (IPS)
  -
  -
  -

- **Federation of Astronomical and Geophysical Data Analysis Services (FAGS)**

  - International Space Environment Service (ISES)
  - Solar Influences Data Analysis Center (SIDC)
  -. International Service of Geomagnetic Indices (ISGI)
  - International GNSS Service (IGS)
  -
  -
  -

since 2009

World Data System (WDS)

Japanese contribution to Space Weather Activities of United Nation (UN)

UN/COPUOS（Committee on the Peaceful Uses of Outer Space）

ISWI (International Space Weather Initiative) WG

UN International Space Weather Science and Education Center started this April in Kyushu University (Prof. Kiyofumi Yumoto).

Long-Term Sustainability WG

Expert Group C (Space Weather)
Chair: Prof. Takahiro Obara (Tohoku University)

Ionospheric Studies Task Force (ISTF) of International Civil Aviation Organization (ICAO) Asia and Pacific Office

Chair of Ionospheric Studies Task Force

Dr. Susumu Saito, Electronic Navigation Research Institute (ENRI), Japan

The task force will develop strategies for collecting, analyzing and sharing ionospheric data and will discuss other issues related to the ionospheric studies as a step towards the implementation of GNSS applications including GBAS and SBAS.

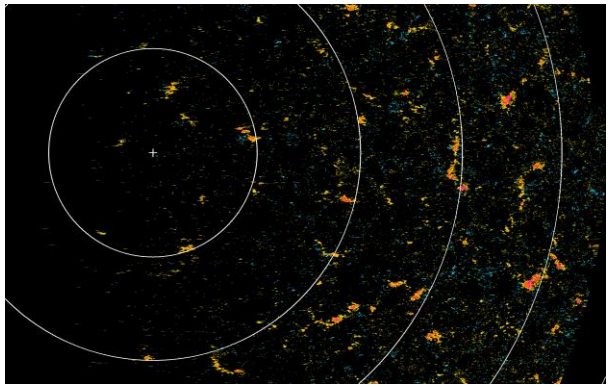
First Meeting of Ionospheric Studies Task Force (ISTF/1)
February 27-29, 2012 in Tokyo
Participants from 9 countries (Australia, Hong Kong China, India, Republic of Korea, Singapore, Thailand, USA, Philippines, and Japan)

Reversal of solar polar magnetic field revealed by Hinode (courtesy of NAOJ/JAXA)

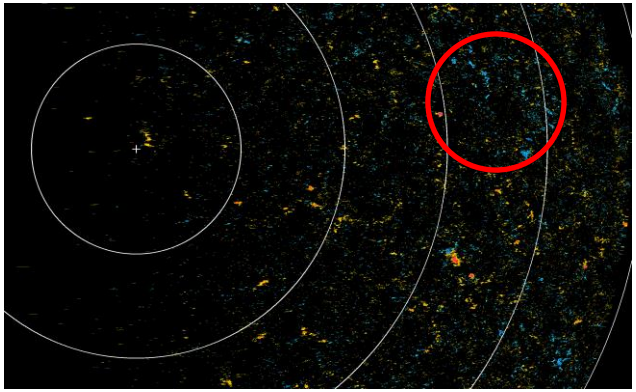
(Shiota, Tsuneta, Shimojo, & Hinode Team)

north pole

September 2008

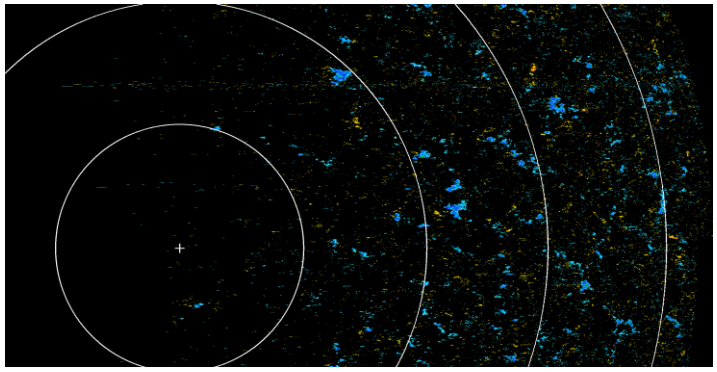


October 2011

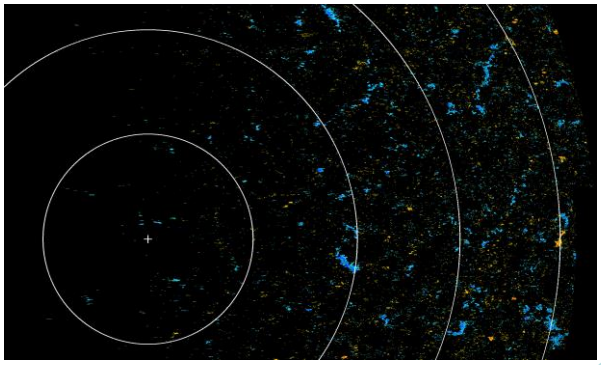


south pole

March 2009



March 2012




Than you !!
太陽風・地磁気
weekly space weather
12(木)
やや乱れ
13(金)
やや乱れ
14(土)
静穏
15(日)
静穏
16(月)
静穏
17(火)
静穏
18(水)
やや乱れ
NICT
太陽風・地磁気