ICSWSE/MAGDAS Project

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Space Environment Research Center (SERC)

April 2002 – March 2012

UNITED NATIONS
Office for Outer Space Affairs

International Center for Space Weather Science and Education (ICSWSE)

April 2012 -

Space environment monitoring: Geomagnetic field disturbances

MAGDAS/CPMN started in 2003
(MAGnetic Data Acquisition System/Circum pan Pacific Magnetometer Array)

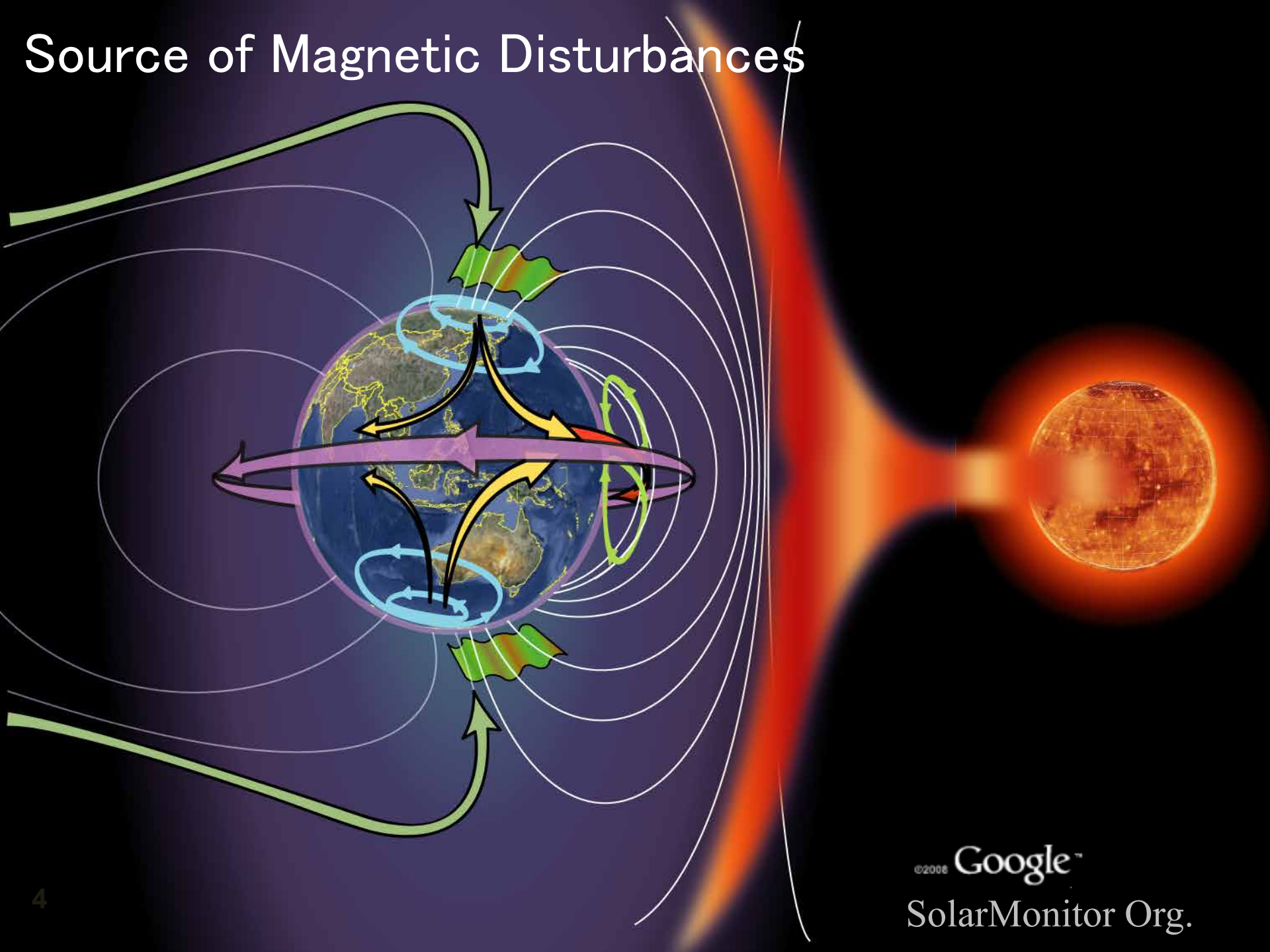
MAGDAS-9 magnetometer

72 observational cites

Magnetic Equator

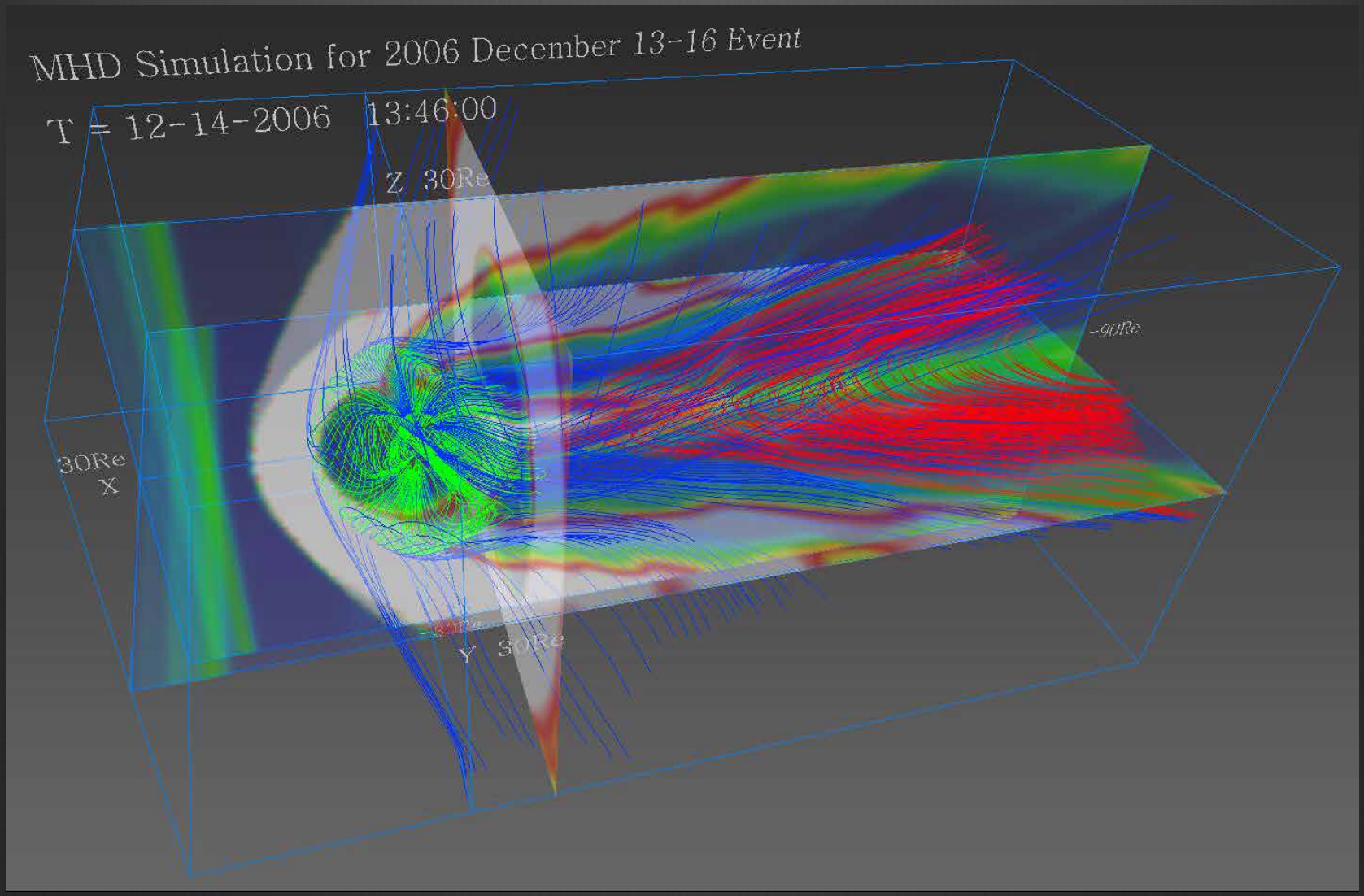
Realtime Station
Non-Realtime Station
FM-CW radar

Source of Magnetic Disturbances

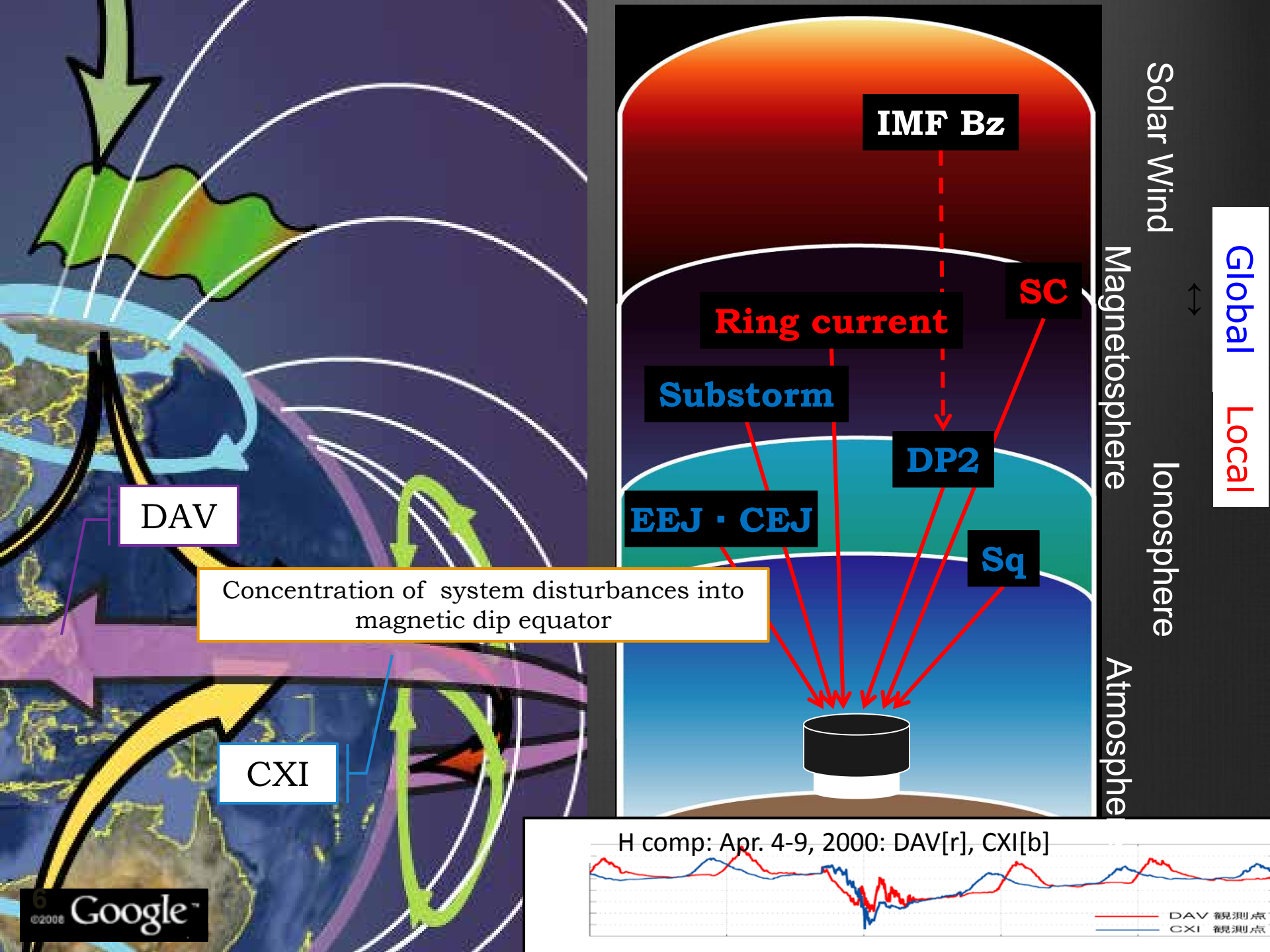


SolarMonitor Org.

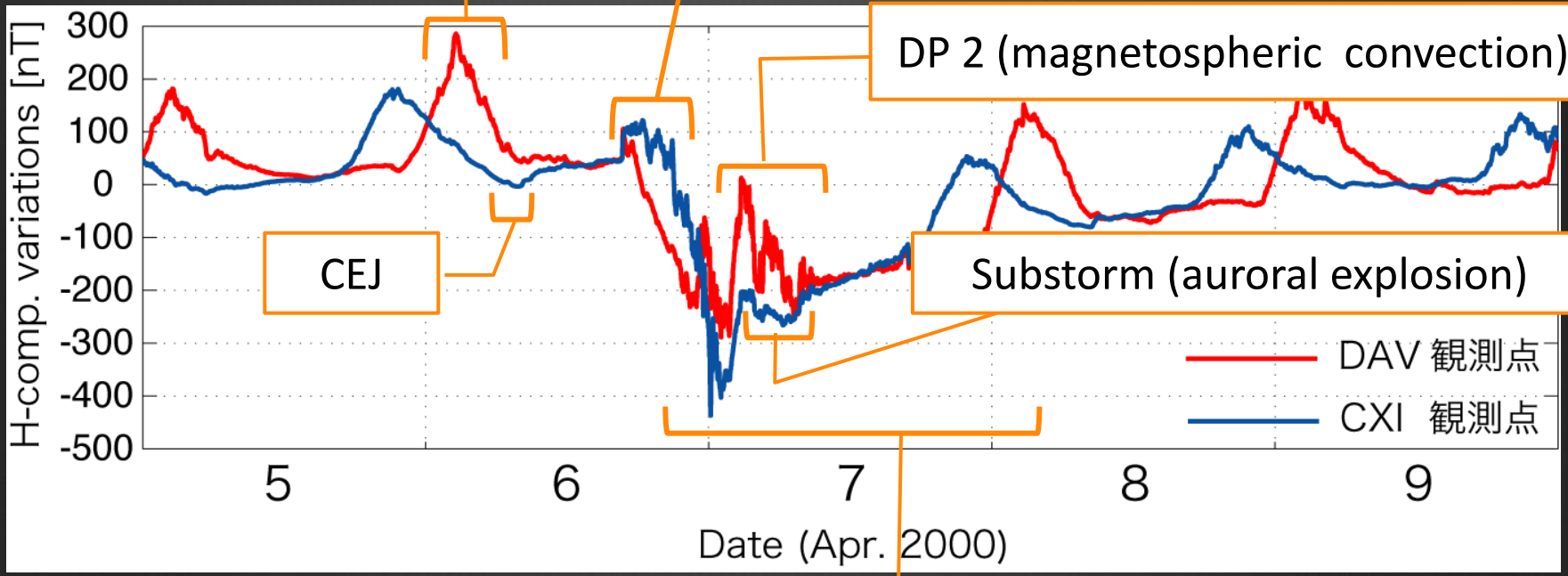
Simulation of Geomagnetic storm by global MHD-simulator



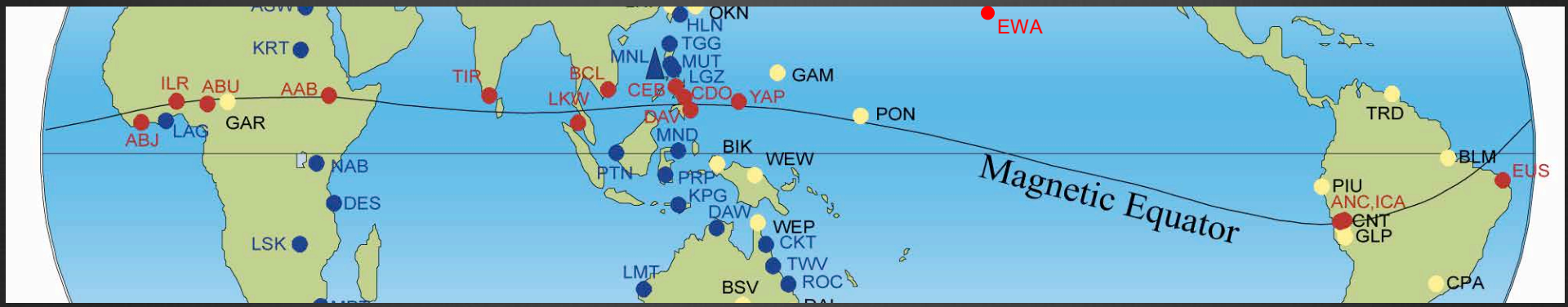
Global MHD simulator → **Global collision-less Hall MHD simulator** → **Global collisional Hall-MHD simulator coupling to the GCM of Earth's atmosphere**


DAV
CXI
Concentration of system disturbances into magnetic dip equator
IMF Bz
SC
Ring current
Substorm
DP2
EEJ · CEJ
Sq
Solar Wind
Magnetosphere
Ionosphere
Atmosphere
Global
Local
H comp: Apr. 4-9, 2000: DAV[r], CXI[b]
DAV 観測点
CXI 観測点
©2008 Google

Short term variation of geomagnetic variation at the magnetic-dip equator



MAGDAS/CPMN Equatorial Network

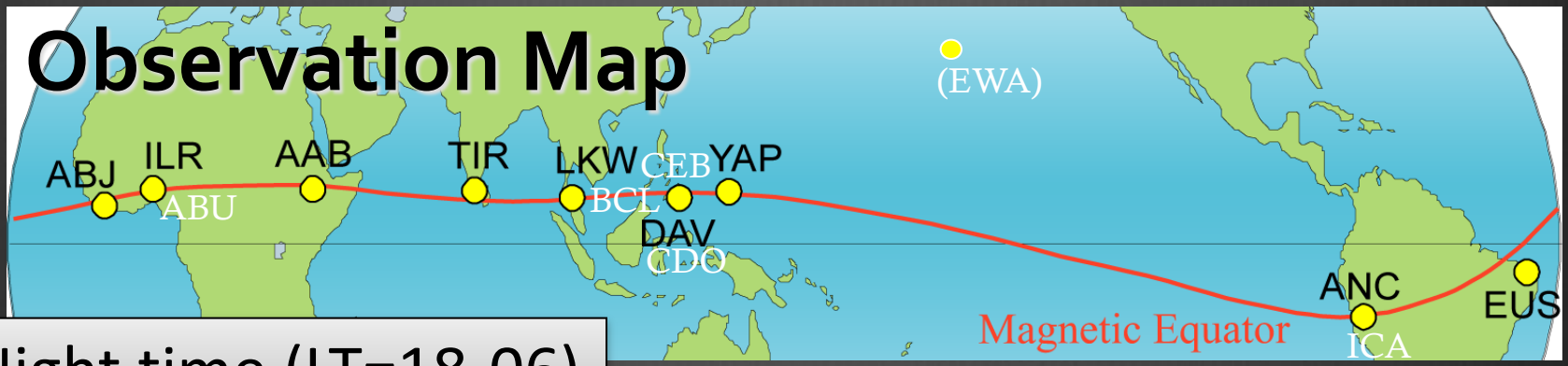


ABJ, ILR, ABU, AAB, TIR, LKW, BCL, CEB, CDO, DAV, YAP, (EWA*), ANC, ICA, EUS

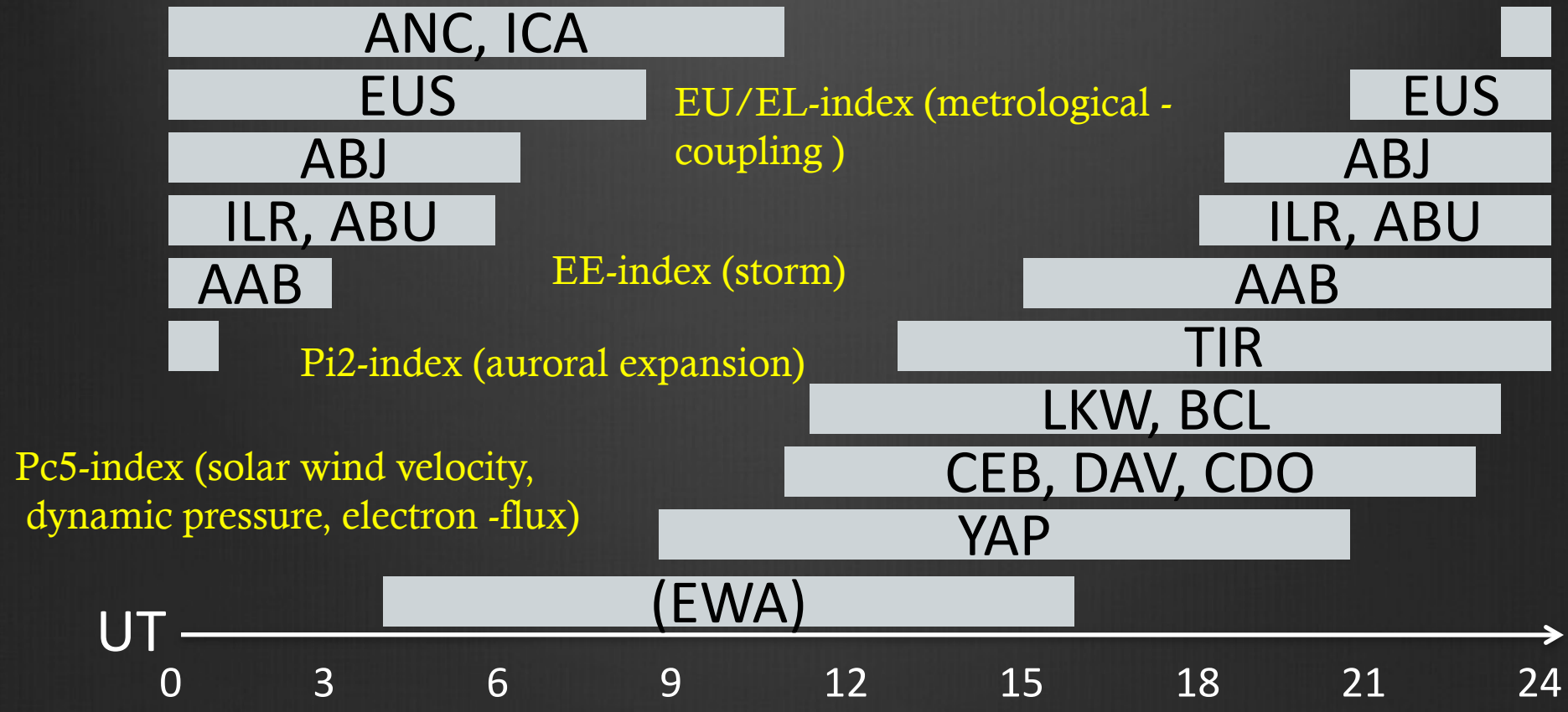
ICSWSE organizes Equatorial Network covering whole LT sectors along the Mag. Eq.

* EWA data is used only for calculating EDst

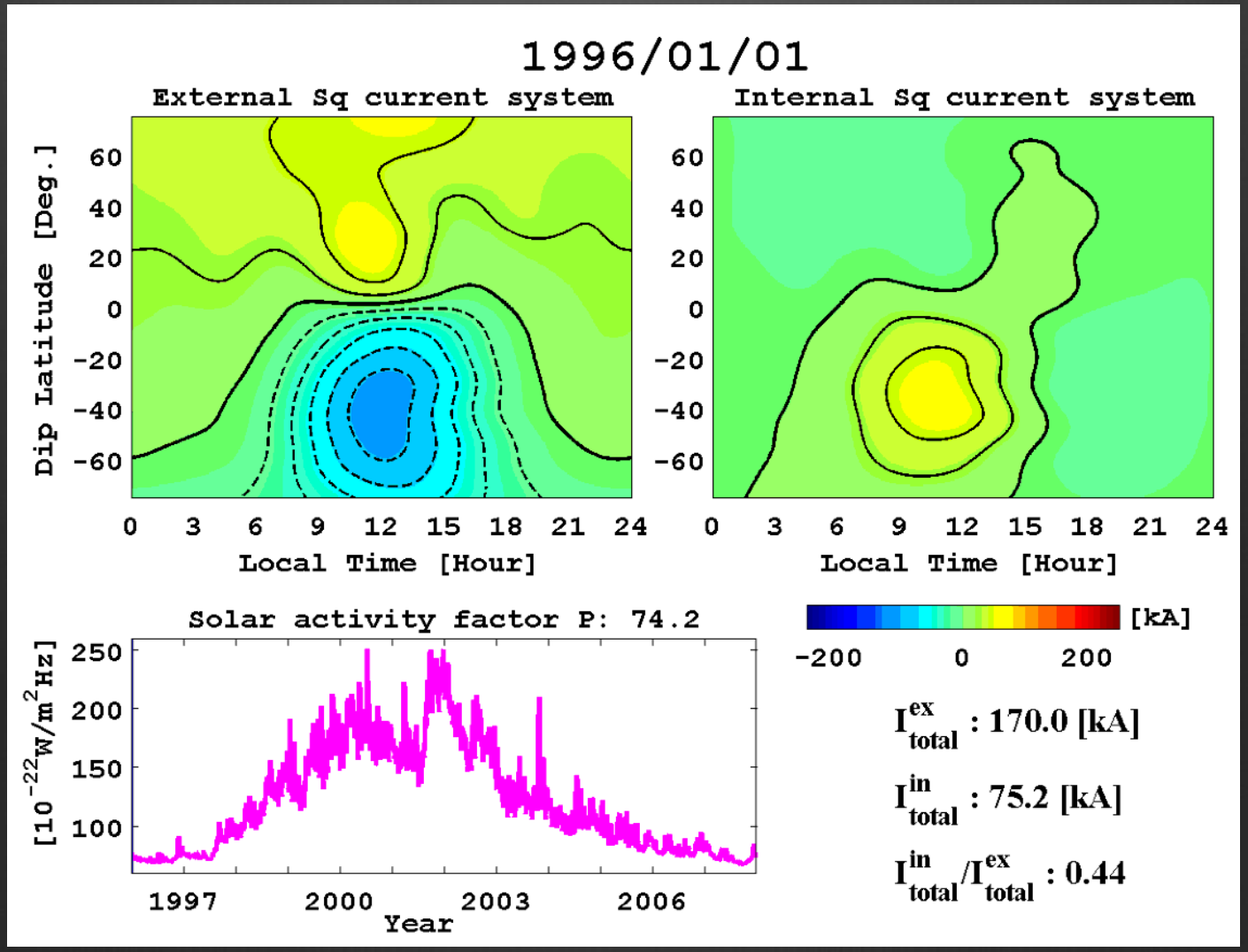
MAGDAS/CPMN Equatorial Network



Night time (LT=18-06)

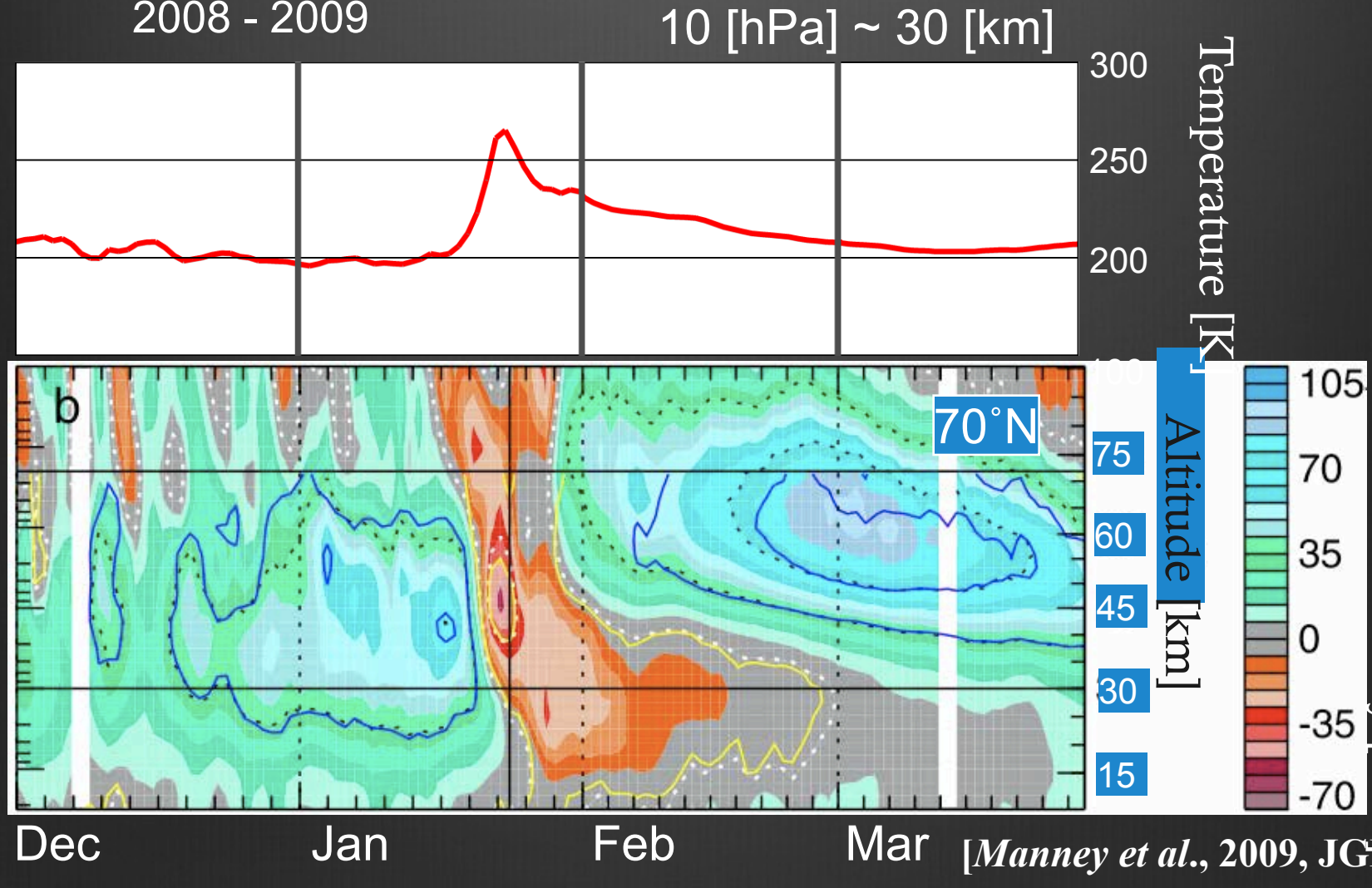


Long term variation of atmosphere-ionosphere coupling



Sudden Stratospheric Warming （SSW）

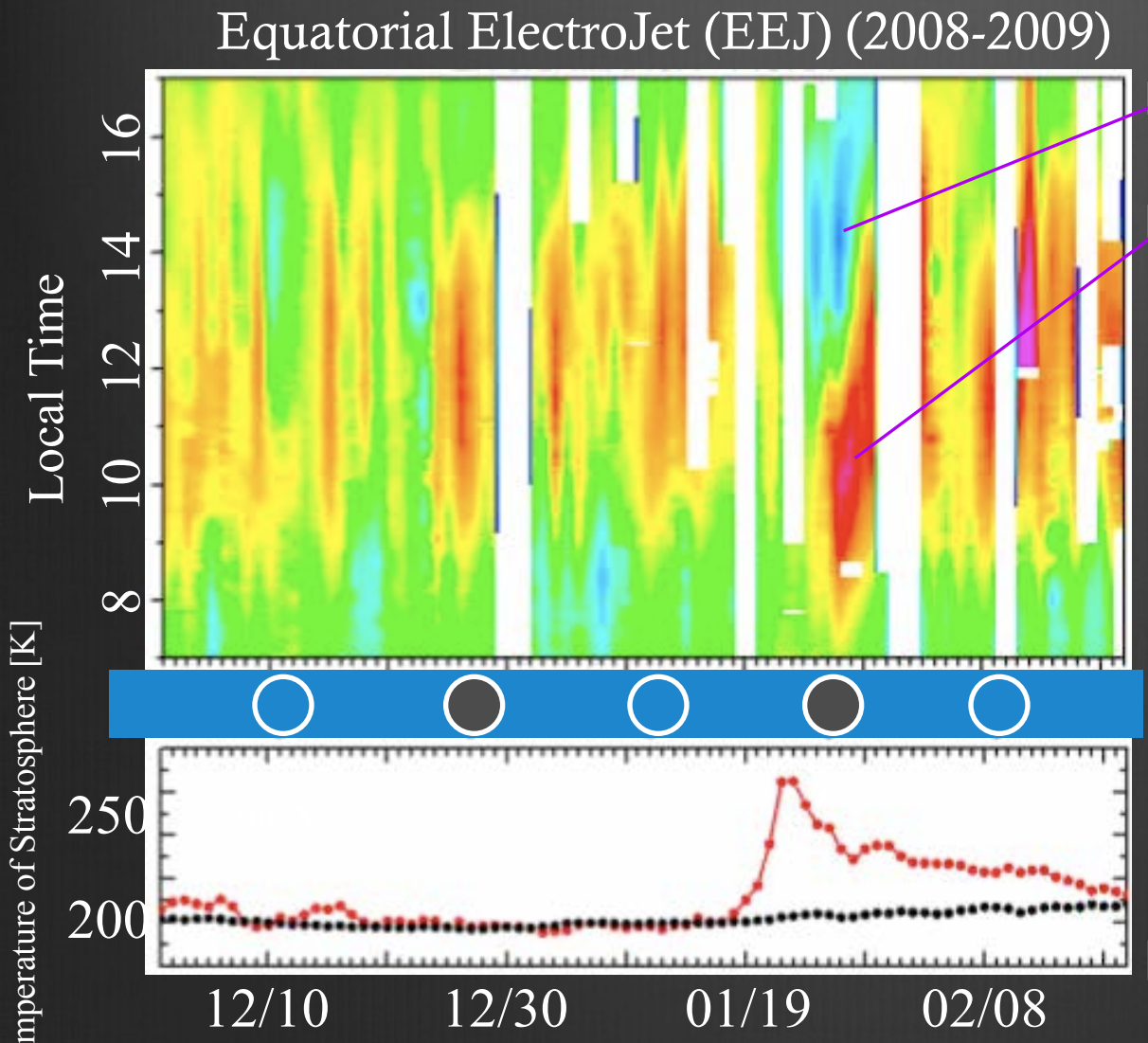
- Large scale disturbances of global circulation in the middle atmosphere
- Sudden warning of zonal mean temperature at polar stratosphere
  (elevation of several tens K/ several days)



[*Manney et al.*, 2009, JGR]

SSW Impact to the ionosphere（Equatorial ElectroJet：EEJ）

CEJ: Counter Electro-Jet



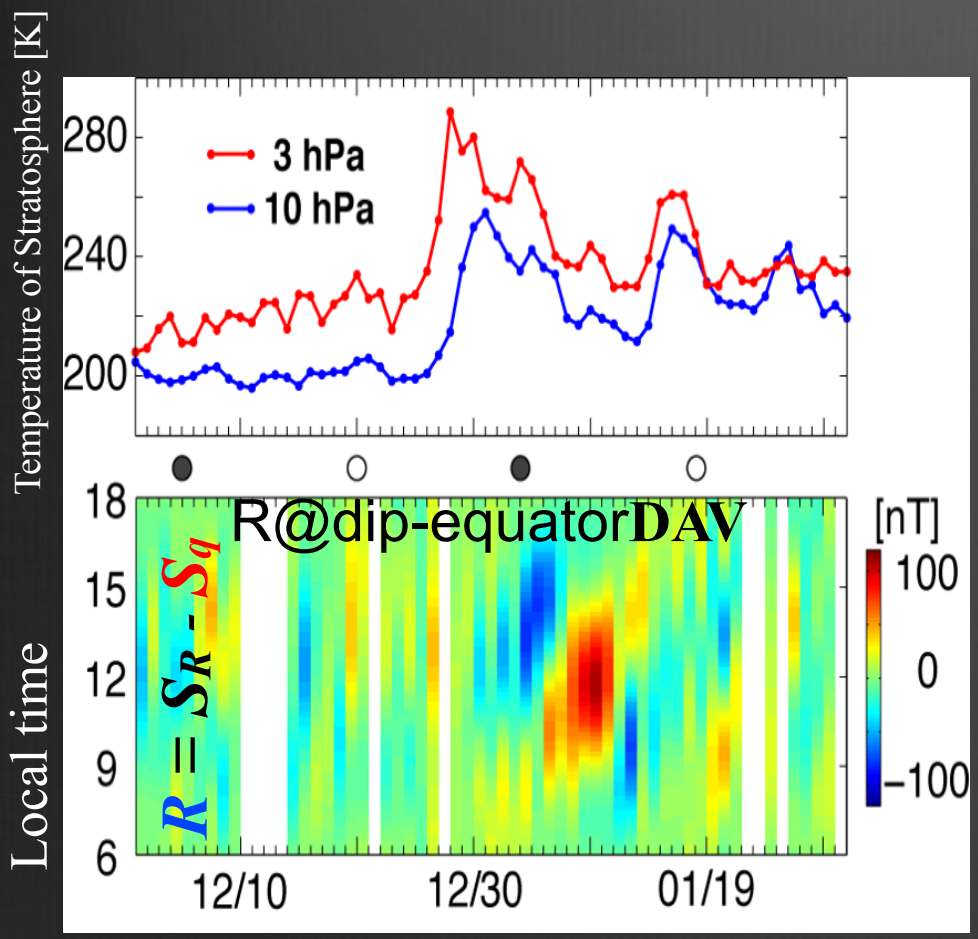
- Afternoon side CEJ
- Morning side strong EEJ

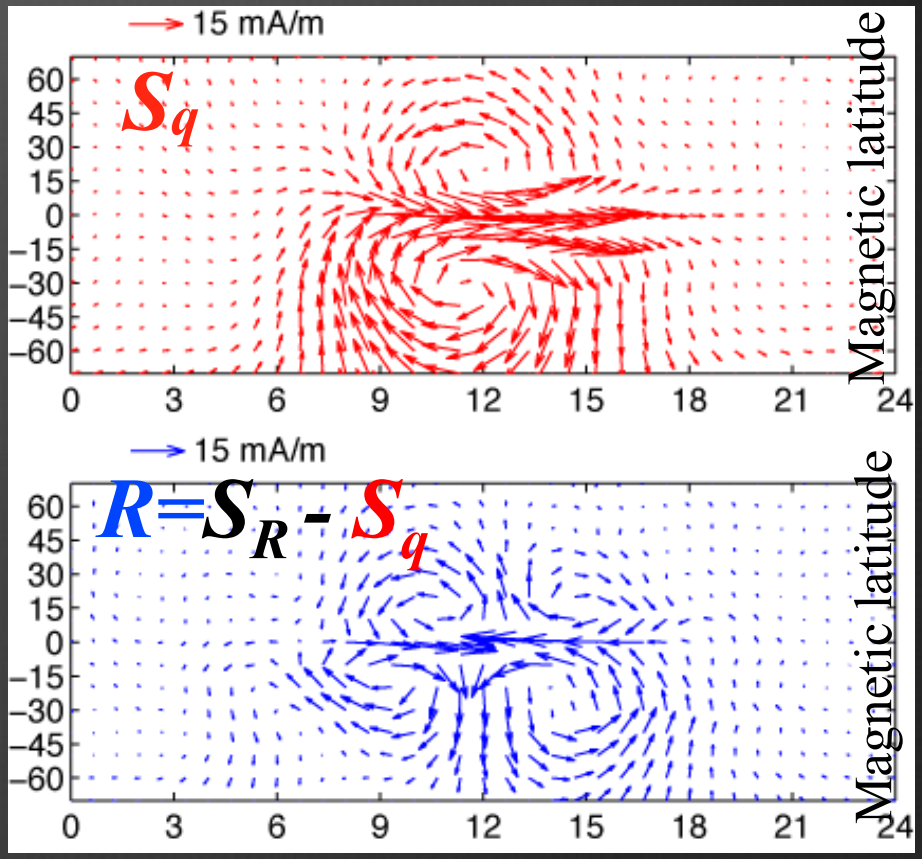
Enhancement of semi annual component generated by new moon or full moon

Anomalous enhancement of lunar tide ?

[*Fejer et al.*, 2010, JGR]

Equivalent current during SSW





- Semi annual components in R-current system was enhanced during SSW

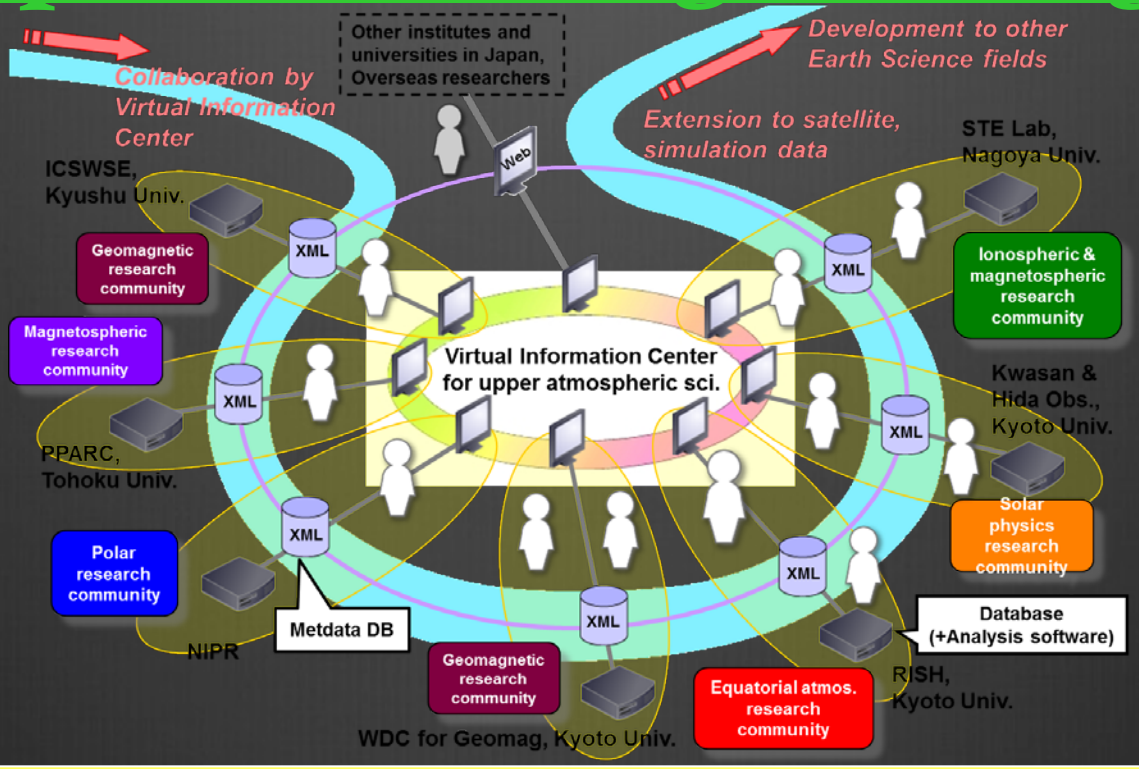
IUGONET

Metadata DB for Upper Atmosphere

超高層大気長期変動の全地球上ネットワーク観測・研究
Inter-university Upper atmospher Global Observation NETwork

Inter-university Upper atmosphere Global Observation NETwork

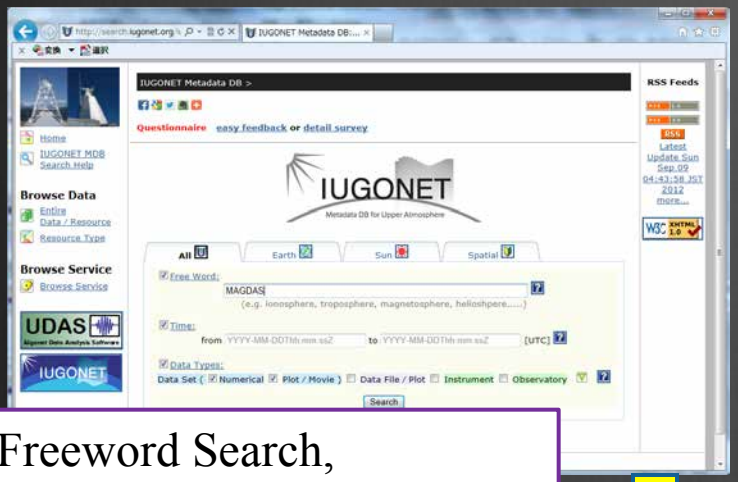
http://www.iugonet.org/en/



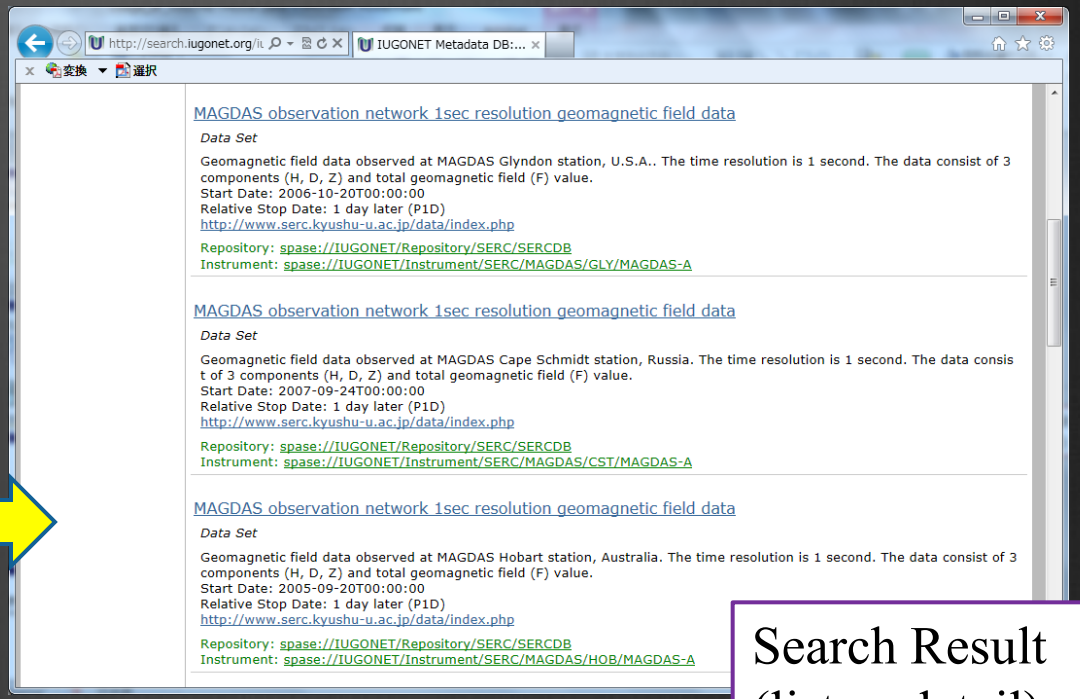
- Develop a metadata database for ground-based upper atmosphere observation data.
- Promote effective use of the observational data spread across the institutes/universities.
- Investigate mechanism of long-term variation in the upper atmosphere.

IUGONET Metadata Database

http://search.iugonet.org/iugonet/



Freeword Search,
Data type Selection,
Visualized search, etc…



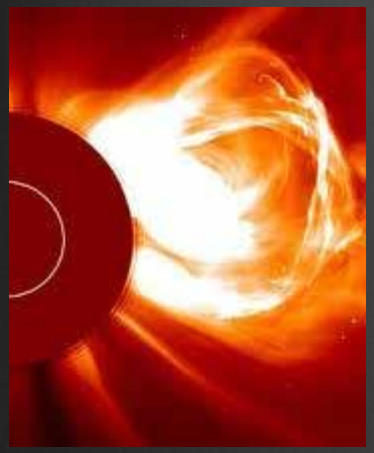
Search Result
(list or detail)

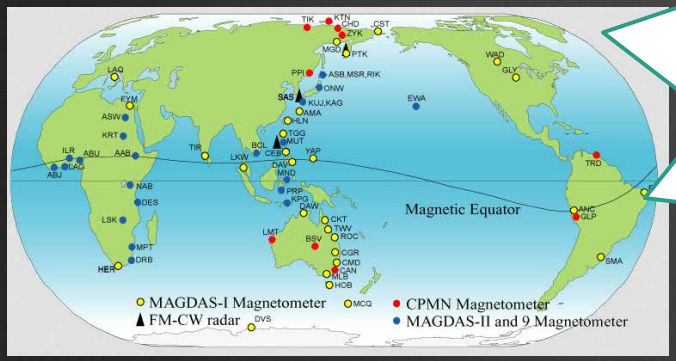
- Provide the service for cross-searching observational data distributed across the IUGONET institutions.
- Remarkable advancement in accessibility to the observational data and accelerate the interdisciplinary study.

iUGONET Data Analysis Software (UDAS)

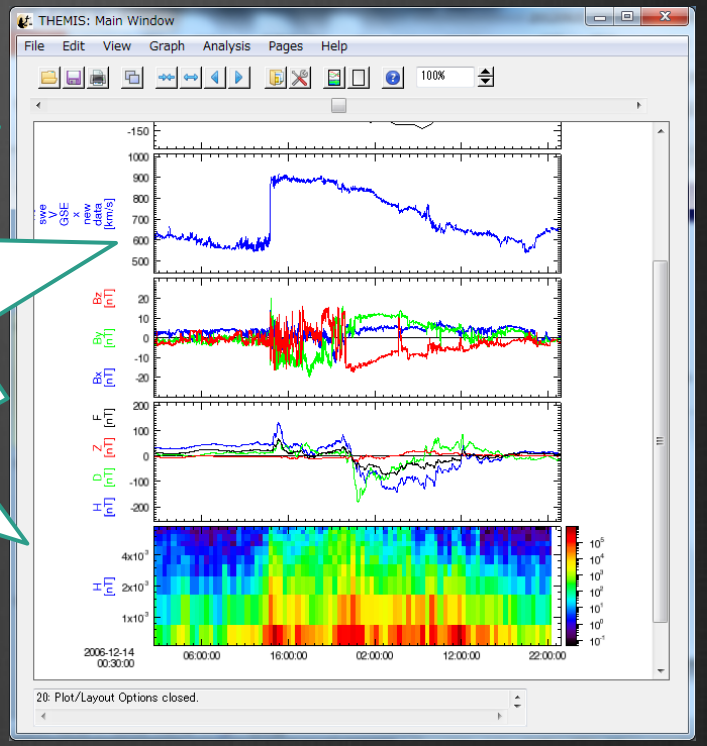
UDAS
iUgonet Data Analysis Software
TDAS
THEMIS Data Analysis Software
IDL

http://www.iugonet.org.en/software/





Visualize many kind of STP related data for your study, easily.



- The plug-in software for THEMIS Data Analysis Software suite.
- MAGDAS and many data belongs to the IUGONET project can be handled.
- Many useful routines to visualize and analyze time series data.
- Accesses the IUGONET data through the Internet, and then the data are automatically downloaded onto the user's computer

MAGDAS installation and maintenance is strongly supported by local collaborators' cooperation

Installation team including local staff

Construction of MAGDAS sensor hut

MAGDAS team requires both strength and intelligence!

Small MAGDAS training at local station

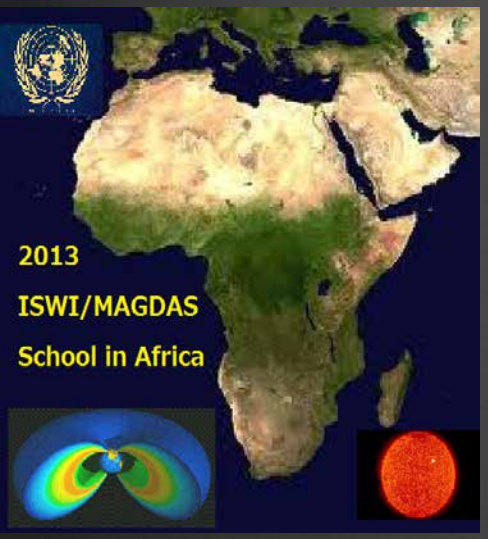
Meeting with local staff

Capacity building

1. Training on the instrumentation

1. Training on data analysis

2. Training on doing science with the data



ISWI & MAGDAS School on Space Science

1. August 15-21, 2011, Lagos, Nigeria
2. September 17-26, 2012, Ciloto, Indonesia
3. September 22-29, 2013, Abidjan, Côte d'Ivoire
4. February-March ?, 2015, Fukuoka, Japan

Capacity Building at ICSWSE

MAGDAS-9 Training Course

1st Batch- 2012/11/11-11/18

2 Filipinos (Philippines) and
1 Malaysian

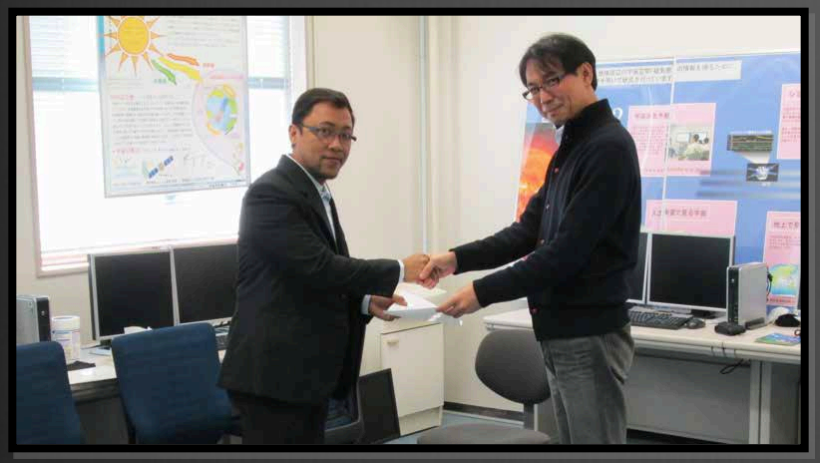
2nd Batch-2013/01/18-01/24

2 Indonesians, 1 Malaysian and
1 Vietnamese

3nd Batch-2013
1 Peruvian and 4 African

Capacity Building at ICSWSE

Capacity Building at ICSWSE



ISWI Newsletter results for 2012

- In 2012, 131 issues of the newsletter were sent out.
- There are now about 500 subscribers to this newsletter.
- All issues are archived at the ISWI Website (http://www.iswi-secretariat.org/)

Summary

The new ICSWSE will conduct *ISWI activity* for young scientists in Japan and in the world through a wide-variety of approaches:

(1) growing into a network of centres, focusing on space weather around the world, dedicated to the advancement of space weather research and education
(2) conducting overseas ISWI/MAGDAS Schools
(3) implementing student exchanges
(4) installing ground magnetometers (e.g. MAGDAS) in "missing areas"
(5) bringing students who want to study space weather science to Japanese universities.

ICSWSE

ICSWSE :"iku-sei": 育成

- research initiatives (e.g., collaboration with foreign researchers)
- data-collection initiatives (e.g. the MAGDAS Project)
- education initiatives (e.g. ISWI/MAGDAS Schools)

The new center will contribute to Space Weather Capacity Building with cooperation of COPUOS and other space weather related institutes in the world. Of course, we always aspires leading science of space physics