題名　ISWI Newsletter - Vol. 2 No. 37
差出人　maeda@serc.kyushu-u.ac.jp


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* ISWI Newsletter - Vol. 2 No. 37                           15 May 2010  *
*                                                                         *
*           I S W I  =  International Space Weather Initiative           *
*                            (www.iswi-secretariat.org)                  *
*                                                                         *
* Publisher:        Professor K. Yumoto, SERC, Kyushu University, Japan  *
* Editor-in-Chief:  Mr. George Maeda, SERC (maeda@serc.kyushu-u.ac.jp)   *
* Archive location: www.iswi-secretariat.org  (maintained by Bulgaria)   *
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Attachment(s):

- space_weather_Egypt, 6.3 MB pdf, 58 pages.
  (From Dr. A. Mahrous of Egypt.)

Dear ISWI Participant:

As you know, Egypt will be host for the "Year 2010 ISWI Workshop". It will take place in historic Luxor, 6 through 10 November 2010.

In Egypt, Dr A. Mahrous of Helwan University, is spearheading his country's space weather activities. An overview of his "Space Weather Monitoring Center" is attached. (It is over 6 MB in size so please take care when you download it.)

The ISWI Steering Committee strongly urges that you consider attending this ISWI workshop in Luxor (http://iswi.cu.edu.eg/).
---> Please mark you calendar for all the key dead-lines.
And note that the workshop is providing some travel funds for eligible applicants (*** but apply early! ***).

The ISWI workshop for next year is set for Nigeria. For the year after next year, the workshop is set for Equador.

Kind regards,
George Maeda
The Editor.

Circulated as
ISWI Newsletter Volume 2, Number 37

15 May 2010.

Space Weather Research in Egypt

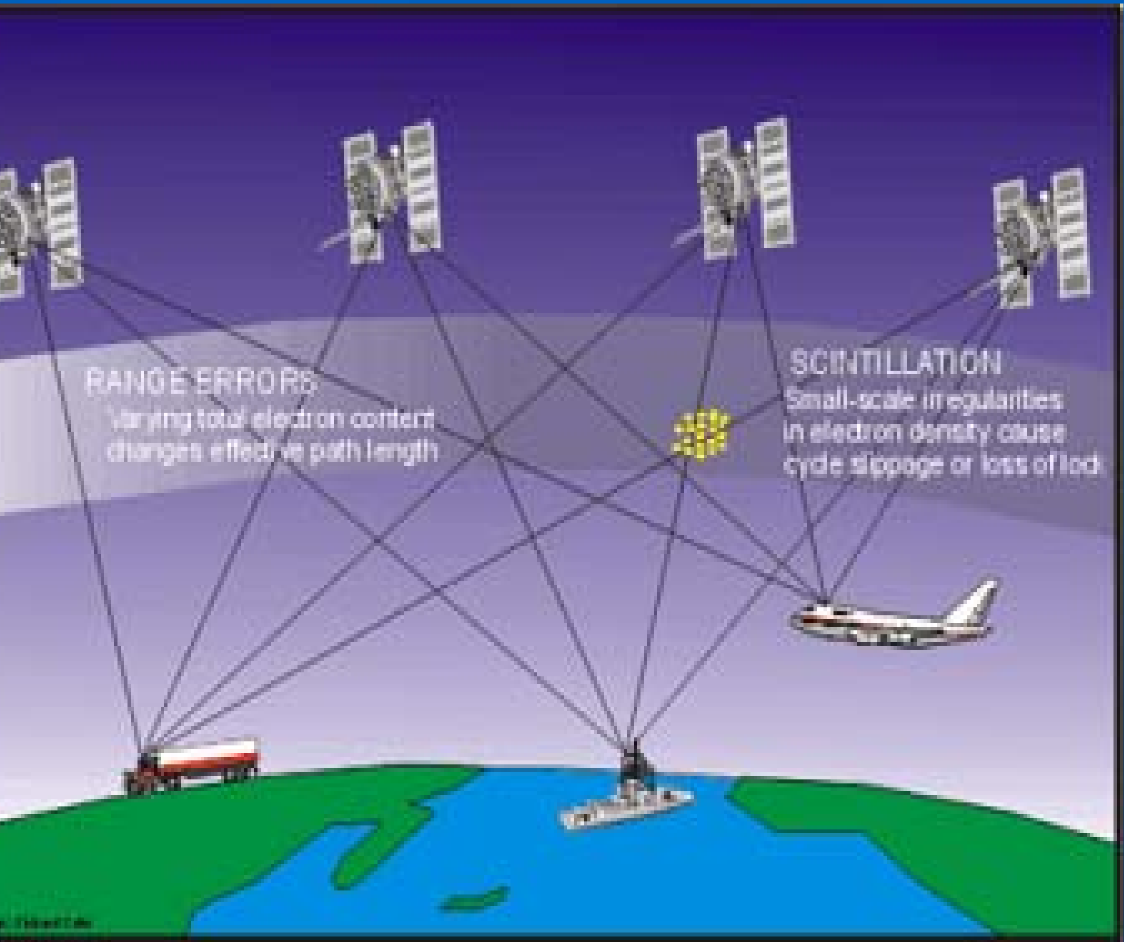
A. Mahrous

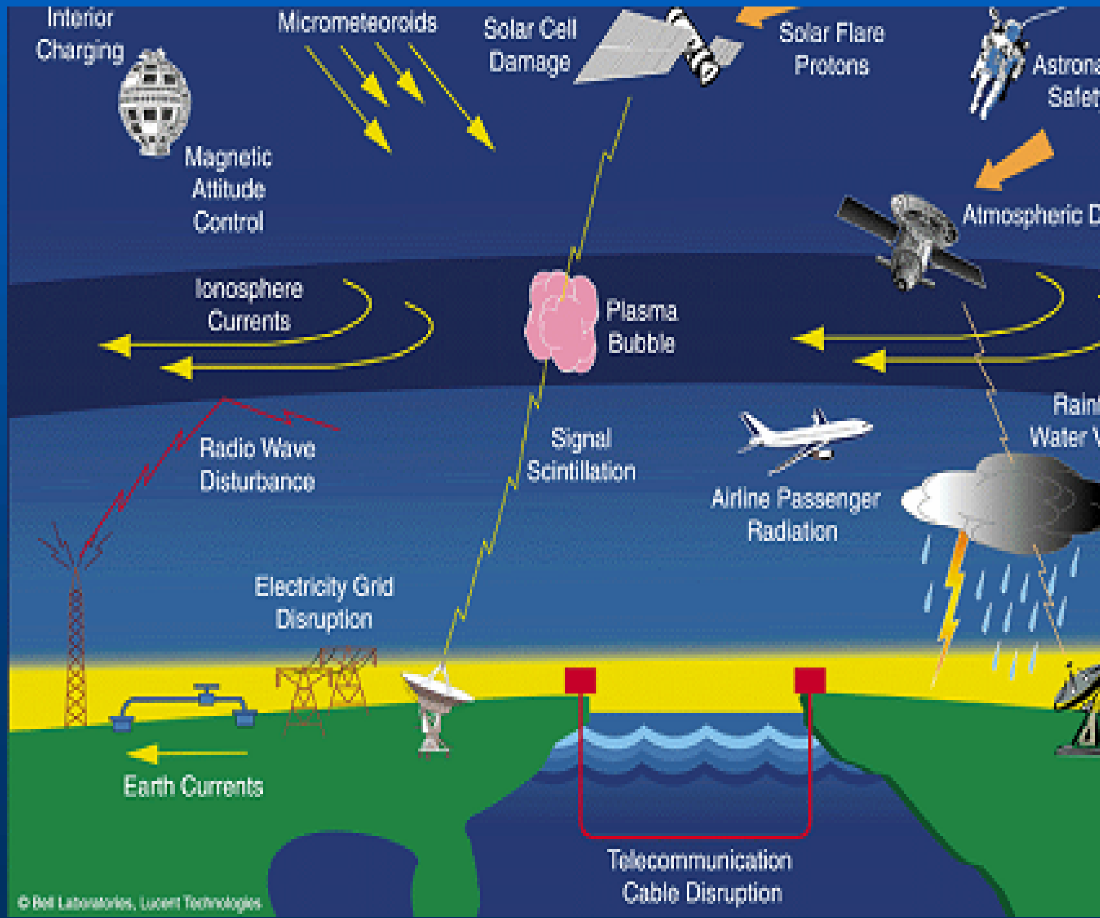
Space Weather Monitoring Center, Faculty of Science, Helwan University, Cairo, Egypt. e-mail: amahrous@helwan.edu.eg , Fax.: 202-555-2468,Tel.: 202-556-7506

Outlines

- Why we Study Space Weather ?
- First Space Weather Center in Egypt
- Geomagnetism Group
- Ionosphere Group
- Cosmic Ray Group
- Solar Physics Group
- Summary

Why we Study Space Weather ?





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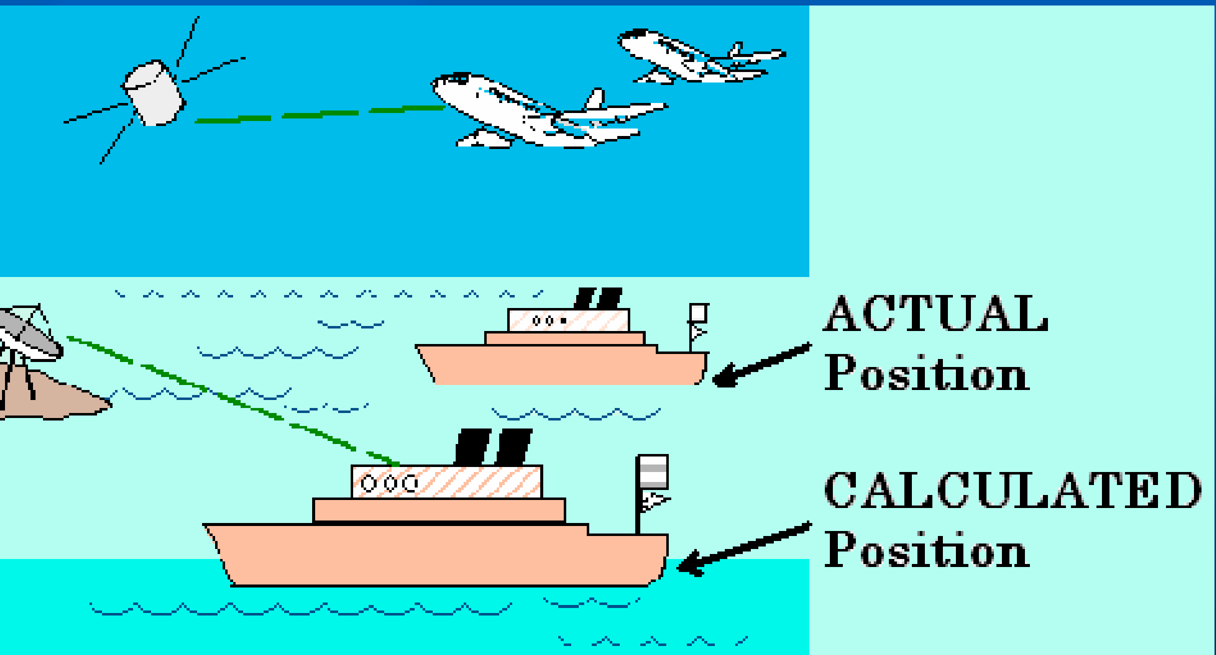

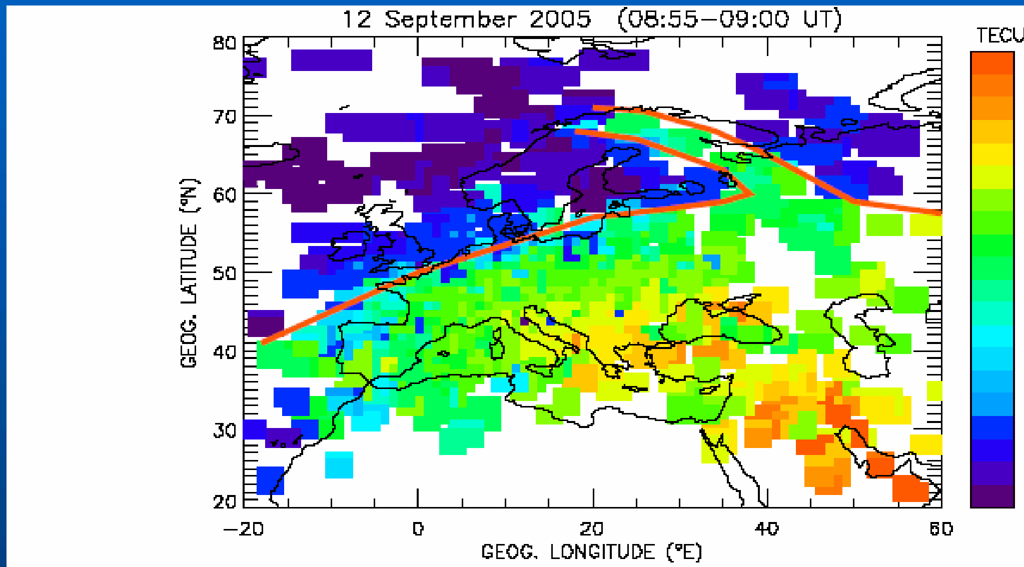

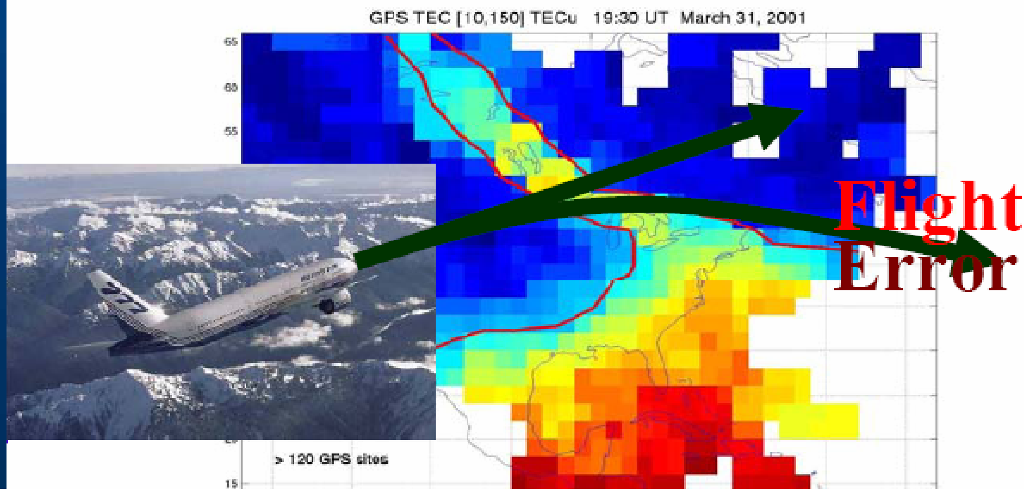

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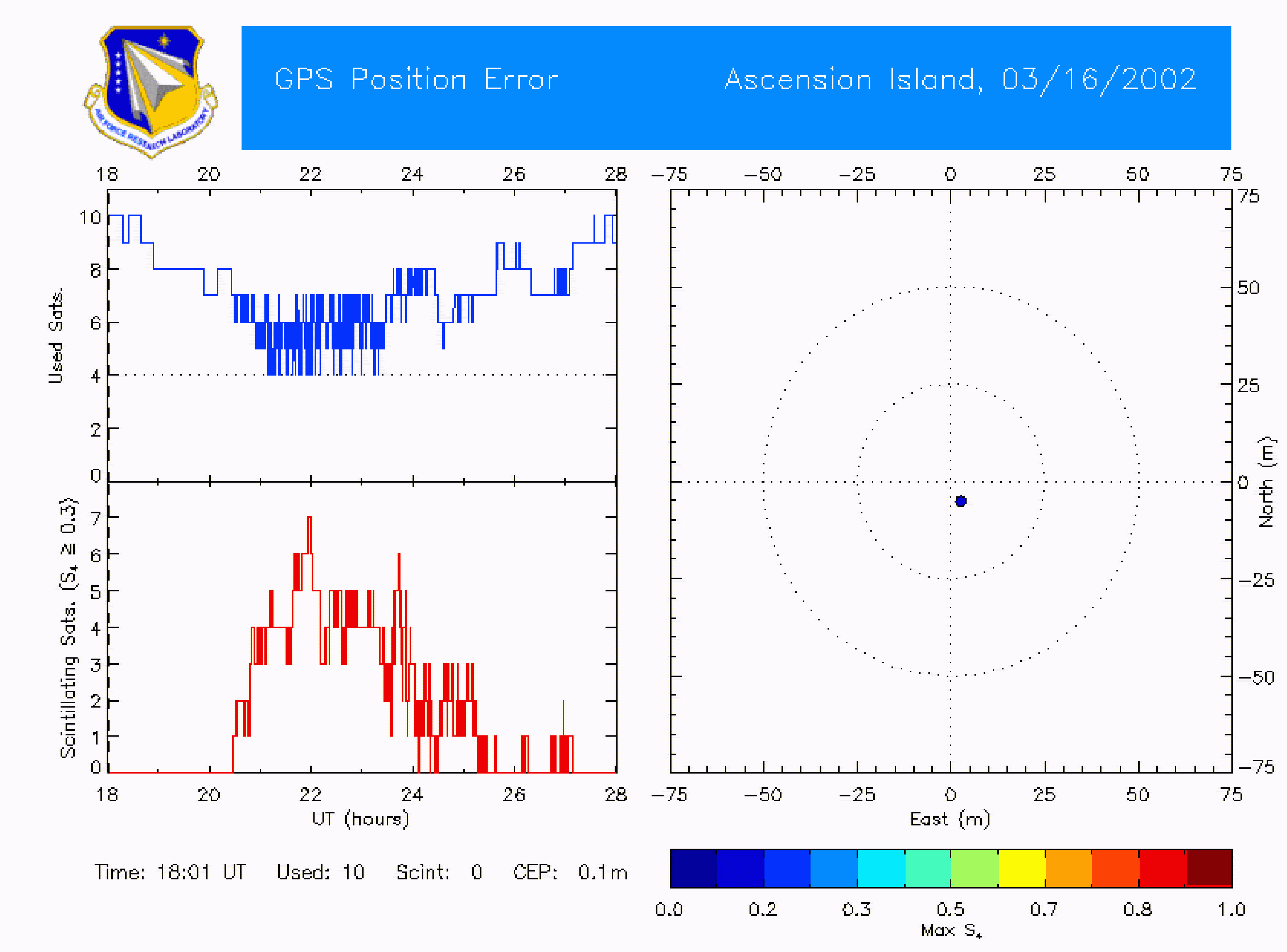
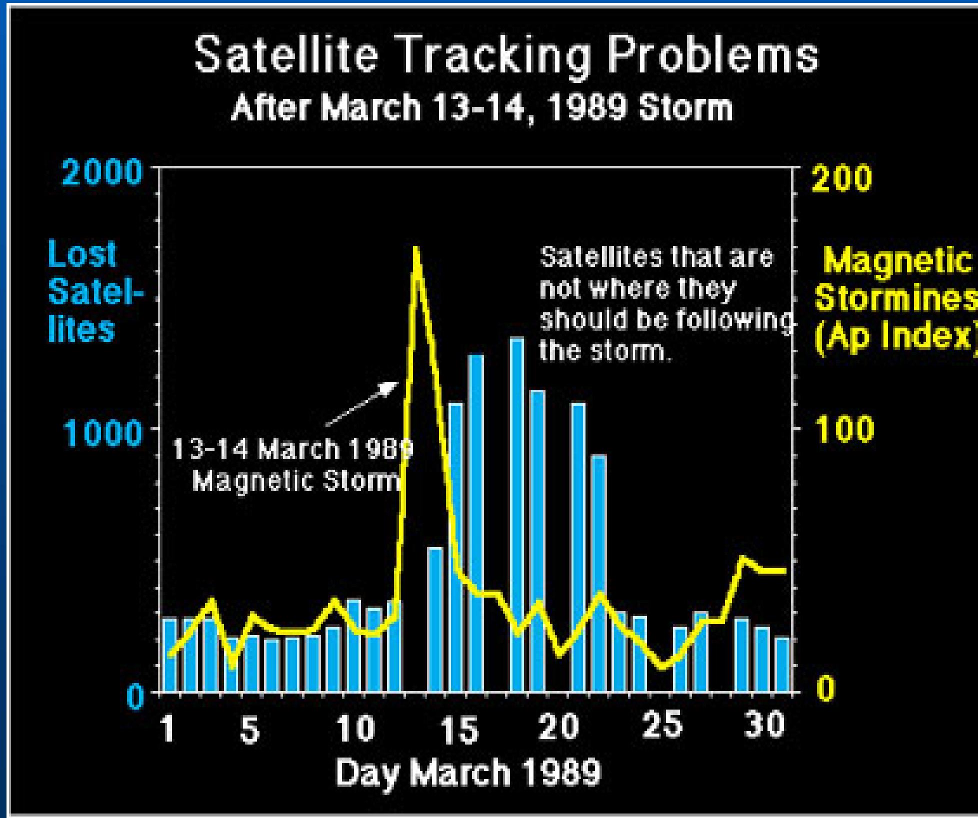
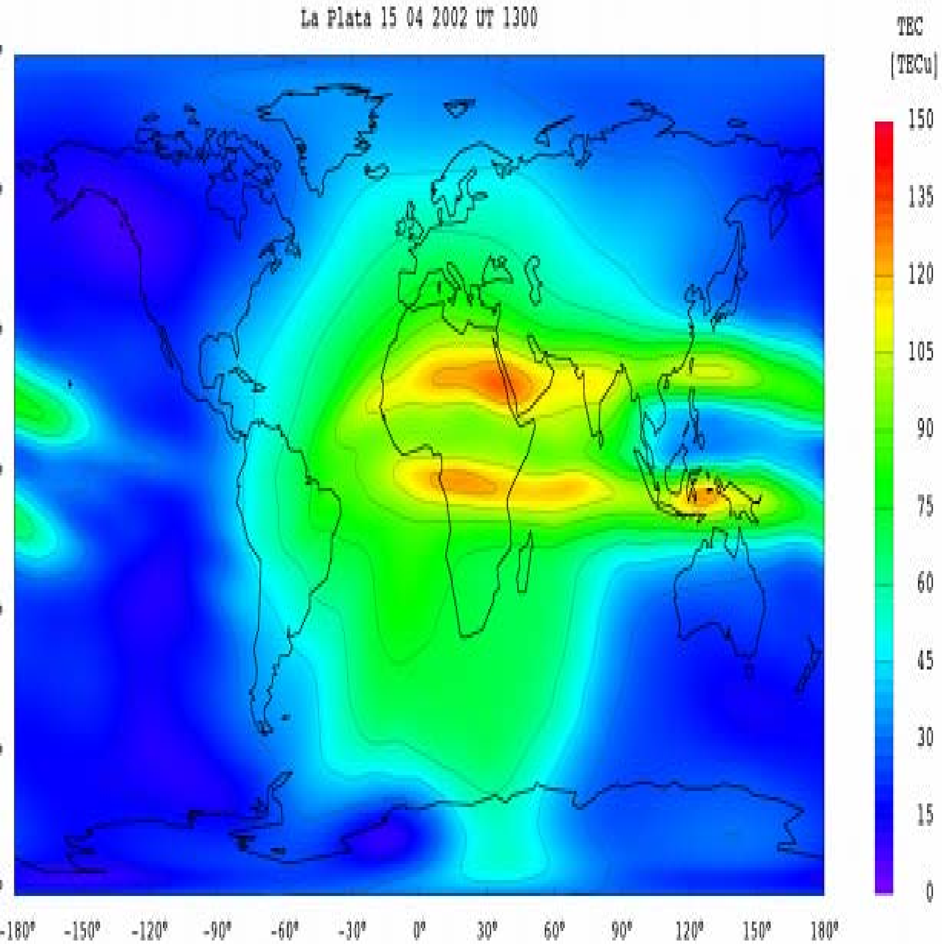


Spacecraft Damage/Loss



Egypt is Located in Equatorial Anomaly Region (Crest and Trough)



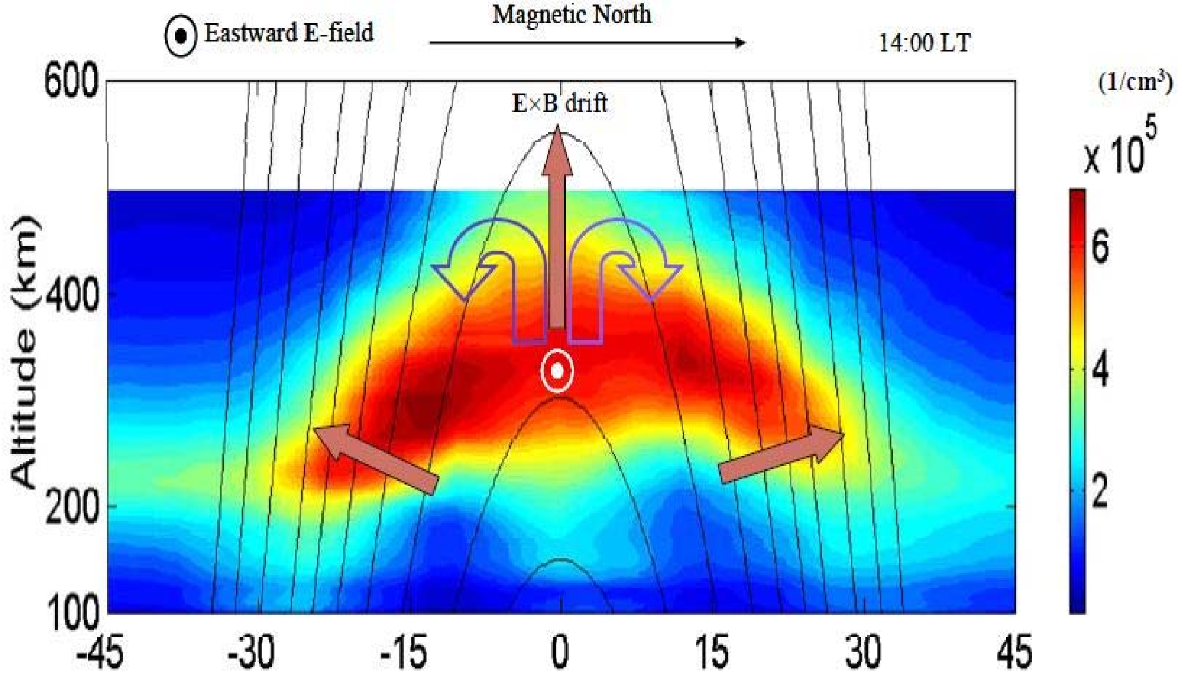


Figure 1.5. Contour is the altitude profile of plasma density at 14LT, black lines are magnetic field lines and arrows stand for the directions of ion drifts [courtesy of Liu and Lin, 2006].

Research Groups in our Center

Our Journal publications

Group			No of Res	Publications
Solar Physics			4	*1) Empirical Model of the Transit Time of Interplanetary Coronal Mass Ejectionsm A. Mahrous, M. El-Nawawy, M. Hammama, and N. Ahmed, Solar System Research, 2009, Vol. 43, No. 2, pp. 128–135.* *2) CME–Fare Association During the 23rd Solar Cycle* *A. Mahrous, M. Shaltout, M.M. Beheary, R. Mawad, M. Youssef* *Advances in Space Research, 2009, Vol. 43, pp. 1032–1035.*
Ionosphere			5	*Ionospheric Tomography Network of Egypt: A New Receiver Network in Support of the International Heliophysical Year* *T. Garner, T. Gaussiran, J. York, D. Munton, C. Slack, A. Mahrous* *Earth, Moon and Planet, 2009, Vol. 104, pp. 227-235.*
Cosmic Rays			3	*Simulation of Muon-Induced Air Showers Affecting CMS Tracking Detecto* *A. Mahrous, M. Sherif, and M. Soliman* *Physics of Particles and Nuclei Letters, 2009, Vol. 6, No. 3, pp. 246–250.*
Geomagnetism			5	*Mahrous, A., Ghamry, E., Elhawary, R., Fathy, I., Yamazaki, Y., Abe, S., Uozumi, T., Yumoto, K., First MAGDAS Installation at Fayum in Egypt, Advances in Space Research, 2010, doi: 10.1016/j.asr.2010.04.022*

http://www.helwan.edu.eg/english/Space

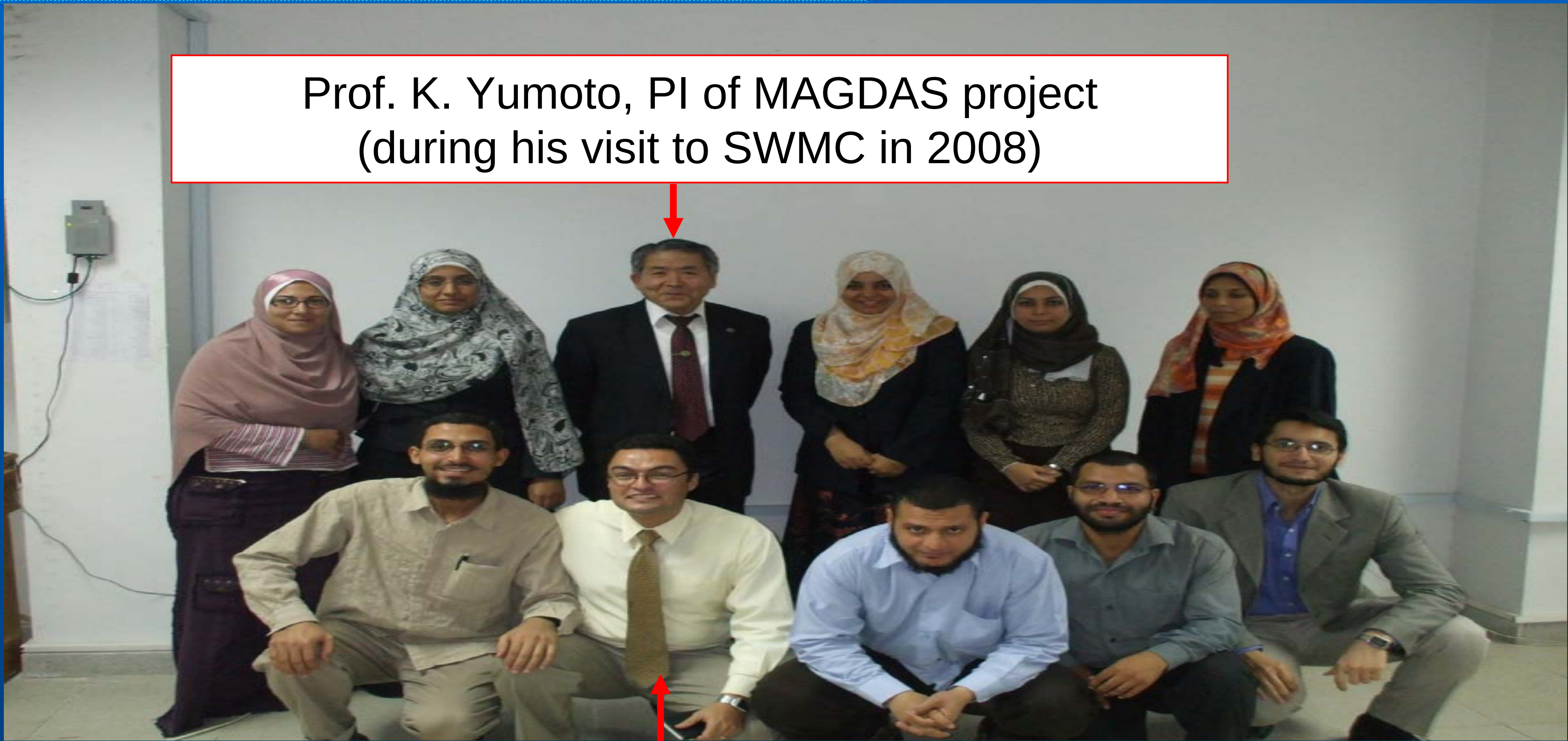
Joint Projects

Texas University (USA) CIDR Ionospheric Receiver	Kyushu University (Japan) MAGDAS Magnetometer
Stanford University (USA) AWESOME Ionospheric Receiver	SCINDA Ionospheric Reciver
European Union TEMPUS 38,000 Euro (started)	US-Egyptian Joint Board 180,000 US$ (accepted)
Joining the African Network with European Networks (proposed)	Cyprus-Egyptian Joint Board 90,000 EP (started)

Geomagnetism Group

MAGDAS Project

MAGDAS Project



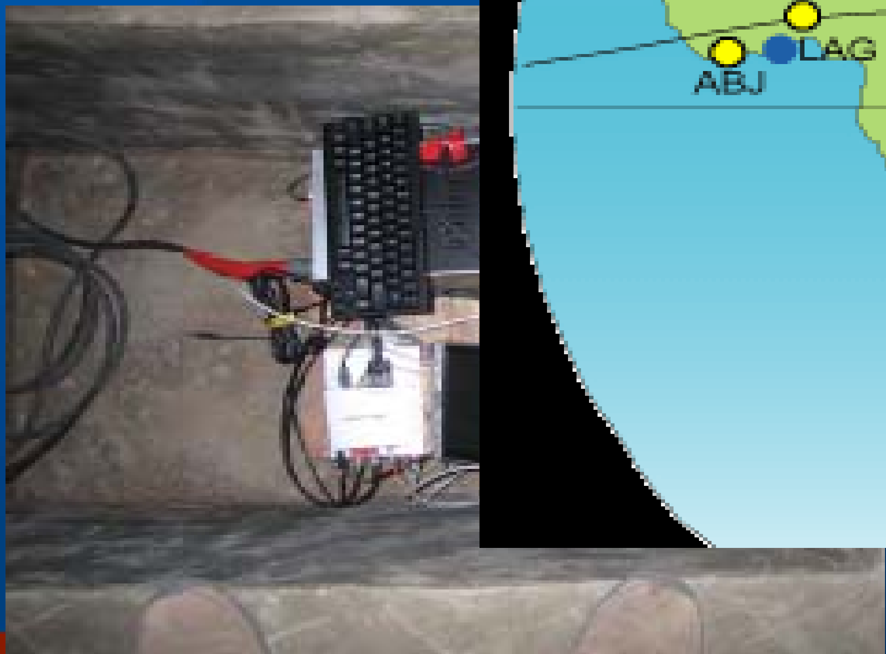
Prof. K. Yumoto, PI of MAGDAS project
(during his visit to SWMC in 2008)

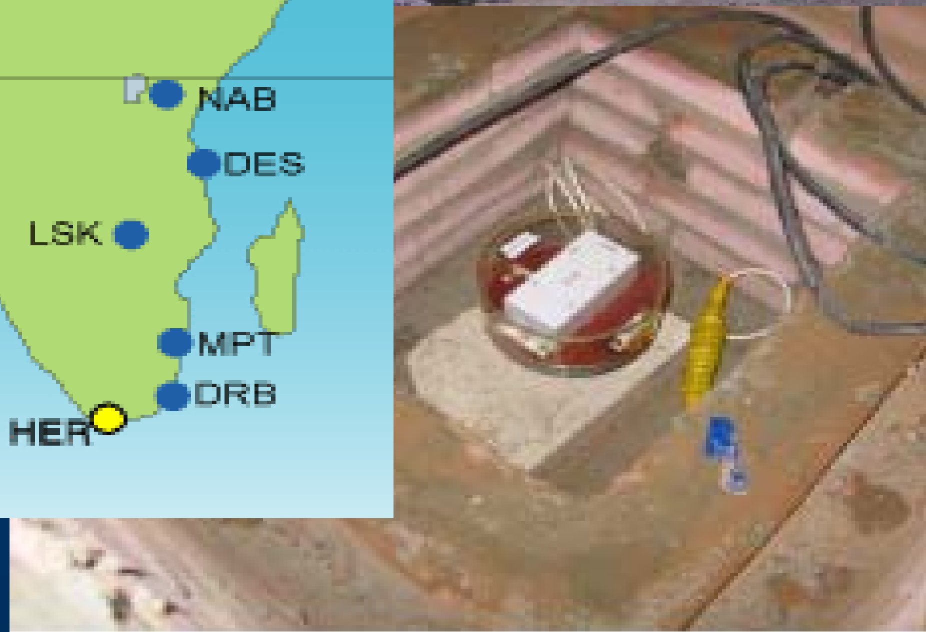
Associate Prof. Ayman Mahrous

Installation of MAGDAS at FYM

MAGDAS-II installation at ASW

Aswan, Egypt,
15.20GMLat, 104.24G
Installed at 08/12/23





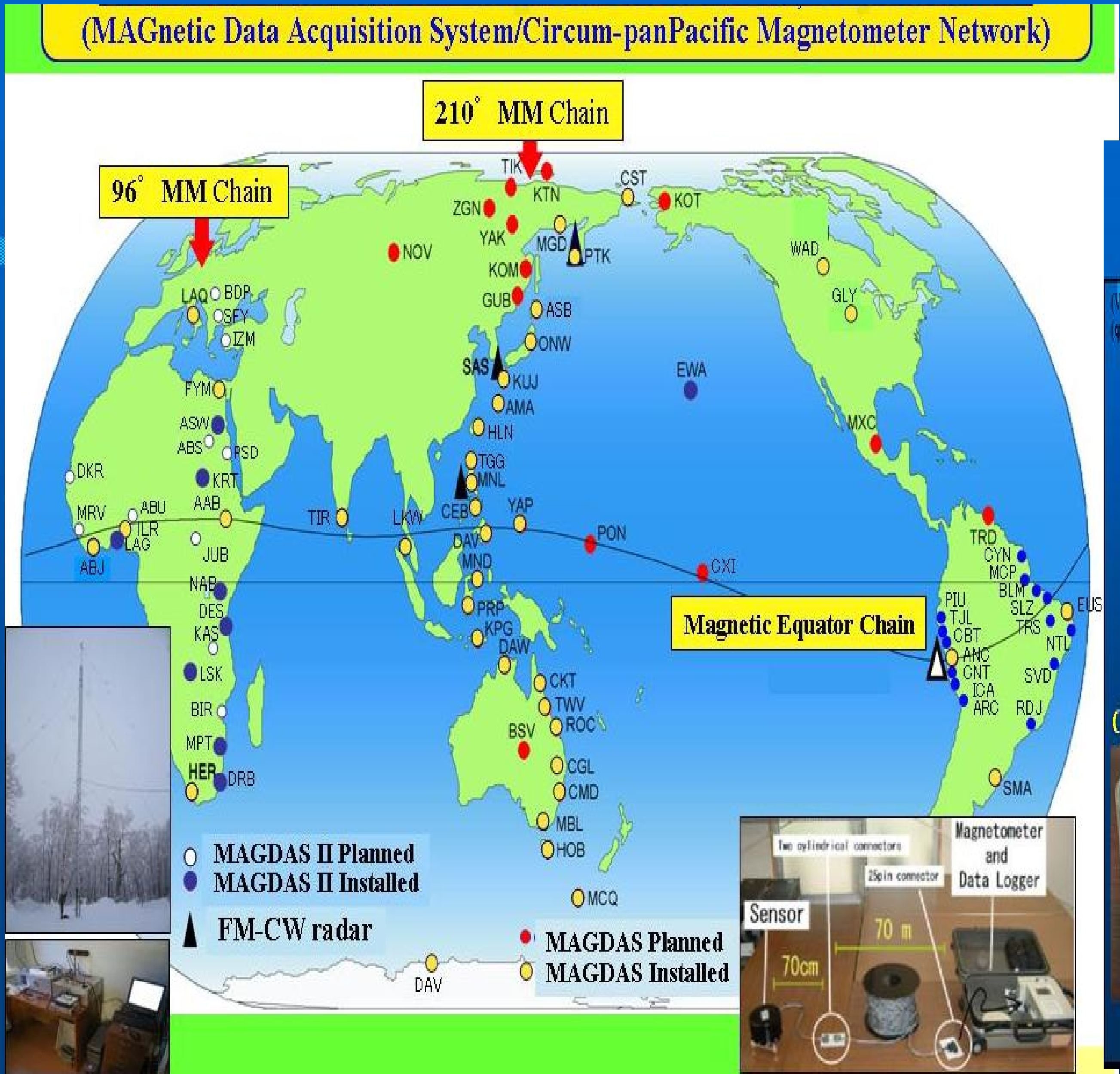
Typical Installation

- First, a solid foundation is laid for the sensor house. Then the sensor house is assembled with jumbo blocks. The sensor is accessible from the topside of the structure.

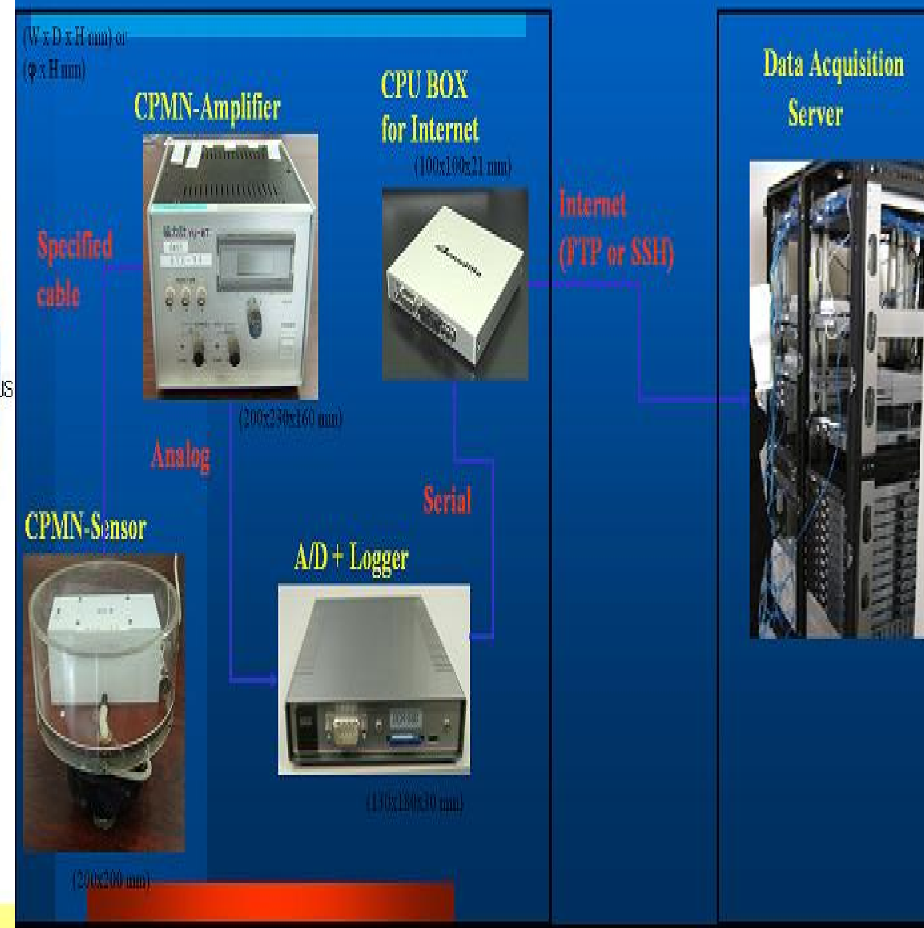
Sensor Cable is Buried

The sensor cable
is passed through a
5-cm flexible tube
and then the tube is
buried underground
by about 10 cm.

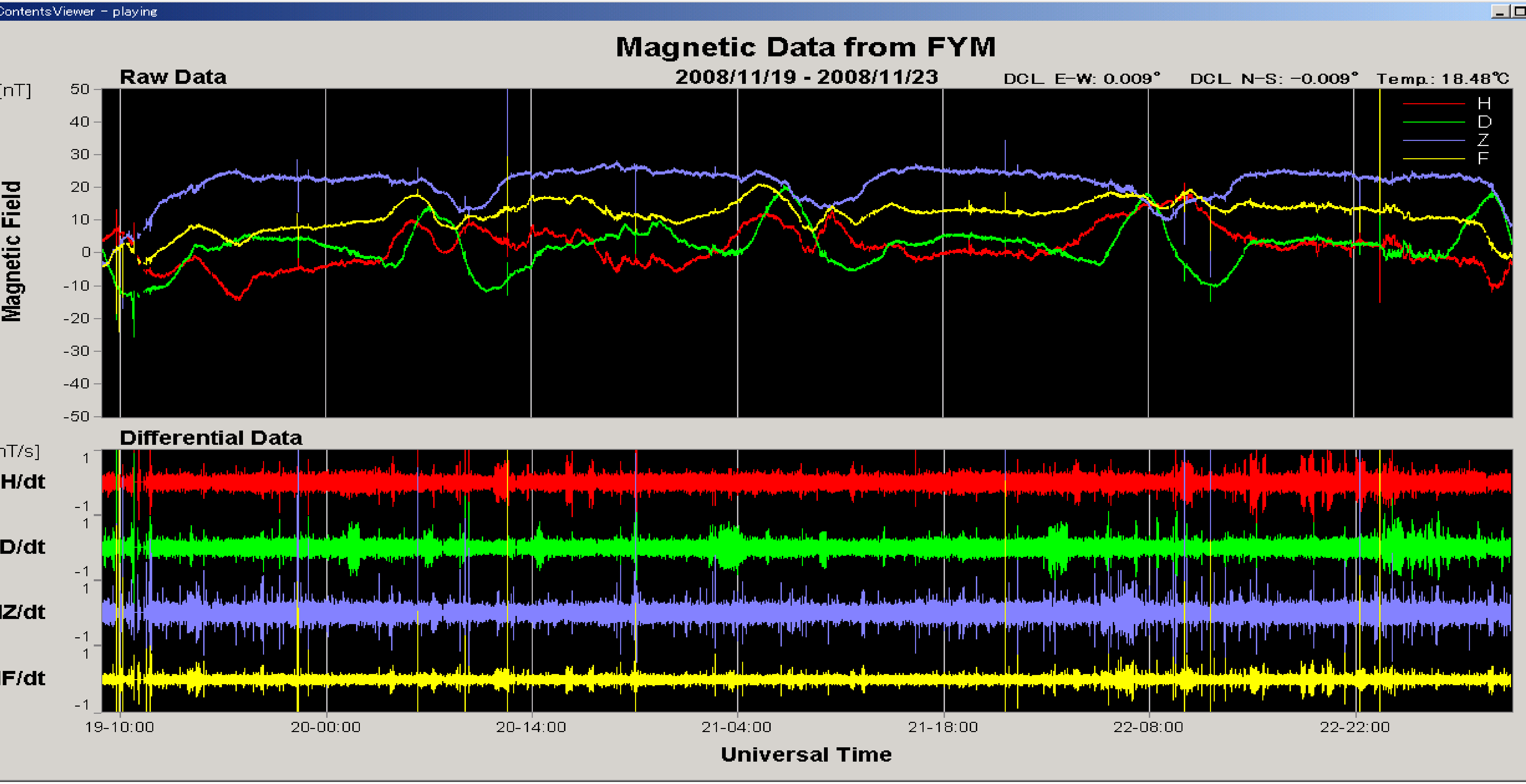
Just prior to burial



MAGDAS-II Magnetometer

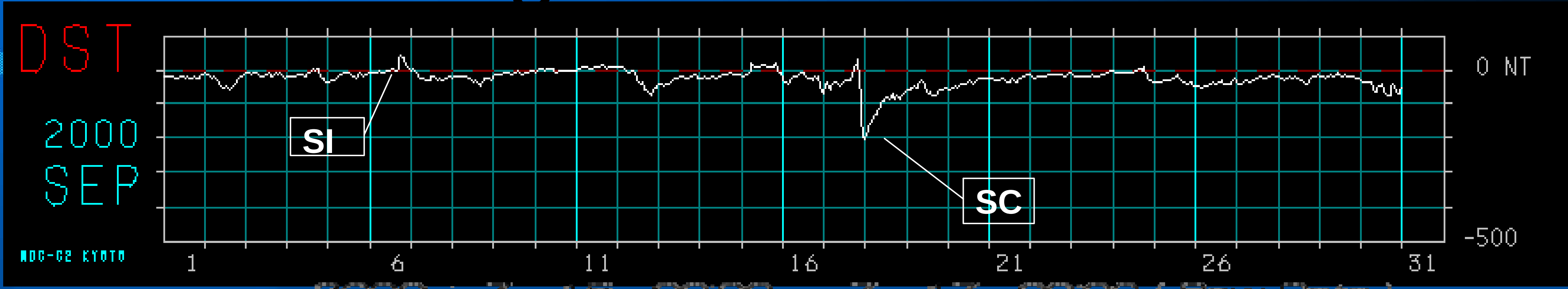


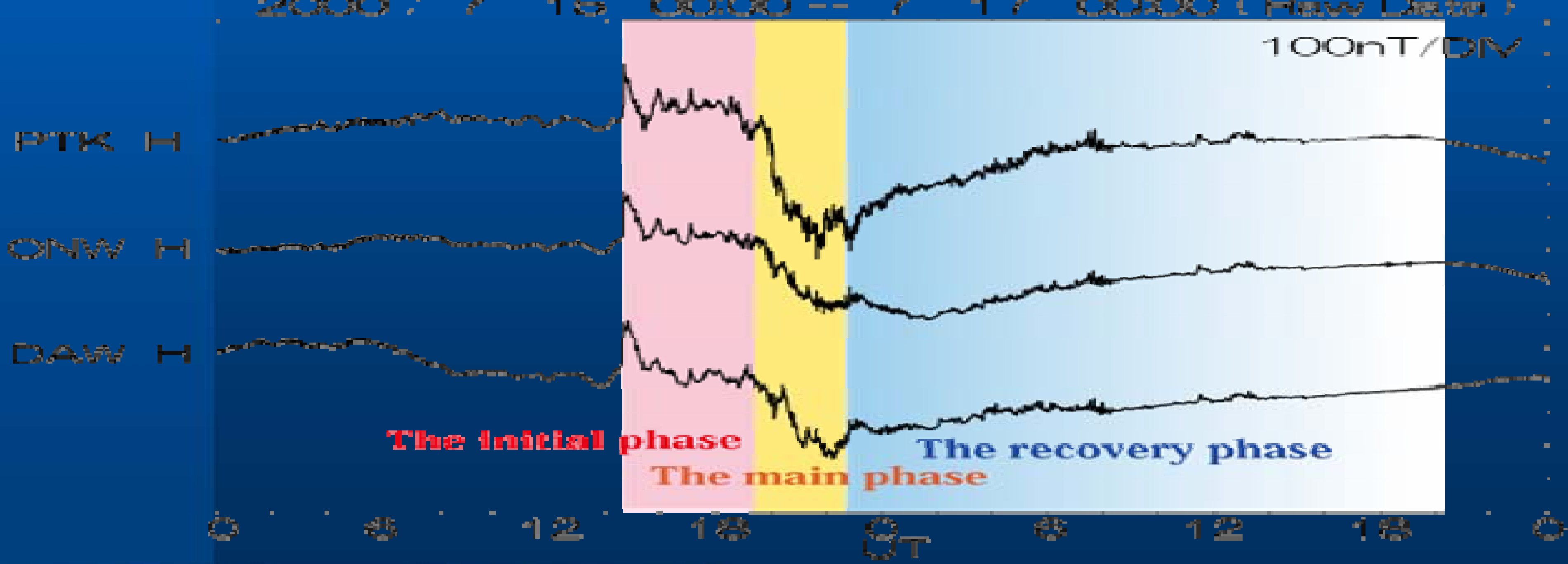
Real-time Monitoring Data from FYM Station



Data is displayed as follows

What we can get from MAGDAS

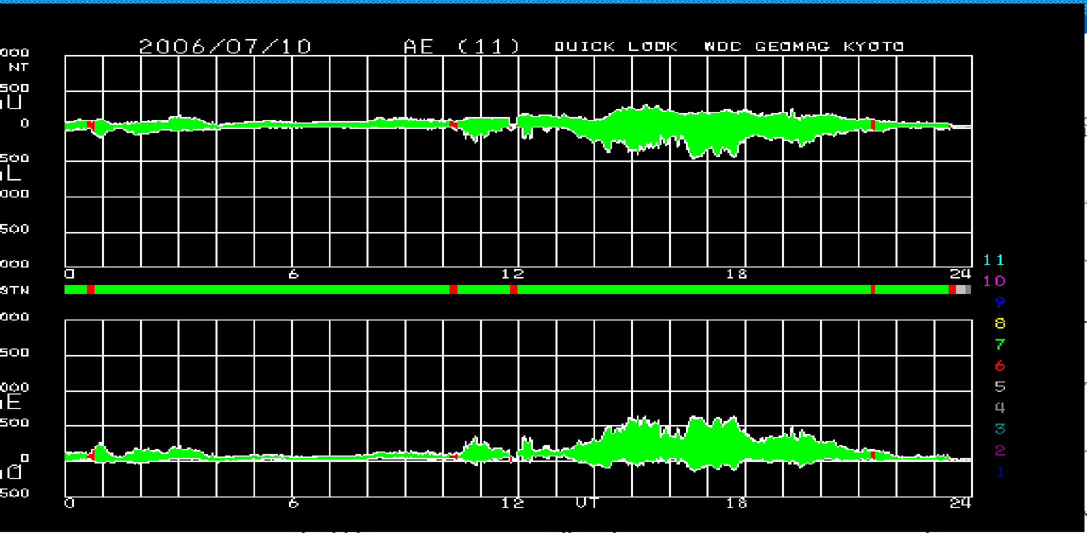


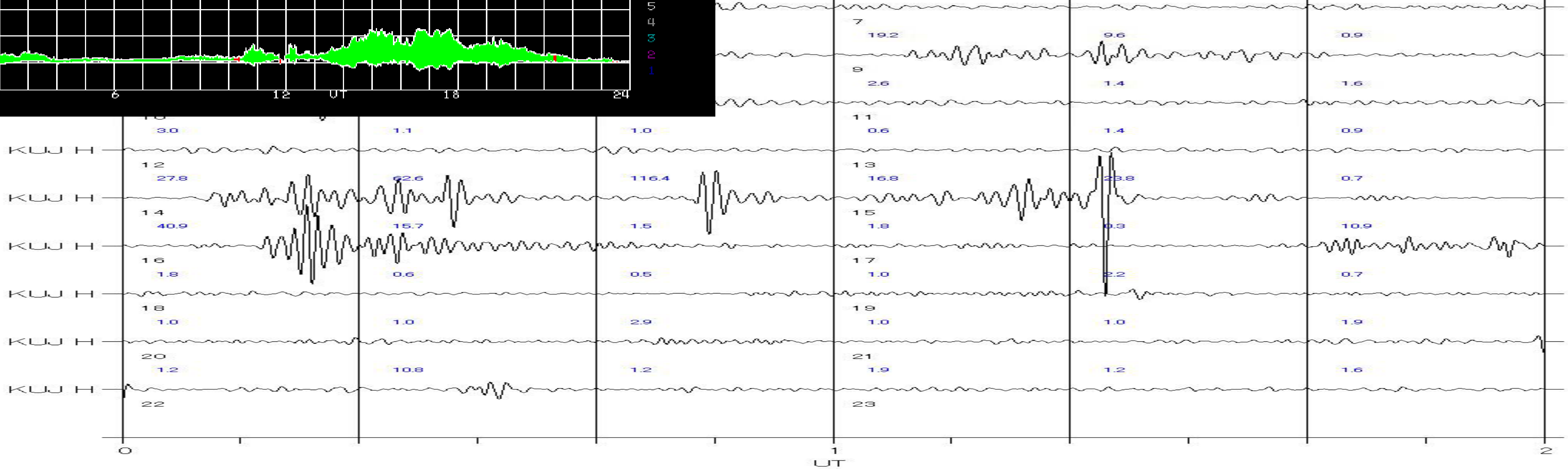


Study of Magnetic Substorm

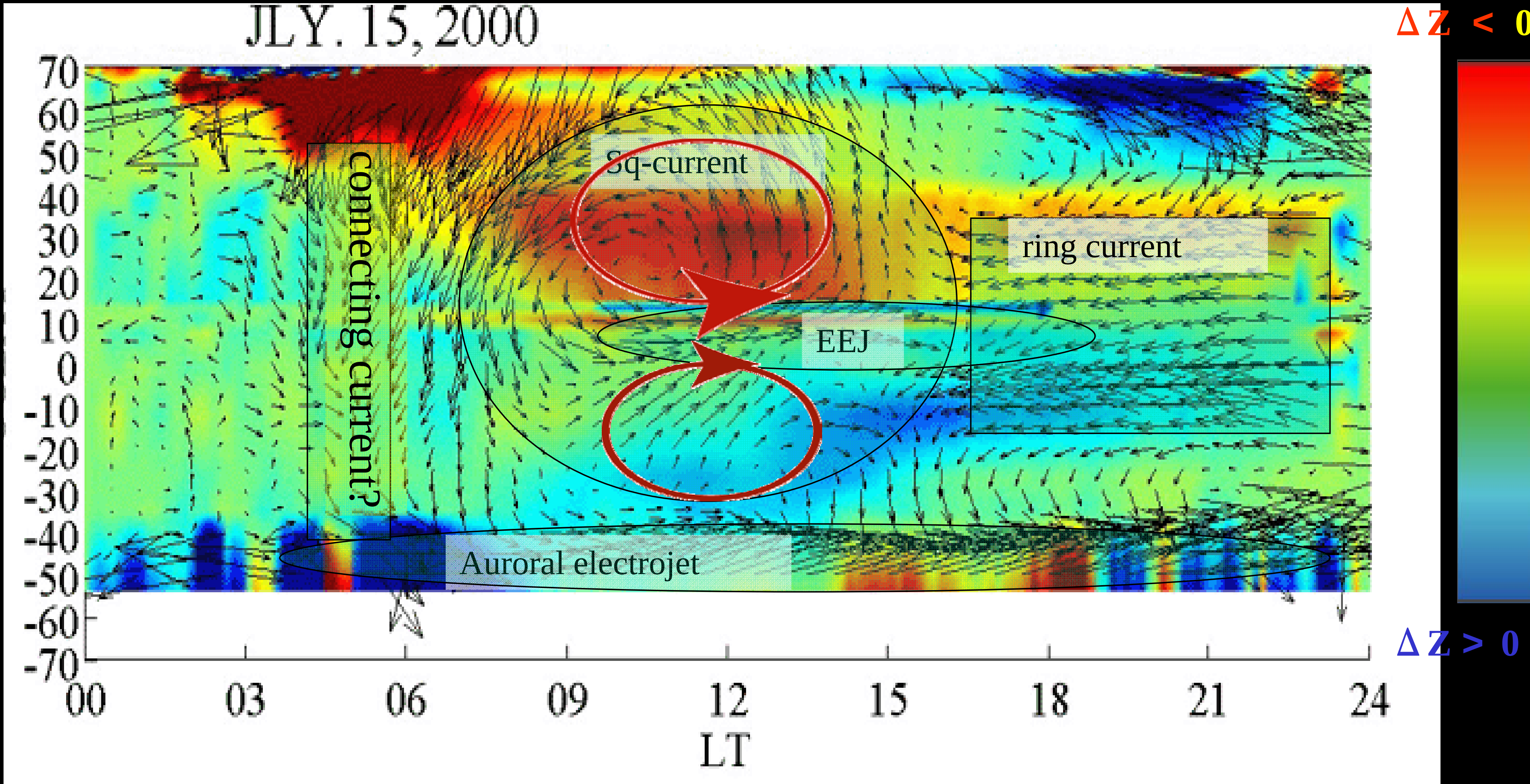
Auroral Electrojet: AE index

Pi 2 pulsation: by MAGDAS





Study of Sq (solar quite) current globally



・We can see clear Sq current, equatorial electrojet, auroral electrojet, ring current and curren connecting between northern and southern ionospheres on a disturbed day.

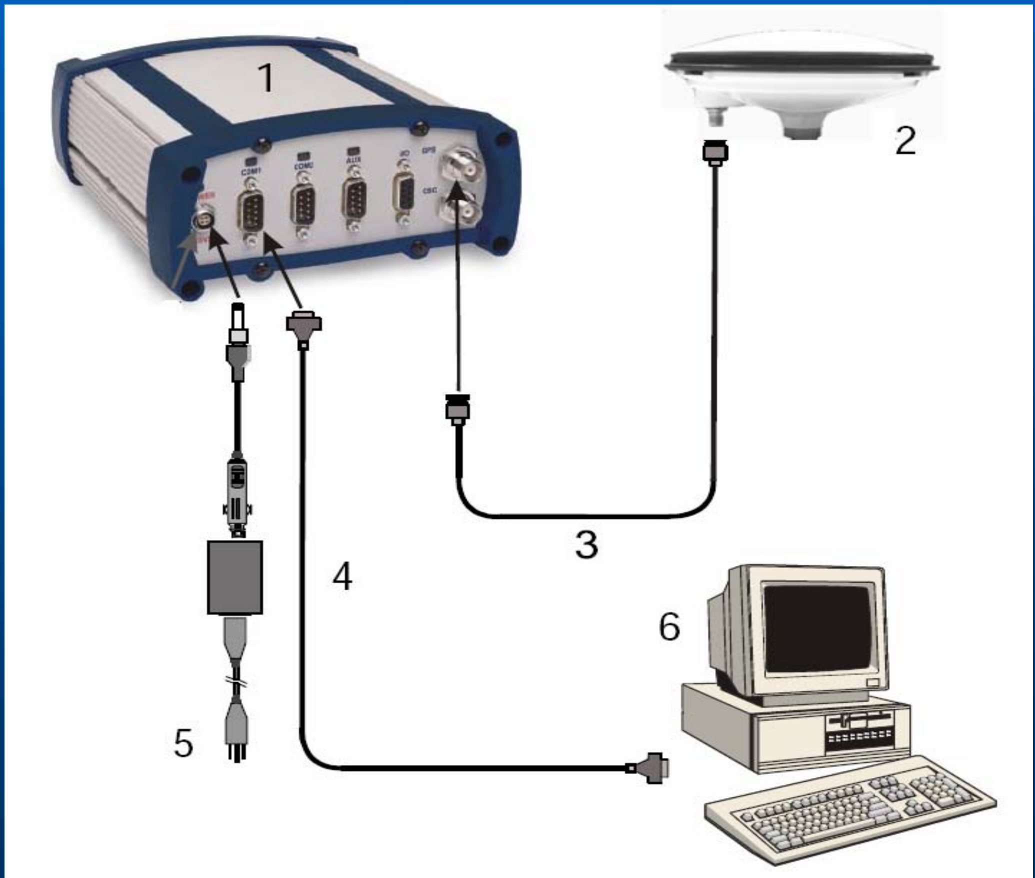
- This image was done by SERC staff.

Ionosphere Group

GPS Sub-group

GPS System at Helwan

GPS System at Helwan



1: GPS receiver

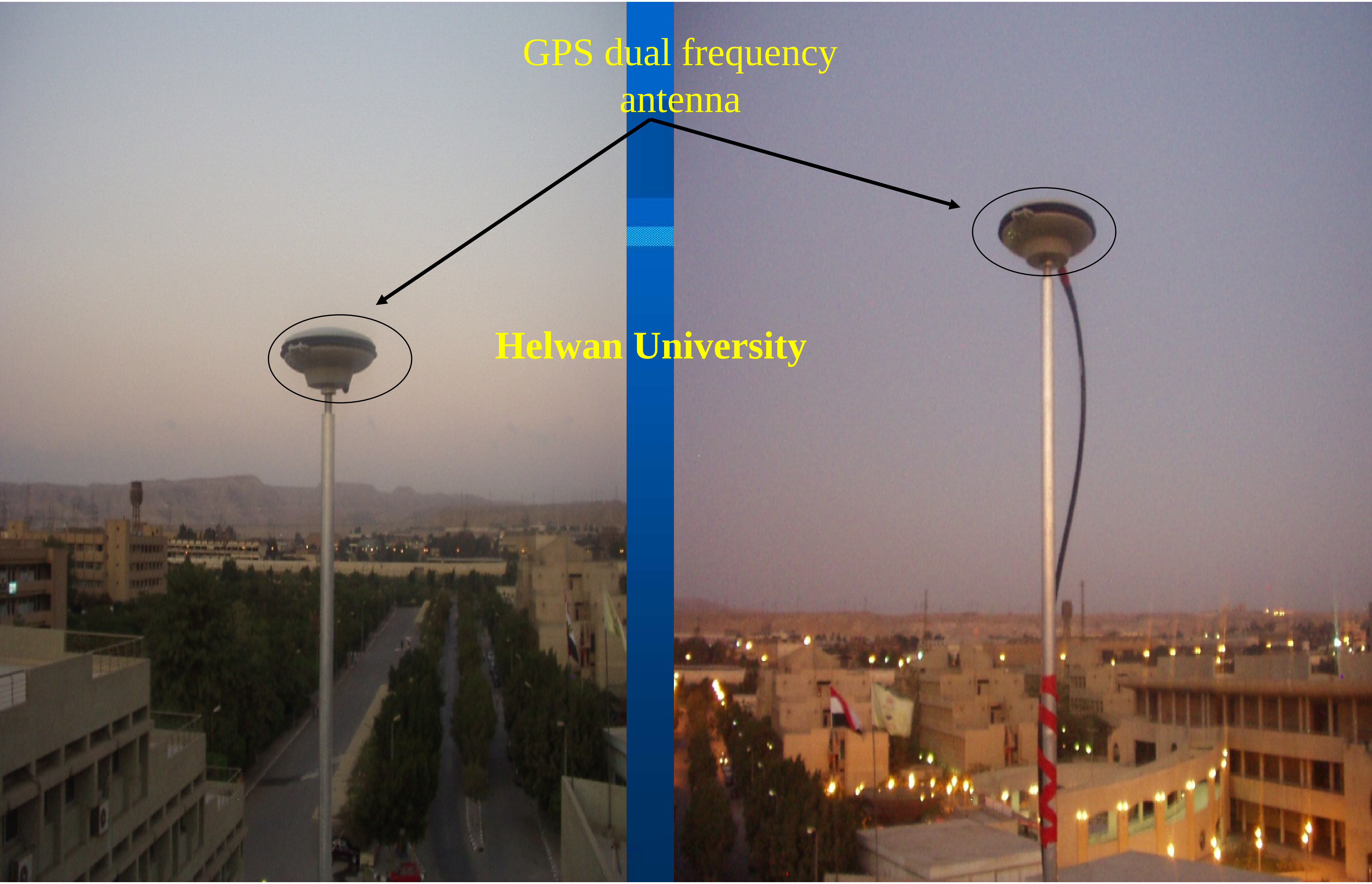
2: GPS dual frequency antenna

3: Antenna cable (30 meter maximum)

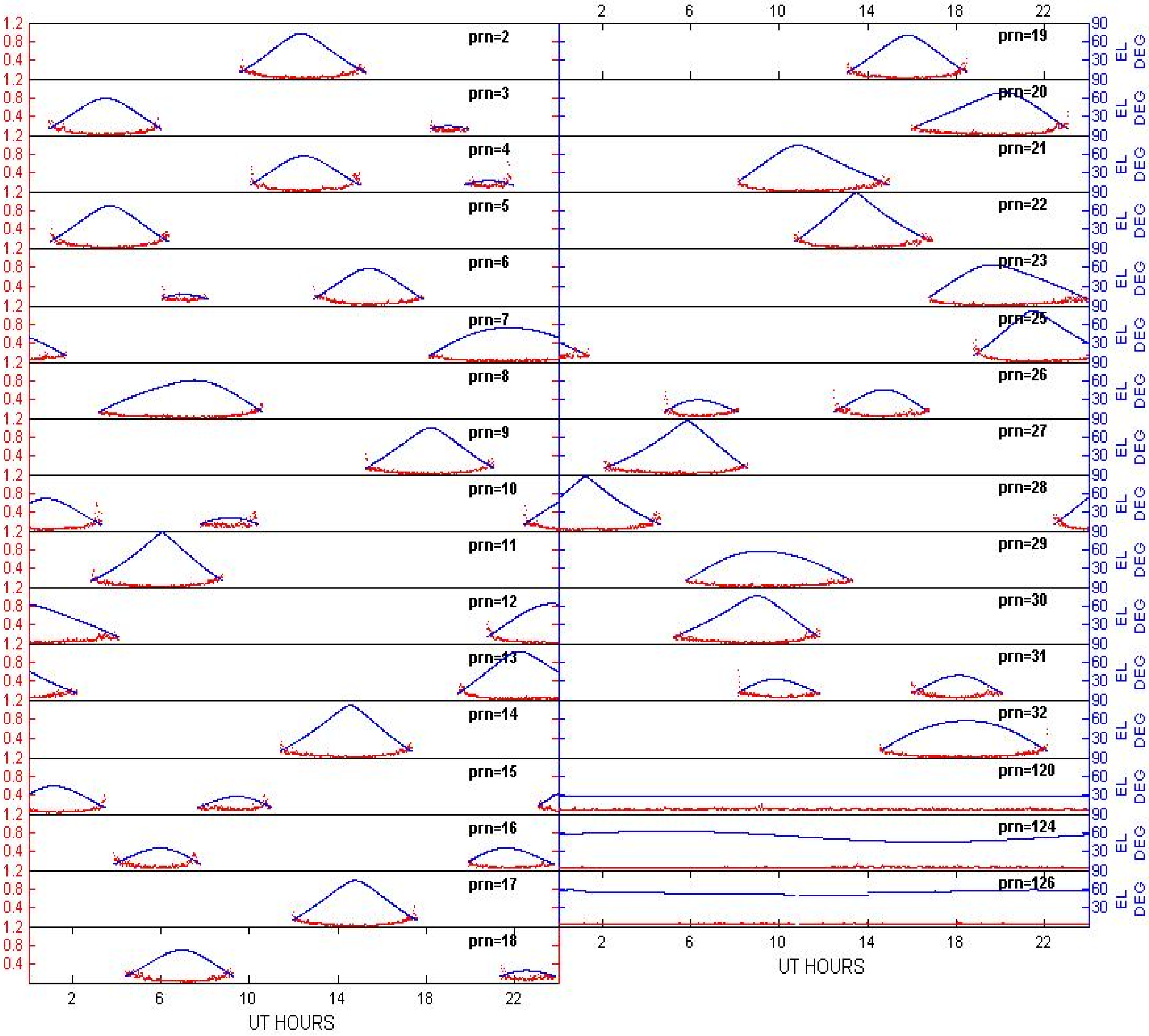
4: Serial cable

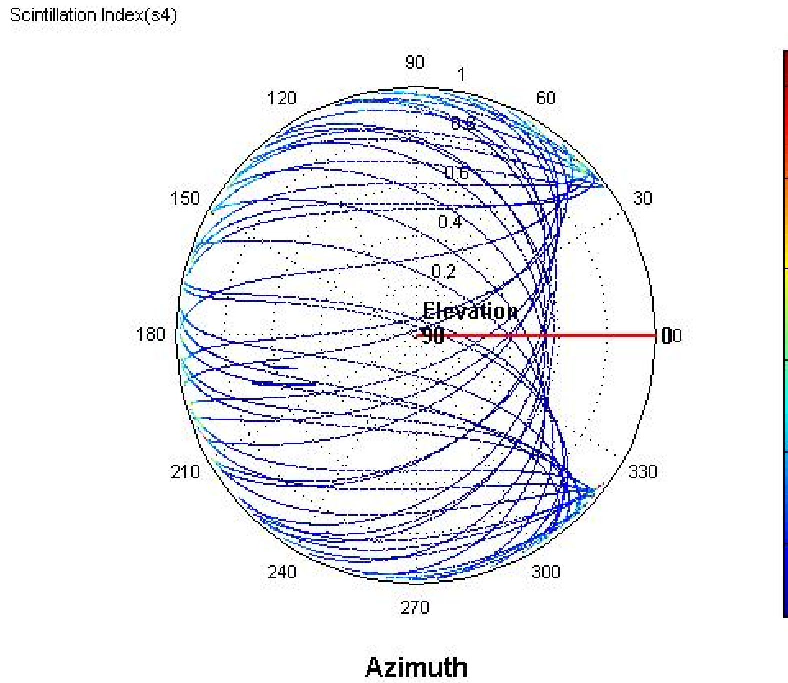
5: Power cable

6: Personal computer running Linux

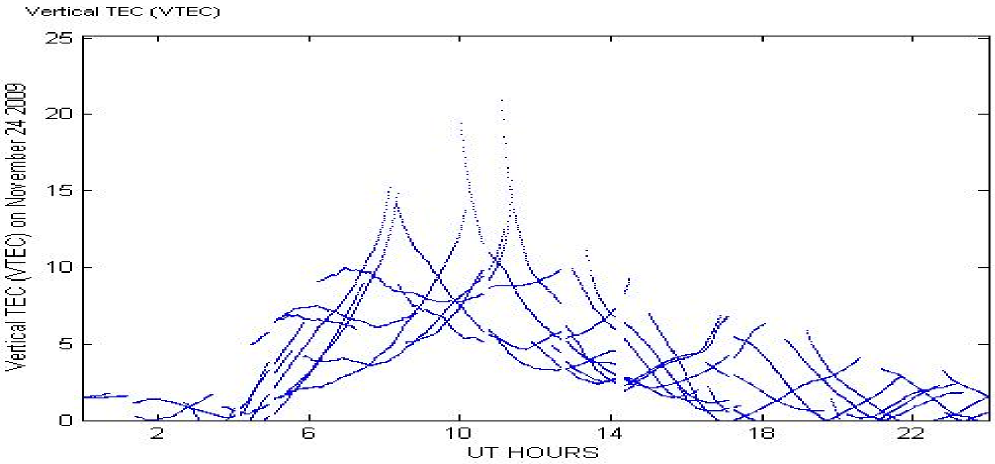

GPS dual frequency antenna
Helwan University

S4 AND ELEVATION ANGLE
on November 24 2009

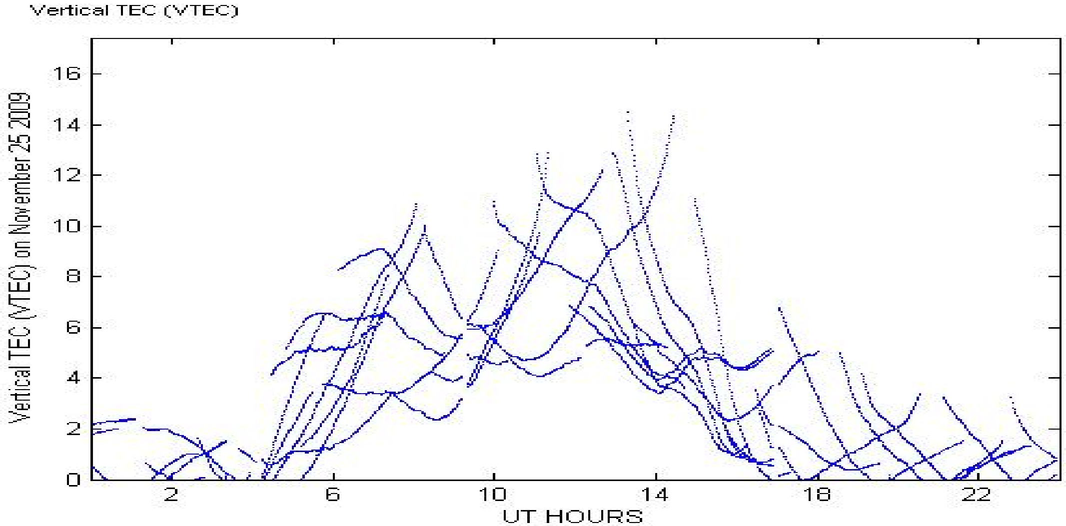




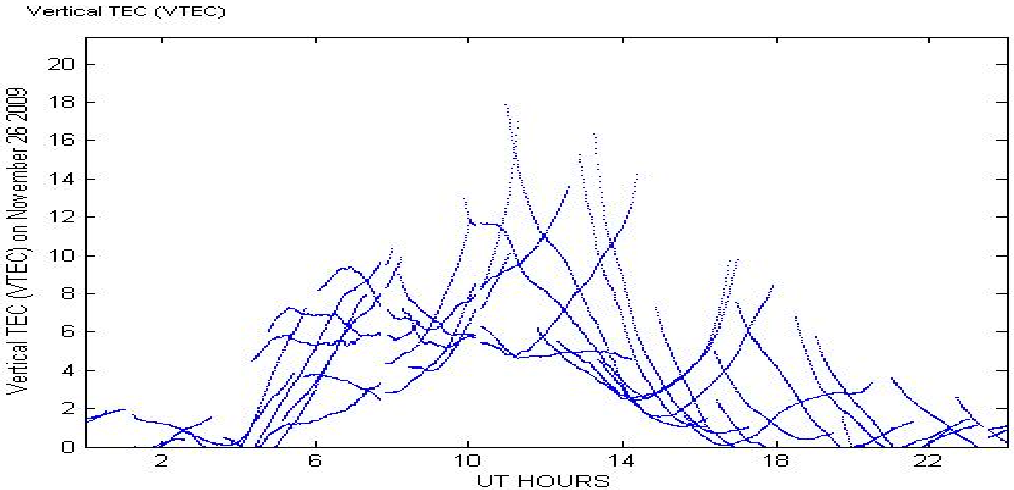
TEC Profile



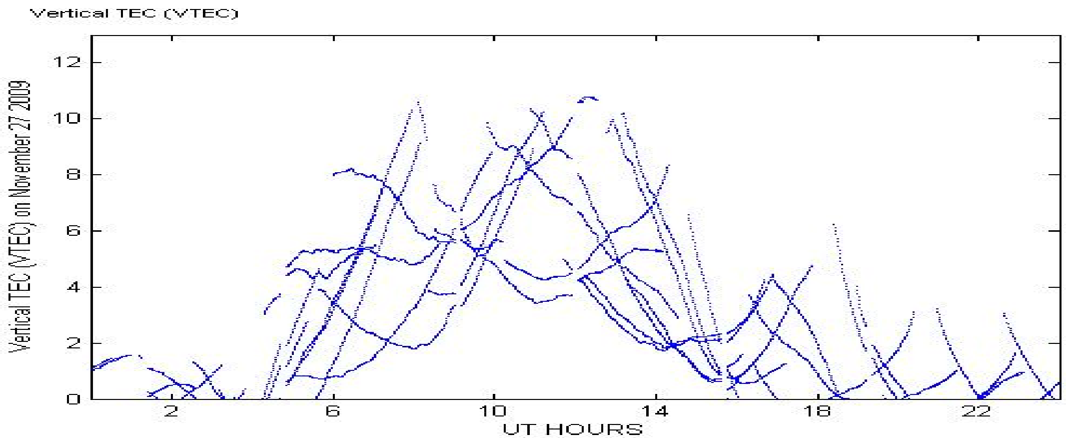
Vertical TEC (VTEC)
Vertical TEC (VTEC) on November 24 2009
UT HOURS



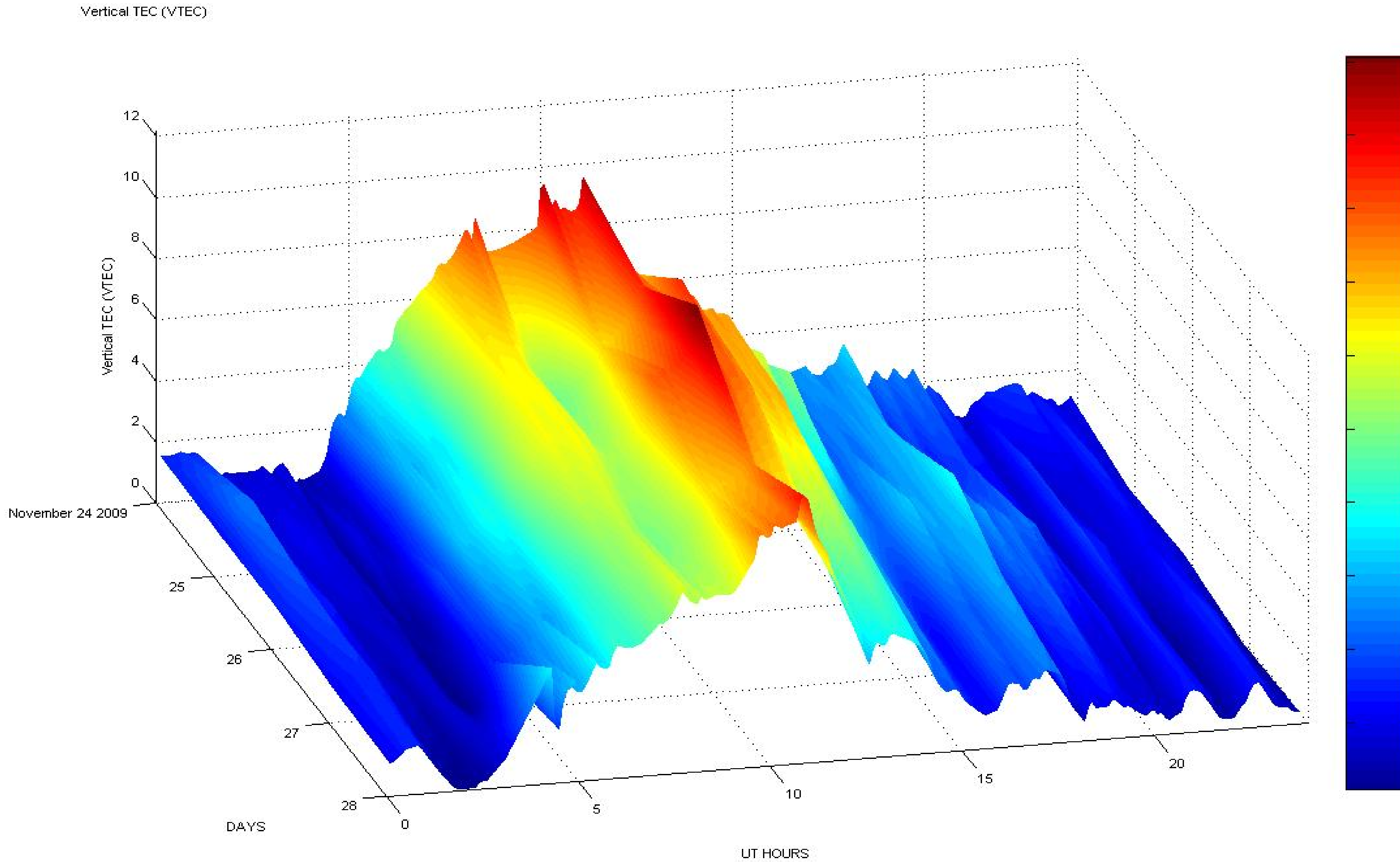
Vertical TEC (VTEC)
Vertical TEC (VTEC) on November 25 2009
UT HOURS



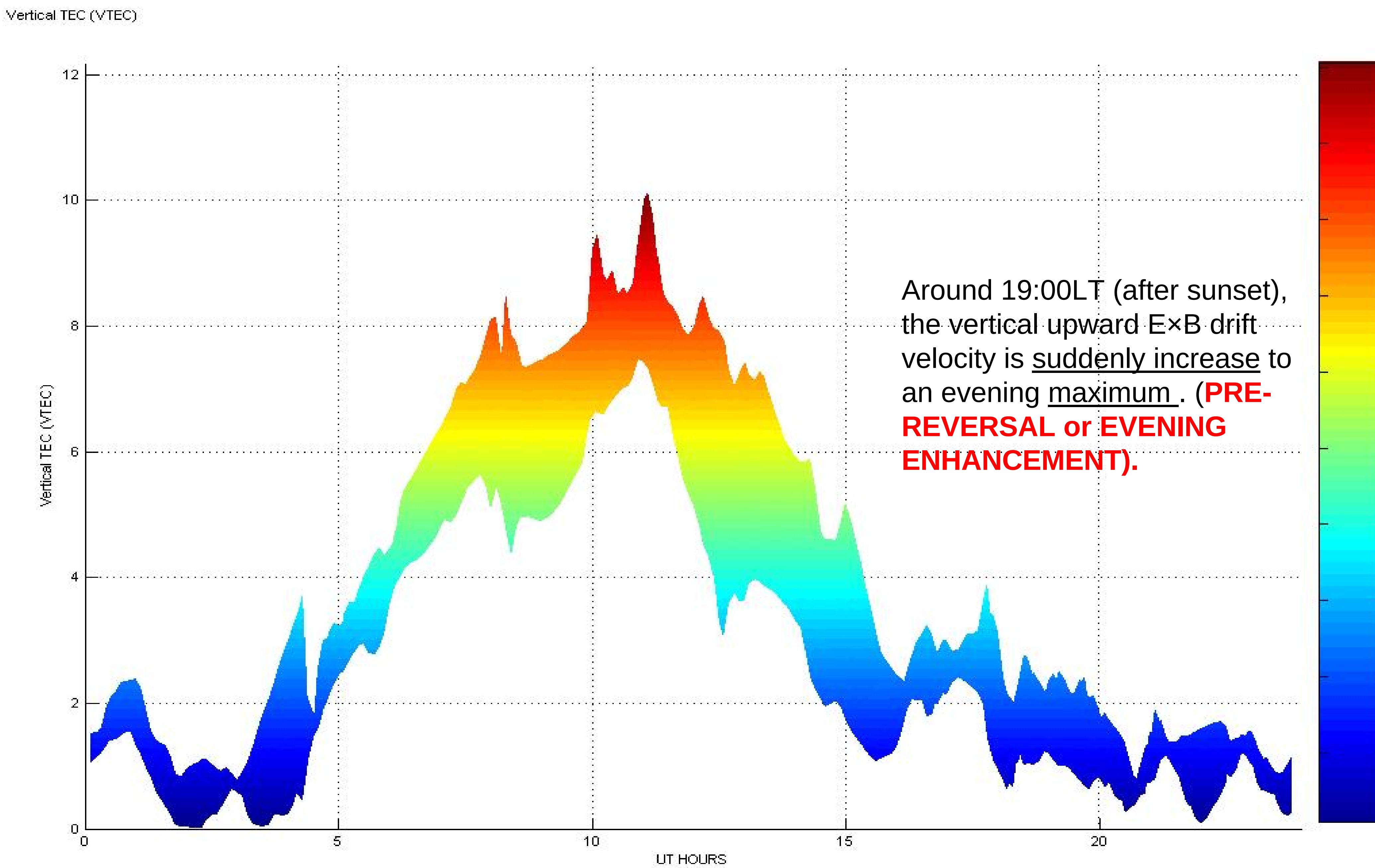
Vertical TEC (VTEC)
Vertical TEC (VTEC) on November 26 2009
UT HOURS



Vertical TEC (VTEC)
Vertical TEC (VTEC) on November 27 2009
UT HOURS



Vertical TEC (VTEC)
Vertical TEC (VTEC)
12
10
8
6
4
2
0
November 24 2009
25
26
27
28
DAYS
0
5
10
15
20
UT HOURS


Vertical TEC (VTEC)
Vertical TEC (VTEC)
UT HOURS
0
2
4
6
8
10
12
0
5
10
15
20
Around 19:00LT (after sunset), the vertical upward E×B drift velocity is suddenly increase to an evening maximum . (PRE-REVERSAL or EVENING ENHANCEMENT).

Ionosphere Group

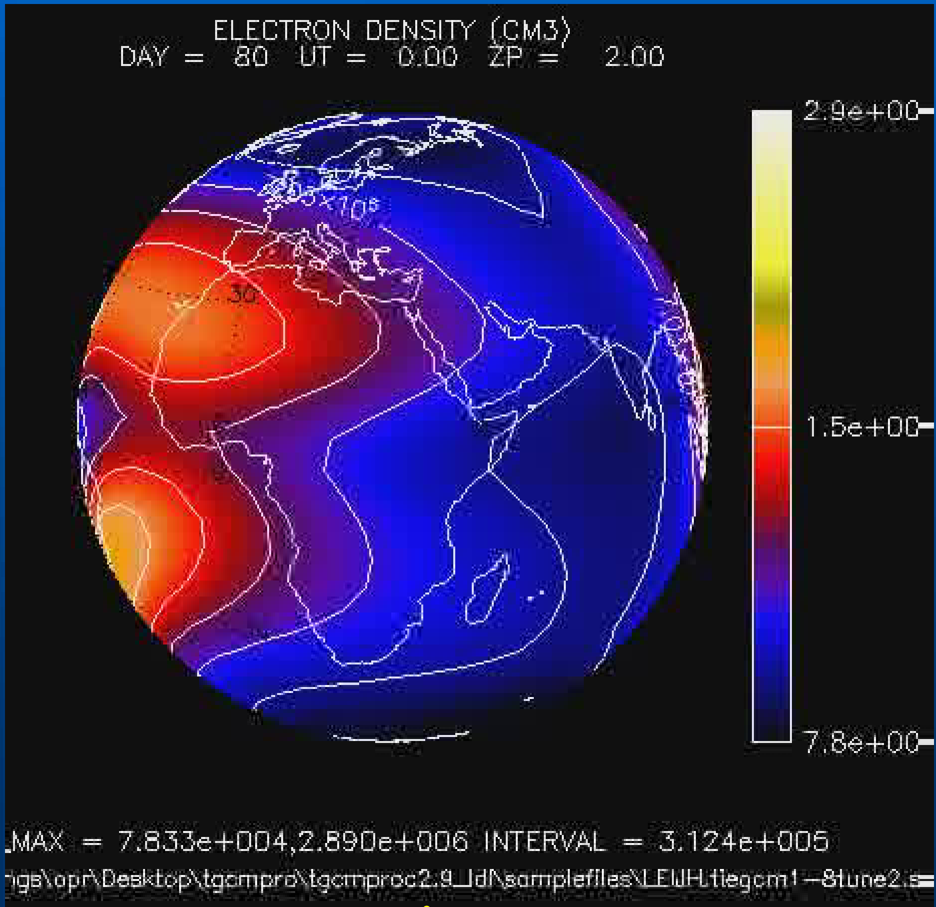
Simulation Sub-group

Comparison with Simulations

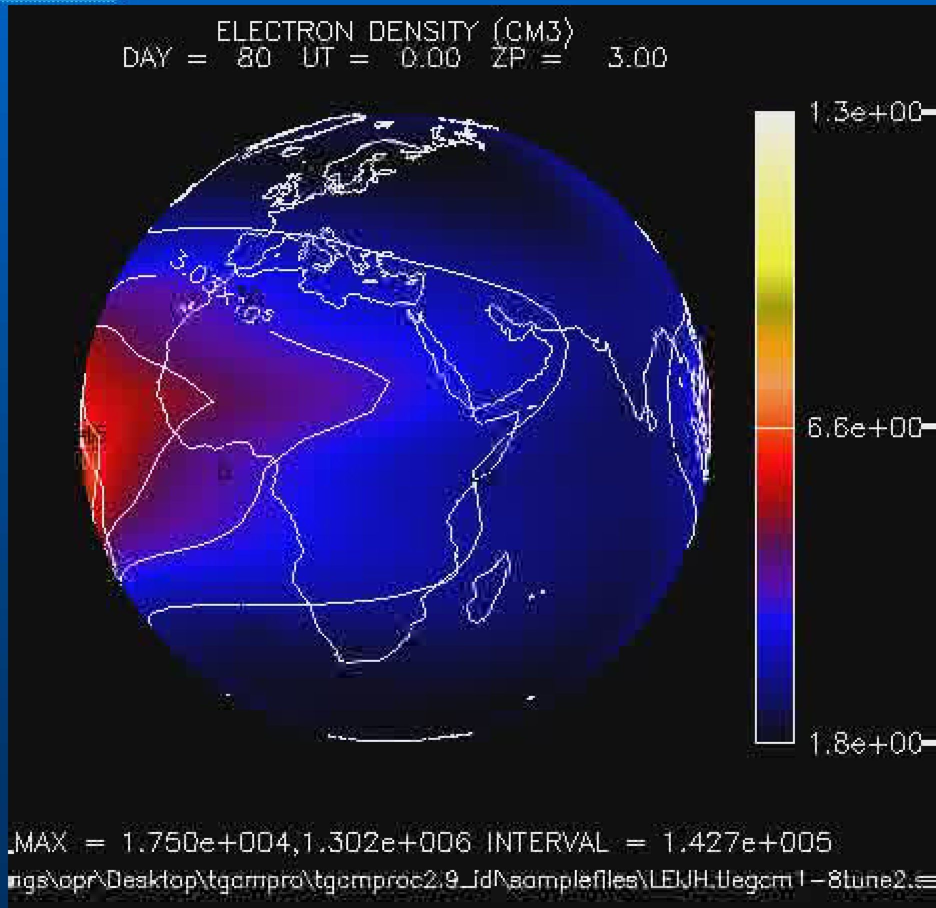
Thermospheric Ionospheric Electrodynamic General Circulation Model

TIEGCM

Simulation Results



Energetic Event



Quite Day

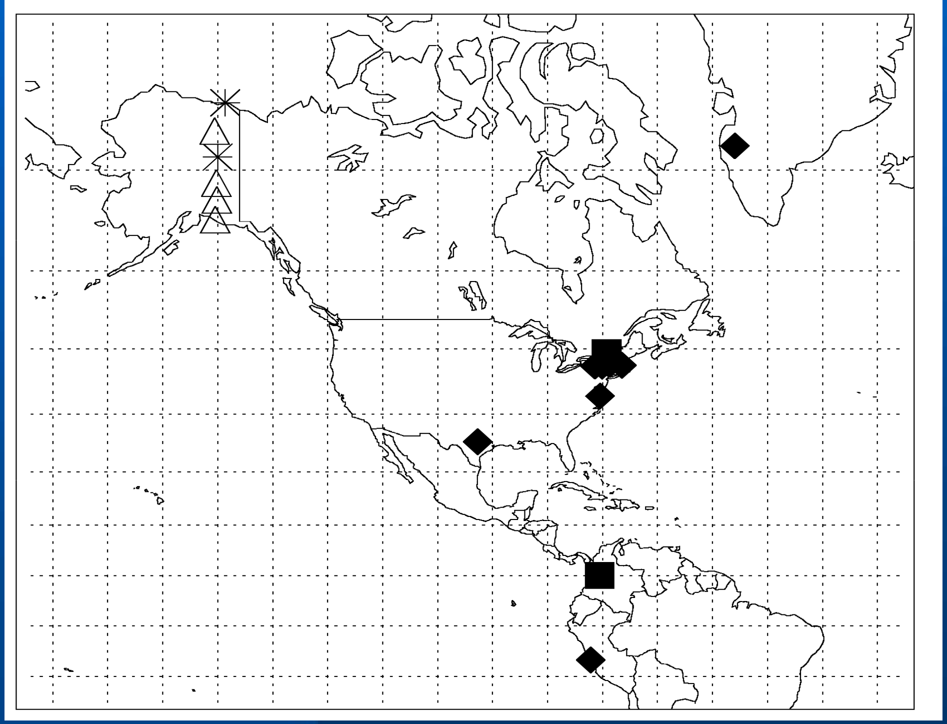
Ionosphere Group

CIDR Sub-group

CIDR Project 2008

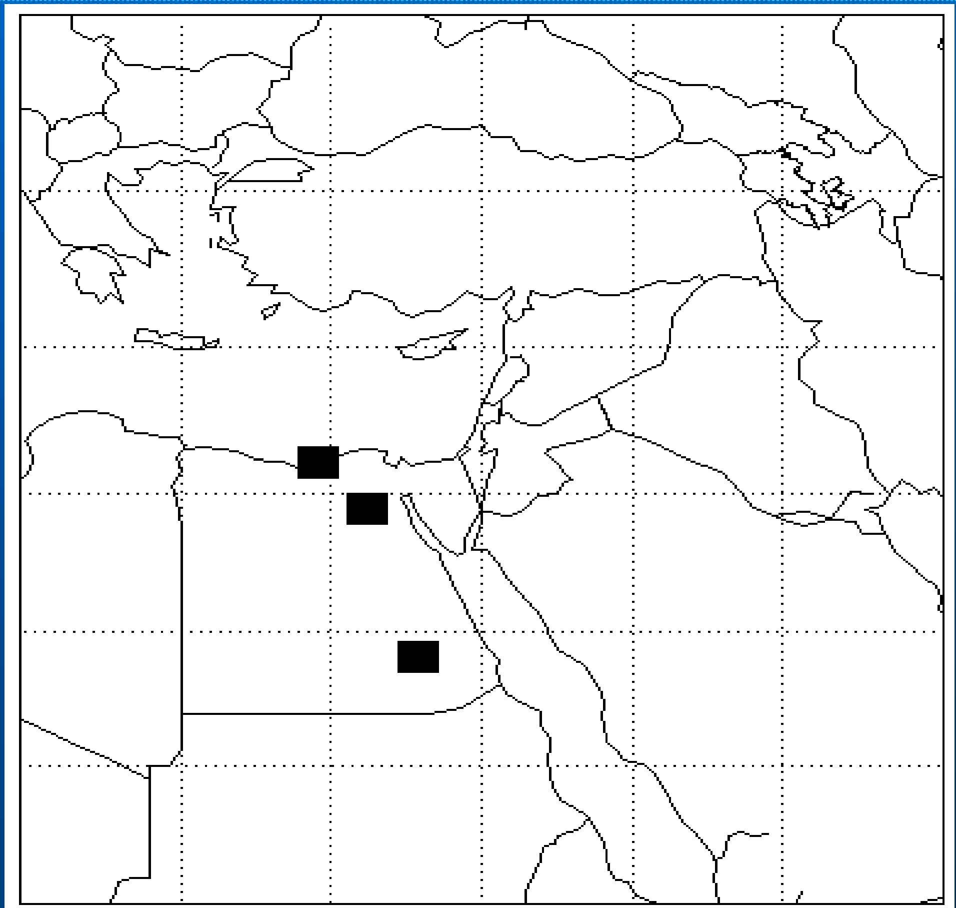
Coherent Ionospheric Doppler Receivers (CIDRs)

Coherent Ionospheric Doppler Receivers (CIDRs)



- 7 Diamonds indicate CIDR systems
- Alaskan CIDRs (Stars) are owned by Univ. of Alaska-Fairbanks are part of a tomography chain with similar tomography receivers developed by NWRA (Triangles)
- Future deployments in New York and Columbia (Squares) have the equipment located at or near the site, but not running.

Coherent Ionospheric Doppler Receivers (CIDRs)



Three CIDRs will be deployed to Egypt as part of IHY

- US coordinator (Dr.Trevor Garner), Texas University
- Egyptian coordinator (Dr. Ayman Mahrous), Helwan University.

The CIDR will be operated jointly by :

1- Helwan University

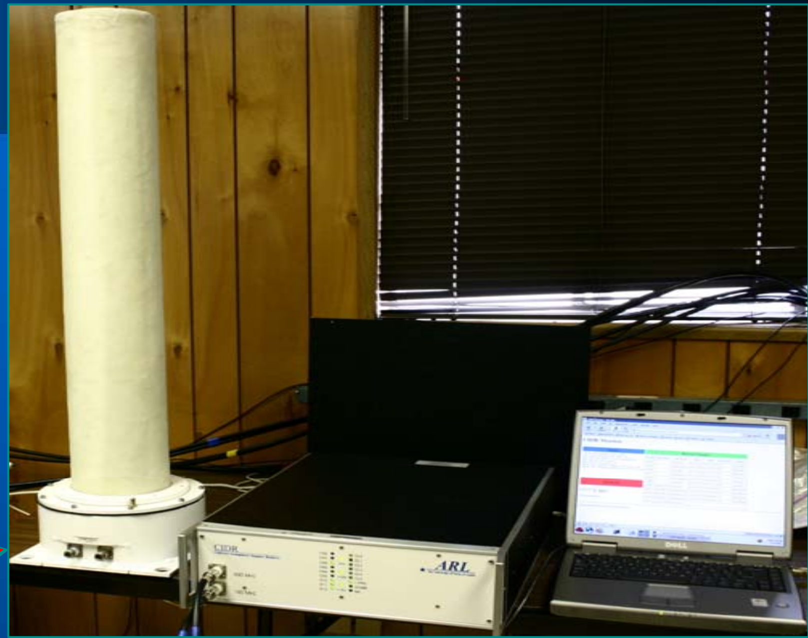
2- South Valley University

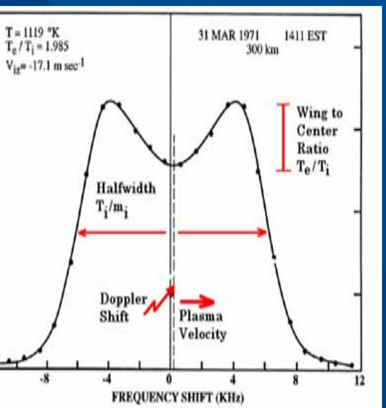
3- Alexandria University

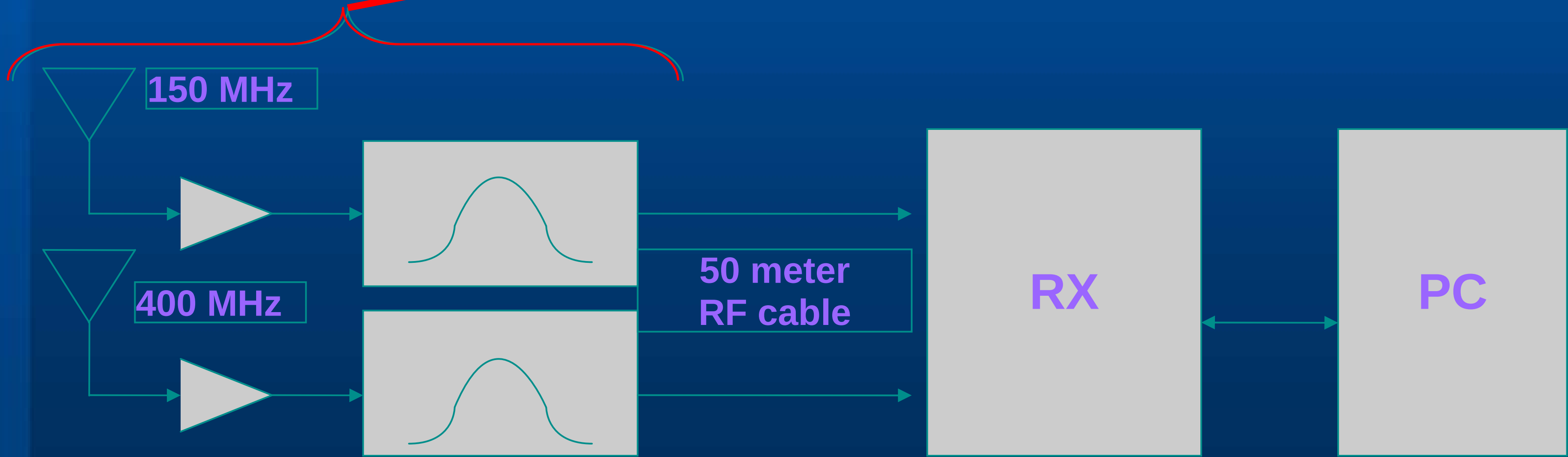
nospheric Tomography Network of Egypt: A New Receiver Network in Support of the International Heliophysical YearT. Garner, Gaussiran, J. York, D. Munton, C. Slack, A. Mahrous, Earth, Moon and Planet, 2009, Vol. 104, pp. 227-235.

Coherent Ionospheric Doppler Receivers (CIDRs)

- Designed to track 150/400MHz LEO beacons (Transit/NIMS, GFO)
- Provides relative TEC and phase scintillation measurements at 50 Hz
- Useful for examining spatial structure with a relatively sparse receiver network and conducting ionospheric tomography







RADCAL/GFO Beacon Satellites

- 3 RADCAL/GFO Satellites
- 20 RADCAL Ground Stations
  - Archived Data 1993 to Present
  - 5 Second Samples
  - Maintained by AF Western Test Range Vandenberg

RADCAL (1993 to Present)

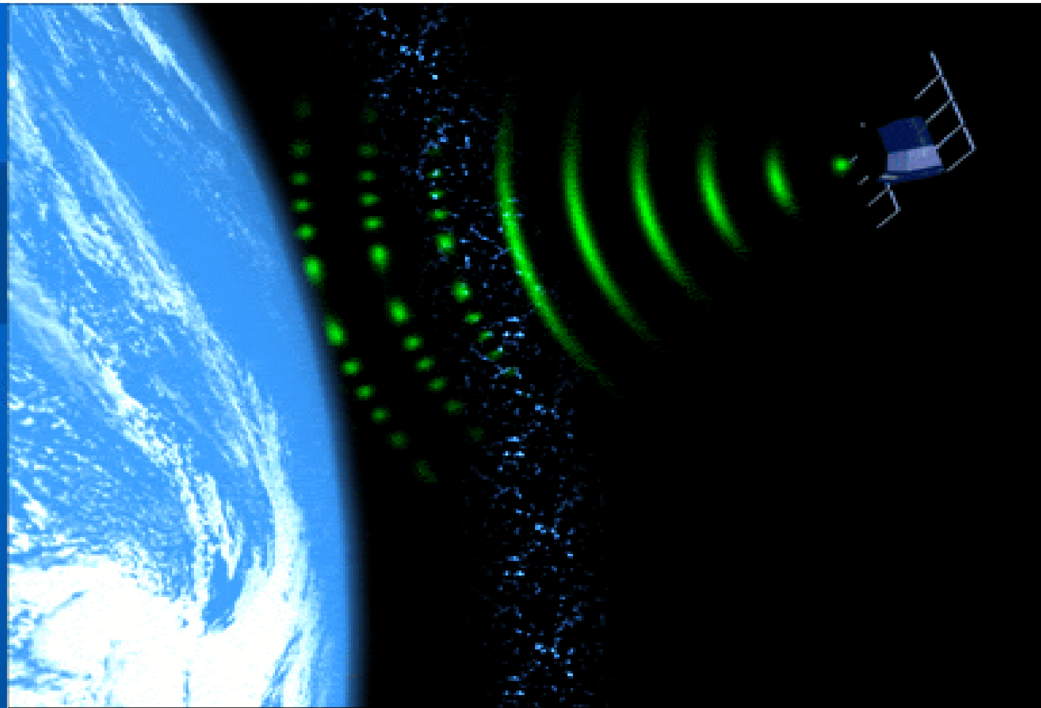
GFO (1998 to Present)

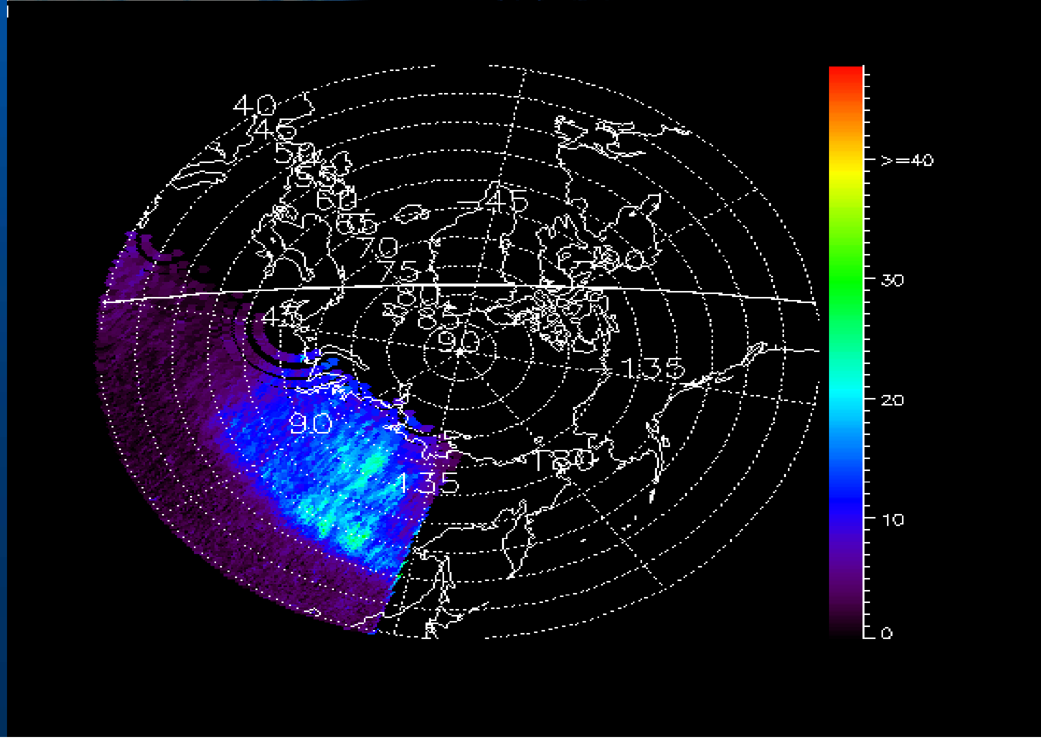
- Radio Altimetry and Ephemeris Satellites
  - 150/400 MHz Radio Beacon
  - Ionospheric TEC Correction Data

RADCAL on DMSP/F15
(Aug 2006 to Present)

Advantages Over GPS

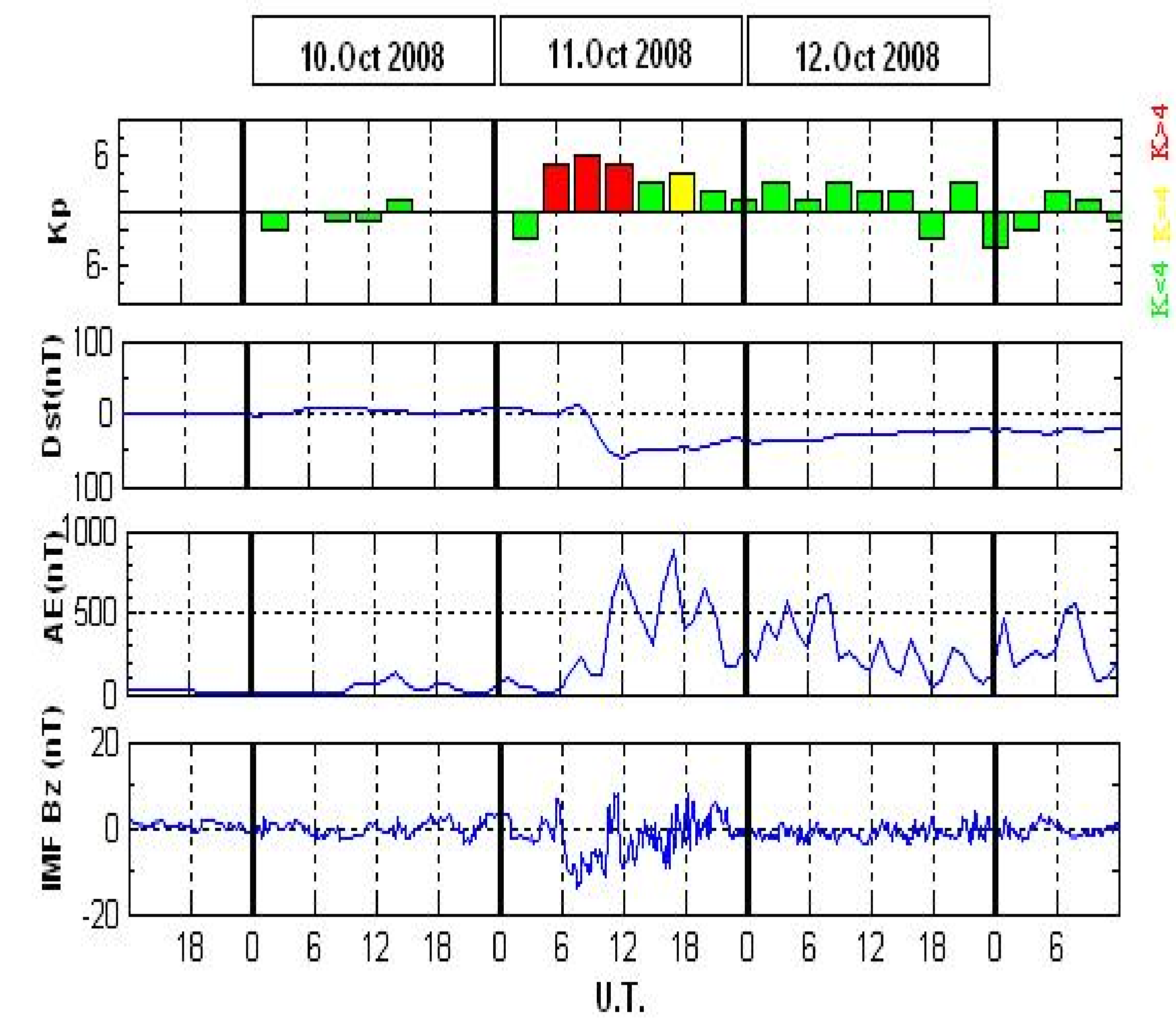
- More accurate, no need for plasmaspheric corrections by using LEO satellites.
- Can measure the spatial structure of the ionosphere.
- A powerful tool for topographic image of the ionosphere





Event of October 11, 2008

A moderate magnetic storm was recorded on October 11, 2008 with a sudden commencement time occurred at 0838 UT. Figure shows, from top to bottom, the Kp index, Dst index =-52 nT, AE index, and IMF Bz component.

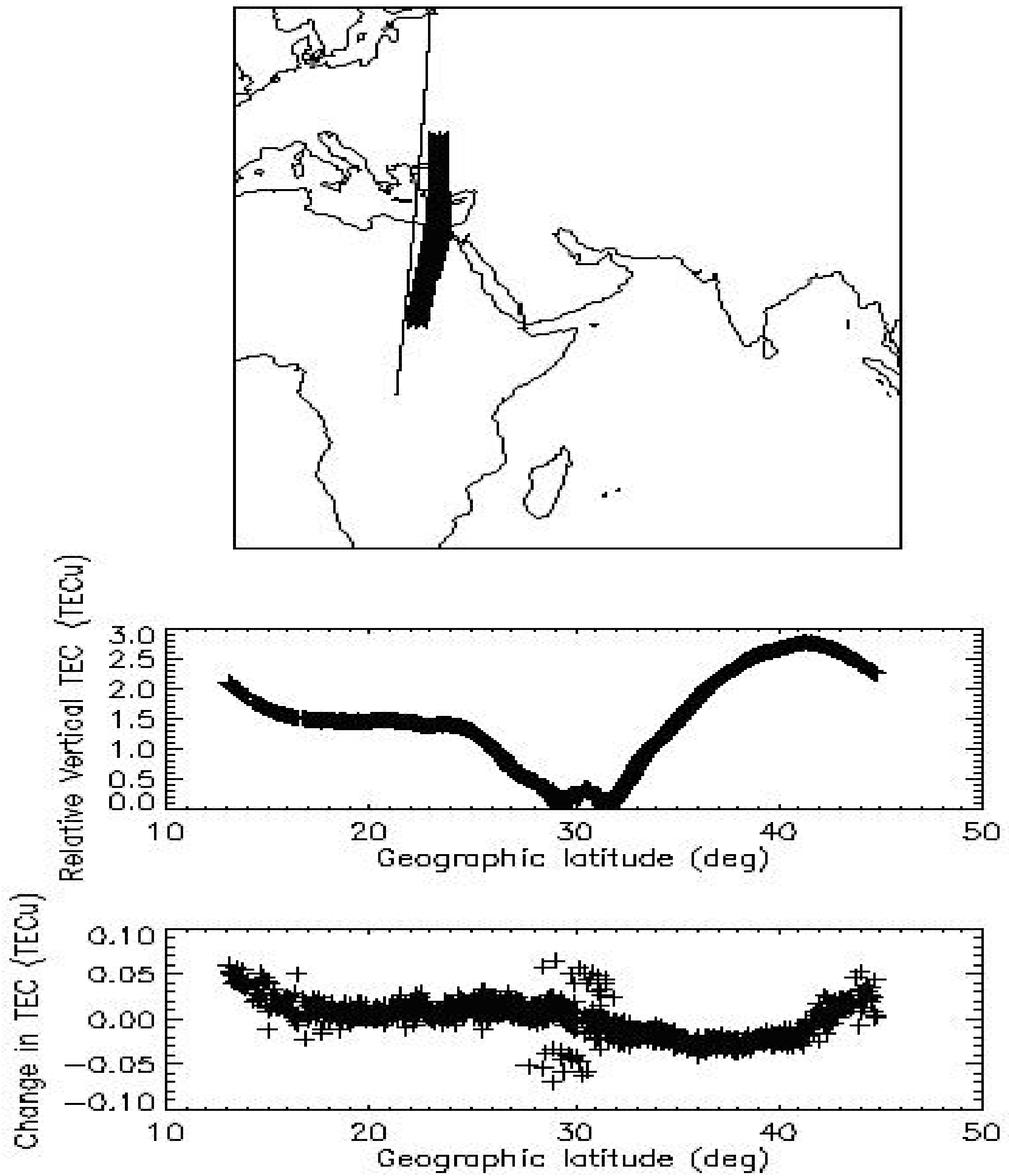


Night-time: 2236 LT

Figure 8 shows the satellite track over Egypt (Oct11, 2008 at 2036 UT, about 2236 LT at night time) is on the recovery phase (Kp=3, Dst=-42) and is an almost directly overhead pass by the satellite OSCAR32. The TEC minimum is located approximately at 30 degrees.

A mid-latitude trough also appeared at lower geographic latitudes, indicating that the trough is propagating equatorward as it is tracked in the three Fig.6,7and 8 but all the result show pre-reversal enhancement at mid latitude.

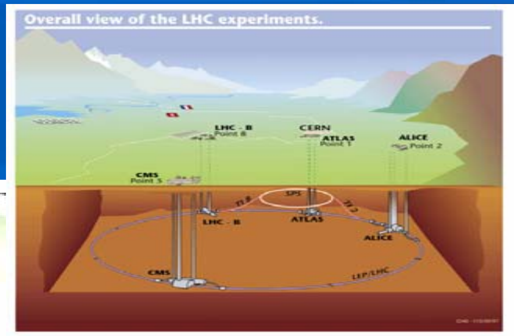
At latitudes closer to the magnetic equator, scintillations can also occur during nighttime. The scintillation is associated with spread-F occurrences. After local sunset, the bottom side of the F-region over the magnetic equator is subjected to gravitational Rayleigh-Taylor mechanisms. As a result, irregularities known as plasma bubbles are generated by rise to the topside ionosphere due to non-linear evolution of the instability and produce scintillations in discrete patches (Kumar and Gwal, 2000; Abdu et al., 1991).



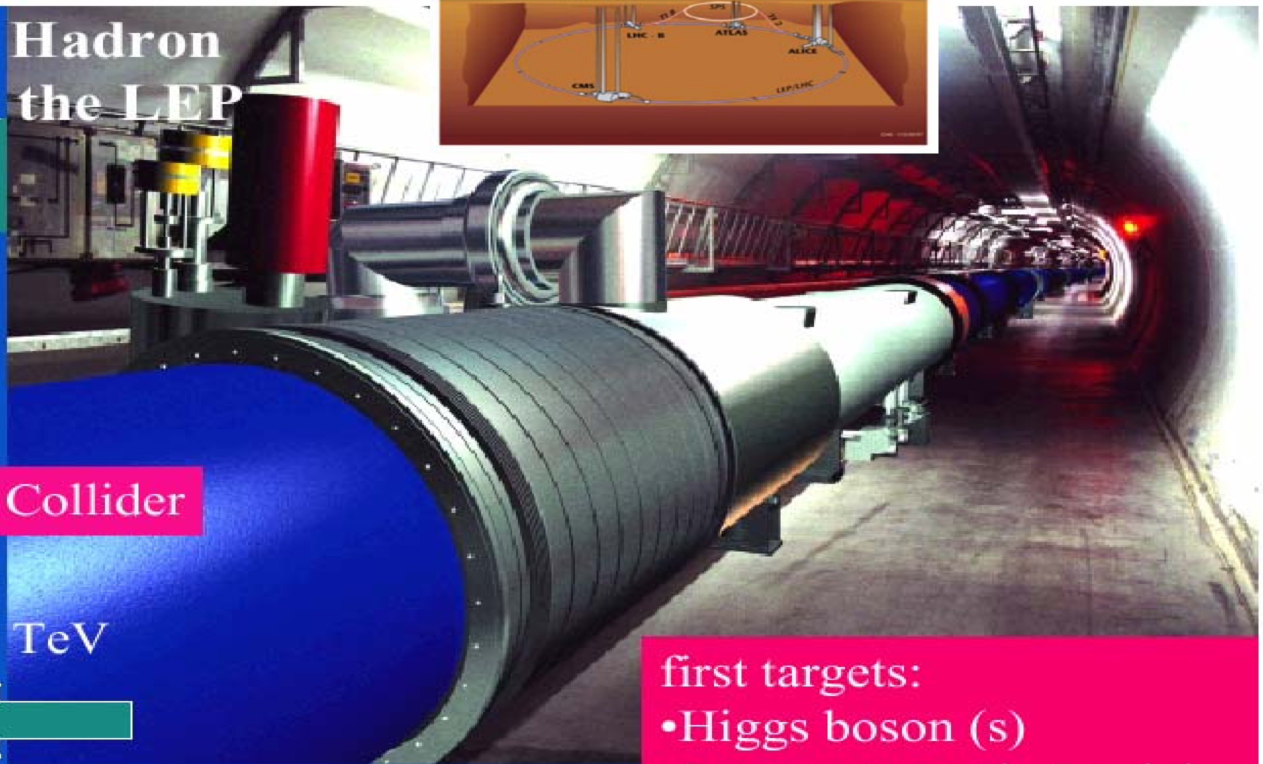
Cosmic Ray Group

Experimental Sub-group

LHC



A superconductive disk on the bottom, cooled by liquid nitrogen, causes the magnet above to levitate. The floating magnet induces a current, and therefore a magnetic field, in the superconductor, and the two magnetic fields repel to levitate the magnet.



The Large Hadron Collider in the LEP Tunnel

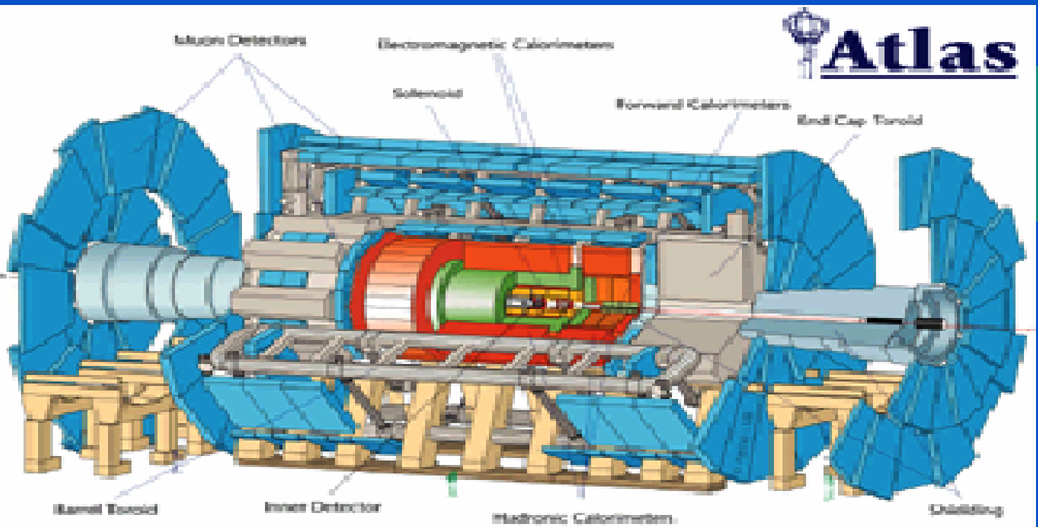
Proton- Proton Collider

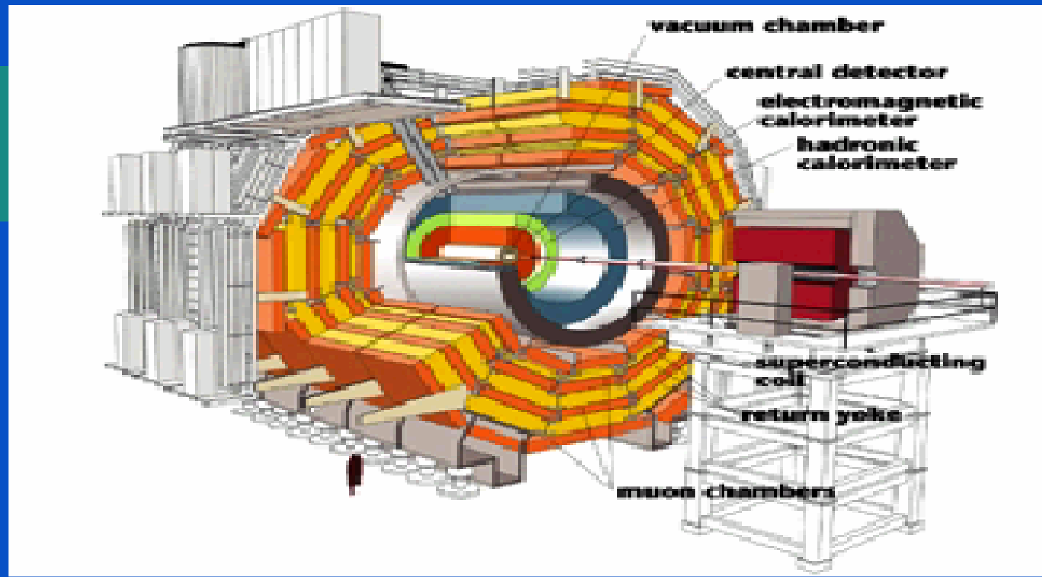
7 TeV + 7 TeV

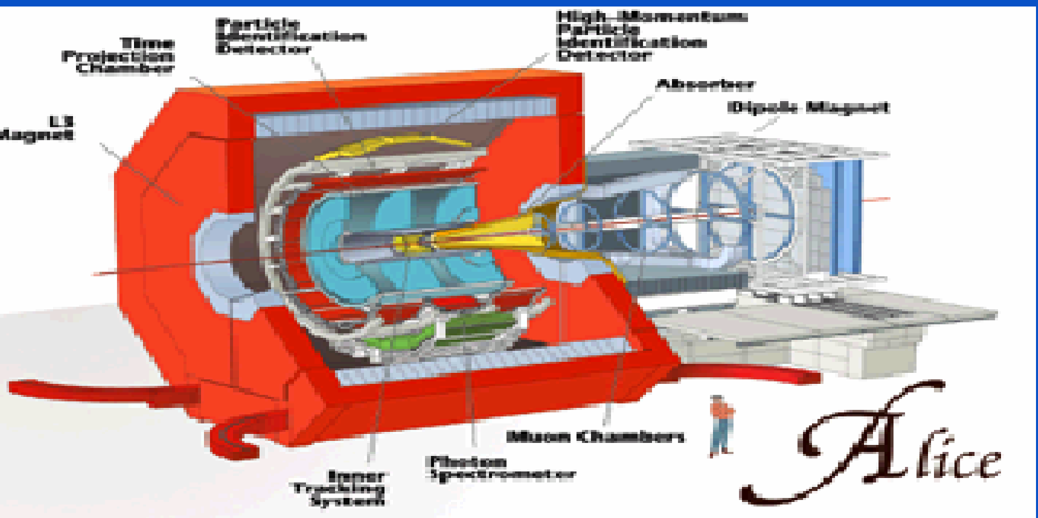
Luminosity = $10^{34} cm^{-2} sec^{-1}$

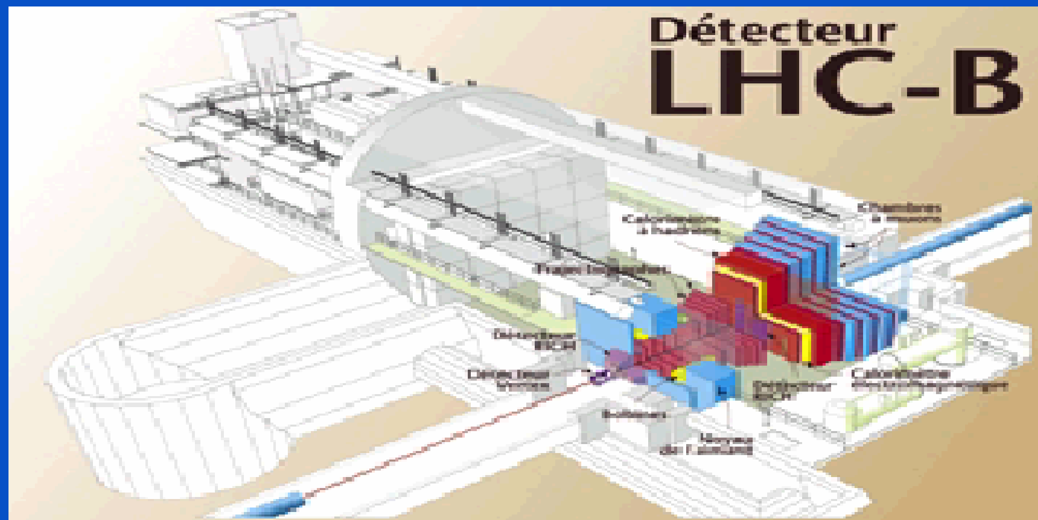
first targets:
- Higgs boson (s)
- Supersymmetric Particles
- Quark-Gluon Plasma
- CP violation in B

LHC Experiments









What is the CMS experiment ?

CMS Outreach

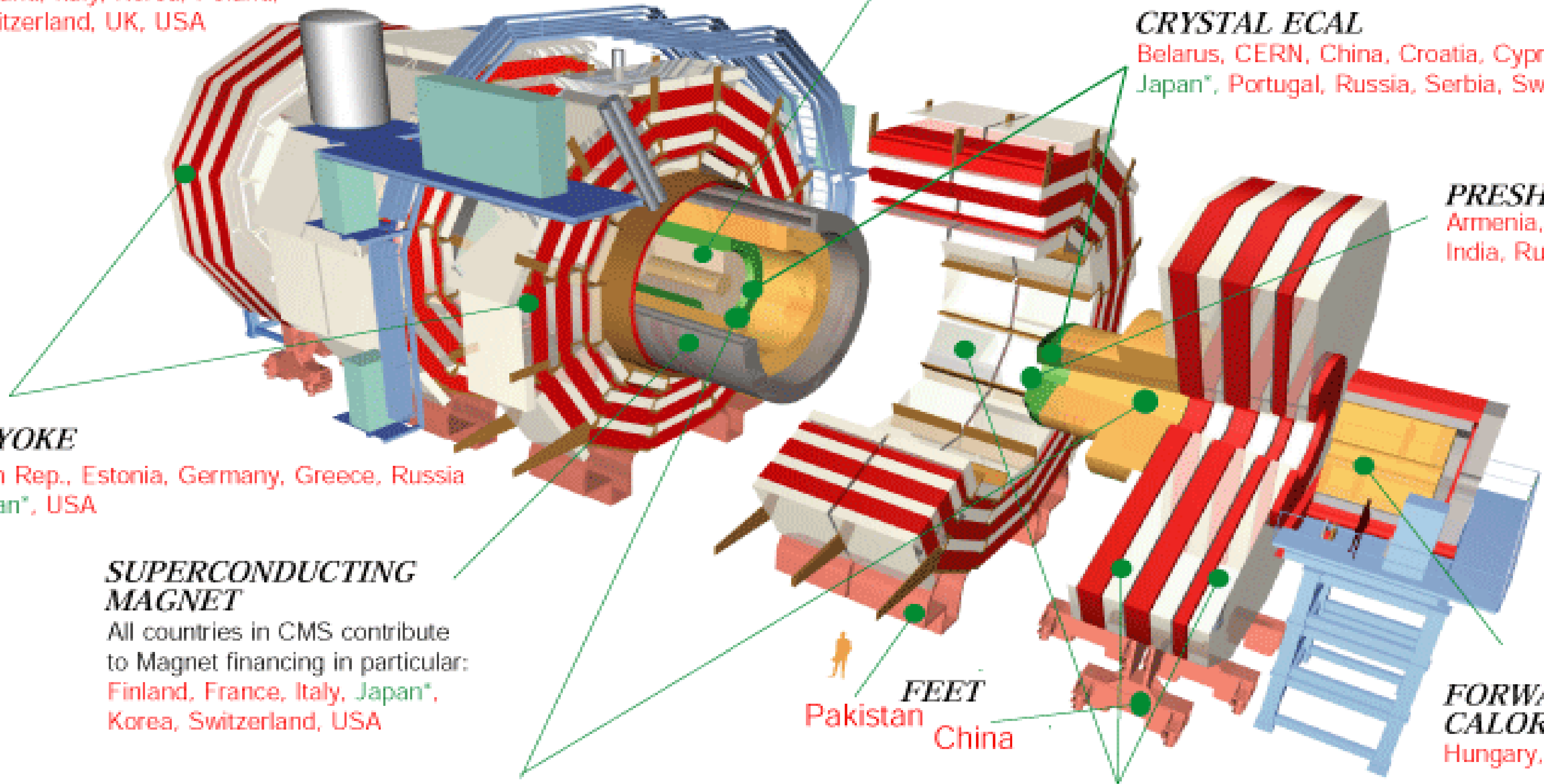
37 Countries, 155 Institutes, 2000 scientists (including about 400 students) October 2006

TRIGGER, DATA ACQUISITION & OFFLINE COMPUTING
ustria, Brazil, CERN, Finland, France, Greece, lungary, Ireland, Italy, Korea, Poland, ortugal, Switzerland, UK, USA

TRACKER
Austria, Belgium, CERN, Finland, France, Germany, Italy, Japan*, Mexico, New Zealand, Switzerland, UK, USA

CRYSTAL ECAL
Belarus, CERN, China, Croatia, Cyprus, France, Italy, Japan*, Portugal, Russia, Serbia, Switzerland, UK, USA

PRESHOWER
Armenia, CERN, Greece, India, Russia, Taiwan



RETURN YOKE
arrel: Czech Rep., Estonia, Germany, Greece, Russia
ndcap: Japan*, USA

SUPERCONDUCTING MAGNET
All countries in CMS contribute to Magnet financing in particular: Finland, France, Italy, Japan*, Korea, Switzerland, USA

FEET
Pakistan China

FORWARD CALORIMETER
Hungary, Iran, Russia,Turkey, US

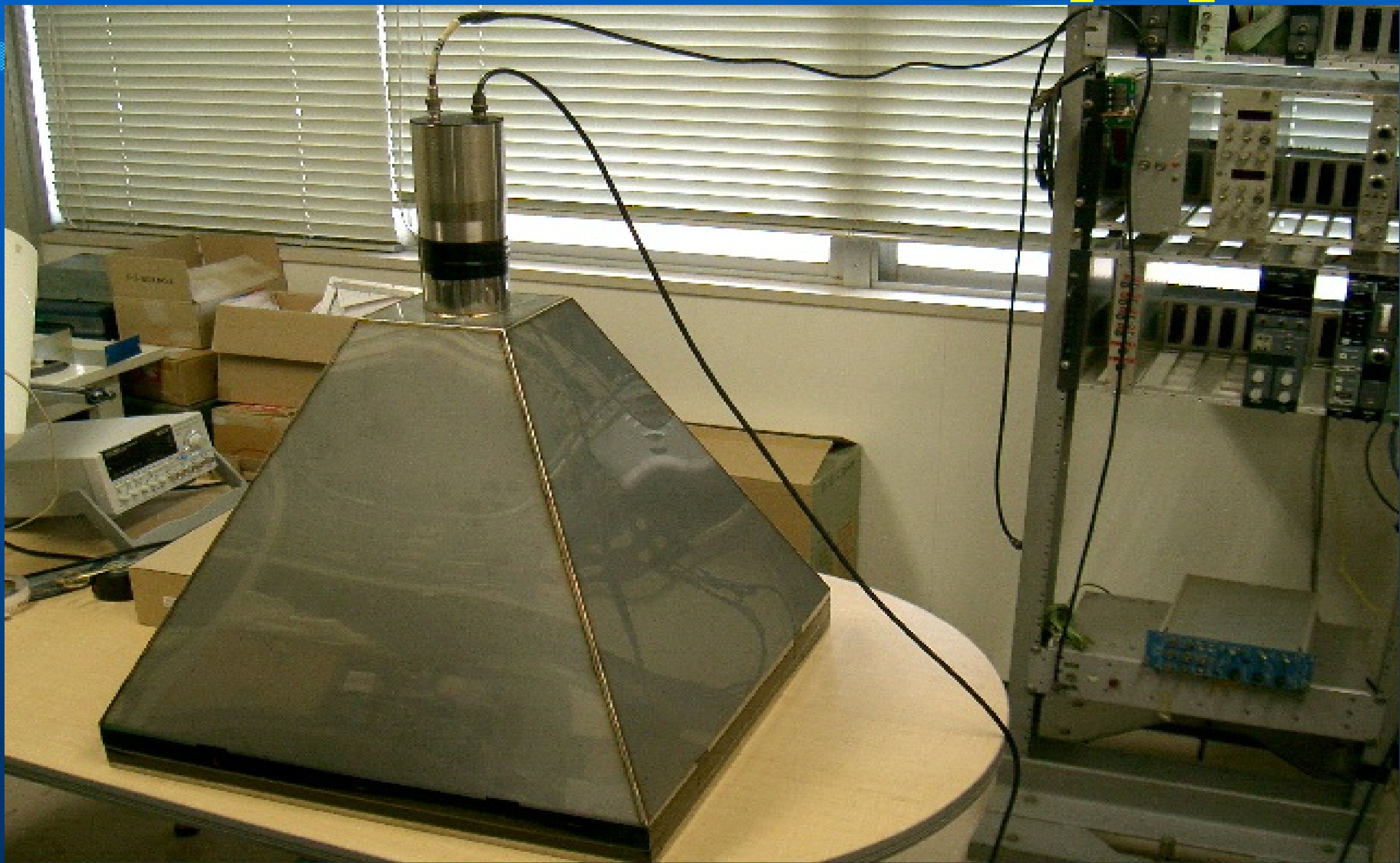
HCAL
Barrel: Bulgaria, India, Spain*, USA
Endcap: Belarus, Bulgaria, Georgia, Russia, Ukraine, Uzbekistan
HO: India

MUON CHAMBERS
Barrel: Austria, Bulgaria, CERN, China, Germany, Hungary, Italy, Spain,
Endcap: Belarus, Bulgaria, China, Colombia, Korea, Pakistan, Russia, USA

tal weight	:	12500 T
erall diameter	:	15.0 m
erall length	:	21.5 m
gnetic field	:	4 Tesla

* Only through industrial contra

Available Equipments



- 4 scintillators
- 4 scintillation detector boxes
- 4 Photo Multiplier Tubes PMT
- 4 electronic boxes to be attached to PMT
- Multichannel analyzer
- Digital oscilloscope
- High voltage power supply

Cosmic Ray Group

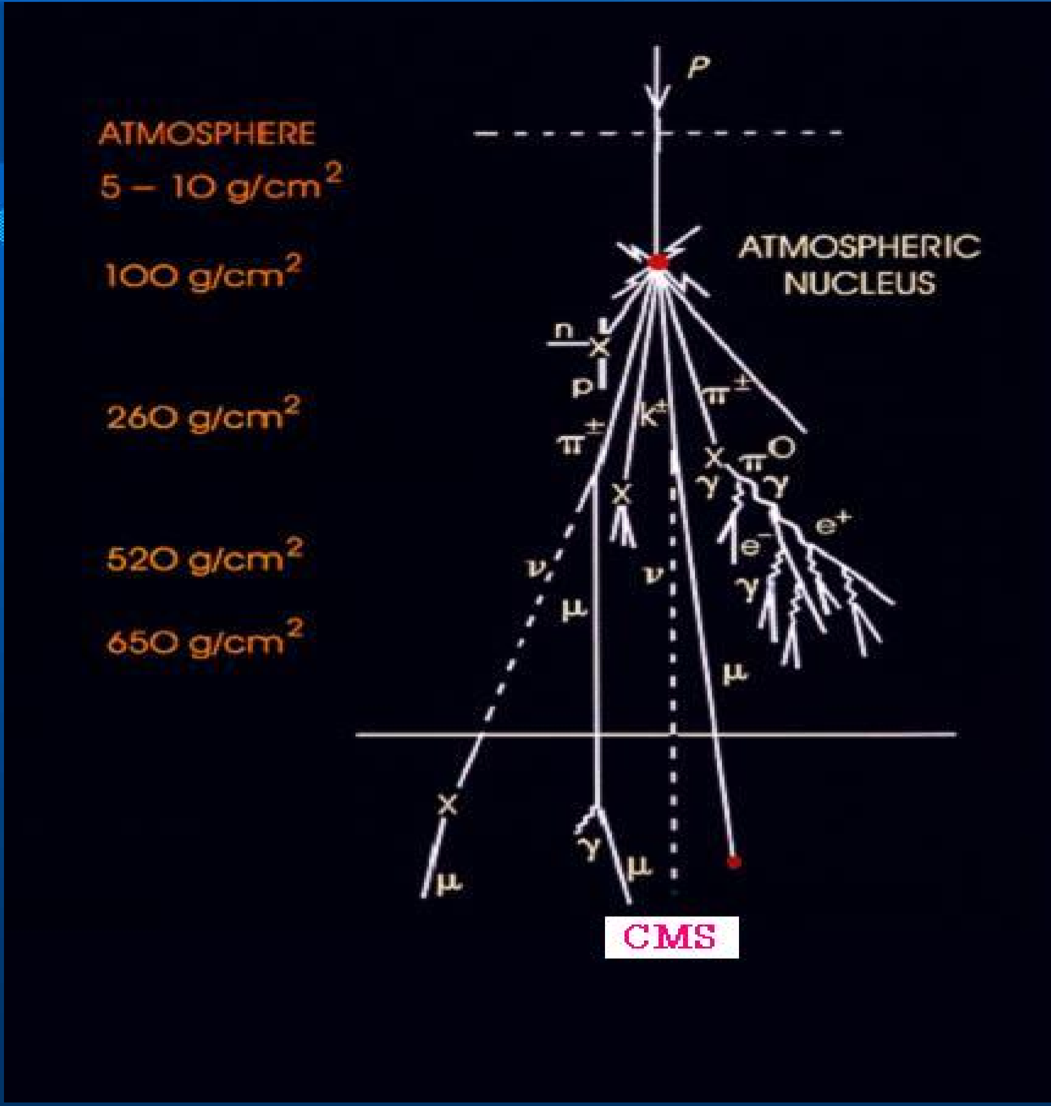
Simulation Sub-group

Muons Triggering to CMS

The interaction of cosmic ray particles in the upper atmosphere (primarily 9~15 Km above Earth's surface) usually produces pions (Duldig, 2000), a bound state of an up and anti-down quark.

With lifetime of (2.6 x 10^{-8} s), the pion travels only hundreds of meters at velocities between (0.966 C and 0.977 C) before decaying into a muon and mu-neutrino .

The muons produced in that reaction descend to Earth's surface with ample supply of muons at sea level which facilitates the study of these particles (Caso et al., 2000).



Data Analysis Group

EUMED Grid

[empowering eScience across the Mediterranean]

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PUBLIC AREA

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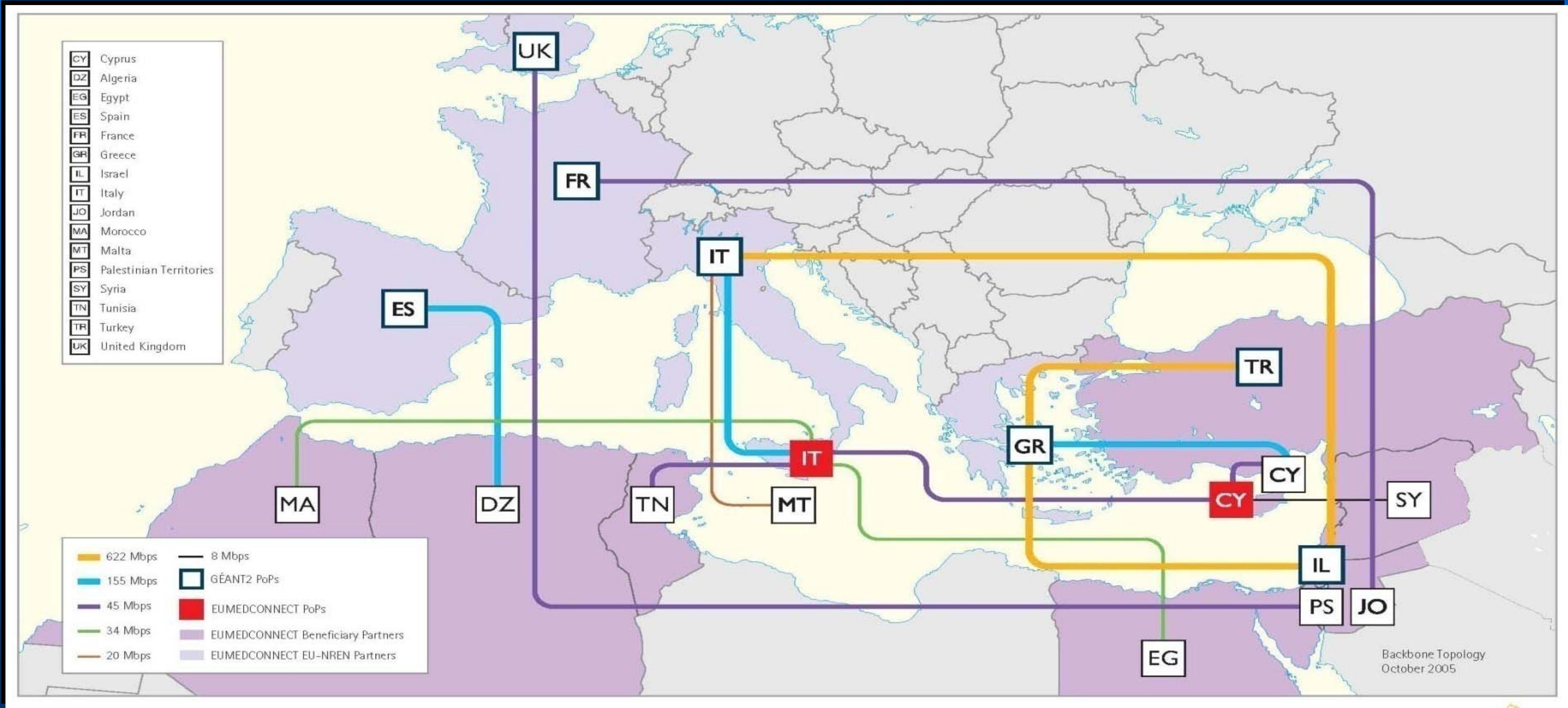
- **country:** Egypt
- **author:** Prof. Mohamed Saleh
- **institute:** Helwan University
- **domain:** Bio-Informatics
- **contacts:**
- **description:** That application was a grid application running BLAST an algorithm for comparing primary biological sequence information (amino-acid sequences of different proteins or the nucleotides of DNA sequence
- **requirements:** The application requires BLAST software. It has been installed on EUMEDGRID e-Science Infrastructure and allowed CEs are

http://www.eumedgrid.org/application/hero.html

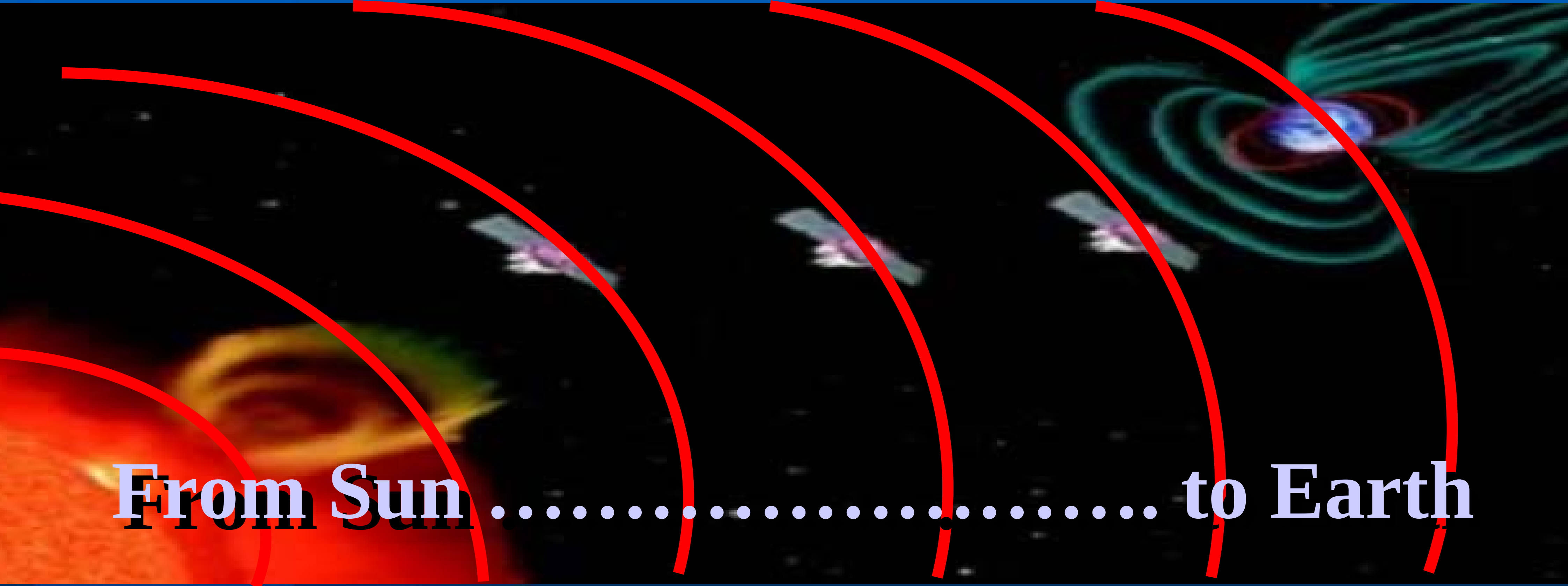
EUMED Connect



Joint Projects with France, 2010 (in progress)

- Micro satellite Programme for Solar and Space Weather Monitoring.
- GRID Project at the Space Weather Monitoring Center (SWMC).
- Monitoring of the water vapor in the troposphere along the River Nile.

Our Main Target : Space Weather (Monitoring & Prediction)




Thank you
SWMC
Space Weather Monitoring Center