2015 UN/Japan Workshop on Space Weather
"*Science and Data Products from ISWI Instruments*"
2-6 March 2015, Fukuoka, Japan

ROLE OF THE ISWI-MAGDAS BAC LIEU MAGNETIC OBSERVATORY IN THE SPACE WEATHER STUDIES IN VIETNAM

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Le Truong Thanh[1]

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PLAN OF PRESENTATION

INTRODUCTION

I. Bac Lieu Equatorial Magnetic Observatory

II. Adherence of Bac Lieu Observatory to the MAGDAS

III. Indispensable role of ISWI-MAGDAS Bac Lieu' data in the space weather studies in Vietnam:

- Diurnal magnetic variation in the equatorial latitude: Sq;

- Magnetic equatorial electrojet (EEJ);

- Total Solar Eclipse;

- Magnetic storms;

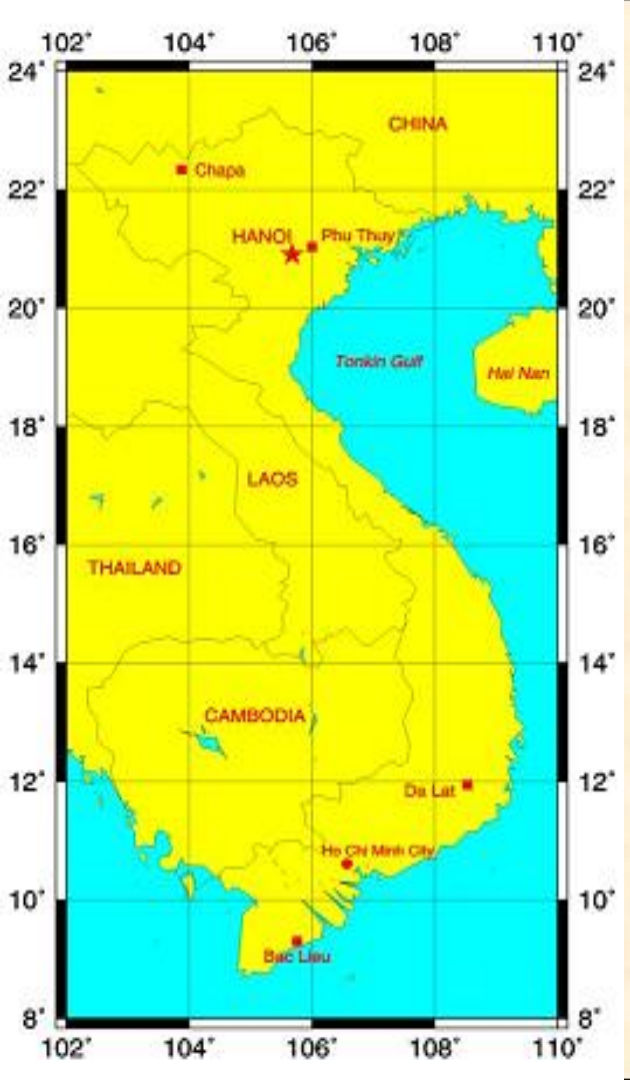
- Geomagnetic field modeling: reduction to an epoch;

- Impact of magnetic storms on electric power transmission system;

- Impact of magnetic storms on petrol & gas pipe lines;

IV. On the contribution of Bac Lieu observatory into capacity building,

CONCLUSION



INTRODUCTION

- Vietnam maintains a network of 4 MO;

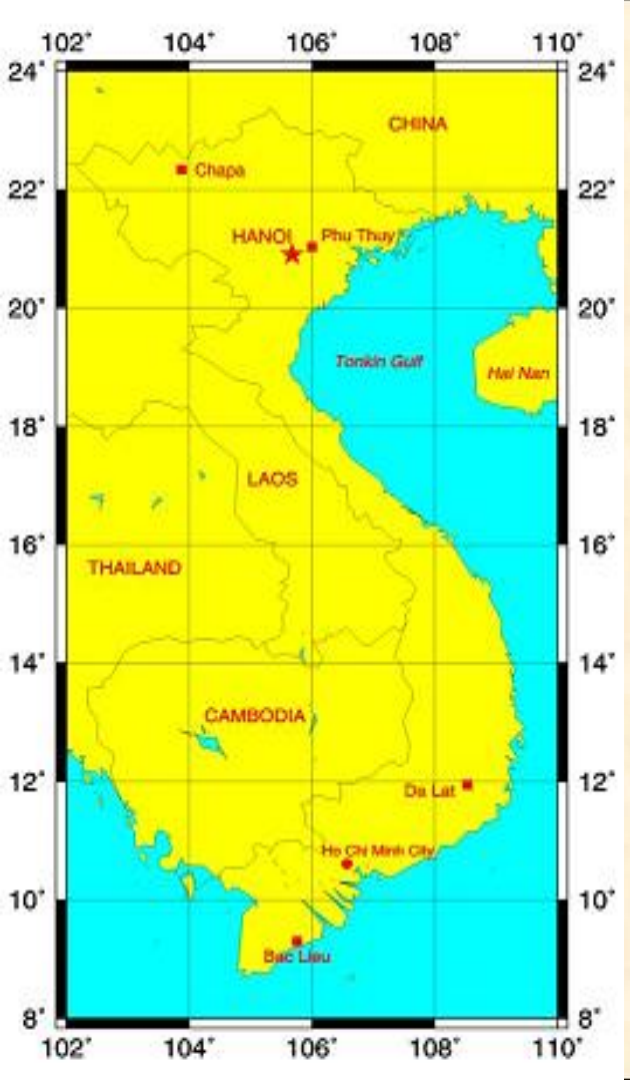
- From 1957: cooperation with Poland Academy of Science: Chapa: 1st magnetic observatory of Vietnam in the 1st IGY 1957;

- From 1994: cooperation with IPGP, France; Phu Thuy: member of INTERMAGNET program;

- From 1998: cooperation with the SERC, Kyushu University, Japan; Bac Lieu: preparation of equipments for adhering to the MAGDAS; from 2009: official member of MAGDAS-II;

- From 2013, cooperation with IPGP, France; Da Lat: 2nd member of INTERMAGNET program;

- MO satisfied the requirements of magnetic research in space weather in Vietnam in the recent 50 years.



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- MO satisfied the requirements of magnetic research in space weather in Vietnam in the recent 50 years.

I. Bac Lieu Equatorial Magnetic Observatory

($\varphi = 9^o17'N$; $\Lambda = 105^o44'E$; $h = 5$ m). **FOUNDATION:** ***1978***

BAC LIEU Equatorial Magnetic Observatory

Main building

BAC LIEU Equatorial Magnetic Observatory

Bac Lieu-Main building

Entrance of the observatory

In the precinct of the observatory

BAC LIEU Equatorial Magnetic Observatory

Magnetic field recording:

- From 1978 – 1997 :
MBC Bobrov (Russian)

2. *Processes of a*dherence of Equatorial Magnetic Observatory to the MAGDAS

Bac Lieu-Main building

1998:

-Cooperation Institute of Geophysics - Department of the Earth and Planetary Sciences, Kyushu University 33;

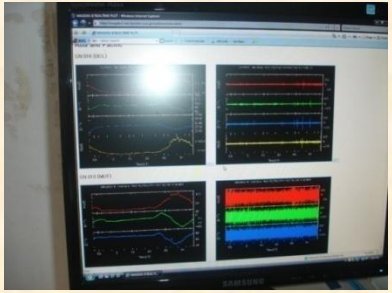
- PEER (Penetration of polar Electric field into Equatorial Region) project, 1998-2003

- From 1998 - 2008: Fluxgate Magnetometer FRG-601 (Japan)


ĐÀI XÍCH ĐẠO TỪ BẠC LIÊU
NHÀ ĐẶT MÁY GHI BIẾN THIÊN TỪ
Hoàn thành.6.1998
THIẾT KẾ XÂY DỰNG
.PTS. HÀ DUYÊN CHÂU
.PGS. TRƯƠNG QUANG HẢO
.KS.NGUYỄN VĂN THÍ, GIÁM ĐỐC ĐÀI

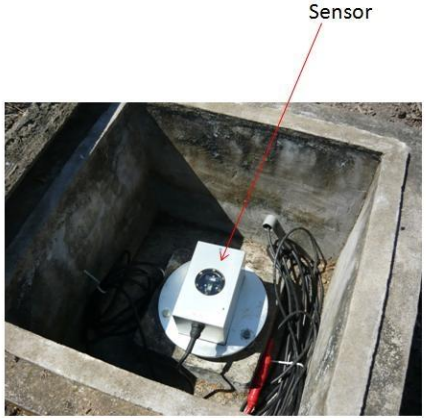

VIETNAMESE JAPANESE
COOPERATION ON
AGNETISM

- From 2009 – 2012:
MAGDAS II (MAGnetic Data Acquisition System II)



Sensor Hut

Outside



Inside

- From 2009 – 2012: MAGDAS II (MAGnetic Data Acquisition System II)

- From 3/2012 up to now: ICSWSE's MAGDAS-9 (FRG-604RC No.19)

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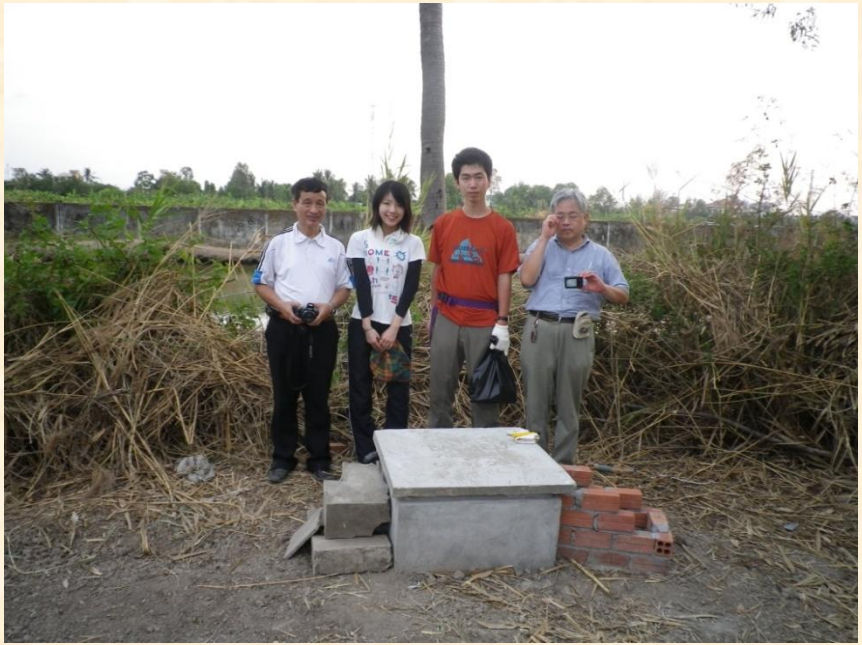

- *From 3/2012 up to now: ICSWSE's MAGDAS-9 (FRG-604RC No.19)*

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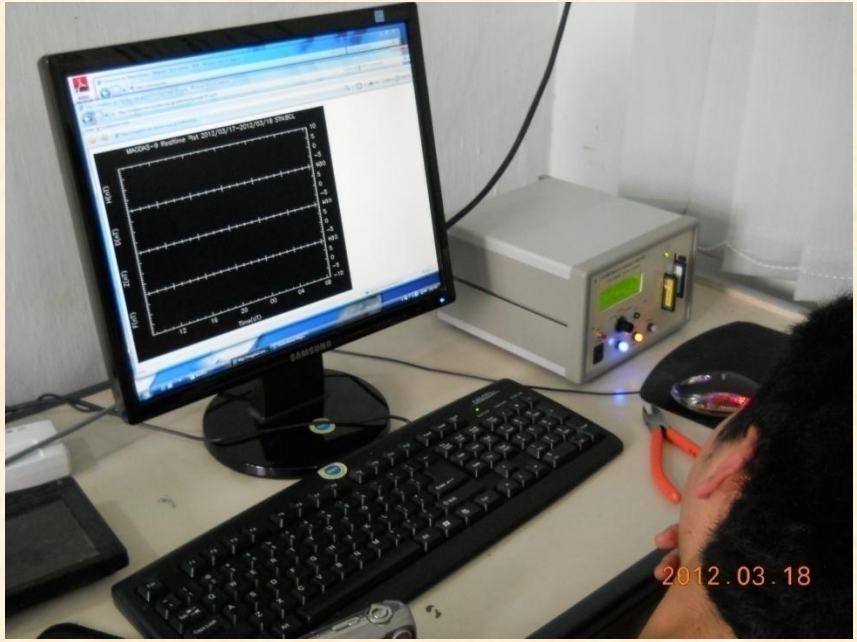
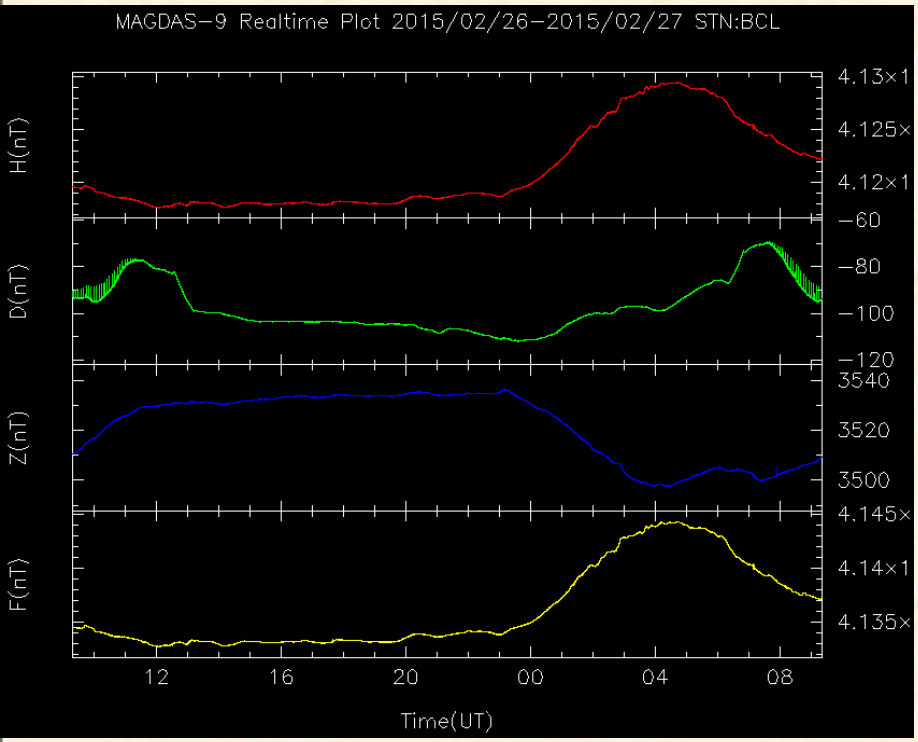
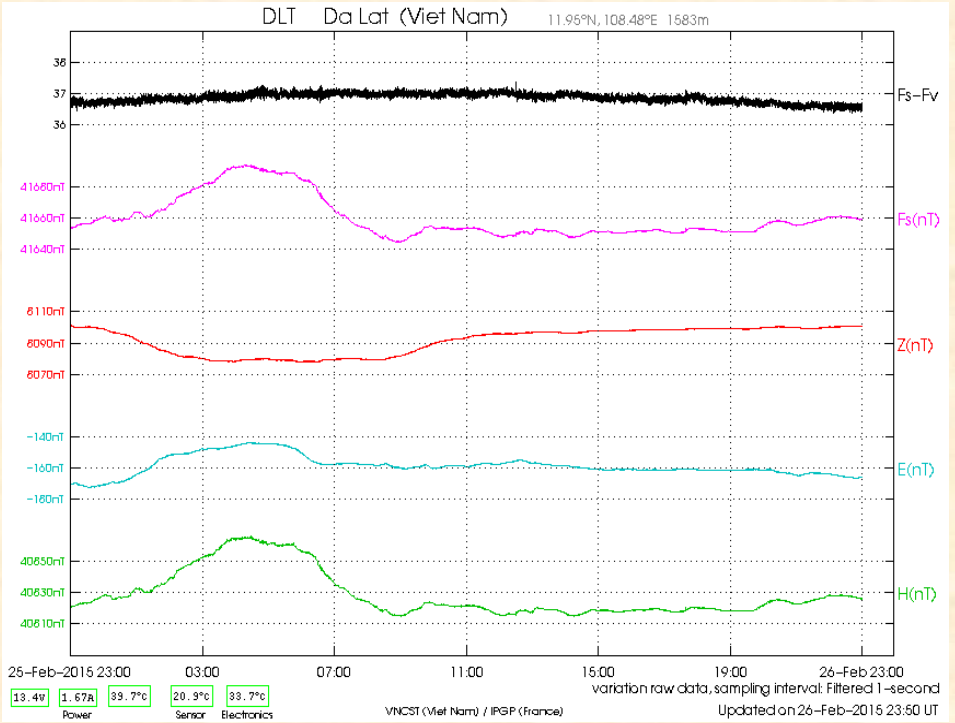
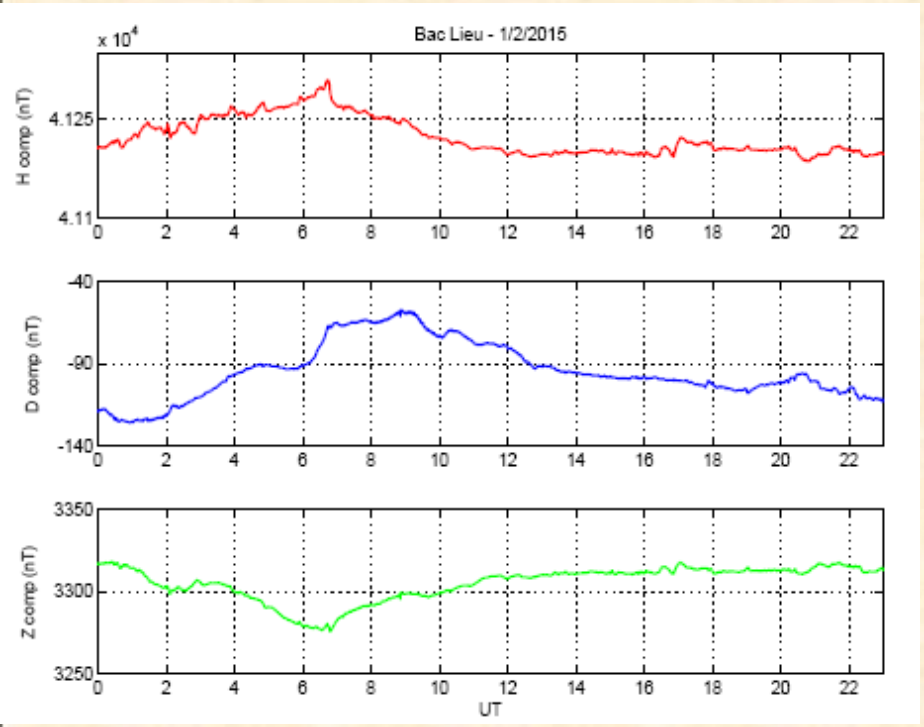


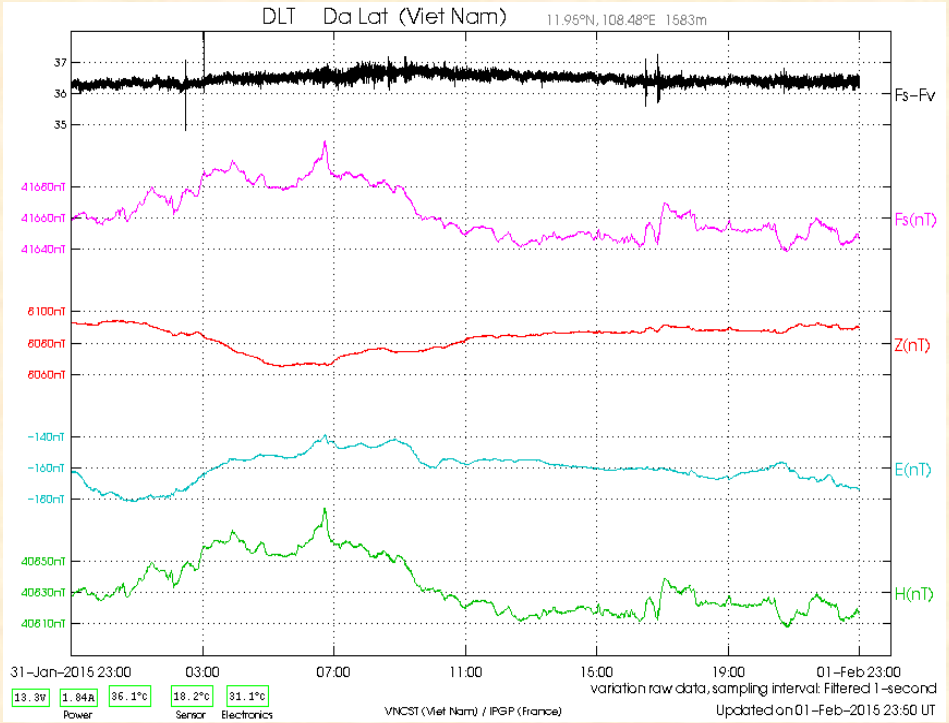
MAGDAS BCL 26-27/2/2015





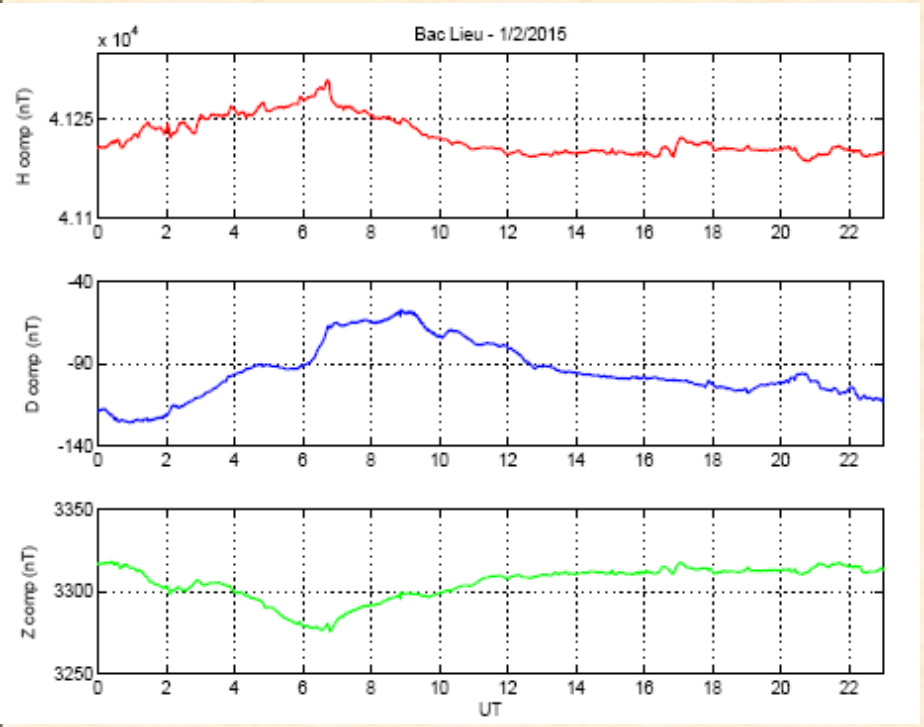
BAC LIEU Equatorial Magnetic Observatory

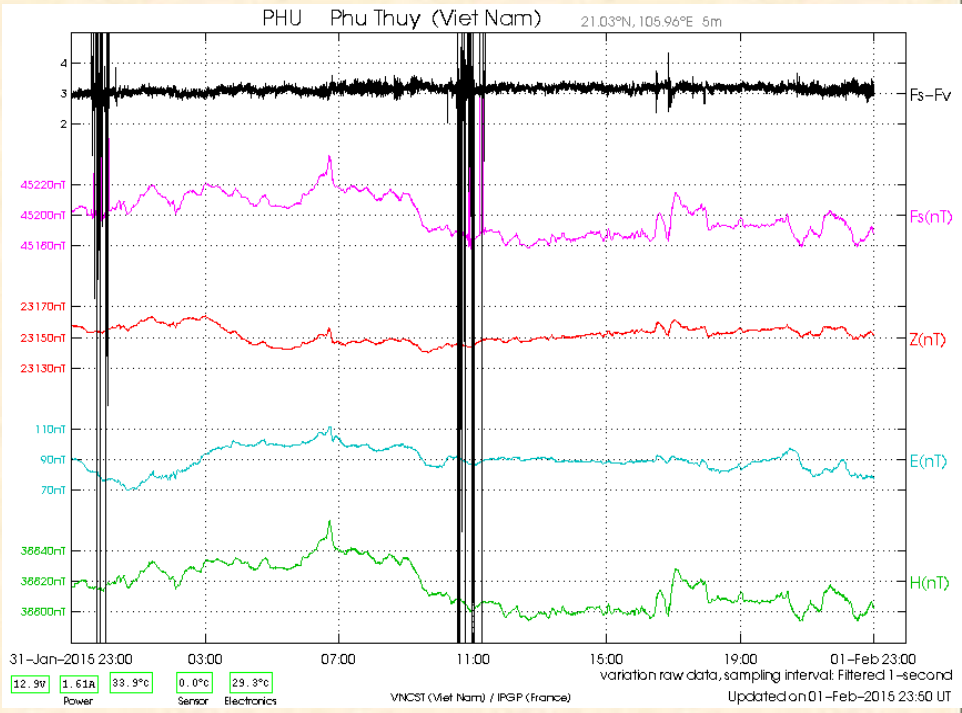




Example of the magnetogram converted from Bac Lieu's data and Da Lat for comparison

BAC LIEU Equatorial Magnetic Observatory





Example of the magnetogram converted from Bac Lieu's data and Phu Thuy for comparison

II. INDISPENSABLE ROLE OF ISWI-MAGDAS BAC LIEU' DATA IN THE SPACE WEATHER STUDIES IN VIETNAM

1. Diurnal magnetic variation Sq

(1987-1997)

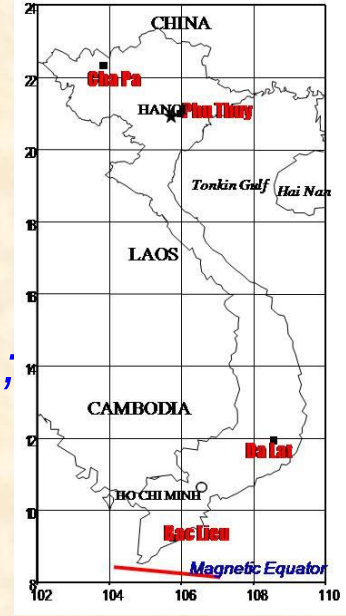
- Sq variation covers a big game in Vietnam: Its amplitude increases along meridian from 50nT at Cha Pa to 150nT at Bac Lieu (near magnetic Equator);

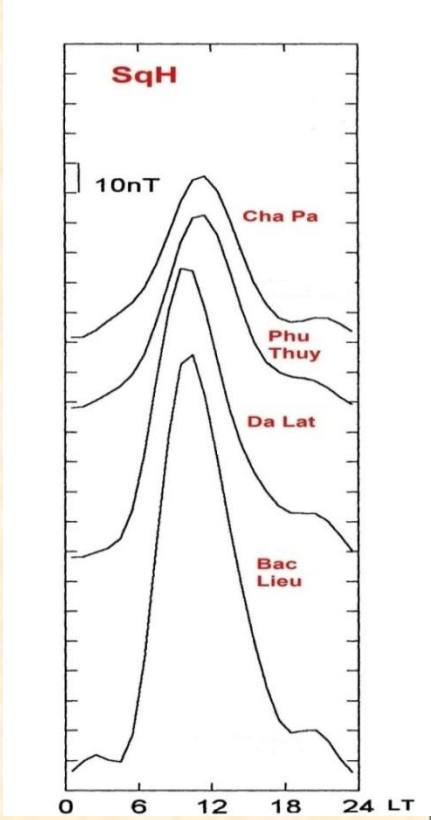
- Amplitude of Sq(H), Sq(Z) is maximal in the equinox (different in the medium and high latitude zones, where its maximal in summers);

- Amplitude of Sq(D) is maximal in the summer;

- Sq(Z) is in reverse direction with Sq(H);

- Amplitude of Sq(Z) is < that of Sq(H).





2. Magnetic Equator (ME):

- ME passes the most Southern part of VN, making a complicated magnetic variation picture in VN South;

- In VN, ME has tendency to drift to the South with velocity of ~4km/year;

Equatorial Electrojet (EEJ):

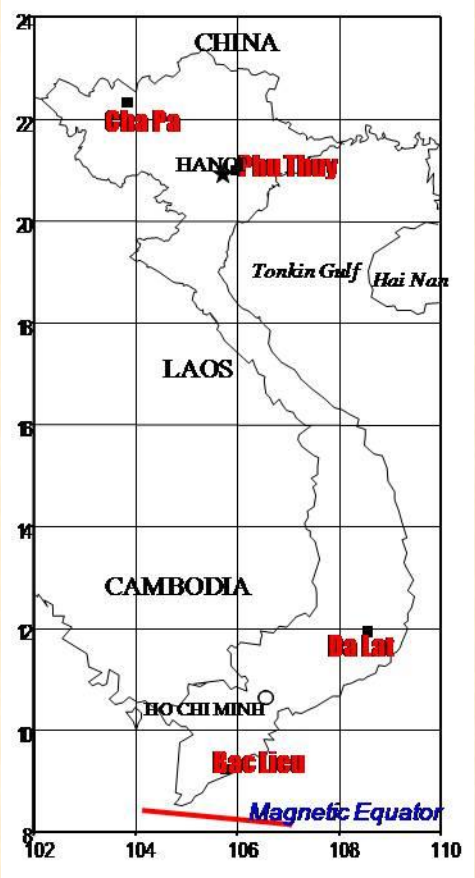
- In VN, position of EEJ's central line in a day and night drifts ~20km from its half local day position;

- EEJ influence on a band with the largeness of ~400km from ME..

Counter EEJ (CEEJ):

- CEEJ appear especially in the calm solar activity period, in the evening local time;

- Amplitudes of CEEJ are less than 10nT.



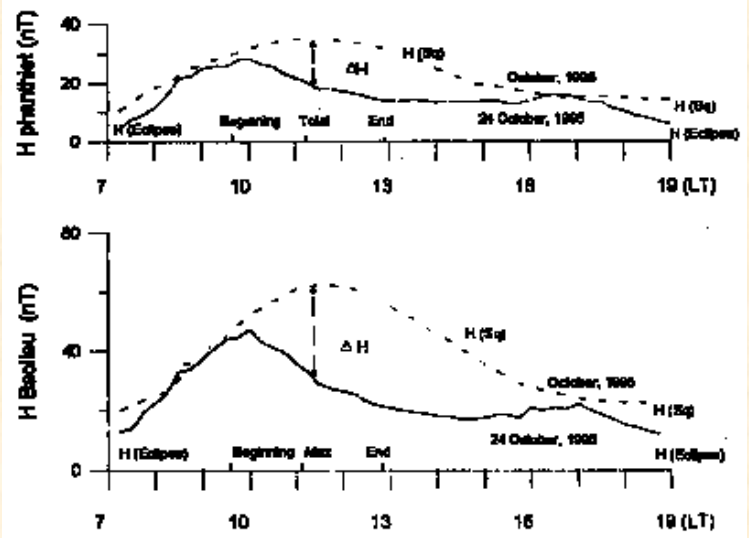
3. SOLAR ECLIPSE

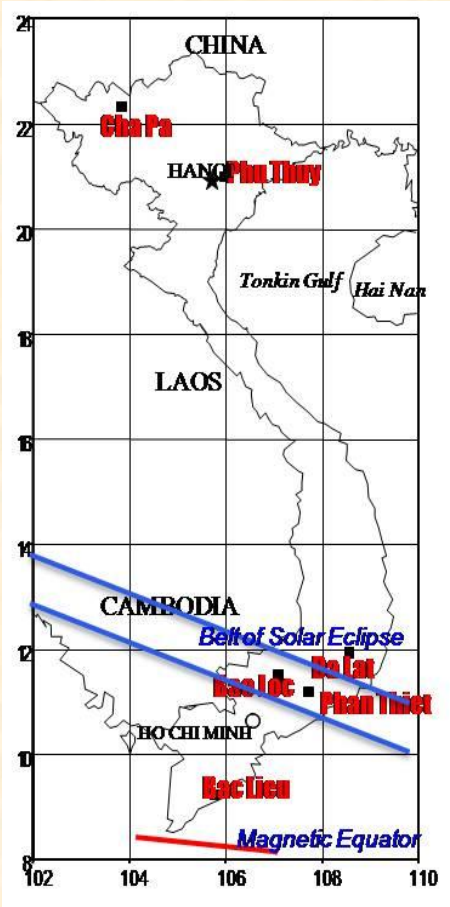
- *Total Solar Eclipse (TSE) October 24, 1995 passed VN sector;*

- *TSE effect on H component was carried out at 6 stations (CPA, PHU, DLT, BCL, BLC, PTT);*

- *Eclipse effect on H component was observed only in the region of 400 km from ME: H component started decrease immediately with the beginning of the SE at 09.33 LT, at the moment of maximum Sq(H) for October 1995, H with reference to night time base value had decreased to 76-82% of the normal Sq value.*

- *For the region in the distance of more than 1400km from ME the similar eclipse effect was not observed.*





4. MAGNETIC STORMS (MS) (1)

From magnetic data of about 5 solar cycles (from 1957):

- For Sc MS, sign of commencement of H and Z components is in anti phase at Cha Pa and in the same phase at Hanoi;

- In VN, Sc MS are of 2 types according to their morphology:

+ sudden increase of H component (as in other mondial observatories): 81% of observed cases;

+ decrease of H before its sudden increase; This type is observed only in the morning time (7h ÷ 14h LT): 19% of observed cases;

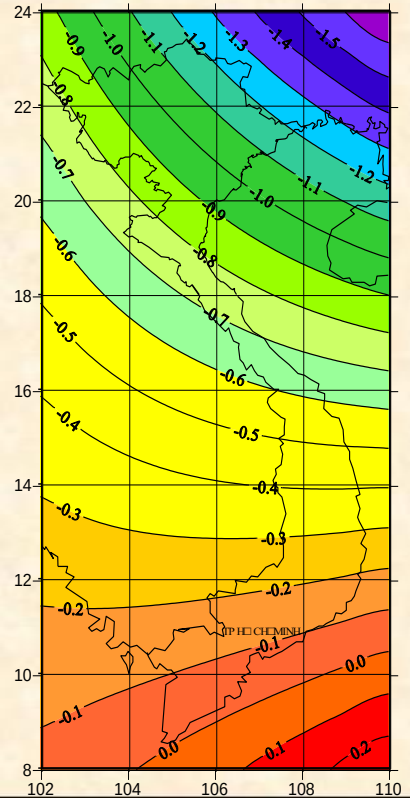
- Amplitude of sudden night-time impulse decreases from North to South and that of sudden day-time, on the contrary, increases from North to South.

5. GEOMAGNETIC FIELD MODELING: REDUCTION TO AN EPOCH

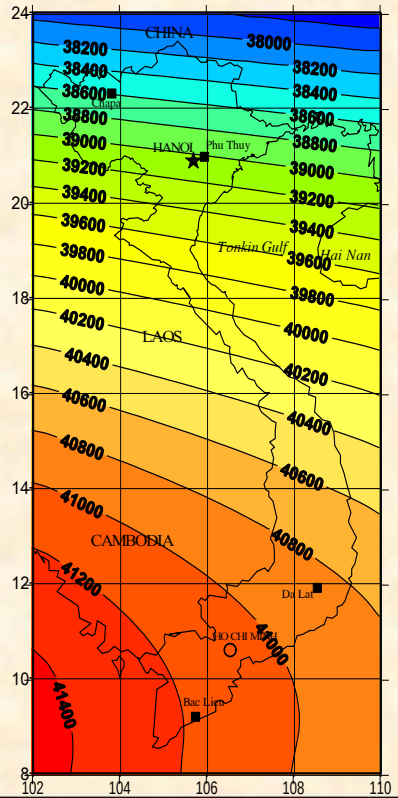
(Geomagnetic charts of Vietnam for epoch 2003.5)

(Example for D, H, Z elements)

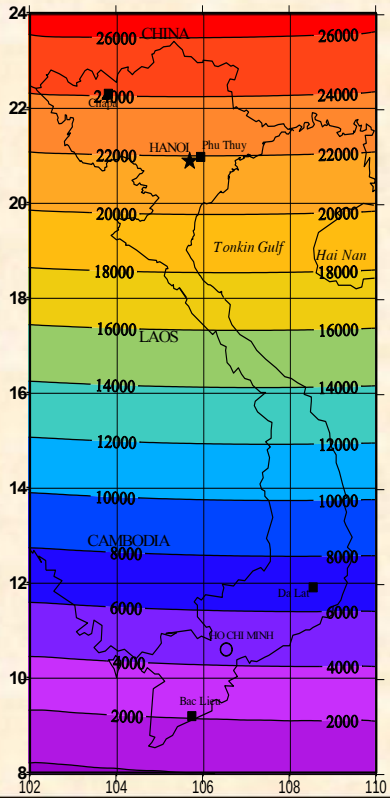
D(′)



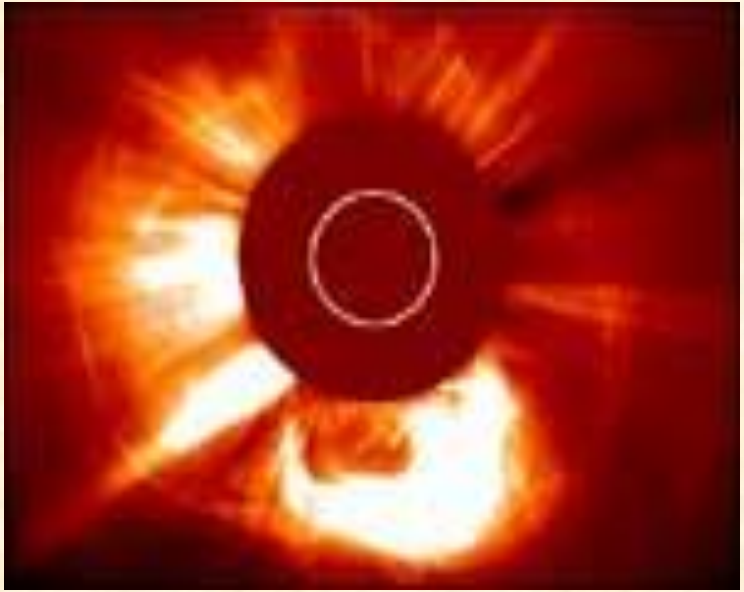
H(nT)

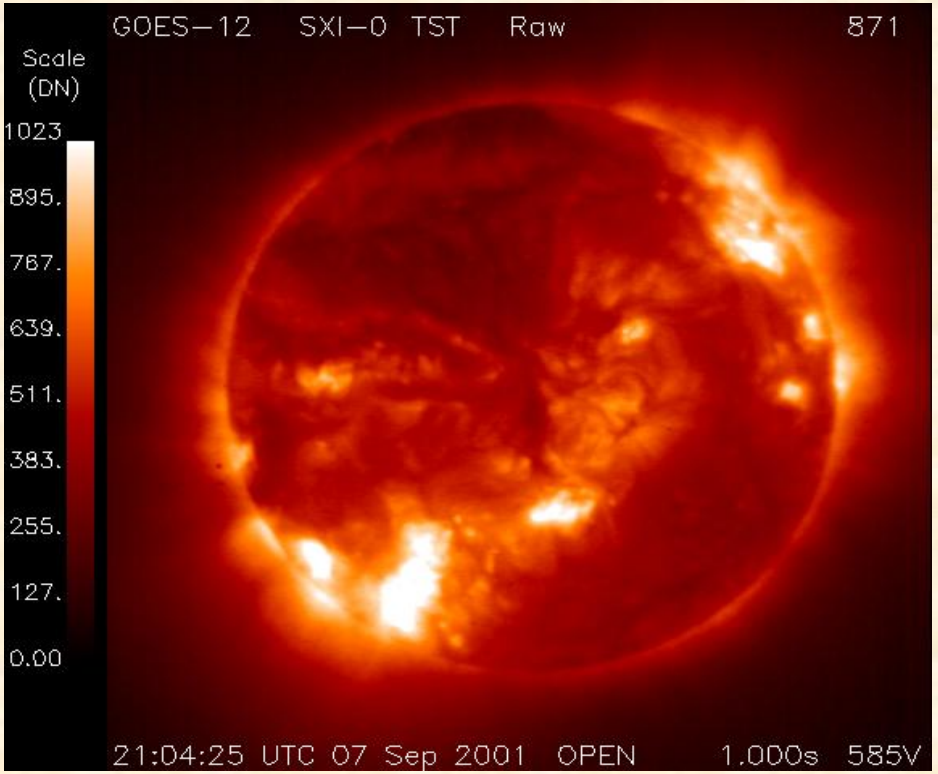


Z(nT)

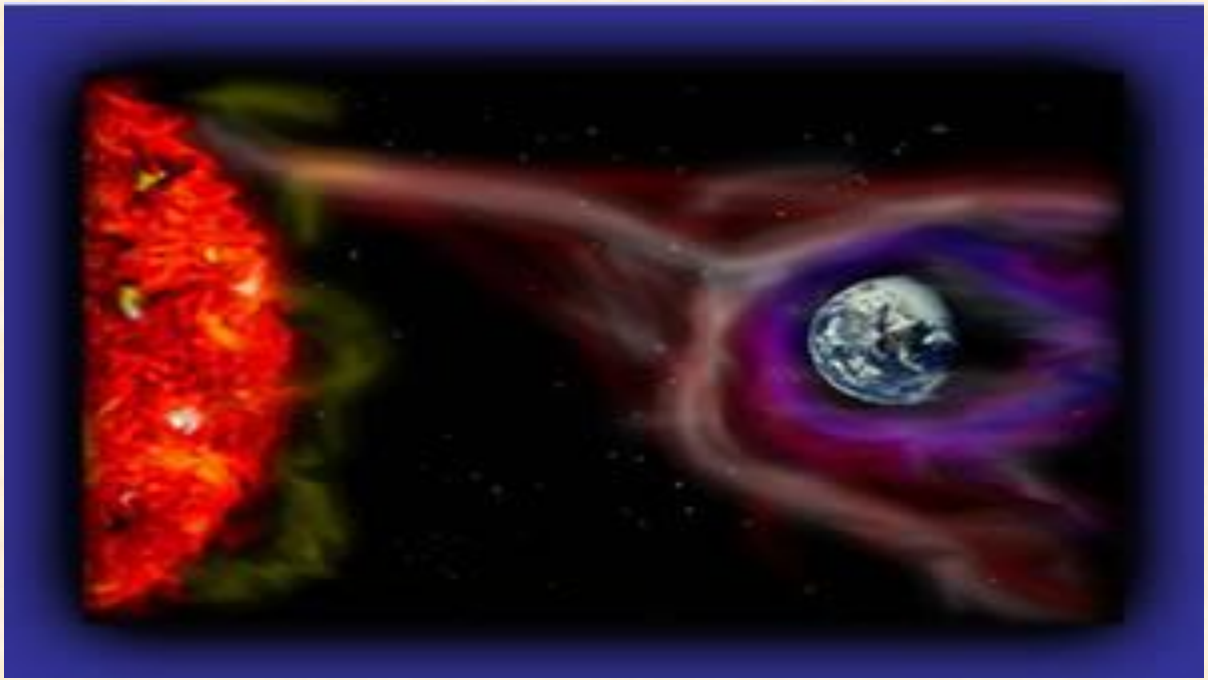


6. IMPACT OF MAGNETIC STORMS ON THE 500-220KV POWER SYSTEM IN VIETNAM

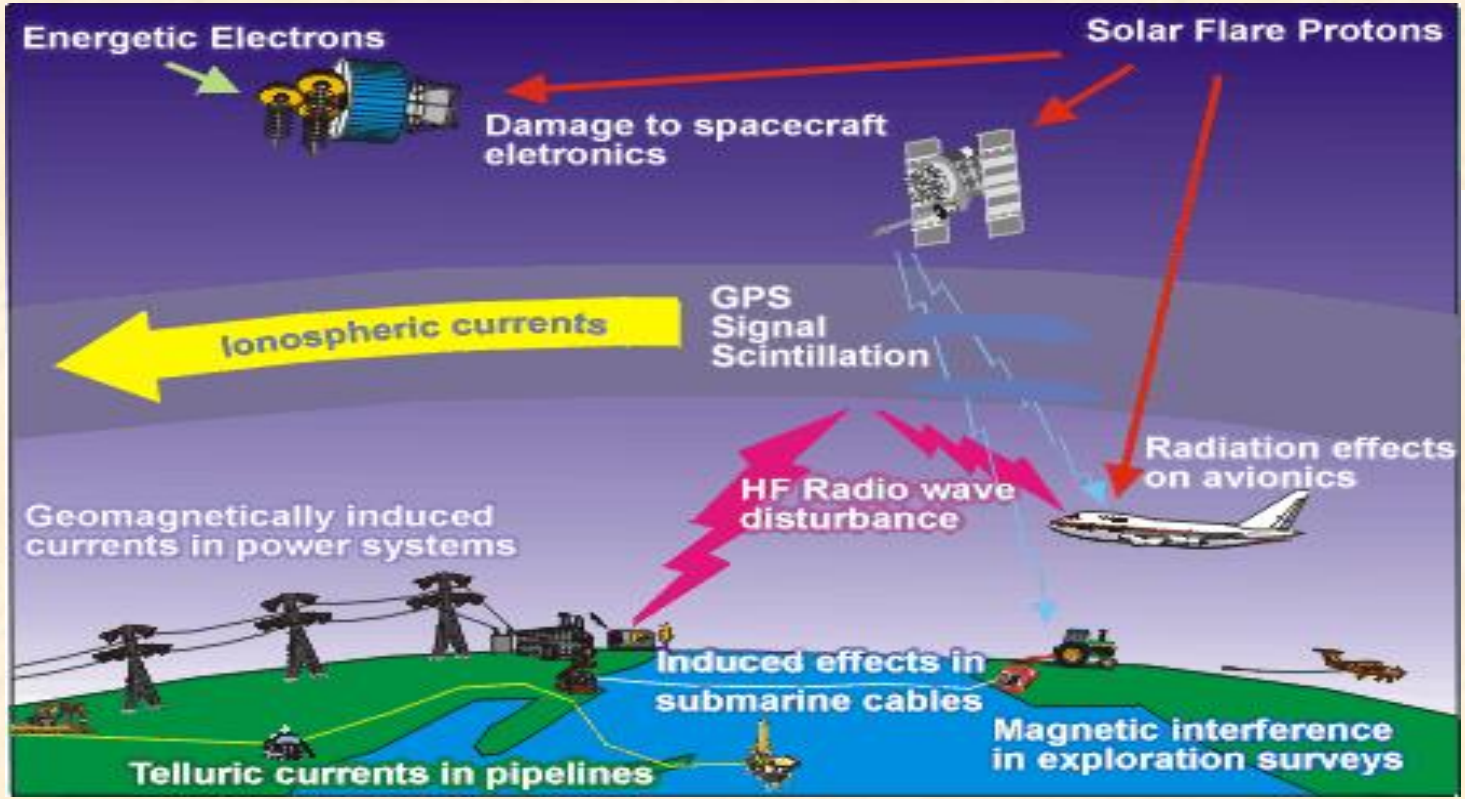


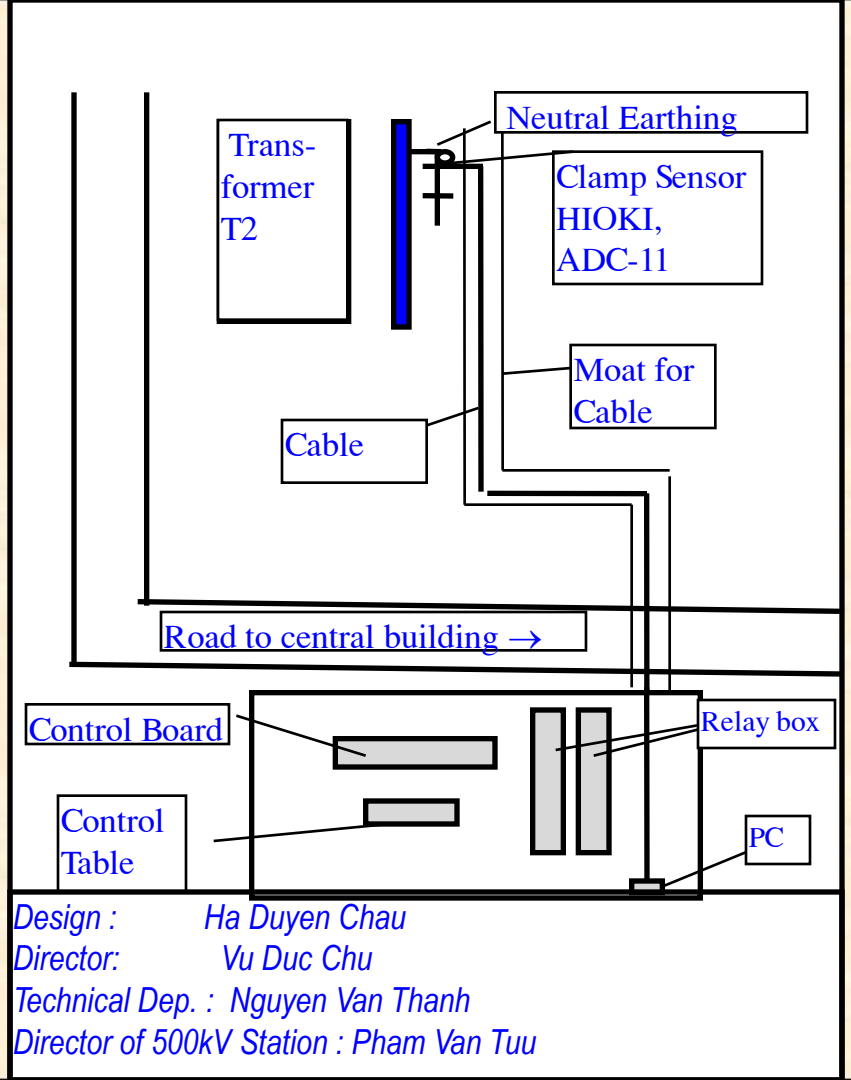


SUN - EARTH



SPACE WEATHER EFFECTS ON TECHNOLOGY





Design : Ha Duyen Chau
Director: Vu Duc Chu
Technical Dep. : Nguyen Van Thanh
Director of 500kV Station : Pham Van Tuu

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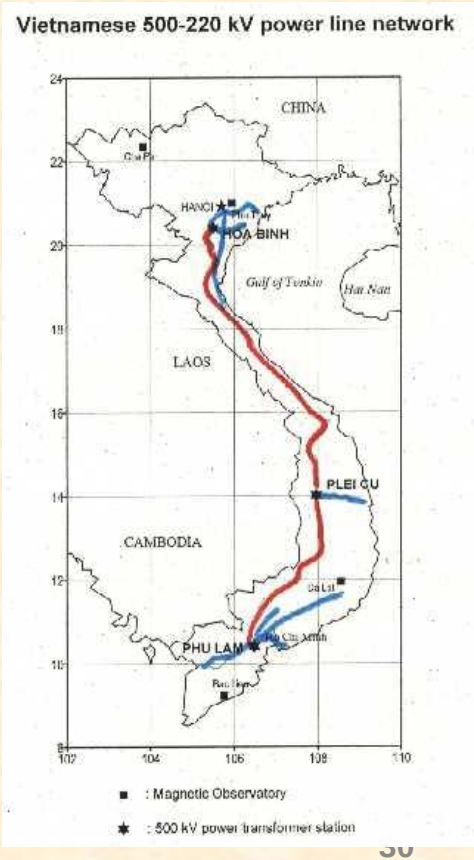
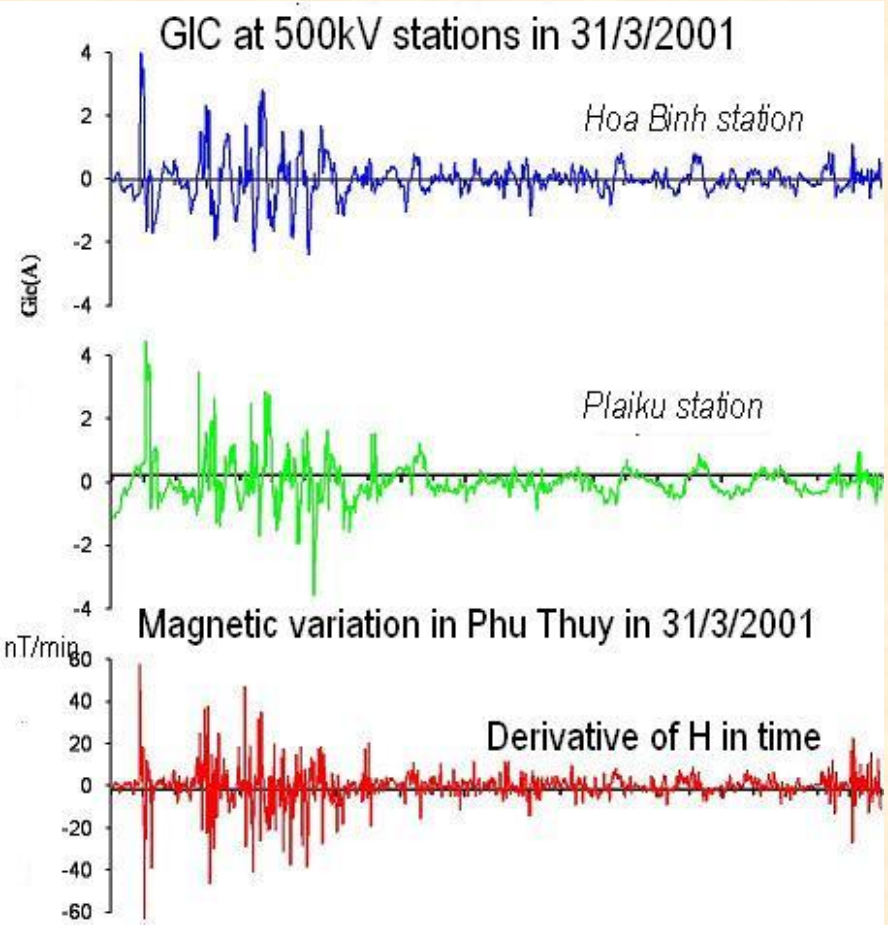
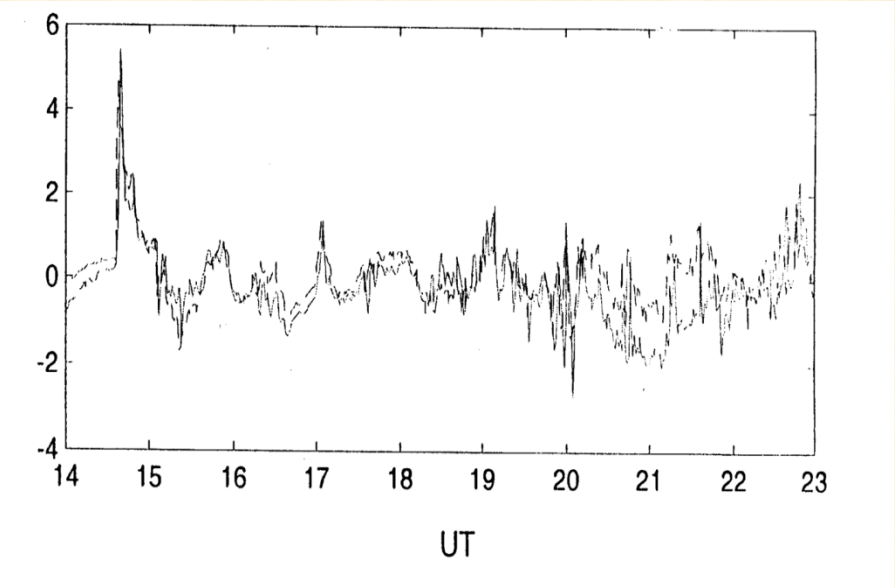
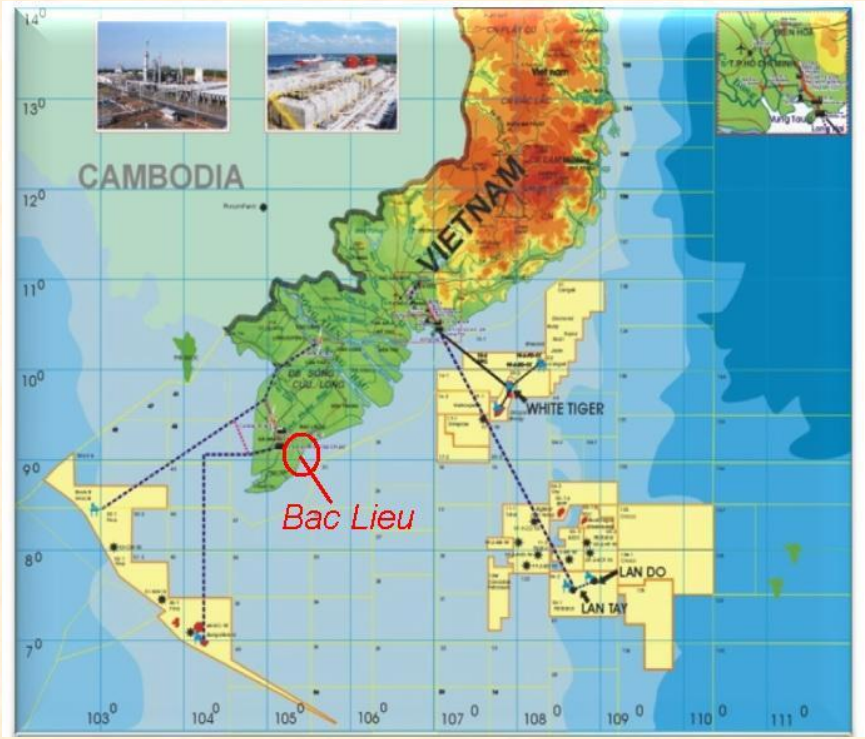


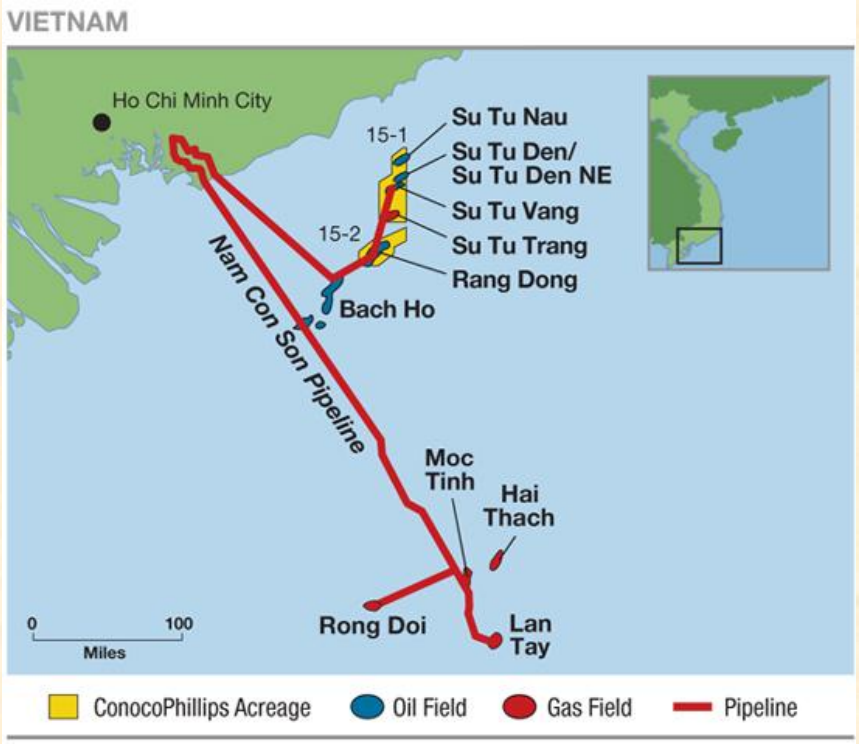




Example of GIC calculated and recorded for July 15, 2000 in Hoa Binh 500kV transformer station

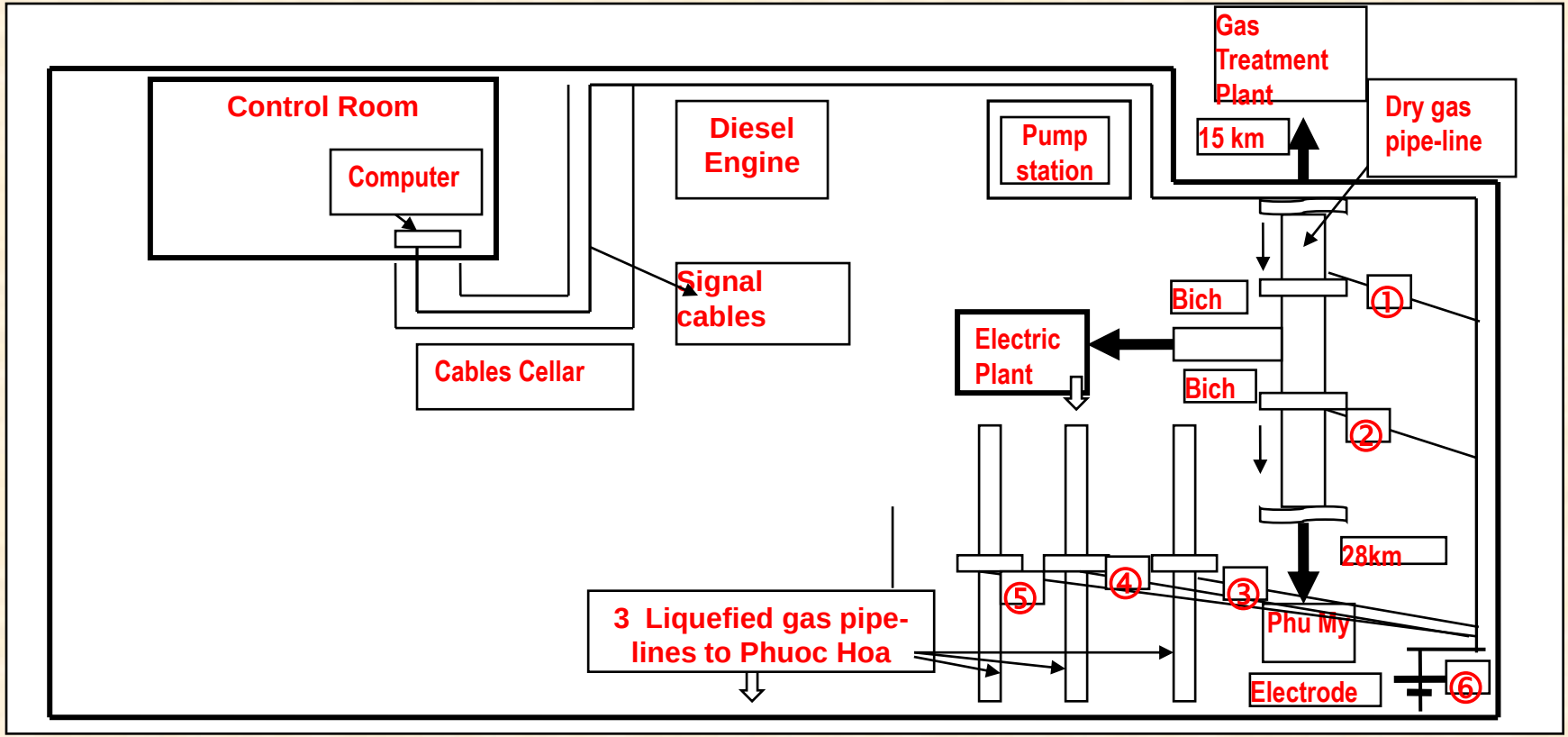
7. IMPACT OF MAGNETIC STORMS ON THE PETROL & GAS PIPE-LINES SYSTEM IN VIETNAM



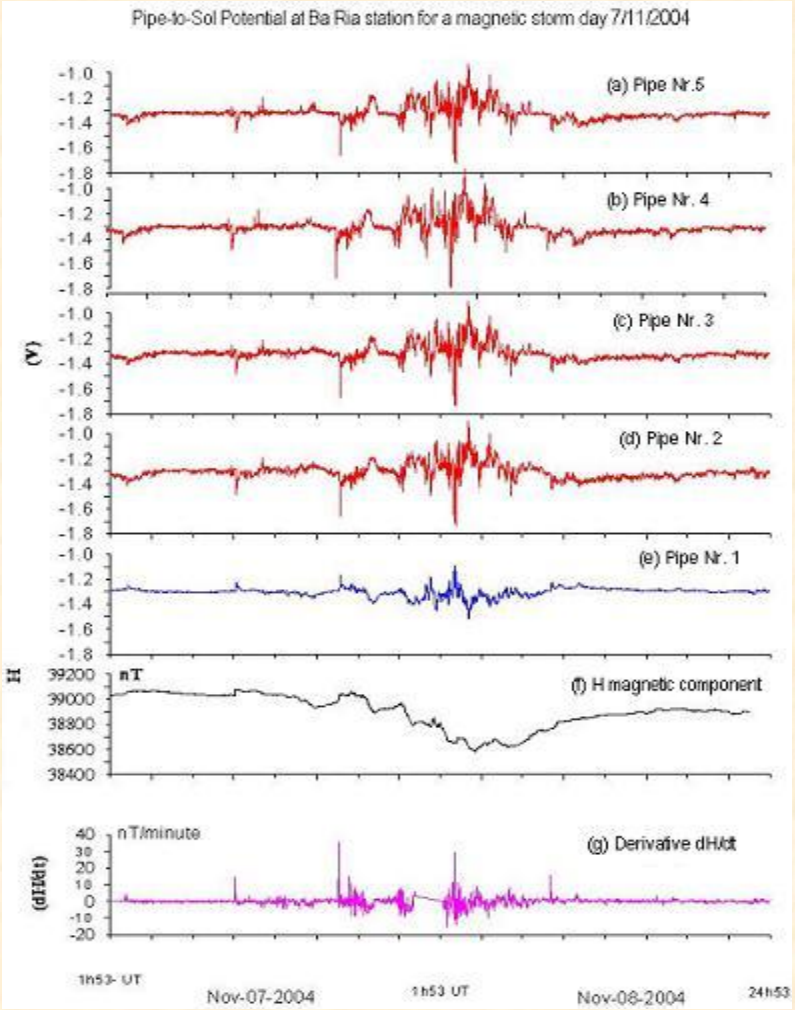


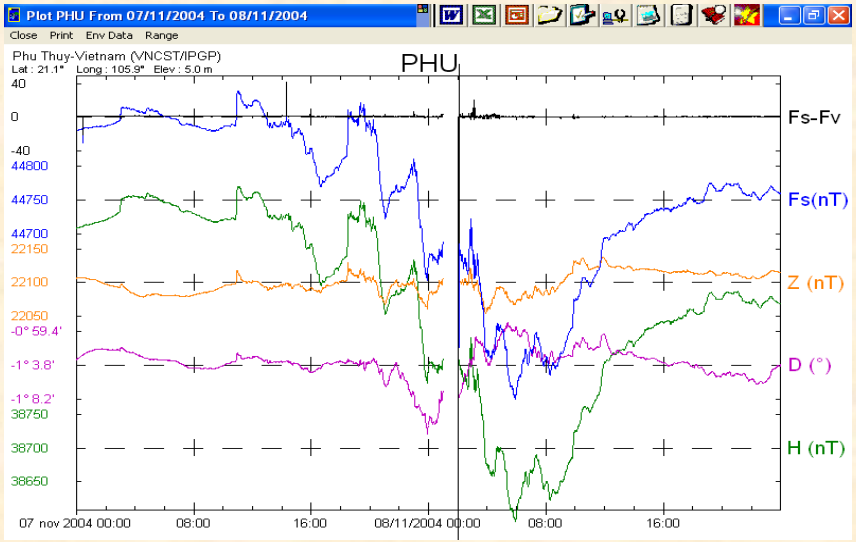
7. IMPACT OF MAGNETIC STORMS ON THE PETROL & GAS PIPE-LINES SYSTEM IN VIETNAM

EQUIPMENT INSTALLATION

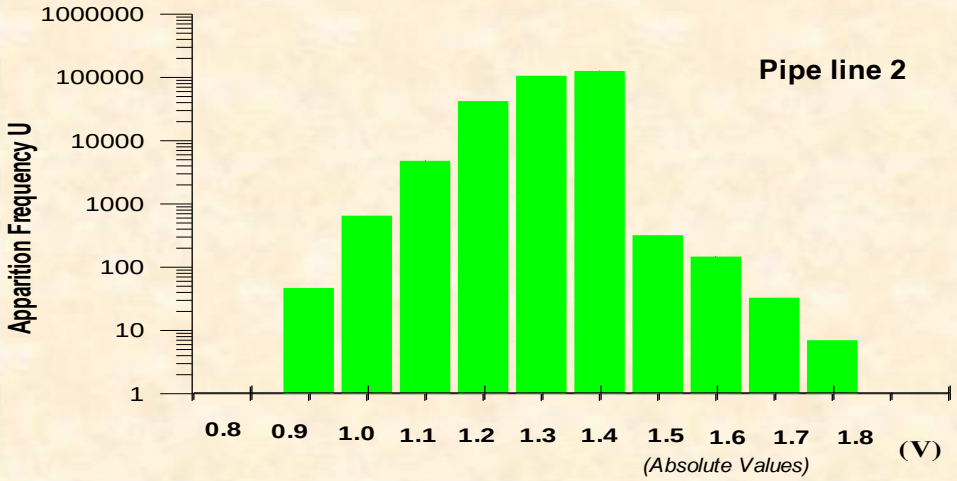


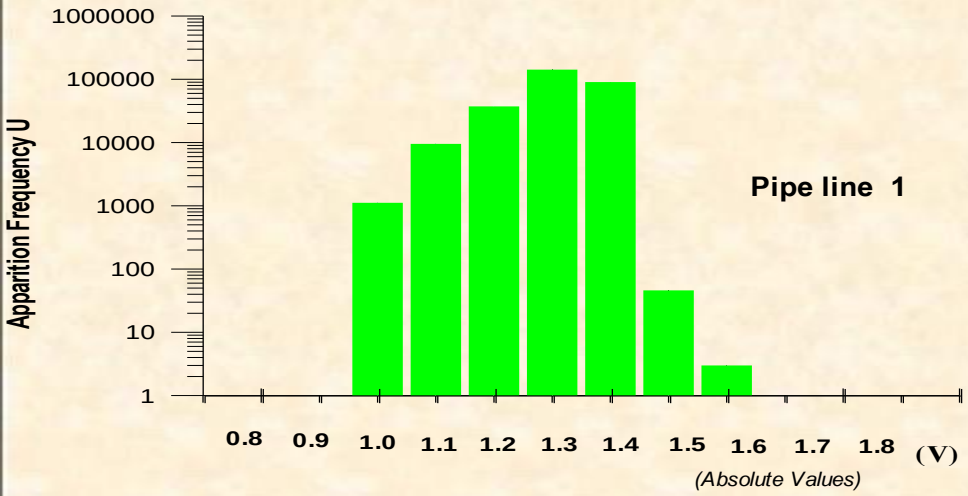
EXAMPLE OF PIPE-TO-SOL POTENTIAL AT BARIA STATION FOR A MAGNETIC STORM DAY 7/11/2004



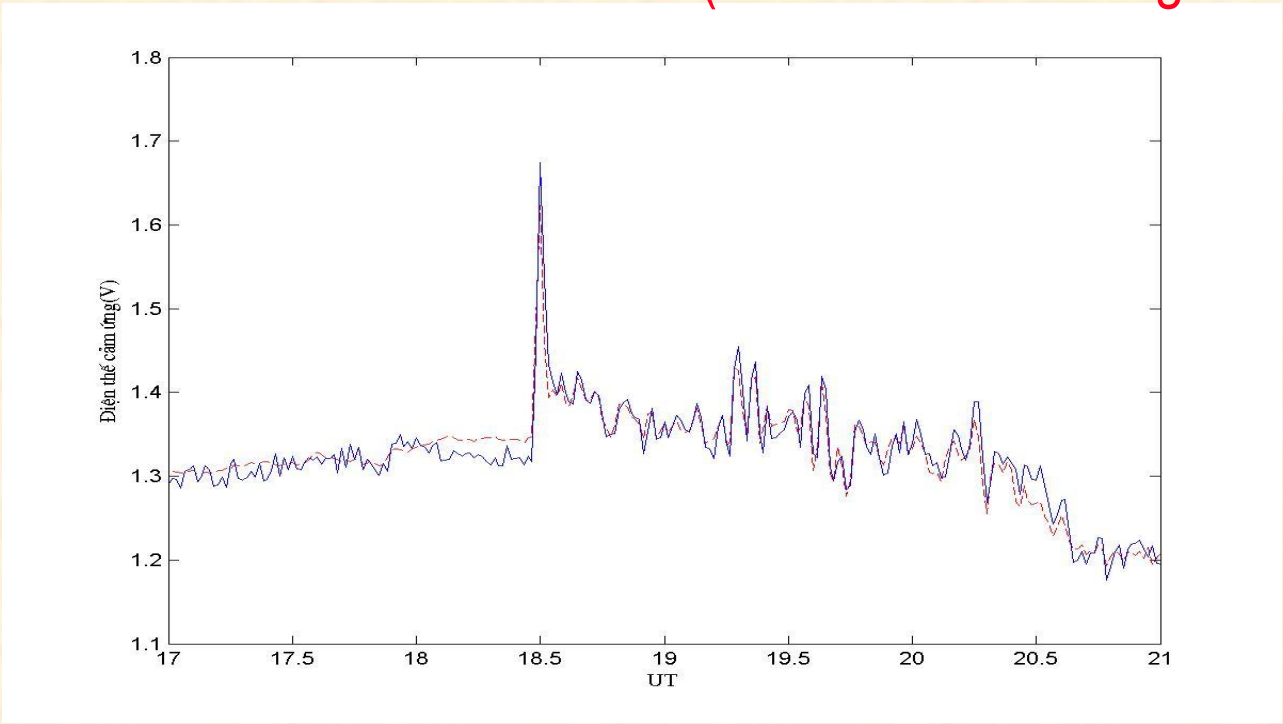


APPARITION FREQUENCY OF P-to-S POTENTIAL U





Example of P-to-S Potential calculated and recorded for November 11, 2004 in Ba Ria station (with Bac Lieu's magnetic data)



——— : P-to-S recorded ; — — — : P-to-S calculated

$\sigma = 2{,}9 \times 10^{-4} \Omega^{-1} m^{-1}$

IV. Capacity building

-Instrument capacity: Maintenance of ISWI – MAGDAS Bac Lieu

- Data analysis capacity: data processing of MAGDAS for Bac Lieu

- Science capacity: supervising students of MAGDAS for Bac Lieu

CONCLUSION

1. *Bac Lieu Observatory become one of the ISWI-MAGDAS observatories thanks to the very effective collaboration between ISCWSE and Hanoi Institute of Geophysics;*

2. *Bac Lieu Equatorial Magnetic Observatory has an indispensable role in the space weather studies in Vietnam. This manifests in various aspects, that is Diurnal magnetic variation in the equatorial latitude: Sq, Magnetic equatorial electrojet (EEJ); Total Solar Eclipse, Magnetic storms, Geomagnetic field modeling, Impact of magnetic storms on electric power transmission system, Impact of magnetic storms on petrol & gas pipe lines* ***etc****…*

3. *Adhering to the ISWI MAGDAS, Bac Lieu Observatory has actively contributed to the instrument capacity building, data analysis capacity building and science capacity building.*

THANKS

- *Prof . Yumoto;*
- *Members of ICSWSE*
- *Prof. Hada;*
- *Prof. Yushikawa;*
- *Mr. Maeda.*

Thank You for Listening!