
* ISWI Newsletter - Vol. 16 No. 002 12 February 2024 *

* Editor: George Maeda, georgemaeda3[at]gmail.com

* Archive of back issues: ISWI Website <https://iswi-secretariat.org/>

* Archive of all ISWI webinars:

* <https://www.youtube.com/playlist?list=PLaOqa4cng0GF3cKuj6Yz5kqG1BQ-Akchr>

* Send subscription request to: iswisupport@bc.edu

Dear ISWI Newsletter Subscriber:

Starting with this February 2024 issue of the ISWI Newsletter, the newsletter will be emailed to subscribers as plain text only -- all attachments shall not be attached. (Occasionally, attachments are too large to be emailed.)

Full versions of each newsletter (with the attachments) can be found at the ISWI website. We ask for your understanding on this matter.

Cordially,
George Maeda
Editor of the ISWI Newsletter

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[03] The United Nations/Germany Workshop on the

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- . opens a Topical Issue "Fast and slow solar winds:
- . Origin, evolution and Space Weather effects"
- . -- deadline 31st October 2024.

[01]-----

ISWI Steering Committee Meeting: Annotated Agenda

2024 February 5: 2:00 PM–6:00 PM;
and February 6: 9 AM –1:00 PM, CET

In-person & Online Meeting

Venue: VIC, Vienna, Austria

Chair: Dr. Nat Gopalswamy (provided the following PDF)

See: ISWI Steering Committee 2024_annotated_agenda.pdf

001

[02]-----

ISWI Steering Committee Meeting: The minutes of the meeting

Minutes taken by Y. Migoya-Orué.

See: ISWI_SC_Minutes_5_6_Feb_2024.pdf

002

[03]-----

TO: The ISWI Newsletter editor.

Dear George,
Greetings from Vienna!

We would like to kindly ask to add the
following announcement the next ISWI newsletter:

=====

To whom it may concern,

The United Nations Office for Outer Space Affairs is pleased to announce that the online application for
**the United Nations/Germany Workshop on the International Space Weather Initiative (ISWI):
Preparing for the Solar Maximum, 10 – 14 June 2024,
Neustrelitz, Germany**

is now open on the website of the Office at:

<https://www.unoosa.org/oosa/en/ourwork/psa/schedule/2024/2024-iswi-workshop.html>

Further information on the workshop can be found in the Information Note available at:

https://www.unoosa.org/documents/pdf/psa/activities/2024/ISWI2024/InfoNote_ISWI_2024.pdf

Direct link to the online application (**Deadline: 3 March 2024**):

<https://forms.office.com/e/NJCqzpzDiZ>

Thanks and best regards,
Patrick

=====

Patrick Gindler
Executive Secretariat of the International Committee
on Global Navigation Satellite Systems (ICG)
United Nations Office for Outer Space Affairs (UNOOSA)
Vienna, Austria

[04]-----

AGS Newsletter, Feb 2024, Vol. 6, No.2

See: ags newsletter FEB2024.pdf

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[05]-----

Received on 6-feb-2024

Dear Georg

Find enclosed 2 invited presentations to present
scientific results in ISWI
sincerely, Christine

[05] SPACE WEATHER ACTIVITY WITHIN THE GIRGEAA

. FROM: Dr. Christine Amory-Mazaudier

. (a) IMCP YanqiForum1 / Beijing, 14-17 September 2023

See: China2023.pdf

004

. (b)

. United Nations/Finland Workshop on the
. Applications of Global Navigation Satellite Systems
. Helsinki, 23-27 October 2023

See: Helsinki2023.pdf

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[06]-----

Photos: 2024 ISWI Steering Committee Meeting and ISWI Exhibition

See: 2024 ISWI Steering Committee Meeting and ISWI Exhibition.pdf

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[07]-----

TO: ISWI NEWSLETTER, 20 Jan 2024

Dear George Maeda,

We kindly ask you to publish the following announcement in the next ISWI Newsletter. It regards an international school entitled "Operational space weather fundamentals". We hope it will be of interest to the wide ISWI community.

Best regards.

Stefania Lepidi and Domenico Di Mauro

Course on “Operational Space Weather Fundamentals”; **13-17 May 2024**

The Consorzio “Area di Ricerca in Astrogeofisica” organizes a Course on “Operational Space Weather Fundamentals”, to be held in L’Aquila, Italy, 13-17 May, 2024 directed by Prof. Domenico Di Mauro (Istituto Nazionale di Geofisica e Vulcanologia, Italy), Stefania Lepidi (Istituto Nazionale di Geofisica e Vulcanologia, Italy), Mauro Messerotti (Istituto Nazionale di AstroFisica, Italy), Tamitha Skov (Millersville University, USA).

The school will serve as a comprehensive introduction to the multi-faceted field of Space Weather, covering solar-heliospheric, magnetospheric, and ionospheric weather, with a specialized focus on operations and forecasting. By establishing the links from research to operations (R2O) and from operations to research (O2R) and by highlighting the effects of space weather on technological systems and society, this curriculum aims at stimulating the involvement of the next-generation researchers in this rapidly growing discipline.

Lectures on phenomenology will be complemented by laboratory activities and applications with the direct and active involvement of the attendees. Another practical aspect will be covered by the "career section" aimed at illustrating which skills are desirable for a job in the frame of space weather research and surveillance centres, and how good strategies should be used for educational and communication purposes.

This school is addressed to PhD students and young scientists in space physics, planetary sciences, aerospace engineering, or related fields. Early-career stage professionals from monitoring agencies and industries related to space weather are invited to apply as well.

Applications are due before March 23, 2024

For more information visit

<http://www.astrogeofisica.it/oswf> or send an e-mail to info@astrogeofisica.it

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Stefania Lepidi, PhD
Istituto Nazionale di Geofisica e Vulcanologia
viale Crispi 43
67100 - L'Aquila
tel. 0862 709106

[08]-----

FROM: Heinemann Stephan <stephan.heinemann[at]helsinki.fi>
TO: ISWI NEWSLETTER
DATE: 25 January 2024.

Dear Dr. Maeda,

We have an announcement that we hope will be included in the next ISWI newsletter, and we believe it will be of interest to the space weather community. Please find it below:

#####

The Journal of Space Weather and Space Climate (JSWSC) opens a Topical Issue "Fast and slow solar winds: Origin, evolution and Space Weather effects", deadline 31st October 2024.

The topical issue (TI) is dedicated to the nuanced exploration of Heliospheric Solar-Wind Dynamics and their implications for Space Weather. This issue seeks to bring together cutting-edge studies that shed light on the complex interplay between slow and fast solar winds, their effects on geomagnetic activity, and the propagation of solar transients.

The heliospheric solar-wind structure, arising from the intricate interplay between slow and fast winds, constitutes the primary instigator of minor to moderate geomagnetic activity. Furthermore, it serves as the medium for the propagation of other solar transients. Stream interaction and co-rotating interaction regions are prolific sources of shocks, compression, and rarefaction regions, well-established contributors to recurrent geomagnetic effects on Earth. In light of these dynamics, a comprehensive understanding of the heliospheric solar wind, ambient magnetic field, and their origins is indispensable for the validation and enhancement of Space Weather forecasting efforts. The objective of this TI is to collect and present new studies on the origin, evolution, and Space-Weather effects of both fast and slow solar winds using observational data and modeling approaches. Recent missions, such as the Parker Solar Probe and Solar Orbiter, in conjunction with established missions like the Solar Dynamics Observatory and the Solar Terrestrial Relations Observatories, offer a wealth of information. This data presents an invaluable opportunity to validate, refine, and augment existing knowledge in the solar wind domain.

This Topical Issue arises from the session CD-02 "All About the Solar Wind", held during the European Space Weather Week 2023 (ESWW2023) in Toulouse. However, contributions to this TI are not limited to participants of the ESWW2023. The TI will be open to all submissions that fit its scope. Submissions are encouraged, focusing on solar wind sources for both slow and fast winds, mechanisms of solar wind acceleration/outflow, dynamics of stream interaction, and the configuration of the magnetic field and plasma topology at the source surface and within the inner heliosphere. The integration of observations and models is particularly welcomed, fostering a deeper understanding of solar and heliospheric physics within the context of space weather.

Manuscripts must be submitted via the JSWSC online submission tool. Guidelines for submission of papers are found on the JSWSC website under the tab "Instruction for Authors".

=====>>> **Deadline: 31st October 2024**

All manuscripts will be peer-reviewed according to the quality standards of international scientific journals. The type of contributions must fit the style of JSWSC. All manuscripts should contain enough new insight, present the results against a properly referenced background of existing work, and present adequate evidence that supports the conclusions. Accepted papers are published in electronic format only, and are freely available to everyone via the JSWSC website. JSWSC offers the possibility to include electronic material, such as animations, movies, codes and

data.

Topical Editor-in-Chief (T-EiC):

Stephan G. Heinemann (stephan.heinemann[at]helsinki.fi),
University of Helsinki, Finland

Topical Editors (TE):

Eleanna Asvestari (eleanna.asvestari[at]helsinki.fi),
University of Helsinki, Finland

Matt Owens (m.j.owens[at]reading.ac.uk),
University of Reading, UK

Krzysztof Barczynski (krzysztof.barczynski[at]pmodwrc.ch),
ETH Zurich and PMOD/WRC Davos, Switzerland

For questions regarding this Topical Issue, please, contact the T-EiC. For questions concerning the submission process, please contact the Editorial Office (jswsc[at]edpsciences.org).

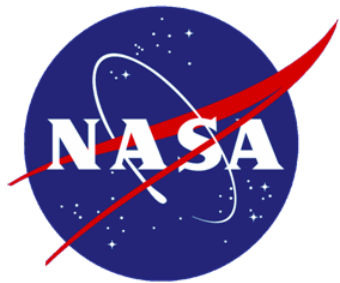
#####

Kind Regards,
Stephan G. Heinemann
Topical Editor-in-Chief,
Journal of Space Weather and Space Climate

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Dr. Stephan G. Heinemann
Postdoctoral Researcher
Solar and Space Physics research group
Department of Physics
University of Helsinki, Finland

*****[End of this issue of the ISWI Newsletter]*****



001



ISWI Steering Committee Meeting: Annotated Agenda

2024 February 5: 2:00 PM– 6:00 PM and February 6: 9 AM – 1:00 PM CET

In-person & Online Meeting

VIC, Vienna, Austria

Chair: Nat Gopalswamy

Agenda

Feb 5

1. Introduction & Report (Nat Gopalswamy, Chair): 14:00 – 14:10
2. Secretariat Update (Nat Gopalswamy, Kathleen Kramer, George Maeda, Graciela Molina) 14:10 – 14:40
3. Steering Committee Update (Nat Gopalswamy) 14:40 -14:50
4. SCOSTEP/PRESTO Report (Kazuo Shiokawa) 14:50 – 15:00
7. ISWI/Iberia School 2023 report (Anna Morozova) 15:10-15:20
8. ISWI/Zambia School report (Chigo Ngwira): 15:20-15:30
9. ISWI/Nepal School plans (Nishu Karna) 15:30 – 15:40
11. ISWI/NOAA Report (Elsayed Talat) 15:40 – 15:50
13. COSPAR Space Weather Roadmap and ISWAT activities (Masha Kuznetsova) 15:50 -16:00
5. Reports from ISWI Regional & National Coordinators (lead: Christine Amory) 16:20 – 18:00

Feb 6

5. Reports from ISWI Regional & National Coordinators (lead: Christine Amory) 9:00:-10:30
6. ISWI Instruments Update (Shing Fung and Instrument PIs); Data subcommittee report 10:30 – 11:00
- 10 UN/Germany ISWI workshop and UN-ISWI activities (Sharafat Gadimova, Daniela Banys) 11:15-11:45
12. ISWI/NASA report (???)
14. Steering committee member presentations/discussion 11:45 -12:15, poster viewing

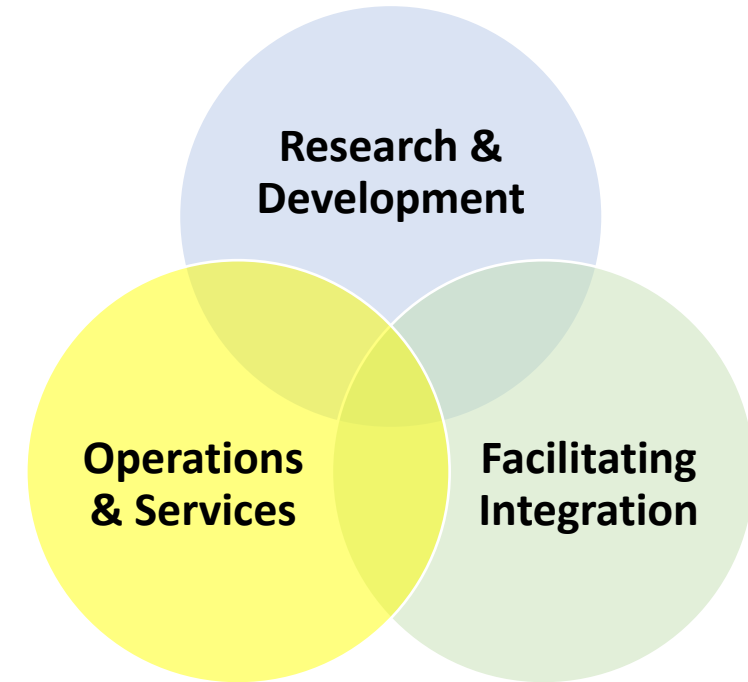
Mitko Danov Passed away on Nov 19, 2023



- Research: Field-aligned currents
- Space projects: Intercosmos-Bulgaria-1300, APEX, International Space Station, others.
- Web-master: BBC-network, Sun and Geosphere journal, ISWI, VarSITI program.
- Above all, a fantastic human being

#1 Introduction & Report (chair)

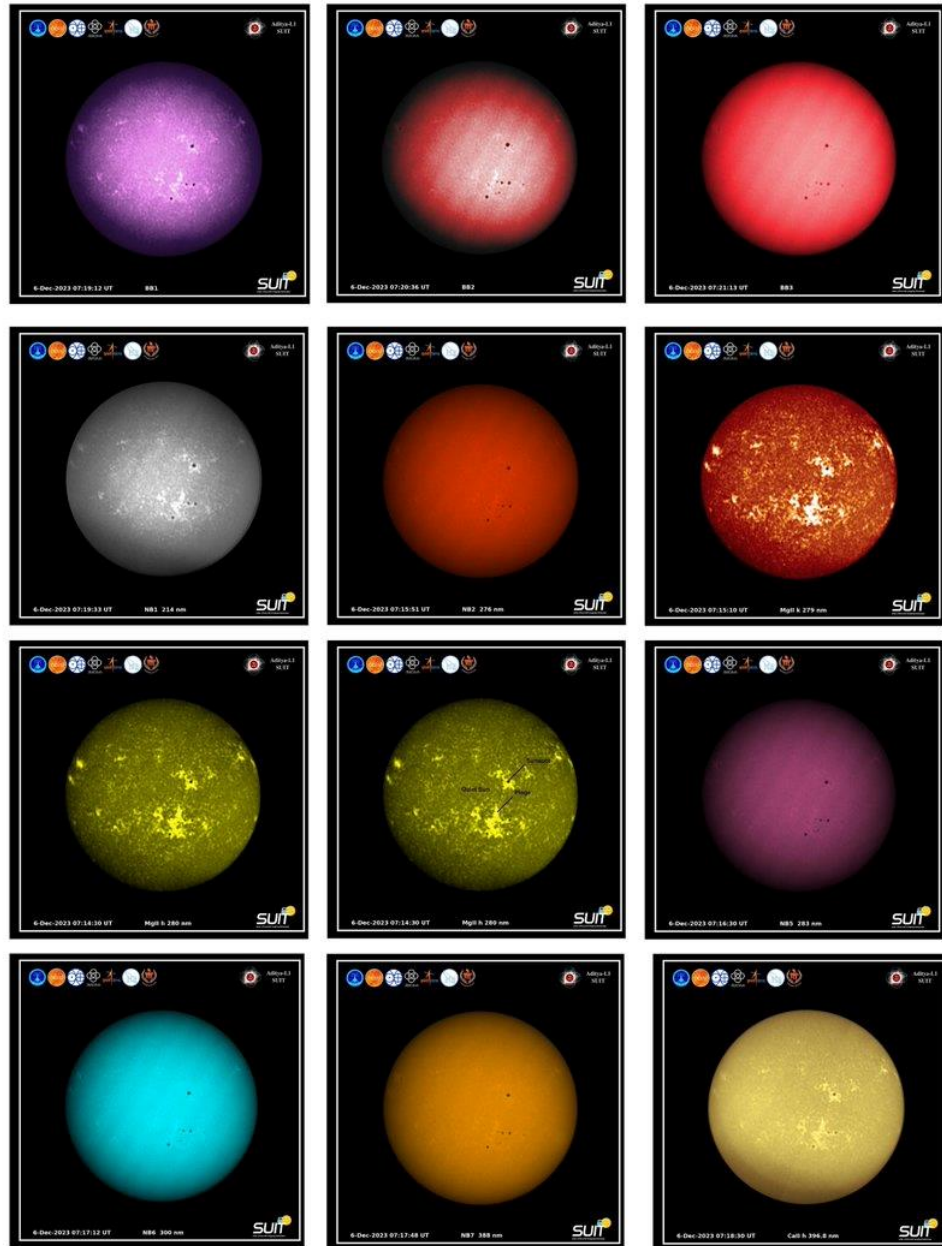
- Busy 2023 with 2 workshops (ICTP, UN) and 2 schools (ICTP, Zambia); support to other schools
- Supported ISWI school students to attend the AGS meeting in Zambia
- Input to WMO-ISES-COSPAR SWx coordination (M. Kuznetsova)
- ISWI intro to ESWW meeting on IMCP Europe-Africa sector (F. Pitout)
- IMCP – new initiative for meridian passing through Africa
- Aditya L-1 launched; science data started
- ISWI has representation in COSPAR PSW
- UN/Germany ISWI workshop (June 10-14, 2023) - manuscript
- Thank the secretariat, steering, data, membership, & webinar committees



ISWI in the intersection

Aditya-L1's SUI1 captures full-disk images of the Sun in near ultraviolet wavelengths

December 2023



Aditya L1

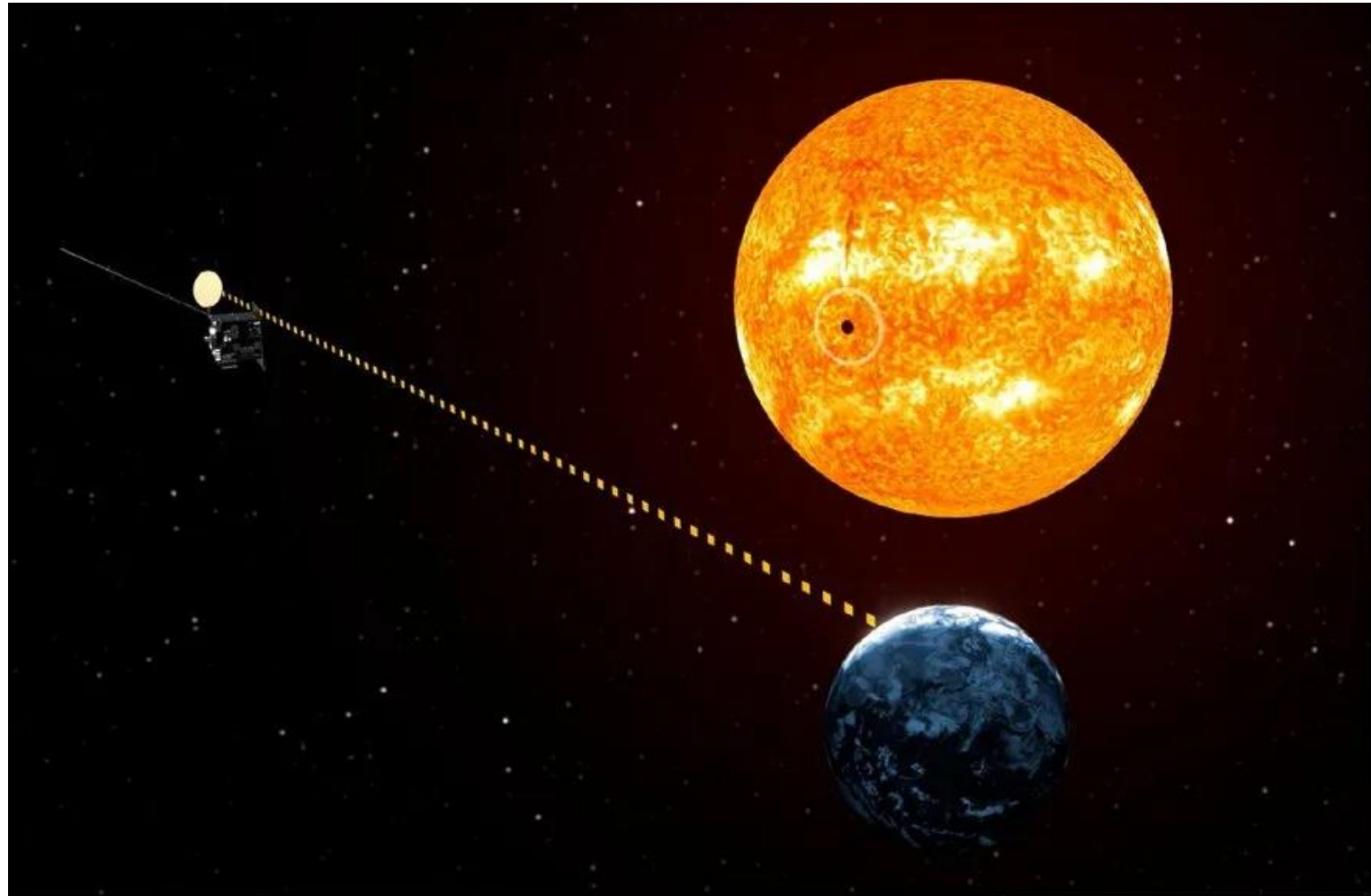


January 6, 2024 SpaceNews

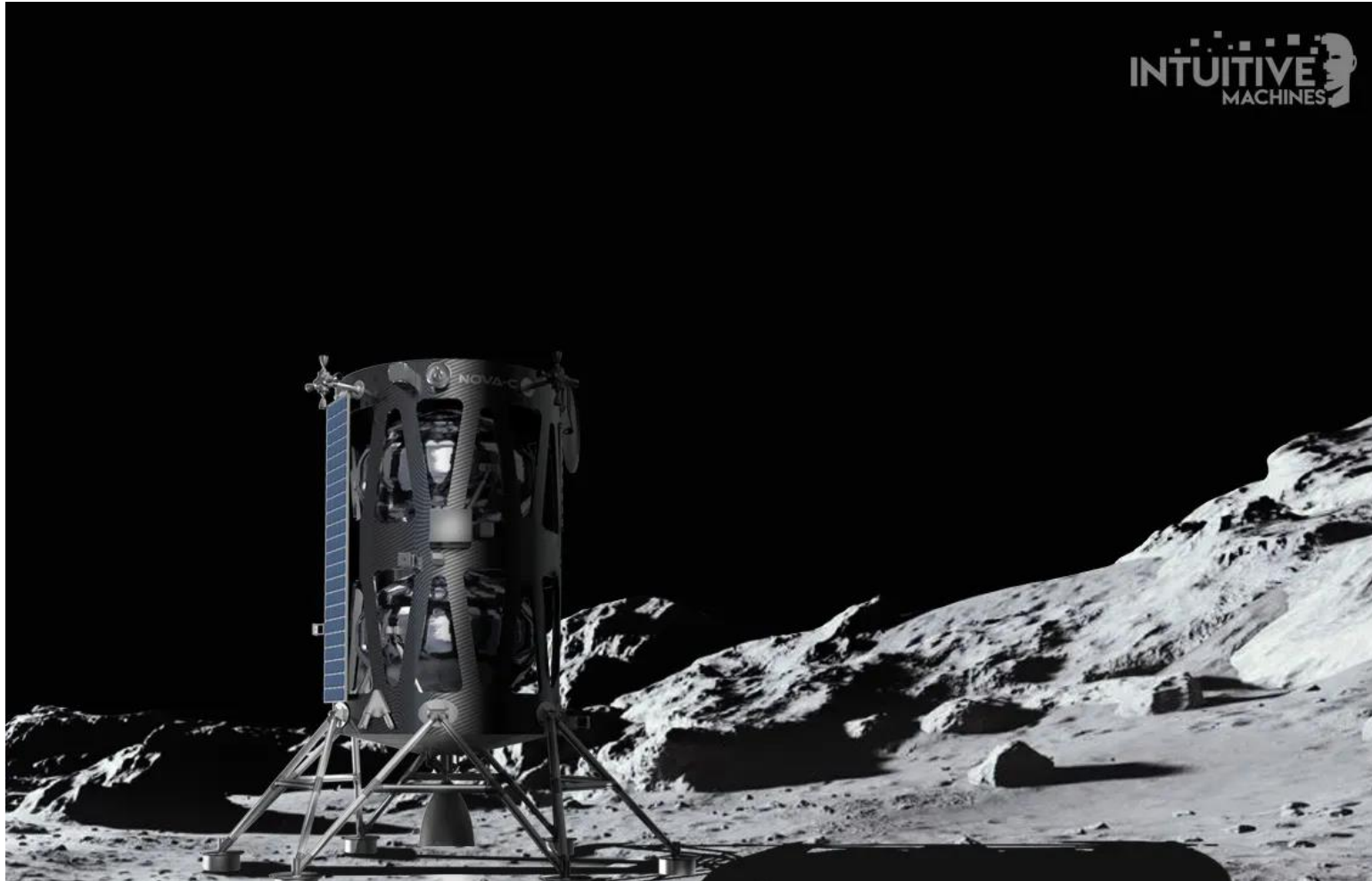
ISRO

ESA's Vigil Mission scheduled to launch in 2030

- Compact Coronagraph
- Heliospheric Imager
- Photo-Magnetospheric field Imager
- Extreme ultraviolet Imager
- Plasma Analyzer
- Magnetometer



IM-1 Launch in days: February 14, 2024



#2 Secretariat update

- <https://www.unoosa.org/oosa/en/ourwork/psa/bssi/iswi.html>

Season's Greetings & Happy New Year 2024!

Secretariat

Nat Gopalswamy *Executive Director*

George Maeda *Newsletter Editor*

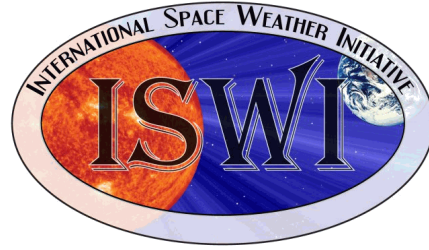
Kathleen Kraemer *Webmaster*

Sharafat Gadimova *UN Liaison*

Keith Groves *Workshop Coordinator*

Shing Fung *Data Coordinator*

Maria Graciela Molina *Webinar Coordinator*



Steering Committee

C Amory-Mazaudier D Banyas S Gadimova K Georgieva

J A Gonzalez Esparza N Gopalswamy K Groves

M Guhathakurta K Ichimoto M Ishii N Jakowski I Mann

R Marshall C Monstein B Rabiou J-P Raulin J Spann

E S Talaat M Temmer C Wang A Yoshikawa



*ICTP-SCOSTEP-ISWI
School*

May 29, 2023

*Abdus Salam ICTP
Trieste, Italy*



Kathleen Kraemer



Updates:

- Website
- Mailing lists
- Conferences



WEBSITE



- Instrument page conversions (old to new style) progressing
 - Limited by inputs, time
- Updates take ~24 hr to appear
 - Limited by large media library
- Newsletter archive:
 - Missing Nov 2021--Mar 2023 back issues



MAILING LISTS



5 BC-hosted mailing lists (@listserv.bc.edu):

- iswi-secretariat (unmoderated; updated 2022)
 - 6 subscribers
- iswi-steering-committee (unmoderated; 2024)
 - 23 subscribers
- iswi-national-coordinators (moderated - Nat, Shafa, Keith, BC; 2024)
 - 89 subscribers, 3 bouncing
- iswi-instrument-networks-and-providers (moderated - Nat, Shafa, BC; 2022)
 - 35 subscribers, 5 bouncing
- iswi-community (moderated – Nat, BC; 2023)
 - 673 subscribers, newsletter, other announcements

iswisupport@bc.edu



Conferences



2023:

- ICELLI, Sep 4-8, Nigeria
- ISWI Space Weather School, Sep 26-29, Zambia
- ICTP-SCOSTEP-ISWI School & Workshop on PRESTO

2024:

- UN/ISWI Workshop, Jun 10-15, Germany
- Nepal

ISWI Newsletter



ISWI
International Space Weather Initiative

A short update from The *ISWI Newsletter*

Editor: George Maeda

10 Jan 2024, Fukuoka, Japan



The **ISWI Newsletter** has been published by the ISWI Secretariat since 2009. It is distributed free of charge to anyone who has an interest in ISWI.

It comes out once per month. The target date is the 15th of each month. However, occasionally the newsletter is released a few days late or early for various reasons.

Any space-weather-related news (announcements of scholarships, job openings, future events, event reports, and so on) is welcome by the editor, George Maeda. His email is [georgemaeda3\[at\]gmail.com](mailto:georgemaeda3[at]gmail.com)

Please send in your news as either plain text or in PDF. Please endeavor to keep the PDF under 1 MB so as to facilitate mass distribution.

As of 7 January 2024, the **ISWI Newsletter** has 674 subscribers all over the world.

**There has been one
big change in the Newsletter**

(refer to the next page)

Note

There is a new mailing list server for the newsletters as of January 2024.

Messages will be coming from

iswi-community@listserv.bc.edu

which you may need to add to your **Contacts** to prevent messages from going to your spam file.

To subscribe or unsubscribe, send a message to iswisupport@bc.edu
(Please do not reply to iswi-community@listserv.bc.edu)

SOURCE:

<https://iswi-secretariat.org/home-page/news/>

Reminder

Issues of the **ISWI Newsletter** are archived by

Dr. Kathleen Kraemer
Boston College Institute for Scientific Research
Kenny Cottle Hall
885 Centre St.
Newton, MA 02459 United States

For back issues, please go to this site:

<https://iswi-secretariat.org/home-page/news/newsletter-archive/>

This has the newsletters for 2009 through Oct 2021.

Back issues for Nov 2021--Mar 2023 are not available yet.

END OF THE 2024 UPDATE FOR THE ISWI NEWSLETTER

ISWI steering committee meeting,
Vienna, 5 - 6 February 2024.

Report

ISWI webinar series



Main objectives

- Enhance participation of the ISWI community (especially after COVID)
- Invited speaker on topics relevant to ISWI (space weather, ionospheric physics, ISWI instrumentation, international government policies and actions, and national activities among others).
- Monthly (last Wednesday of each month).
- Started on April 2022.

ISWI seminar committee

Chair

- María Graciela Molina

Members

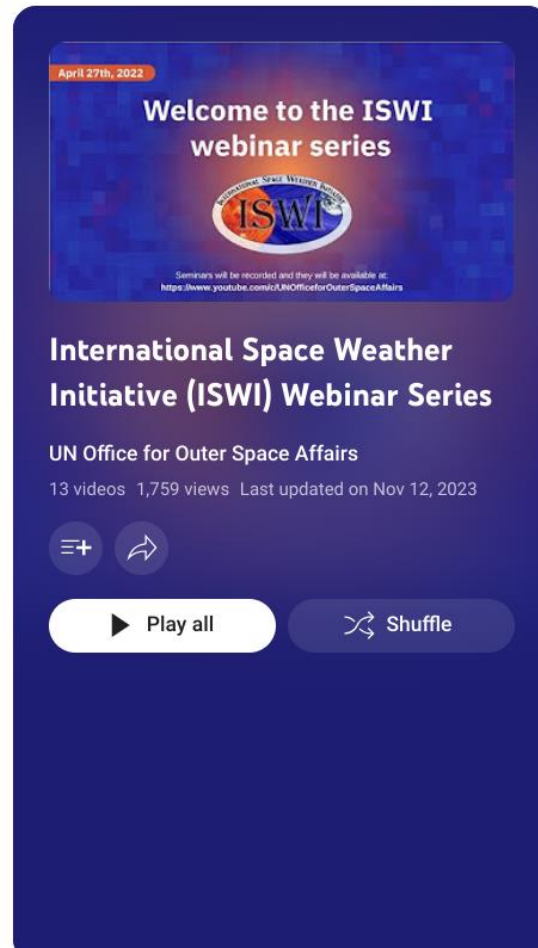
- Shing F. Fung
- Sharafat Gadimova
- Nat Gopalswamy
- George Maeda
- Babatunde Rabiou
- Nandita Srivastava
- Endawoke Yizengaw

<https://iswi-secretariat.org/home-page/organization/iswi-webinar-committee/>

• Invited speakers so far

- Nat Gopalswamy
- Mark Moldwin
- Pertti Makela
- Ramón Lopéz
- Sergio Dasso
- Miho Janvier
- Christine Armory-Mazaudier
- Ivan Galkin
- Manuela Temmer
- Kazuo Shiokawa
- Keith M. Groves
- Lucia Kleint
- Doug Rowland
- Hebe Cremades
- Wojciech Miloch

Up to 1k views in the first Webinars



- 1  International Space Weather Initiative Webinar 01 (27 April 2022)
UN Office for Outer Space Affairs • 1K views • 1 year ago
- 2  International Space Weather Initiative Webinar 2 (25 May 2022)
UN Office for Outer Space Affairs • 542 views • 1 year ago
- 3  International Space Weather Initiative Webinar 3 (29 June 2022)
UN Office for Outer Space Affairs • 324 views • 1 year ago
- 4  International Space Weather Initiative Webinar 4 (27 July 2022)
UN Office for Outer Space Affairs • 305 views • 1 year ago
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- 6  International Sp
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> 250 views in the last uploaded talk



To achieve our objectives,

Participation of the community, please share the information about future ISWI seminars with students and colleagues, and share the Youtube channel to visit past Webinars



Steering Committee

C Amory-Mazaudier
D Banys
S Gadimova
K Georgieva
J A Gonzalez Esparza
N Gopalswamy
K Groves
M Guhathakurta
K Ichimoto
M Ishii
N Jakowski

I Mann
R Marshall
C Monstein
B Rabiou
J-P Raulin
J Spann
E S Talaat
M Temmer
C Wang
A Yoshikawa

#4 SCOSTEP/PRESTO Report (Kazuo Shiokawa)

- Available separately

#7. ISWI/Iberia School 2023 report (Anna Morozova)

The 3rd Iberian Space Science Summer School (i4s)

June 26-30, 2023, Coimbra, Portugal



The 3rd Iberian Space Science Summer School (i4s) June 26 - 30, 2023, Coimbra, Portugal

Co-Chairs:

- Anna Morozova, Uni. of Coimbra, Portugal
- Natchimuthuk Gopalswamy, NASA GSFC, USA
- Kazuo Shiokawa, ISEE, Nagoya Uni., Japan

Programme Committee Members:

- Antonio Guerrero, Uni. of Alcala, Spain
- Bernd Funke, Instituto de Astrofísica de Andalucía, CSIC, Spain
- Christine Amory-Mazaudier, IPP, France
- Consuelo Cid, Uni. of Alcala, Spain
- Daniel Marsh, NCAR/Uni. of Leeds, USA/UK
- Keith Groves, Boston College, USA
- Ramon Lopez, Uni. of Texas, USA
- Rui Pinto, IRAP, France
- Teresa Barata, Uni. of Coimbra, IA, Portugal

i4s LOC members:

- Anna Morozova, Uni. of Coimbra, Portugal
- Teresa Barata, Uni. of Coimbra, Portugal
- Consuelo Cid, Uni. of Alcalá, Spain
- Antonio Guerrero, Uni. of Alcalá, Spain
- Ricardo Gafeira, Uni. of Coimbra, Portugal
- Manuel Flores, Uni. of Alcalá, Spain

Organizational and financial support:



Students

- The school was aimed at students with MSc degree (with defense scheduled no later than December 2023), PhD students and young researchers/postdocs working in Space Sciences (mostly in Space Weather).
- The school received a total of 46 applications that fulfilled the criteria.
- Most of the applications were received from developing countries:
 - India (19 applications)
 - Brazil (8 applications)
 - Egypt (6 applications)
 - Nigeria (5 applications)
- At the end, after a 2-stage review process and negotiation with ISWI and ISEE about travel support of students DAC-supported countries, 20 students were selected to participate in i4s 2023 (including 4 students with ISWI and ISEE travel grants)

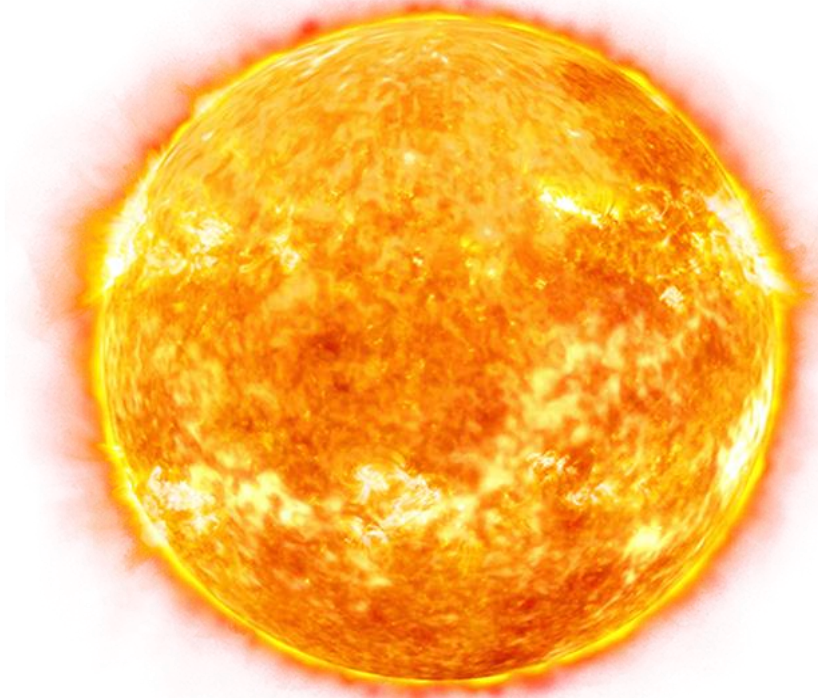


Activities

- The school was organised during a week from Monday to Friday
- The i4s program included:
 - **Lectures** (morning hours):
 - 9 lectures on space weather topics (from Monday to Thursday)
 - 2 lectures on broader space-related topics (Friday)
 - Work on **school projects** (afternoon hours):
 - An analysis of a certain space weather event from its solar sources to possible ground effects.
 - The students were divided into four groups of 4-5 people, and each of the groups was assigned a specific space weather event
 - **Presentations** of students' own work (poster and oral presentations),
 - **Final presentation of the projects** made by all members of all groups (Friday)
 - **Extracurricular activity:**
 - A visit to the University of Coimbra museum and Joanina Library (Tuesday afternoon),
 - A visit to the Geophysical and Astronomical Observatory of the University of Coimbra (Wednesday afternoon)



#8. ISWI/Zambia School report (Chigo Ngwira)



The 2023 International Space Weather Initiative School – Lusaka, Zambia

Chigo Ngwira and The Organizing Committee

Organizing the ISWI School

- Dates: September 26-30, 2023
- Location: Grand Palace Hotel, Lusaka, Zambia
- Local Institutions
 - Led by the Physics Society of Zambia
 - University of Zambia, Copperbelt University, Nkrumah University, & Mulungushi University
- International Partners:
 - ISWI
 - African Geophysical Society
 - SANSA
 - NASA
 - University of Calgary
 - University of Michigan
 - Catholic University of America

Announcements, Applications, and Selection

Announcement disseminated through several platforms

Name	Acronym
International Space Weather Initiative	ISWI
African Geophysical Society	AGS
Solar News (American Astronomical Society)	SolarNews AAS
Coupling, Energetics, and dynamics of atmospheric regions	CEDAR
Geospace Environment Modeling Messenger	GEM
AGU Space Physics and Aeronomy Newsletter	AGU SPA

- School targeted MSc, PhD, and early career/postdocs
- 93 unique applications received
 - 20 different countries
 - 64 - international
 - 29 - Zambia
- 34 final participants
 - 23- international
 - 11- local
 - 12 MSc, 14 PhD, and 8 undergrads
- **14 experts - lecture team**



Participants



Outcomes

- Exchange of knowledge and creation of new collaborations
- Skills development – python coding, data analysis/mining etc
- Capacity building – Instrument deployment at one local university
- Positive feedback from participants about the school and future opportunities
- Other engagements
 - Local school visits
 - Stakeholder meeting
 - Cultural visit

Funding Support

- A total of **\$33,600 USD** available to cover all expenses (air tickets, rooms, venue, meals, conference dinner):
 - ❑ ISWI - **\$27,000 USD**
 - ❑ University of Calgary - **\$5,000**
 - ❑ Copperbelt University – **\$1,100**
 - ❑ University of Michigan – **\$500**
- Other Funded items
 - ❑ SANSA – **1 student** (air ticket)
 - ❑ NSF – **2 students** (full support)
 - ❑ SCOSTEP - **\$5,000** (capacity building – lecturers from Africa)
 - ❑ NASA Goddard - **\$8,000** (hotel rooms for ISWI students during AGS conference)



AGS International Conference on Space Weather

- Focus on capacity building in Africa
- Run from October 2nd – 4th 2023
- About 65 scientists and students attended
- ISWI school participants among attendees
- NASA Goddard funded participants hotel

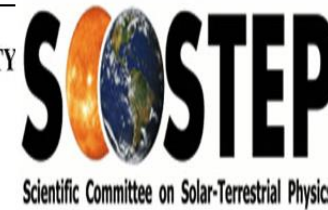
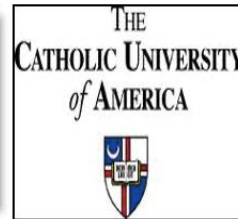
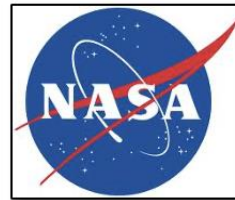
Sponsors and partners



UNIVERSITY OF
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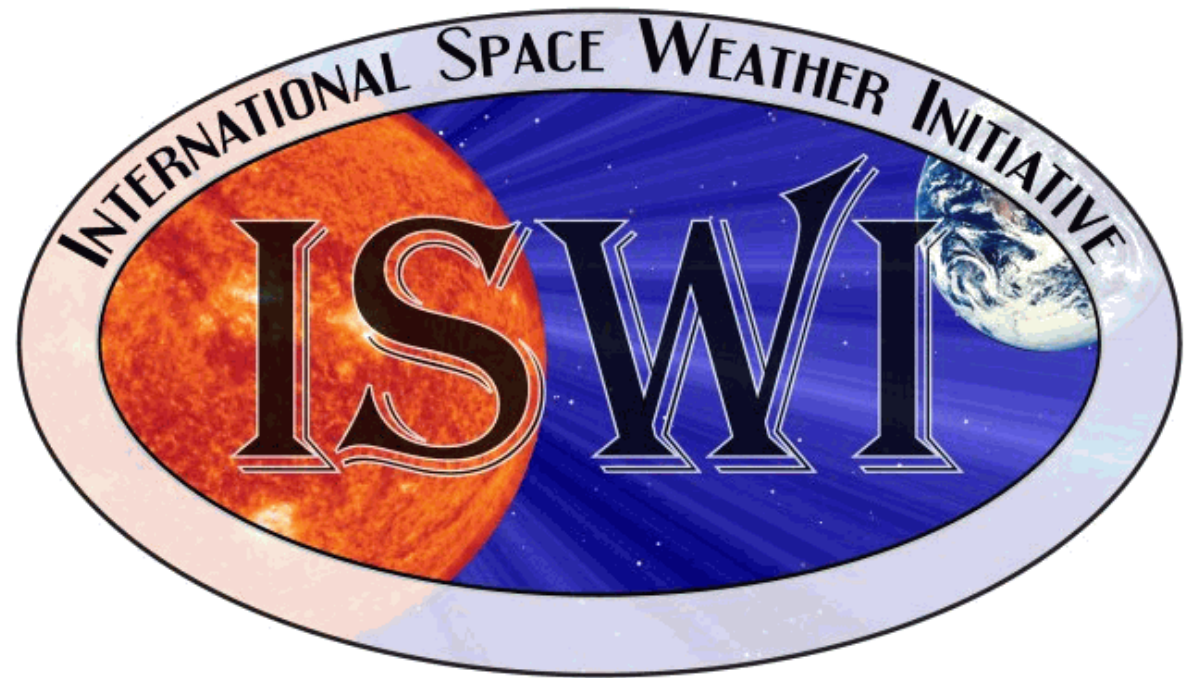


AFRICAN
GEOPHYSICAL
SOCIETY

#9. ISWI/Nepal School plans (Nishu Karna)

ISWI Space School

Kathmandu, Nepal
September 15-21, 2024



Meeting Information

Location: Kathmandu, Nepal

Date: September 15 to September 21, 2024

Tentative venue: Nepal Academy of Science and Technology

Applications will open on February 01, 2024 and will close on May 31, 2024

The school will host about fifty participants. Around twenty-five students will be participating from Nepal and the rest (twenty-five students) from neighboring countries.



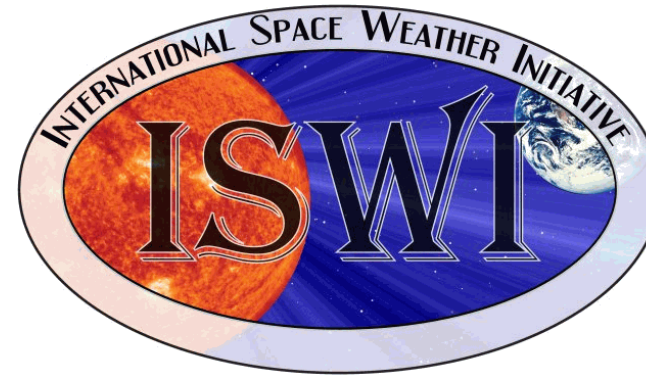
Cosponsors

Local hosting group

Led by the **Nepal Physical Society**

Nepal Academy of Science and Technology

Local host to fund venue, tea/coffee breaks, and banquet dinner



International partners

ISWI, SCOSTEP, NSF

More partners to be engaged

Largely funded by ISWI





Proposed Topics

- ❑ Instrumentation
- ❑ Solar Interior and Photosphere
- ❑ Solar Atmosphere-Heliosphere
- ❑ Solar Wind-Magnetosphere, Ionosphere coupling and Earth response
- ❑ Solar cycle and prediction
- ❑ Space Weather effects on Global Navigation Satellite Systems and applications
- ❑ Space science Communication, Education, and Outreach.
- ❑ Python tutorial

Instructors

- 1) Dean Pesnell (NASA/GSFC)
- 2) Michael Kirk (NASA/GSFC)
- 3) Kathy Reeves (CfA)
- 4) Nat Gopalswamy (NASA/GSFC)
- 5) Tatiana Niembro (Mexico, CfA)
- 6) Nishu Karna (Nepal, CfA)
- 7) Laxman Adhikari (Nepal, UAH)
- 8) Dinesh Manandhar (Nepal, CSIS)
- 9) Bidya Vinay Karak (India, IIT BHU)
- 10) Shea Hess Webber (Stanford)
- 11) Keith Groves (Boston College)
- 12) Hiroshi Hasegawa (Japan, JAXA)
- 13) Narayan Chapagain (Nepal, TU)



Local Organizing Committee

Dr. Nilam Shrestha (Chair)

Dr. Hari Shankar Mallik

More members to be added

#11. ISWI/NOAA Report (Elsayed Talaat)

- Available separately



#13. COSPAR Space Weather Roadmap and ISWAT activities (Masha Kuznetsova)



Pathways to Improving International Coordination in Space Weather

Masha M. Kuznetsova

with

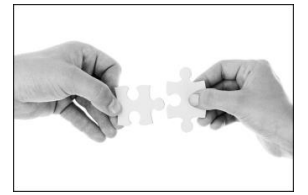
COSPAR Panel on Space Weather (PSW)

International Space Weather Action Teams (ISWAT)

WMO-ISES-COSPAR Coordination Team (WICCT)



COSPAR Panel on Space Weather (PSW)



- PSW led by a chair and four vice-chairs includes **40+ appointed members** representing national agencies, international bodies (UN COPUOS, WMO, ISWI, ISES, SCOSTEP, IAGA, URSI), and major space weather research organizations world-wide.
 - On-going update/reappointments of PSW members for the 2024-2028 term. Nominations are welcome. A chair and one vice chair are due for re-election in summer 2024.
- PSW is hosting a bottom-up community-driven **International Space Weather Action Teams (ISWAT)** initiative established by international community members with a sense of urgency to enable *Space Weather Without Borders*
- PSW chair and several PSW appointed members are representing COSPAR at the **WMO-ISES-COSPAR Coordination Team (WICCT)** established based on recommendations from UNOOSA Space Weather Expert Group.

Platform for Self-Organized Open Collaborations

Addressing Challenges Across the Field of Space Weather



<https://iswat-cospar.org>

<i>S: Space weather origins at the Sun</i>	<i>H: Heliosphere variability</i>	<i>G: Coupled geospace system</i>	<i>Impacts</i>
<p>S1: Long-term solar variability</p> <p>S2: Ambient solar magnetic field, heating & spectral irradiance</p> <p>S3: Solar eruptions</p>	<p>H1: Heliospheric magnetic field and solar wind</p> <p>H2: CME structure, evolution and propagation through heliosphere</p> <p>H3: Radiation environment in heliosphere</p> <p>H4: Space weather at other planets/planetary bodies</p>	<p>G1: Geomagnetic environment</p> <p>G2a: Atmosphere variability</p> <p>G2b: Ionosphere variability</p> <p>G3: Near-Earth radiation & plasma environment</p>	<p><i>Climate</i></p> <p><i>Electric power systems/GICs</i></p> <p><i>Satellite/debris drag</i></p> <p><i>Navigation/Communications</i></p> <p><i>(Aero)space assets functions</i></p> <p><i>Human exploration</i></p>
<p>Overarching Activities:</p> <p><i>O1: Assessment</i> <i>O2: Information Architecture & Data Utilization</i></p> <p><i>O3: Innovative Solutions</i> <i>O4: Education & Outreach</i></p>			

Action Teams (building blocks of **ISWAT**) are organised into **ISWAT Clusters** by domains, phenomena, impact, or overarching activity.

Status: 62 Action Teams, 15 Clusters, 550+ active members, 40+ countries, 300+ affiliations.

Working Meetings:

- 2020 (Florida, USA)
- 2022 (Coimbra, Portugal)
- ISWAT@ESWW2023 and other mini-ISWATs

- **2025, Feb 9 – 14, 2025**
Port Canaveral, Florida, USA)

- ISWAT is an effort multiplier. Maximise return on investments by national/regional programs

Community-Driven Space Weather Roadmap:

Where are we now? Where are we going? Where we want to be?

- ISWAT formed the backbone for two **Roadmap Special Issues** in COSPAR 'Advances in Space Research' with
 - a set of science papers for **ASR-SI-1 (Science Research and Applications)** coordinated by Action Team Leads.
 - a set of review papers mirroring the ISWAT Cluster structure for **ASR-SI-2 (Achievements and Future Goals)**
- **Additional** papers for **ASR-SI-2** led by PSW: *Source-to-Impact Pathways, Interfacing with Users, International Space Weather Landscape*
- **Transparency in writing process for review papers:** titles, abstracts, paper outlines were available for the community for comments/contributions at ISWAT website. Internal review prior to submissions.
- Everyone had opportunity to participate in this **open peer reviewed endeavor** by submitting papers to Roadmap Special Issues and contributing to review papers.
- *COSPAR-ILWS Roadmap [Schrijver et al, 2015] is used as a point of reference*
- *ASR-SI-1 is **published** in Vol 72, No. 12 (2023), 37 papers, 500+ pages*
- *ASR-SI-2 status: 13 papers **accepted**, 8 under **review/revision**, 2 in final stages of **preparation***
- **Roadmap Summary and Recommendations** to be available before COSPAR 2024.
- **Roadmap event at COSPAR 2024:** Review recommendations, discuss approach to periodic updates.
- Plan **post-Roadmap** goals/activities in preparation to **ISWAT2025** (Feb. 2025, Florida, USA)

Space Weather International Coordination Forum

WMO-ISES-COSPAR Coordination Team (WICCT) organized a **Space Weather International Coordination Forum** to bring together representatives from major organisations engaged in space weather to identify areas where coordination is lacking and to explore pathways to increased coordination of activities.

Anticipated outcomes of ISWC Forum include:

- An outline of the international space weather landscape identifying **primary expertise of each organization** represented in the Forum
- Plans for interfacing with organizations representing major user groups
- Approach to alignments with national strategic planning activities and funding programs
- Join projects to demonstrate the value of collaboration and coordination

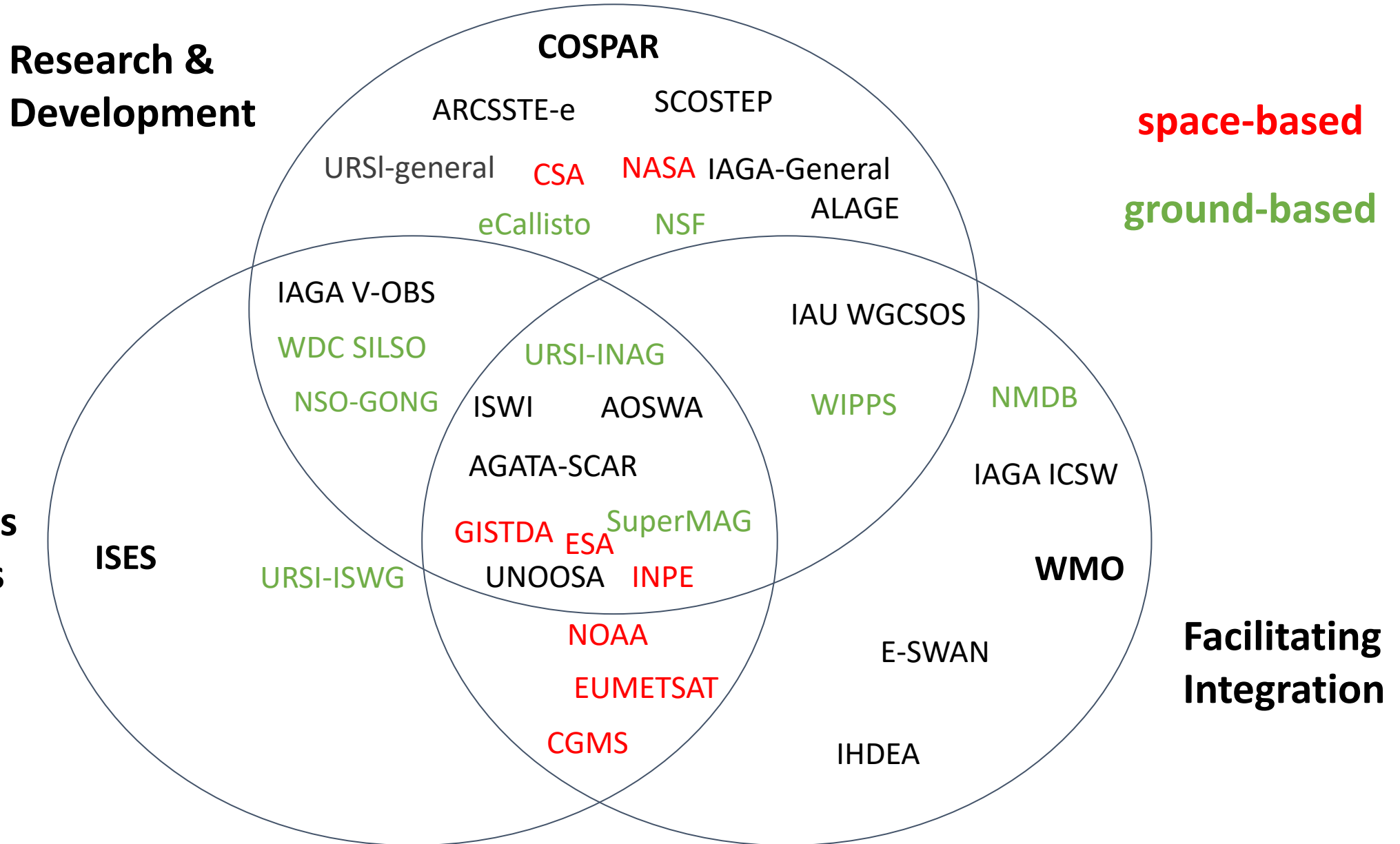
First ISWCF Meeting: 17 November, 2023, WMO

*Links to **Statement of Intent** are available at COSPAR, WMO and ISWS Websites:*

<https://drive.google.com/file/d/1MtCZC1JuRdoqByRRHLnoKBi7mPAJfX1H/view>



Primary area of ISWCF organisations' expertise



#14 Steering Committee member presentations (Mamoru Ishii)

- AOSWA Activities
- WDS and SES activities
- Available separately

#5. Reports from ISWI Regional & National Coordinators (lead: Christine Amory)

- On February 5 from 16h20 to 18h00
 - Introduction : 16h20-16h25 Christine Amory-Mazaudier
 - Presentations of Scientists from Europe (Regional coordinator : Daniela Banys) 16h25-17h25
 - Presentation project IMCP Europe Afrique (Michel Blanc)
 - Presentations of Scientists from America (Regional coordinator : Americo Gonzales Esparza) 17h30-18h00
- On February 6 from 9h00 -10h30
 - Presentations of Scientists from Asia (Regional Coordinator : Richard Marshall) 9h-9h30
 - Presentations of Scientists from Africa (Regional Coordinator : Babatunde Rabiou) 9h30-10h30
- Coordinator presentations are available separately

#15 Any other business?

Acknowledgments

- Many thanks to Shafa and Patrick for organizing the SC meeting
- Thanks to all the participants and presenters.

ISWI /SC Annual Meeting

Minutes



Meeting Details: 5 February 2024 (14:00 – 18:00) and 6 February 2024 (9:00 – 13:00) CET
Conference Room M5 (M-building), Vienna International Centre (VIC)

Meeting mode: In-person and online

On February 5, 2024, at 14:00 (CET) ISWI Executive Director and Steering Committee chair, Nat Gopalswamy (NG) welcomed in-person and online attendees and invited them to introduce themselves.

NG presented the agenda (points 5, 6 and 10 developed not in order, point 12 skipped) and thanked all the attendants for the participation and preparation of the posters in exhibition in the UN Rotunda during the week. A few minutes were dedicated in memory of Mitko Danov, former ISWI site webmaster, who passed away on November 19, 2023.

1. Introduction and Report (NG). Reported 2023 activities and new ISWI representations in WMO, COSPAR, IMCP, ESWW. The next ISWI Workshop will take place in Neustrelitz, Germany on 10-14 June 2024. New missions relevant to Space Weather have been mentioned: Aditya-L1 just reached L1, ESA Vigil, to be launched in 2030 and IM-1, expected to land on the moon in the current month.
2. Secretariat update. Members of the ISWI Secretariat gave updates in the following order:
 - a. Kathleen Kraemer (BC, online/ website): confirmed the completed transfer of the material to the new website, updated about new (moderated and unmoderated) mailing lists, invited to contact her in case of new material at iswisupport@bc.edu.
 - b. George Maeda (AES, online/ newsletter): announced an important change: communications will be done from now on to “iswisupport” managed and archived by Kathleen Kraemer. NG acknowledge the great contribution made by George maintaining the ISWI Newsletter.
 - c. Graciela Molina (UNT, online/webinars): revised the ISWI webinars series organized so far and invited ISWI community to suggest speakers and share the info about next and recorded webinars.
3. Steering Committee update (NG). No changes in the members, in case of changes it will be communicated. NASA to name someone in place of Jim Spann. Manuela Temmer stepped down.

K. Ichimoto needs to be replaced.

4. SCOSTEP/PRESTO Report (Kazuo Shiokawa, in-site). PRESTO as scientific program of SCOSTEP, continue to run with participation of scientists of more than 70 countries in capacity building, visiting scholar program and outreach activities (3 schools organized in 2023 in collaboration with ISWI, 4 planned for 2024 with ISWI).
7. ISWI/Iberia School 2023 report (Anna Morozova, online). Anna reported on the school held in Coimbra, Portugal in June 26-30, 2023, with participation of 46 students and lecturers.
8. ISWI/Zambia School report (Chigo Ngwira, online). Chigo gave details about the school held in Lusaka, September 26-30, 2023, that counted with 34 participants and 14 lecturers (mostly from US, 3 Africans supported by SCOSTEP). The school was followed by AGS meeting (65 scientists/students). NG commented on the schools' visits organized by ISWI national coordinator for Zambia, Patrick Sibanda during the event, there were important to appreciate the challenges faced by the children (e.g. no electricity, use of solar panels) and reminded that these kind of public outreach activities are one of the ISWI objectives.
9. ISWI/Nepal School plans (Nishu Karna, online). The next ISWI/Nepal School on Space Science will take place in Kathmandu, September 15-19, 2024, hosted by the Nepal Physical Society. An ISWI/SCOSTEP/NSF list of instructors has been shown.
11. ISWI/NOAA report (Elsayed Talaat, online). Updates of the Office of Space Weather Observation (SWO) and its Space Weather Follow-On Program (SWFO-L1) were made, together with news about missions and aged satellite replacements.
13. COSPAR Space Weather Roadmap and ISWAT activities (Masha Kuznetsova, online). MK reported on the Space Weather International Coordination Forum (ISWCF) organized by WMO-ISES-COSPAR was made, its first meeting was held last year on November 17, 2023. Link and info provided in slides.

At 15.28 an Open Discussion was started

Prof. Shiokawa presented the SCOSTEP Fellow Program that recognizes the contribution of distinguished scientists to SCOSTEP studies and activities. Subsequently presented Dr. Gopalswamy as SCOSTEP Fellow 2023 for his outstanding contributions to the understanding of solar CME and SW consequences and promotion of international scientific collaboration, awarding him a medal and certificate.

Chigo acknowledged the availability of Masha in providing lectures and exercises and her labor has been recognized by NG and other Steering Committee members.

GM asked for the targeted countries in Nepal School. NG clarified that is an activity for students of the region and lecturers should be self-costed. GM asked if Uganda is still in the list of potential hosts of ISWI school. NG confirmed and clarified that previous Uganda event was cancelled due to health issues in the country (some cases of Ebola).

New online and in-site attendants introduced themselves.

A group picture was taken at 16:00.

5. Reports from ISWI Regional & National Coordinators (lead: Christine Amory). CA recognized an increased national contributions number this year and presented the new national coordinators for

Algeria, China, Kenya, Norway, Tunisia and USA and the order of presentation of national coordinators by regions.

Daniela Banys (DLR, in-site) as regional coordinator for Europe chaired the national representatives who gave updates about ISWI related activities in their country in the following order:

- Austria (Manuela Temmer, online)
- Bulgaria (Simeon Asenovski, in-site)
- France (DB on behalf of F. Pitout)
- Germany (DB, in-site)
- Italy (Vincenzo Romano, in-site)
- Norway (Kjellmar Oksavik, online)
- Romania (Diana Desliu-Ionescu, online)
- Slovakia (Ivan Dorotovic, in-site)
- Spain (Consuelo Cid-Tortuero, online)
- Switzerland (Christian Monstein on behalf of A. Csillaghy, in-site)
- Turkey (Ali Kilcik, online)
- M. Blanc (International Meridian Circle Program, online)

Americo Gonzalez-Esparsa (UNAM, online), regional coordinator for America, chaired the contributions of national coordinators ordered as follows:

- Argentina (G. Molina, online)
- Brazil (Clezio De Nardin, in-site)
- Mexico (A.G-E)
- Perú (Walter Guevara-Day)
- USA (A. Sterling, online)

First meeting day finished by 18:15 with an invitation to all the presents to take a group picture at the UN Rotunda where posters were exhibited.

On February 6, 2024 at 9:04 AM NG welcomed the attendants and presented 2 added points to the agenda, related to ISWI international “sisters” institutions.

- Ishii Mamoru (ISES, in-site) presented the ISES, AOSWA, WDS, and NICT activities related to Space Weather.

- Yenca Migoya-Orué (ICTP, in-site) briefly introduced ICTP and presented its contributions in relation to ISWI: a low cost GNSS receivers network, capacity building/training and scientific projects. She invited ISWI community to check ICTP calendar and website for the next events and programs.

5. CA introduced the Asian regional coordinator, Richard Marshall (Australia) who chaired the Asian countries presentations as follow:

- Australia (Richard Marshall, online)
- China (LUO Bingxian, in-site)
- India (Nanditha Srivastava, online)
- Indonesia (Dahni Herdiwijaya, online)
- South-Korea (Kyung-suk Cho, online)
- Kazakhstan (Olga Kryakunova, online)

- Nepal (Narayan Chapagain, online). NC asked about his involvement in the organization of the next ISWI school in Nepal. NG clarified that he was considered as lecturer and that he will be contacted soon by the organizer, Nishu Karna.

RM thanked all national regional coordinators of Asian region.

CM invited Babatunde Rabi (UN-ARCSSTEE, in-site) to chair the African countries contributions. BR presented an overview of the African region poster and emphasized about the advances on international collaboration, instrument deployment, students exchange and increasing interest among African countries in space Programs. Then he presented most of the 15 contributions regarding facilities, MSc and PhD students training, etc on behalf of the national coordinators in the following order:

- Algeria (on behalf of new entry coordinator Omar Hammou Ali).
- Benin (on behalf of Joseph Adechinan), there were some difficulties in reaching the objectives due to funding issues. Students express interest in low atmosphere studies.
- Burkina Faso (on behalf of Jean-Louis Zerbo), they have now their own programs in Space Science (before students needed to study in Ivory Coast).
- Cameroon (coordinator Honoré Messanga).
- Congo (on behalf of Bienvenu Dinga), continuation of activities related to EIA studies, update on master and PhD students in SWx related programs and contribution to an African Space Policy development.
- Ethiopia (on behalf of Melessew Nigussie), new facilities in collaboration with international bodies were installed (meteors radar (IAP, Germany), all-sky imager (ISEE). There are issues when transmitting data due to the current civil war, also for the AMBER magnetometer (BC).
- Ghana (on behalf of new entry Solomon Otoo Lomotey), low cost GNSS (ICTP) receiver installed and working in Accra.
- Guinea (on behalf of Rene Tatu Loua), a summer school on Space Science will be held in Conakry in October 2024 for 20 students of the region (in French) with an international faculty team. BR underlined the support among the countries to face the difficulties when organizing these kinds of activities (e.g. cover students' tickets).
- Cote D'Ivoire (coordinator Frank Grodji), there is a need for equipment (most were discontinued due to the past civil war).
- Kenya (on behalf of new coordinator Joseph Olwendo), they are active in capacity building, new Observatory NORISK with INGV and ASI. They are organizers of the next ISWI Workshop in September 2024 with COSPAR, INGV and KSA.
- Morocco (coordinator Aziza Bouhnir) continues maintaining scientific facilities (FPI, RENOIR), there is interest in I-T coupling.
- Nigeria (BR) updated on operational and new facilities: low cost GNSS receivers (ICTP), low cost ionosonde, VT-NigerBEAR (80% completed). Training continues through ICELLI with international sponsors.
- Senegal (on behalf of Idrissa Gaye), the active involvement on aviation continues, together with existing collaboration with ASECNA (JPO), GIRGEA and CORS network.
- Tunisia (new coordinator Ahmed Ammar, online) reported results obtained with AWESOME VLF receiver station. There is collaboration with Algeria.
- Uganda (on behalf of Patrick Mungufeni) reported main developments that included the introduction of SWx courses in the university's curriculum. PM organized a workshop in Space Data Science Analysis for students of the region (sponsored by SCOSTEP).

CA pointed out that even though there are advances in the continent, there are still many things to do: deploying tools and low-cost instruments can be a starting point, more help from developed countries is needed.

6. ISWI Instruments update (Shing Fung, in-site). SF chaired the instruments update of the different networks given by the person in charge:

a) AWESOME (Morris Cohen)

b) GIFS, AMELIE (DB, in-site)

c) LISN (SF on behalf of Cesar Valladares)

d) MAGDAS (Kirolosse Girgis, in-site)

e) OMTIS

f) RION (Ryan Hamel on behalf of Ivan Galkin, in-site)

g) SCINDA (Keith Groves, in-site), indicated good results from low cost GNSS receivers and expressed to be optimistic to consider them as an affordable alternative to repopulate uncovered regions. SCINDA databased transitioned to be open access.

e) SEVAN (SF on behalf of A. Chilingarian).

SF asked for updates about AMMA, CIDR and RENOIR and for possible discontinuity in ISWI network since PI's are not answering to emails.

CA explained that AMMA was a IHY campaign already finished, data are available for atmospheric studies and will provide the link. Regarding RENOIR, CA and BR indicated that there are some stations hosted by Morocco. NG will contact RENOIR PI, Prof J. Makela, and suggested keeping AMMA as legacy instrument on the website.

f) e-CALLISTO (Christian Monstein, in-site) updated about lost and new installed stations. He explained that due to lack of funding, scientists interested in new stations should pay for them. He also tried to contact people interested in organizing a technical workshop, but no interest was shown so far. KG acknowledge CM efforts and asked about the possibilities to give continuation to CALLISTO network. DB said that DLR would take care of the continuity (with some limitations, continuous data from a core of 4 stations will be guaranteed) and will set new instruments. KG asked about 2023 solar burst events that seemed to interfere with airplane controllers. CM explained that these events happened once a year but in general rare and showed in his presentation an example from the Uruguay station. NS indicated that the Uruguay case shown was on December 14, 2023. NG pointed out that those kinds of events are called "dragon-king" events and that it would be interesting to identify their effects in the 1 – 1.5 GHz frequency range.

SF presented the report from Data sub-committee, starting with the present situation of members and invited those interested to participate. Efforts are needed to: make ISWI data policy (SPASE) more visible and have a better track of the impact of data usage in ISWI, after feedback gained during last ISWI workshop (held in June 2023 in Vienna). SF suggested to highlighting scientific publications that make use of the data network in the ISWI Newsletter.

SF informed the last ISWI data policy version (1.3.9a) updated on January 5, 2024. He reminded that SPASE is a Metadata Registry, thus data are more discoverable and accessible for the broader community. So far AWESOME and eCALLISTO are registered.

There was a discussion (CA, NG, NS) regarding the use of publications archives like arXiv, Research Gate, Google Scholar to list and share papers. NG suggested the preparation of paper nuggets and the formation of an editorial committee.

10. UN/Germany ISWI workshop and UN-ISWI activities (DB, Sharafat Gadimova, in-site). DB announced and invited ISWI community to attend the next UN/Germany for ISWI Workshop to be held in Neustrelitz on 10-14 June 2024. SG indicated that deadline for applications is March 3, 2024, and communicated that arrangements with Springer editorial have been done to publish the papers presented. NG added that sending a manuscript draft together with the application is a pre-condition to get the funding to participate in the workshop.

AOB (NG)

The presentations will be available in ISWI website.

The meeting finished by 13:00; the in-site attendants were invited to view the posters exhibited in the Rotunda.

Minutes taken by Y. Migoya-Orué.

AGS Newsletter

Welcome to AGS Newsletter

by EDITOR : ADERONKE OBAFAYE



Are you looking for a platform to share your news? AGS Newsletter is your best choice. We encourage you to announce your meeting reports, conferences, workshops, job openings, scholarships, and news related to Astronomy, Earth and Space Science.

1. NEWS OF AGS PRESIDENT'S RECENT AWARD



Professor Obrou K. Olivier has been awarded the 2nd price of the National Price of Excellency 2023 Edition as best Professor and research scientist. This award recognizes his research accomplishments and professional experience. His commitment to the advancement of space science in the continent and the Ivory Coast in particular.

2 APPLICATION FOR THE E-JUST TICAD8 AFRICAN SCHOLARSHIP

Dear Colleagues, it is our greatest pleasure to announce the 2024 Post-graduate International admission of TICAD8 African Scholarships including (Space Environment Program). E-JUST TICAD8 African Scholarship

is available for all African students (Non-Egyptians) who need to obtain M.Sc. or Ph.D. degree in Engineering/Basic and Applied Sciences (BAS).

Scholarship Covers:

- Flight Tickets
- Tuition Fees
- Accommodation
- Monthly Stipend
- Medical Insurance

The Online Application is available on E-JUST website till the 10th of February 2024. For more information about the admission requirements, available scholarships and the online application, Kindly check the following link:

Basic and Applied Science Institute (BAS); Space Environment Program: <https://www.ejust.edu.eg/int-admission>

Please feel free to share this information with anyone who might be interested. For questions please contact;

Ayman M. Mahrous, Ph.D. ayman.mahrous@ejust.edu.eg.

Space Environment Research Lab (SERL).

Institute of Basic and Applied Science (BAS).

Egypt-Japan University of Science and Technology.
New Borg El-Arab City, 21934 Alexandria, Egypt.

3. UNITED NATIONS/GERMANY WORKSHOP ON THE INTERNATIONAL SPACE WEATHER INITIATIVE, 10-14 JUNE 2024, NEUSTRELITZ, GERMANY

To whom it may concern, The United Nations Office for Outer Space Affairs is pleased to announce that the online application for the United Nations/Germany Workshop on the International Space Weather Initiative (ISWI): Preparing for the Solar Maximum, 10 – 14 June 2024, Neustrelitz, Germany is now open on the website of the Office at:

<https://www.unoosa.org/oosa/en/ourwork/psa/schedule/2024/2024-iswi-workshop.html>

Further information on the workshop can be found in the Information Note available at:

https://www.unoosa.org/documents/pdf/psa/activities/2024/ISWI2024/InfoNote_ISWI_2024.pdf

Direct link to the online application
(Deadline: 3 March 2024):

<https://forms.office.com/e/NJCqzpzDiZ>

Best regards,
Patrick

Patrick Gindler

Executive Secretariat of the International Committee on Global Navigation Satellite Systems (ICG) United Nations Office for Outer Space Affairs (UNOOSA) Vienna, Austria

patrick.gindler@un.org

www.unoosa.org

4. POSTDOCTORAL RESEARCH POSITIONS IN THE PROJECT ON "ELECTRODYNAMICS OF IONOSPHERE, SPACE PHYSICS, AND SUN-EARTH RELATIONSHIP"

Applications are invited for two (2) Postdoctoral fellowship positions to work on the studies related to ionospheric electrodynamics and irregularities of the F-layer, E-layer, and Sporadic E during quiet and disturbed periods. Selected candidates will be working with Dr. Paulo Roberto Fagundes and Dr. Marcio Tadeu de Assis Honorato Muella, researchers at the "Universidade do Vale do Paraiba-UNIVAP", Brazil. This project is funded by the Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), Brazil. The positions are for 12 months/year, with an initial term appointment of one year (12 months), renewable depending on satisfactory performance. We anticipate that the joining date will be no later than May 2024, but an earlier joining will be considered. Our research group has a strong international presence and the UNIVAP is located in Sao Jose dos Campos, the state of Sao Paulo, Brazil.

Required Qualifications: A Ph.D. or foreign equivalent in Space Physics and physics of the ionosphere or a

related field is required. The doctoral degree must have been obtained within the past 7 years. The successful candidate for this position will have a strong background in physics, mathematics, and/or computational; programming experience in at least one general-purpose language; demonstrated written and verbal communication skills; and the ability to work both independently and collaboratively with individuals from a wide spectrum of backgrounds. Emoluments: Monthly fellowship of Brazilian Reais R\$ 9,047.00. A limited contingent amount shall be available for attending conferences during the fellowship period. Applicants should send an e-mail to fagundes@univap.br with the following documents on or before March 30, 2024.

- (1) a letter of interest describing their skills and experience
- (2) a curriculum vitae including a list of publications
- (3) a research project (maximum 5 pages)
- (4) Proof of the Ph.D. degree, obtained within the last 7 years.

5. SCIENTIST OF THE MONTH: DR CYNTHIA UMUHIRE



AGS congratulates Dr. Cynthia Umuhire (University of Rwanda) who successfully defended her PhD

thesis "Characterization of Coronal Mass Ejections using Solar Radio Bursts" on January 23! Cynthia is part of a ISP supported physics group in Rwanda and she is the first female to obtain a PhD in Astro/space science in Rwanda!

POEM OF THE MONTH: THIS NEW YEAR

by ALEENA

FEBRUARY 2, 2024

Even during the worst of times
When I feel the years go slipping
by Life seems rife with possibilities
When the New Year arrives.

Buoyed by hope at the New Year
coming I feel renewed and want to
start living. This year I'll travel and
see the sights, I'll be bold, I'll be
courageous.

I'll reach out and go beyond. I
might even try being flirtatious! I'll
be a new fish in a brand-new pond.
This new year I'll be brave and I'll be
strong.

Even though time does fly, I won't
let this year be wasted. I'll look forward
to new adventures And be open
to opportunities I am graced with.

I'll learn and laugh and have good
times. I won't dwell on years gone by.
I'll start each new morning a brand-
new way. I'll pretend it is New Year's
Day!

Aleena. "This New Year." Family
Friend Poems, February 24, 2011.
<https://www.familyfriendpoems.com/poem/this-new-year>



004



SPACE WEATHER ACTIVITY WITHIN THE GIRGEAA Europe-Africa-Asia

Christine Amory-Mazaudier

*Sorbonne Université, Ecole polytechnique, Institut Polytechnique de Paris, Université Paris Saclay,
Observatoire de Paris, CNRS, Laboratoire de Physique des Plasmas (LPP), 75005 Paris, France*

christine.amory@lpp.polytechnique.fr

IMCP Yanqi Forum I/ Beijing, 14-17 September 2023

OUTLINE

- International Projects IEEY, IHY, ISWI
- Physics of Low Latitudes (equatorial fountain , Equatorial electrojet EEJ, plasma irregularities)
- Magnetic quiet time
 - EEJ, ionospheric ionization, plasma irregularities
- Effect of Solar Flare
- Effect of SSW on the Sq field
- Disturbed magnetic time
 - Coupling between High and low latitudes
 - CME, HSSW effects on ionization and plasma irregularities
 - PPEF (DP2) and DDEF (Ddyn) physical process
- Conclusion

United Nations Space Science Initiative [1991-2012]

- 1992-1994: IEEY International Equatorial Electrojet Year – IAGA => capacity building
- 1995 : GIRGEA – scientific network Europe Africa

www.girgea.org

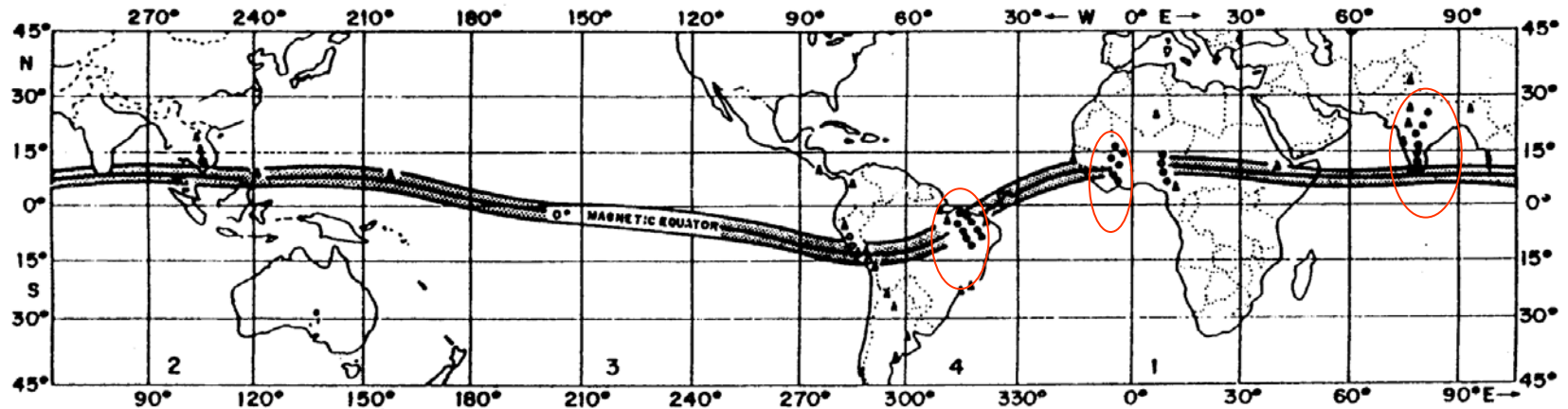
- 2005-2009: IHY International Heliophysical Year
- 2010-2012 : ISWI International Space Weather Initiative
- Since 2012 : ISWI network in United Nations

www.secretariat.org

77 National coordinators
(11 in GIRGEA among 20 in Africa)

Amory-Mazaudier, C., S. Radicella, P. Doherty, S. Gadimova, R. Fleury, B. Nava, E. Anas, M. Petitdidier, Y. Migoya-Orué, K. Alazo, and K. Shiokawa, Development of research capacities in space weather: A successful international cooperation, J. Space Weather Space Clim. 2021, 11, 28, Published by EDP Sciences 2021, <https://doi.org/10.1051/swsc/2021006>

International Equatorial Electrojet Year 1992-1994



Brazil, 1992



LEADERS : M.A. Abdu (Brazil)/ America, B.A. Arora (India)/Asia, A. Onwumechili and S. Ogunade (Nigeria)/Africa, O. Fambitakoye (Niger)/West-Africa/Europe

Dr R. Gendrin was the President of the IAGA 1987-1991.
 He created a French national commission for the
 International Equatorial Electrojet Year in 1990

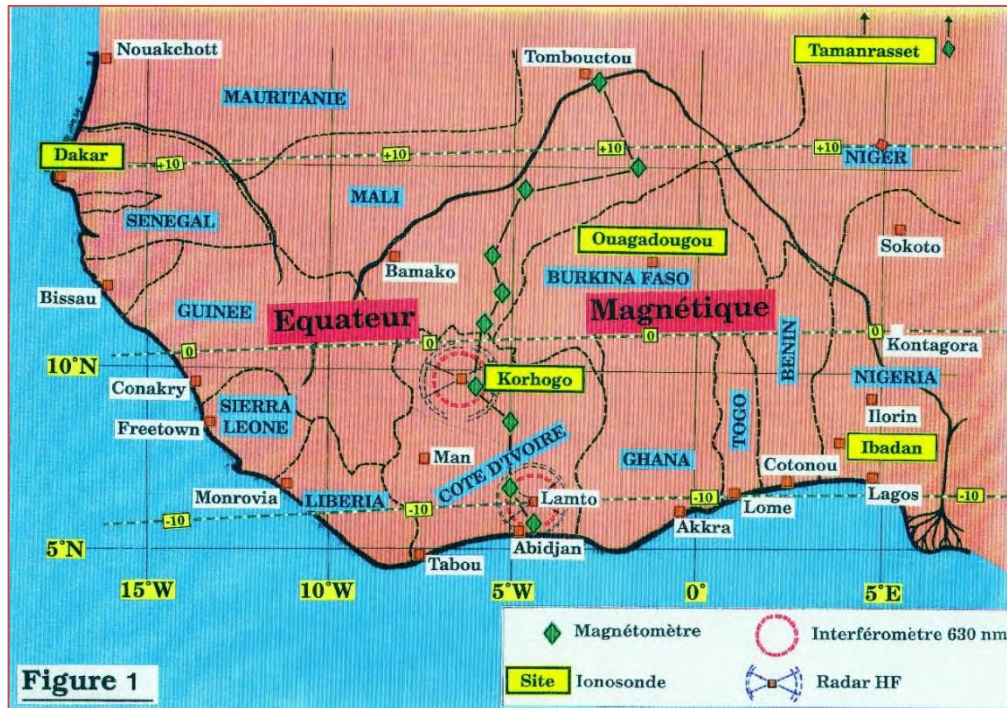
↓
 EUROPE-AFRICA in 1991

Africa : Algeria Ivory Coast, Mali, Nigeria, Senegal

Europe : England, France, Spain

↓
 IGRGEA

International Group of Research in Geophysics Europe Africa



Magnetotelluric station
 H,D,Z, Ex,Ey components

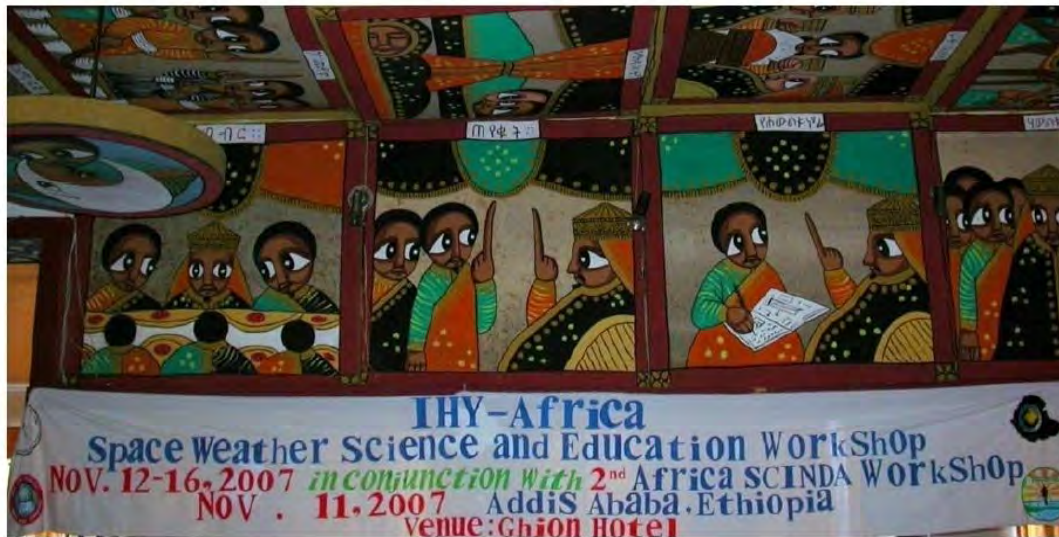


International Heliophysical Year 2007-2009

a turning point in the participation of African countries

WHOLE AFRICA

IHY-Africa Space Weather Science and Education Workshop Report



African Countries Represented (20): (72 representatives)

Algérie
Bénin
Burkina Faso
Cameroon
Cape Verde
Côte d'Ivoire
Démocratique République du Congo
Egypt
Ethiopia
Kenya
Liberia
Libya
Mozambique
Namibia
Niger
Nigeria
République du Congo
Sénégal
South Africa
Uganda

Other Nations Represented (9): (56 representatives)

Australia
Austria
Canada
France
India
Italy
Japan
UK
USA



The Ethiopian Physical Society

in conjunction with

Addis Ababa University and Bahir Dar University



Request of the international community: to train in French



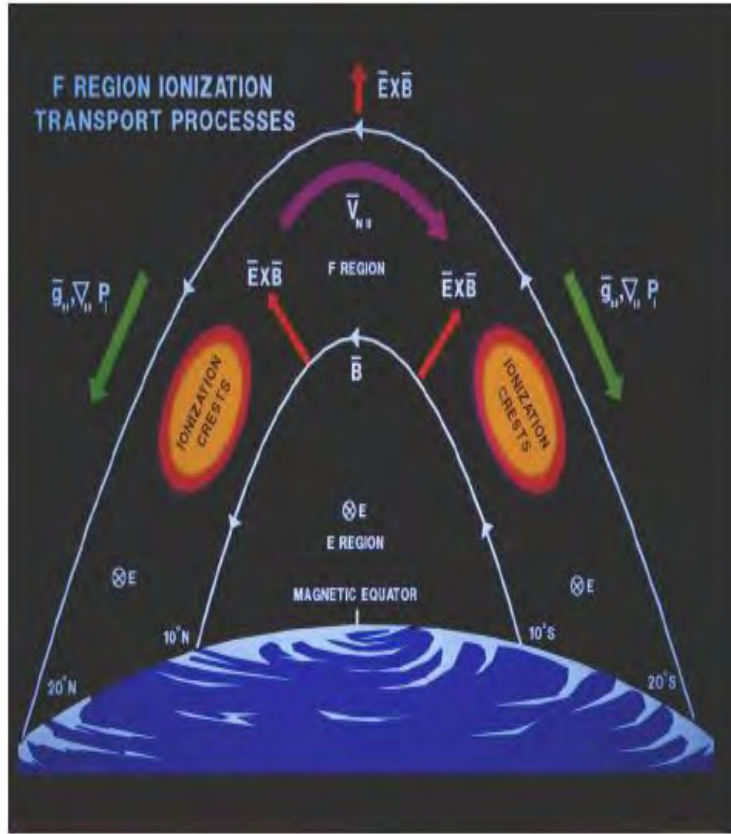
ISWI project 2010-2012

ISWI network: <http://www.iswi-secretariat.org>



1. Distribution of scientific tools
2. Training schools / GNSS and Physics of the Sun Earth's System
3. PhD => position in the country
4. Curricula in Universities

PHYSICS of Low latitudes

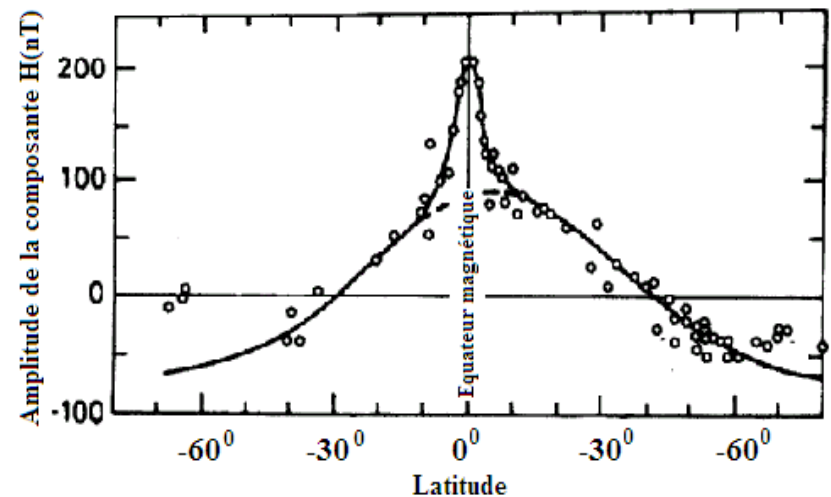


Equatorial Fountain

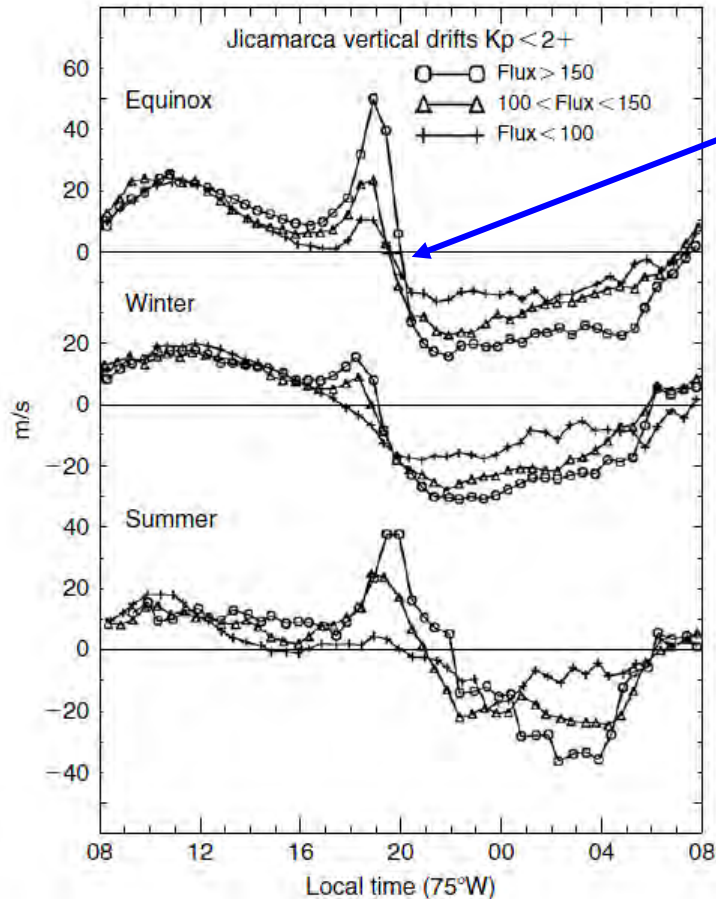
Eastward electric field \Rightarrow moves up
 Westward electric field \Rightarrow moves down

The Equatorial Electrojet (Jacobs, 1990)

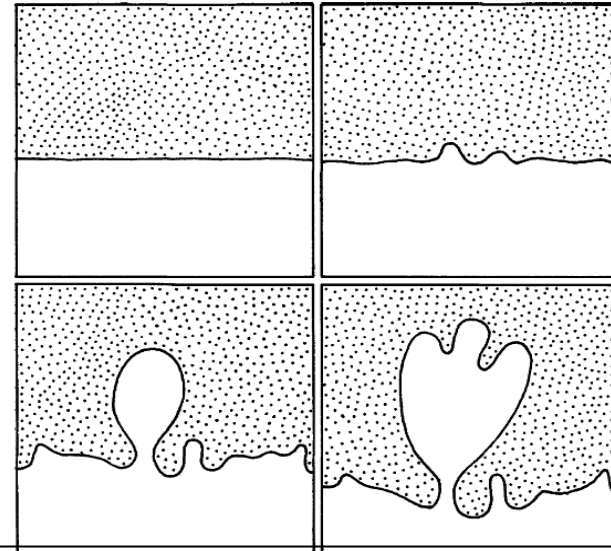
At equator the Earth's magnetic field is horizontal. During the daytime the east–west electric field and the north–south geomagnetic field produce the lift of plasma in E ionospheric region by **vertical $E \times B$ drift**. At higher altitudes in F region, the plasma diffuses downward along the geomagnetic field lines into both hemispheres under the influence of gravity and pressure gradients, this produces the EIA which is characterized by an electron density trough at the magnetic equator, and two crests of enhanced electron density at about $\pm 15^\circ$ magnetic latitude.



PRE : Pre Reversal Enhancement



Equatorial Plasma Bubbles
 Magnetic quiet time
ExB drift 25m/s \leftrightarrow 1 mV/m



Sequential diagram, from photos, of the development of a Rayleigh Taylor instability. The heaviest fluid [... ..], over a lighter and more transparent fluid (Kelley, 2009)

Average vertical plasma velocities at Jicamarca during the equinox (March-April, September-October), winter (May-August), summer (November-February) for 3 solar flux values (Fejer, et al., Average vertical and zonal F region drifts over Jicamarca, Journal of Geophys. Res, Vol. 96, N° A8, page 13901-13906, 1991)

Equatorial plasma bubble s: a Review d'Archana Bhattacharyya in special issue ionospheric and magnetic signatures of Space Weather events https://www.mdpi.com/journal/atmosphere/special_issues/Space_Weather_Events

Scintillations a regular phenomenon

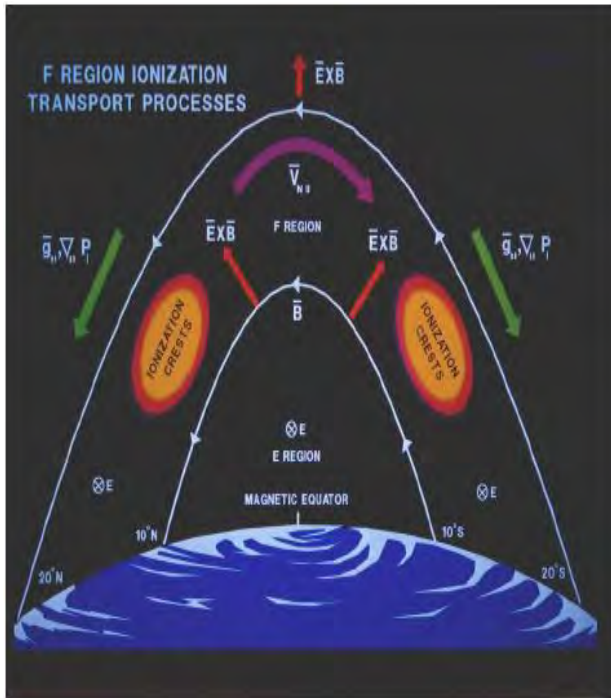
Ionospheric scintillation is the rapid modification of radio waves caused by small scale structures in the ionosphere : **Plasma Instabilities**

S_4 and ROTI indices derived from GNSS data

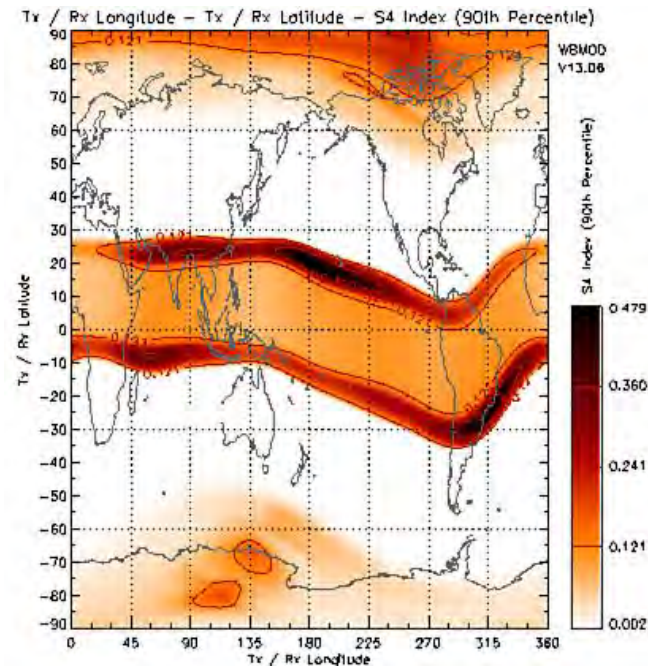
$$S_4 = \sqrt{\frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}}$$

I : intensity of the signal

$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$



Equatorial Fountain

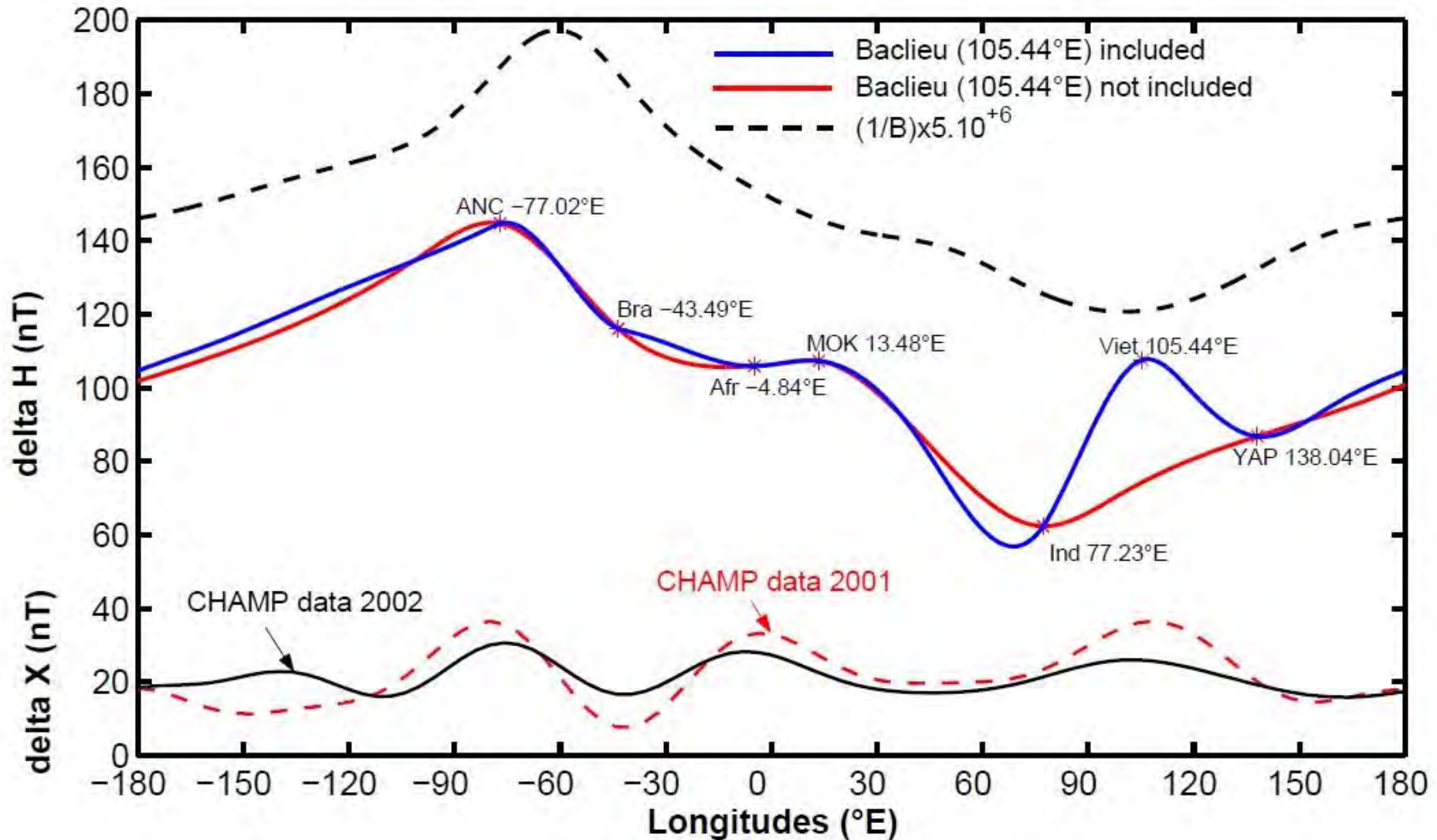


Scintillation index at GPS L1 (1575.42 MHz) assuming constant local time 23.00 at all longitudes (from <http://www.sws.bom.gov.au>)

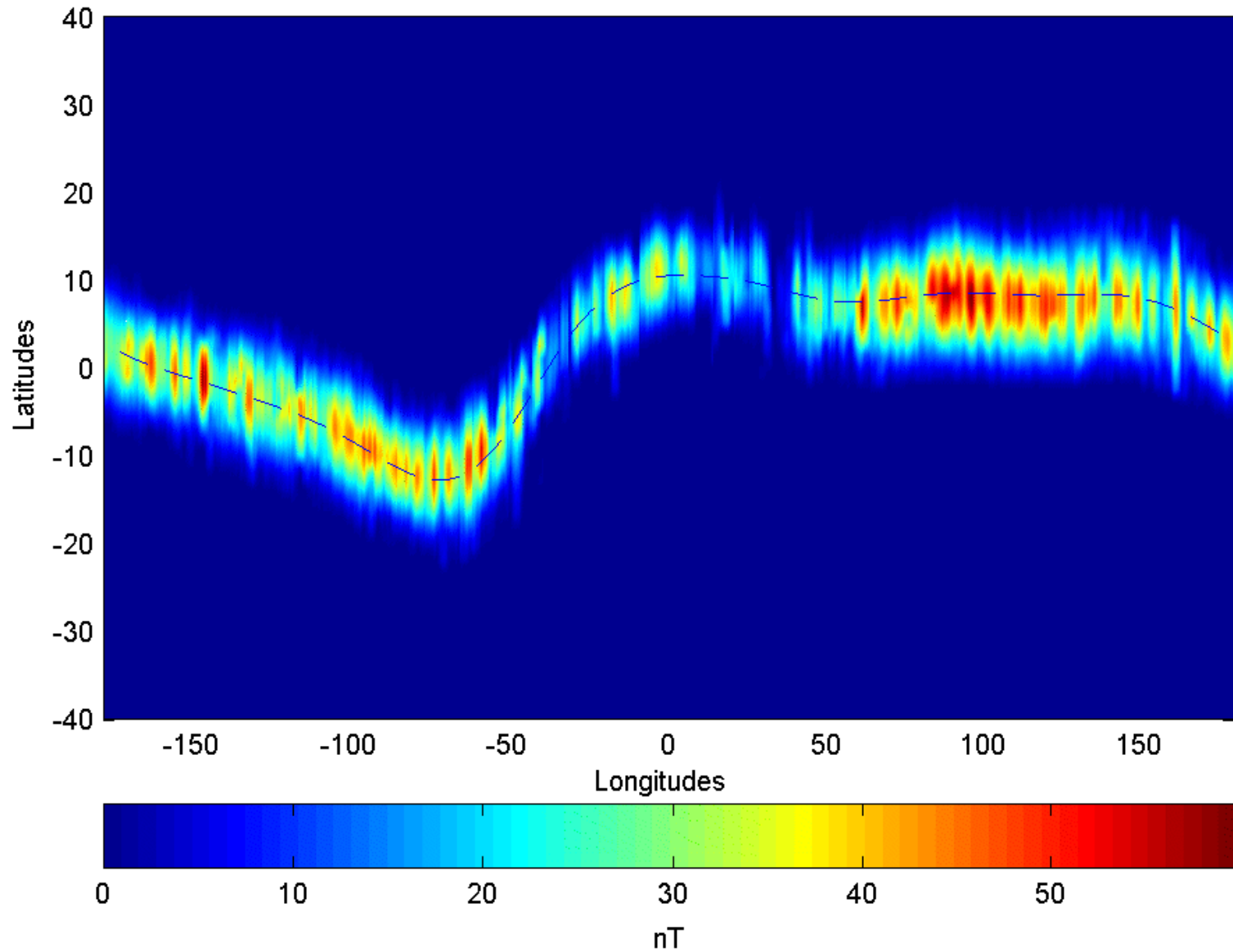
Fields of Research in the GIRGEA (in blue presented in this talk)

- *Equatorial Electrojet
 - *Impacts of the Sun on Ionospheric ionization
 - *Telluric electric field due to solar flare
 - *Effect of a SSW on Sq Field
 - *Electrodynamics coupling between High and low latitudes
 - *Sq field: regular variations of the earth's magnetic field
 - *Long term variations of ionospheric parameters
 - *Solar wind and geomagnetism
 - *Relations between solar magnetic field and equatorial ionosphere
 - * Impacts of high energy particules on satellite
 - * Dynamics of the ionosphere with HF radar
 - *Study of the atmosphere with interferometer
 - Monsoon
 - Gravity waves
 - *Sismology
 - *Models IRI, Nequick, TIEGCM etc...
- etc....**

Longitudinal variation of the EEJ with ground and satellite data



CHAMP SATELLITE EEJ MAGNETIC SIGNATURE AT NOON - 2002

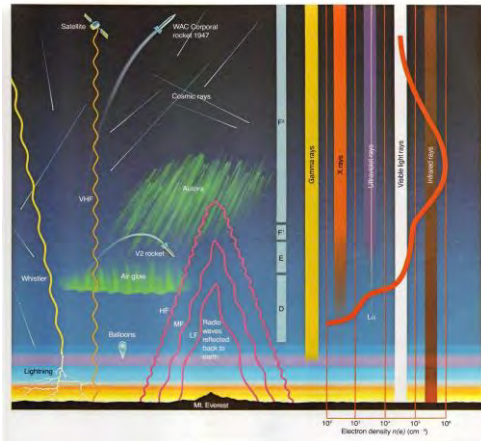
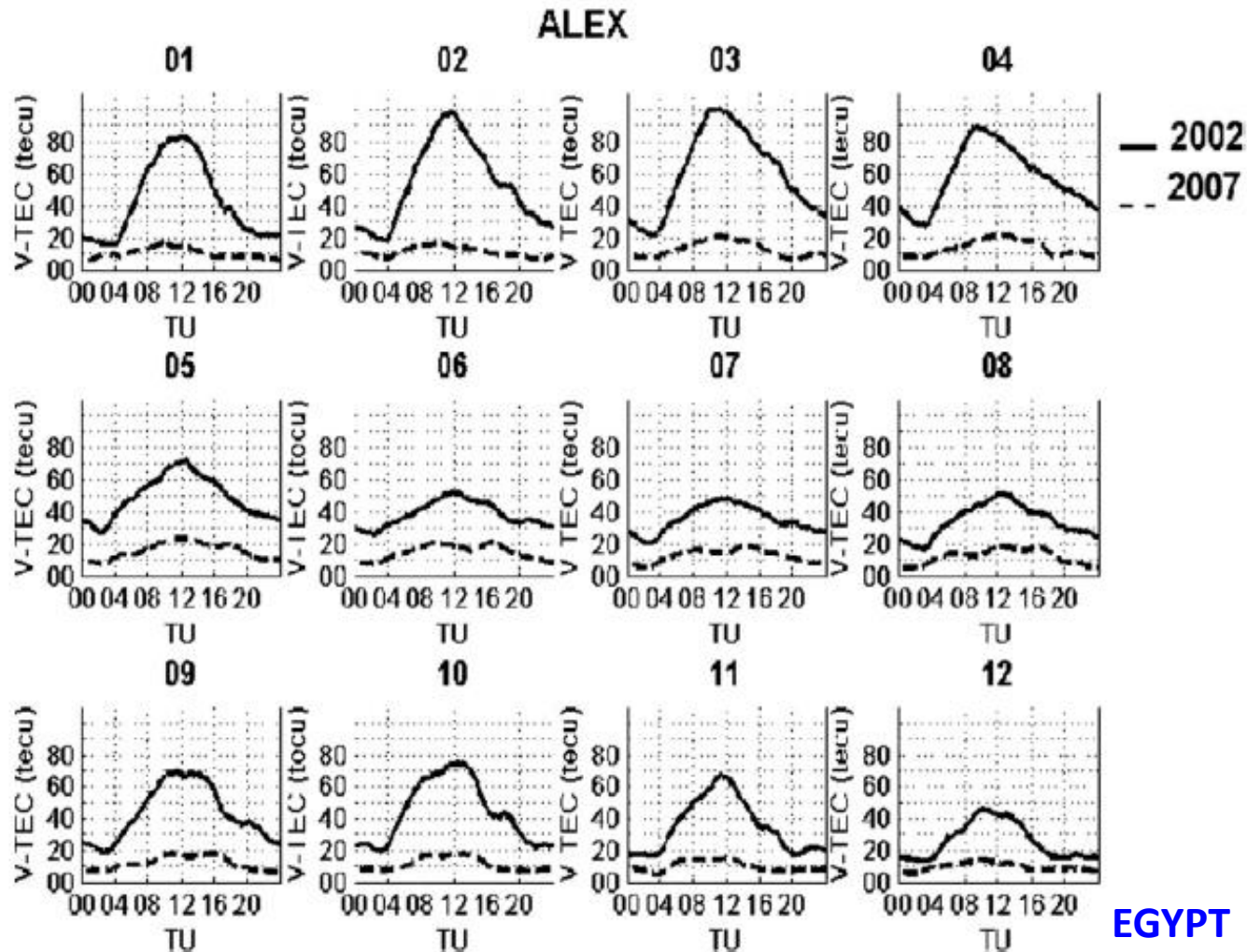
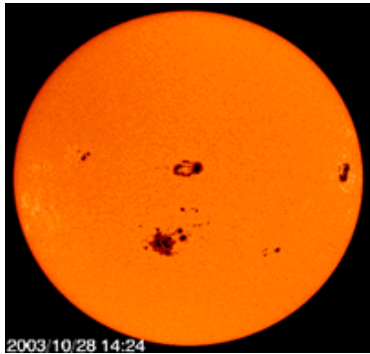


Le Truong Thanh, Le Huy Minh, Ha Duyen Chau, V. Doumouya, Y. Cohen, Anomaly of equatorial electrojet (EEJ) and its seasonal variation, *Journal of the Earth's Sciences*, 2011, Vol T33(1), pp 29-36.

Diurnal variations of VTEC for 2 years 2002 and 2007

2002 : maximum of sunspot cycle 23, 2007 : minimum of sunspot cycle 23

Study made in all the countries of GIRGEA with GPS receivers







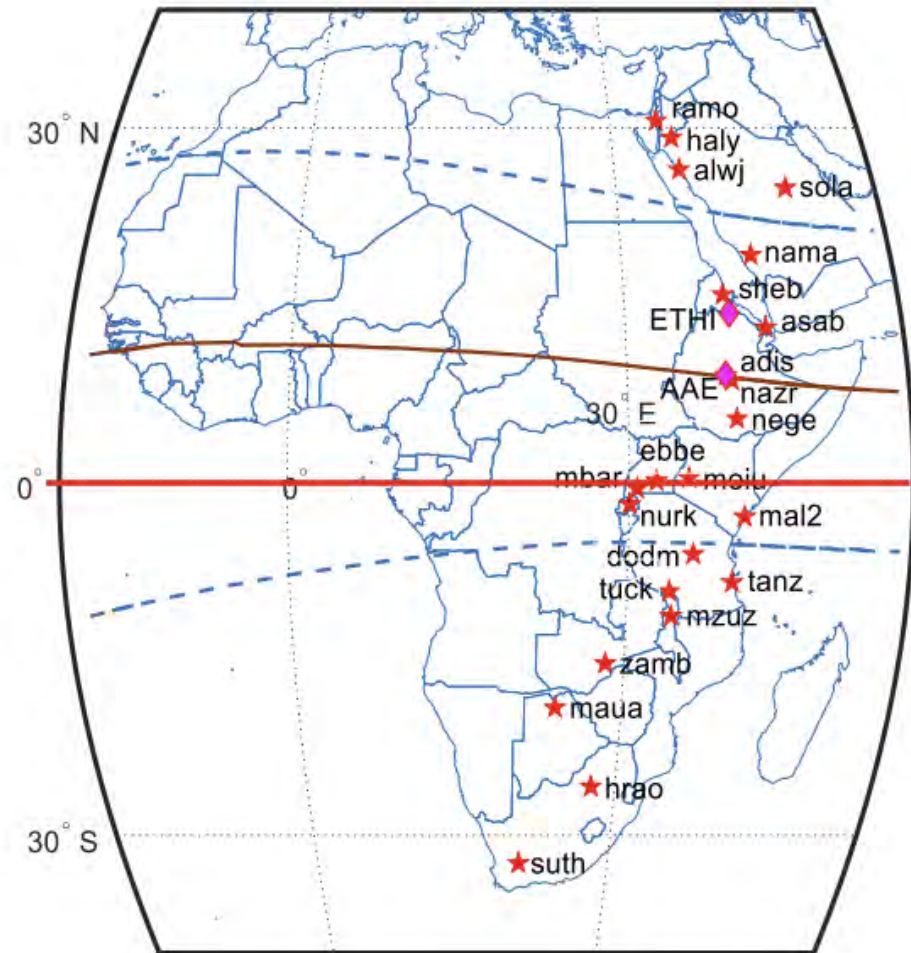
Regular Solar Radiations
UV, EUV, X rays

EGYPT

STUDY of IONOSPHERIC IRREGULARITIES IN EAST AFRICA using the ROTI index derived from the TEC

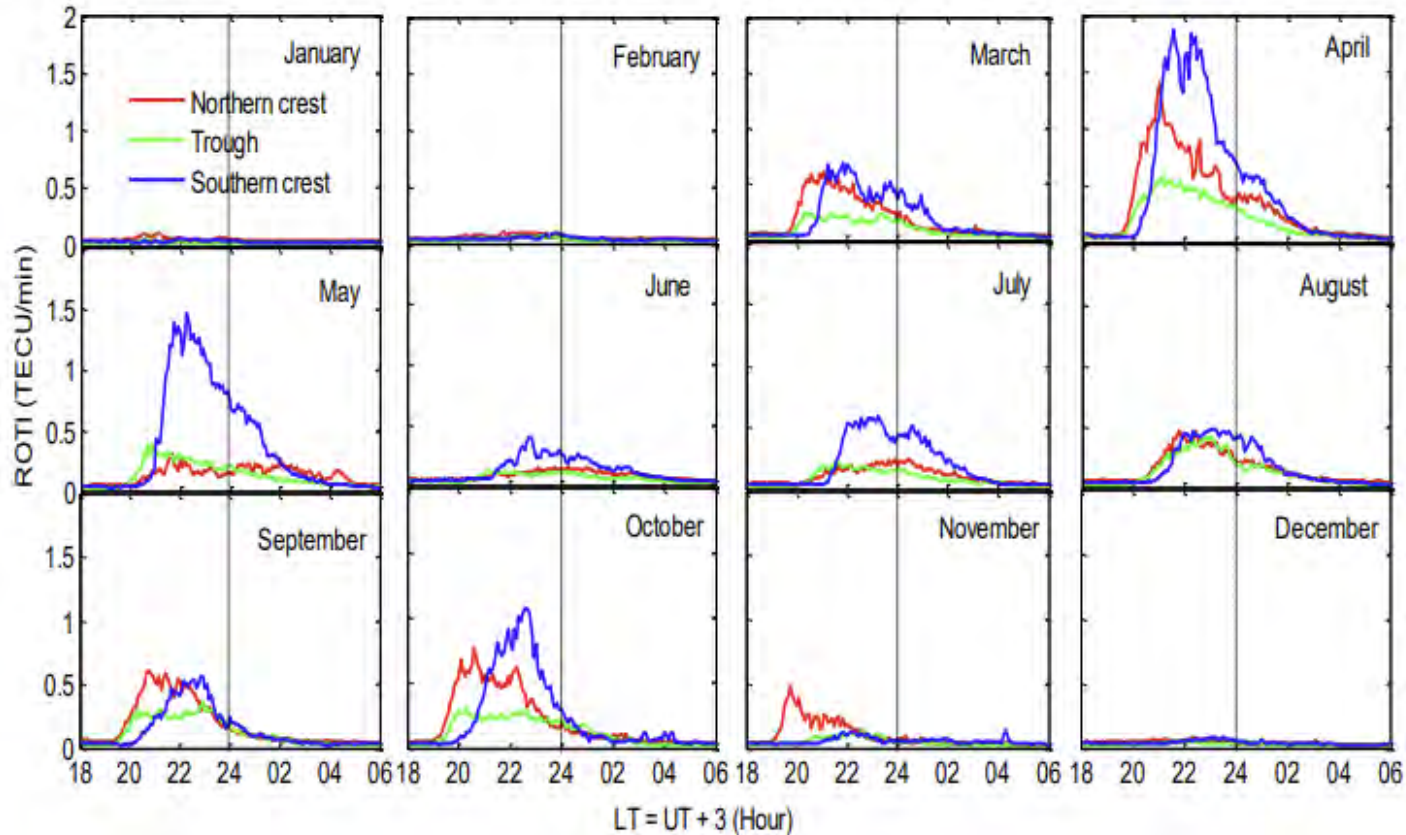
$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$

-  Magnetic equator
-  ± 15° dip latitude
-  GNSS station
-  Magnetometer station



Amaechi, P.A., E.O. Oyeyemi, A.O. Akala, E.O. Falayi, M. Kaab, Z. Benkhaldoun, C. Amory-Mazaudier, Quiet-time ionospheric irregularities over the African Equatorial Ionization Anomaly (EIA) region, Radio Science, 55, e2020RS007077. <https://doi.org/10.1029/2020RS007077>

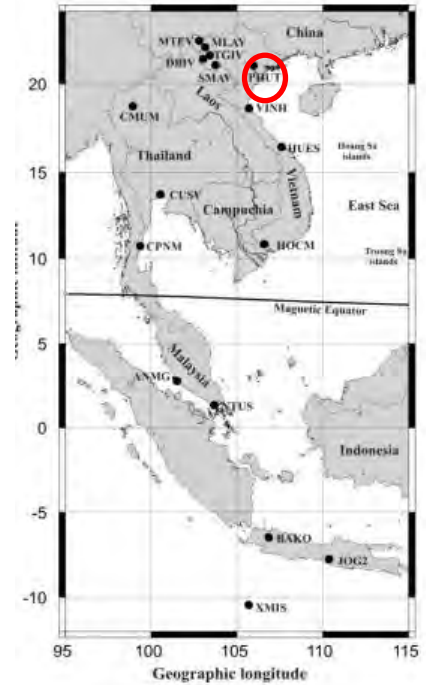
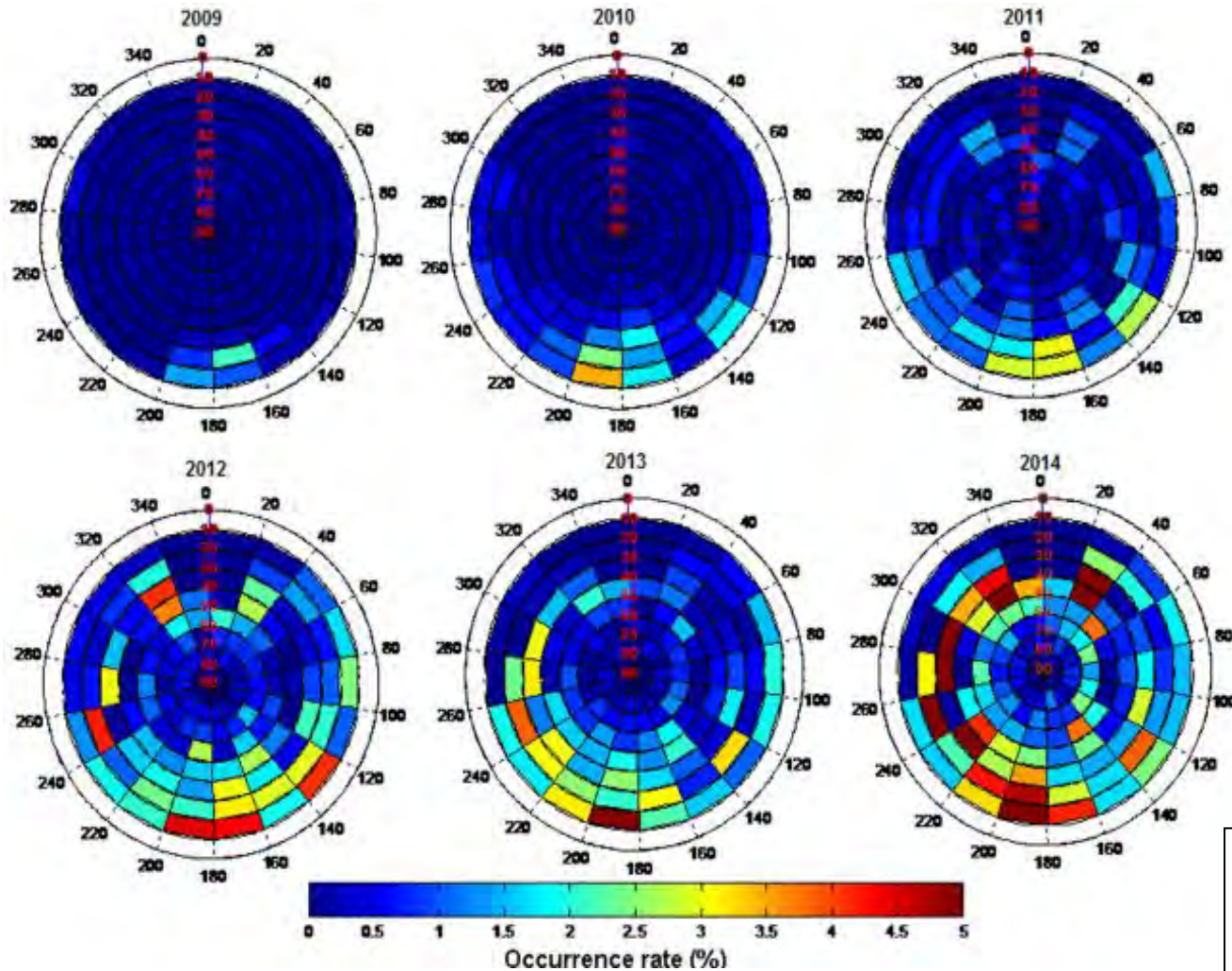
Asymmetry between the Northern and Southern crests of the EIA due to the configuration between the magnetic equator and the geographic equator (influence of the neutral wind)



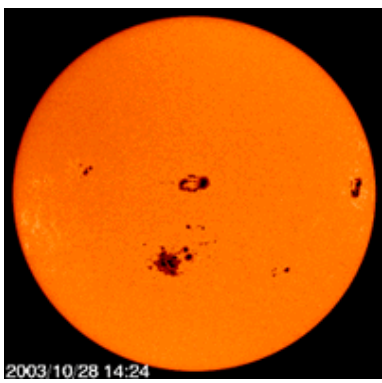
Monthly mean variation of quiet time irregularities over Northern crest (red line), trough (green line) and Southern crest (blue line), in 2013 (figure 5 of Amaechi et al., 2020)

The directional distribution of scintillations observed from PHUT station during 2009–2014.

VIETNAM



$$s4 = \sqrt{\frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}}$$



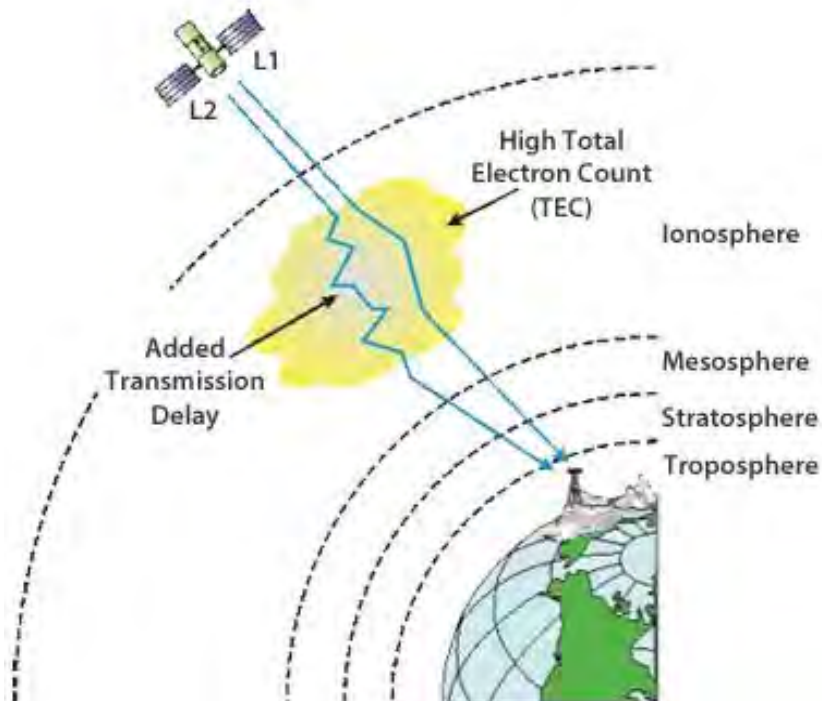
SOLAR FLARE (8')

Disturbed solar electromagnetic emission

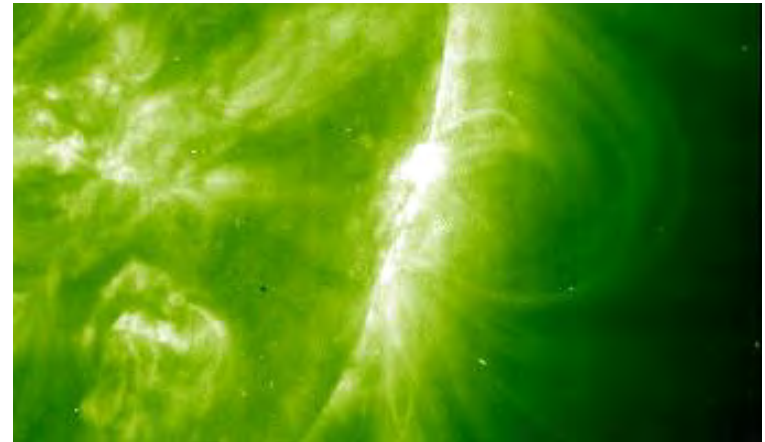
Physical processes

extra Solar Radiation => Photo ionisation

The extra X-rays emitted by the solar Flare directly ionize the atmosphere and thus increase the electron density and the TEC.



Big solar flare of November 2003



SOHO data

Geo-electric field variations due to the solar flare on 04 April, 1993

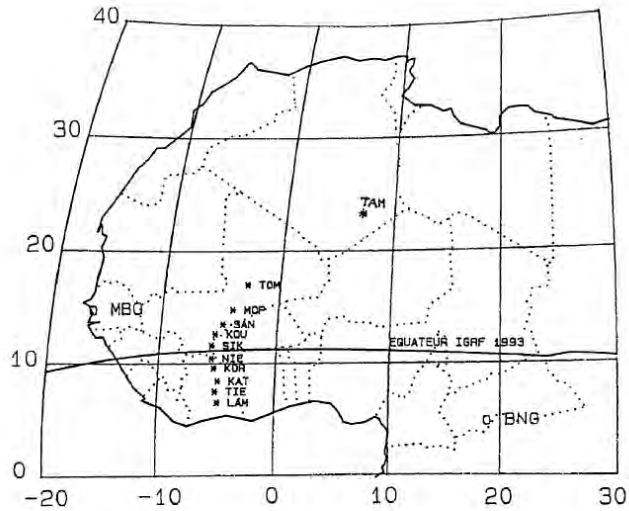
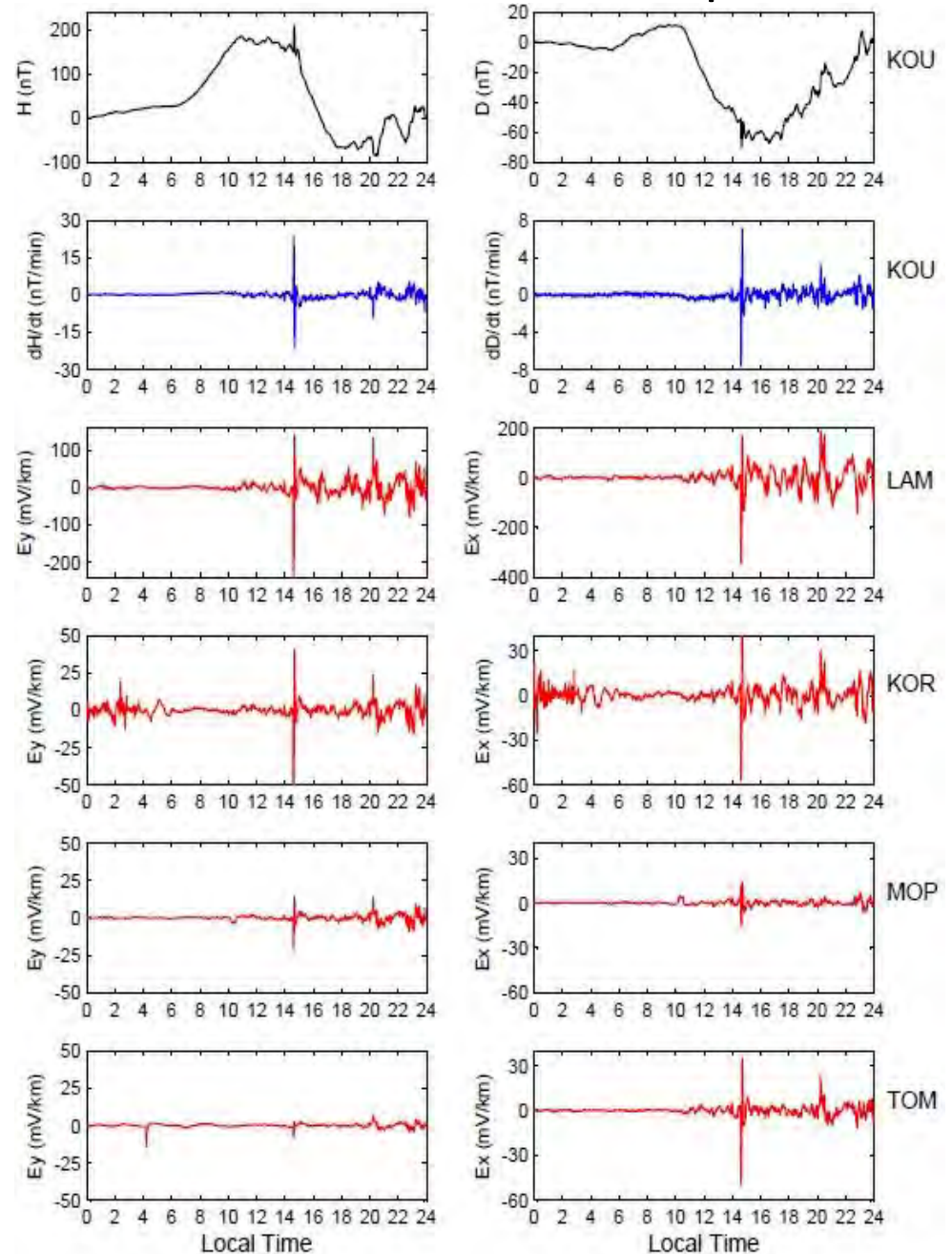


Fig. 1. Experimentation sites of the African sector during the IEEY project.

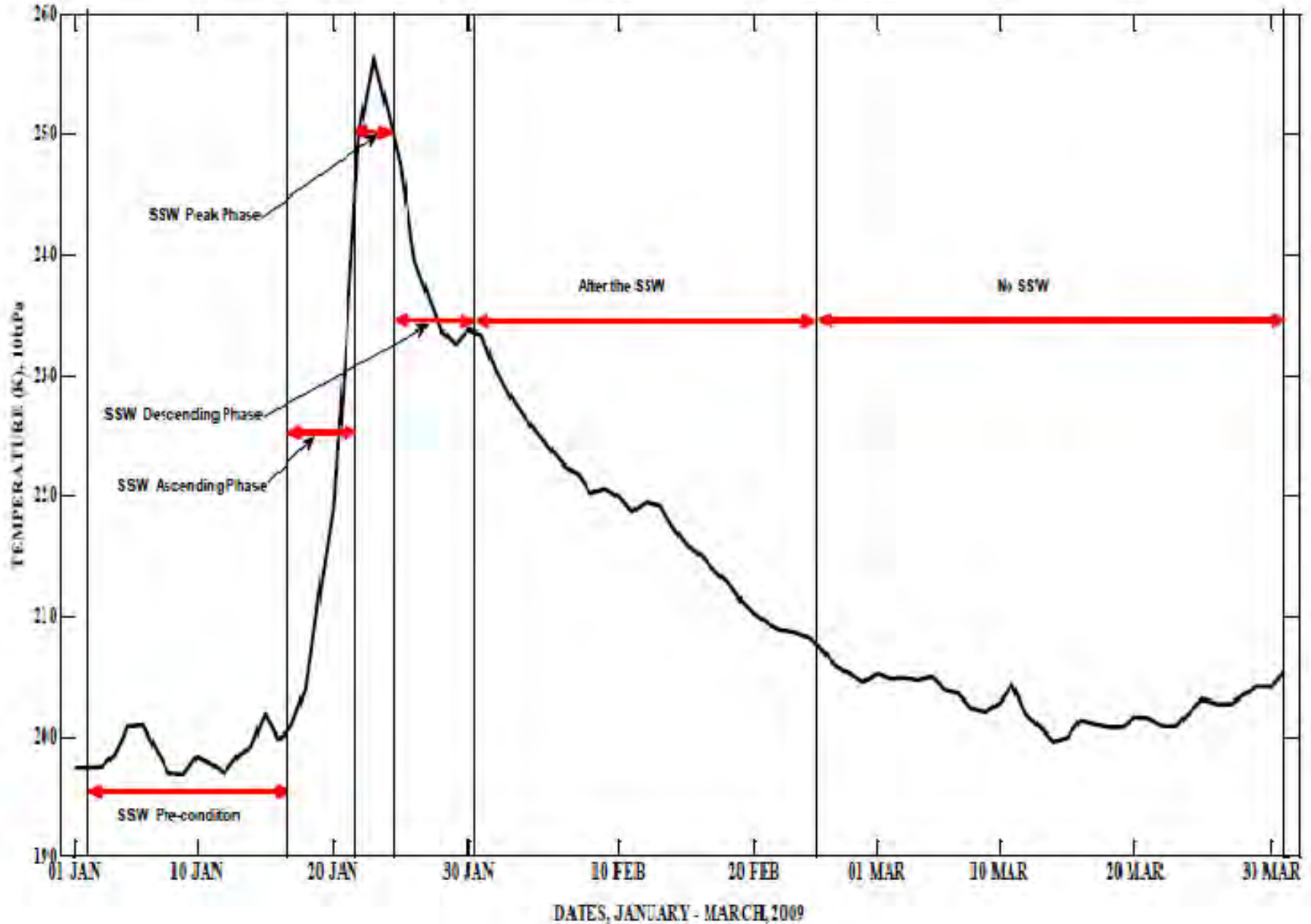
Magneto telluric station



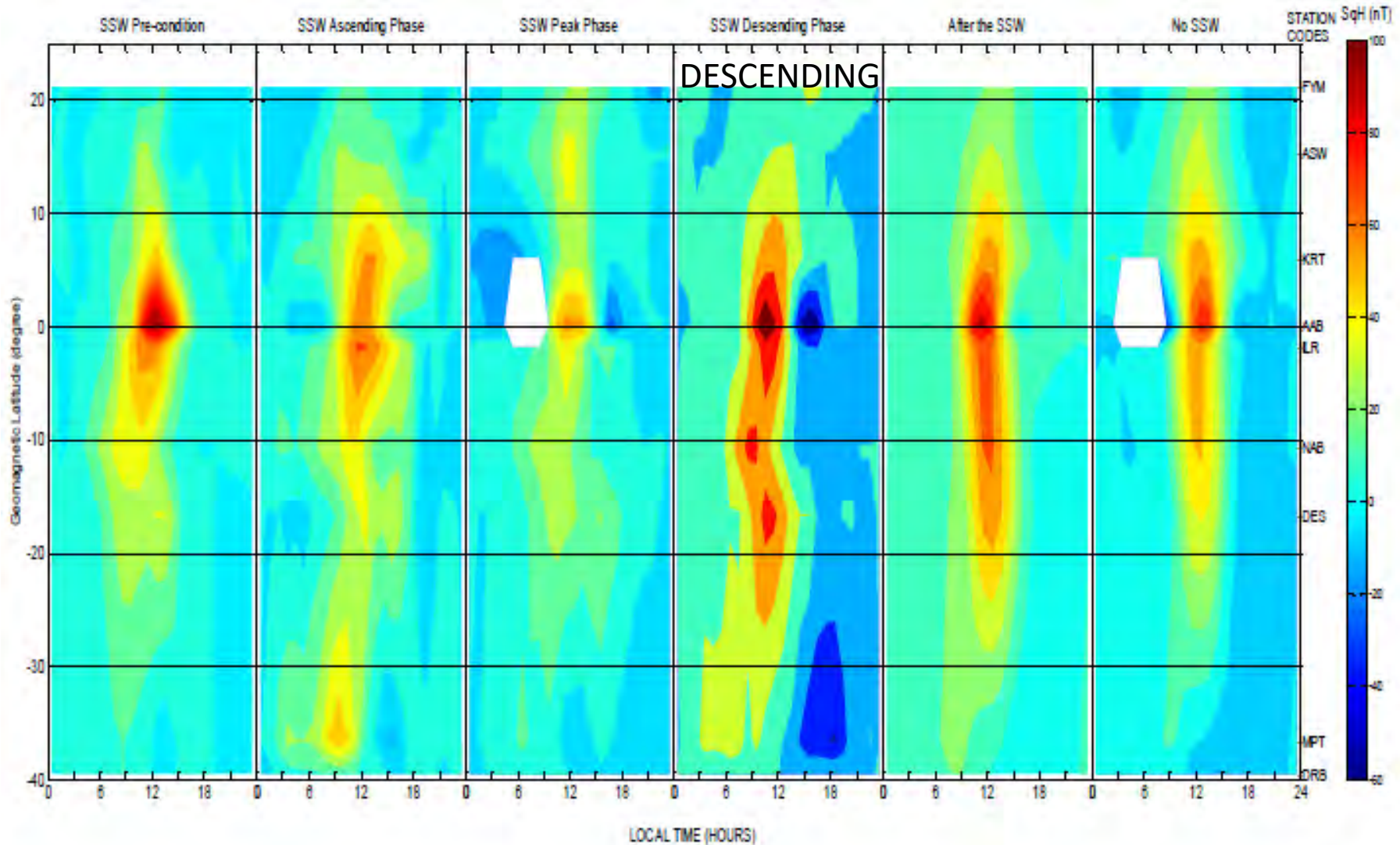
V. Doumbia, K. Boka, O. D. F. Grodji, C. Amory-Mazaudier, and M. Menvielle, 2017, Induction Effects of Geomagnetic Disturbances in the Geo-electric Field Variations at Low-latitude, *Ann. Geophys.*, 35, 1-13



Stratospheric warming/temperature at 32 km



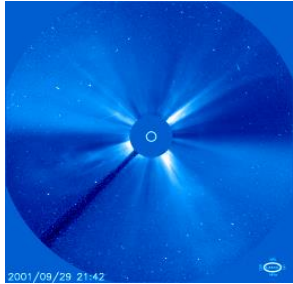
EQUATORIAL ELECTROJET : EFFECT OF A SSW => CEJ



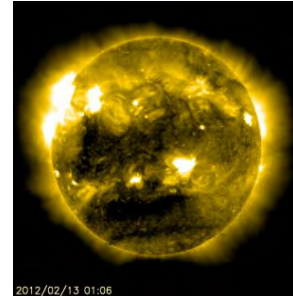
Two dimensional plot of Sq(H) as a function of local time across nine stations in Africa during the year 2009 SSW event

Bolaji et al., J. Geophys. Res., Space Physics, 121, 8055-8065, 2015, 2016

CME: Coronal Mass Ejection Magnetic cloud



Coronal hole HSSW -CIR



SUN-EARTH CONNECTIONS

Solar wind from the Sun to the Earth

Coupling between high and low latitudes

1. Transmission of an **electric field PPEF**

*Magnetic disturbance **DP₂** (large scale disturbed ionospheric electric current)*

2.a Thermal expansion of the atmosphere

Changes in pressure, temperature, motions, composition

2.b Transmission of a disturbance **electric field dynamo DDEF** by the disturbed atmospheric **motions in the dynamo layer**

*Magnetic disturbance **Ddyn** (large scale disturbed ionospheric electric current)*

Original papers : electrodynamics coupling between high and low latitudes

Prompt penetration of the magnetospheric electric field

Magnetic signature : Nishida, A. (1968), Geomagnetic DP2 fluctuations and associated magnetospheric phenomena, *J. Geophys. Res.*, 73, 1795–1803, doi:10.1029/JA073i005p01795.

Nishida, A., N. Iwasaki, and N. T. Nagata (1966), The origin of fluctuations in the equatorial electrojet: A new type of geomagnetic variation, *Ann. Geophys.*, 22, 478–484.

Theory : Vasyliunas, V. M. (1970), Mathematical models of magnetospheric convection and its coupling to the ionosphere, in *Particles and Fields in the Magnetosphere*, edited by M. McCormac, pp. 60–71, Springer, New York.

Ionospheric disturbance dynamo

Theory : Blanc, M., and A. D. Richmond (1980), The Ionospheric disturbance dynamo, *J. Geophys. Res.*, 85(A4), 1669–1686, doi:10.1029/JA085iA04p01669.

Magnetic signature : Le-Huy, M., and C. Amory-Mazaudier (2005), Magnetic signature of the ionospheric disturbance dynamo at equatorial latitudes, “Ddyn”, *J. Geophys. Res.*, 10, A10301, doi:10.1029/2004JA010578

Change in composition due to thermal expansion of the atmosphere

Theory : Volland, H. (1979), Magnetospheric electric fields and currents and their influence on large scale thermospheric circulation and composition, *J. Atmos. Terr. Phys.*, 41, 853–866. Effect of the onset of the storm

Theory / Numerical simulations

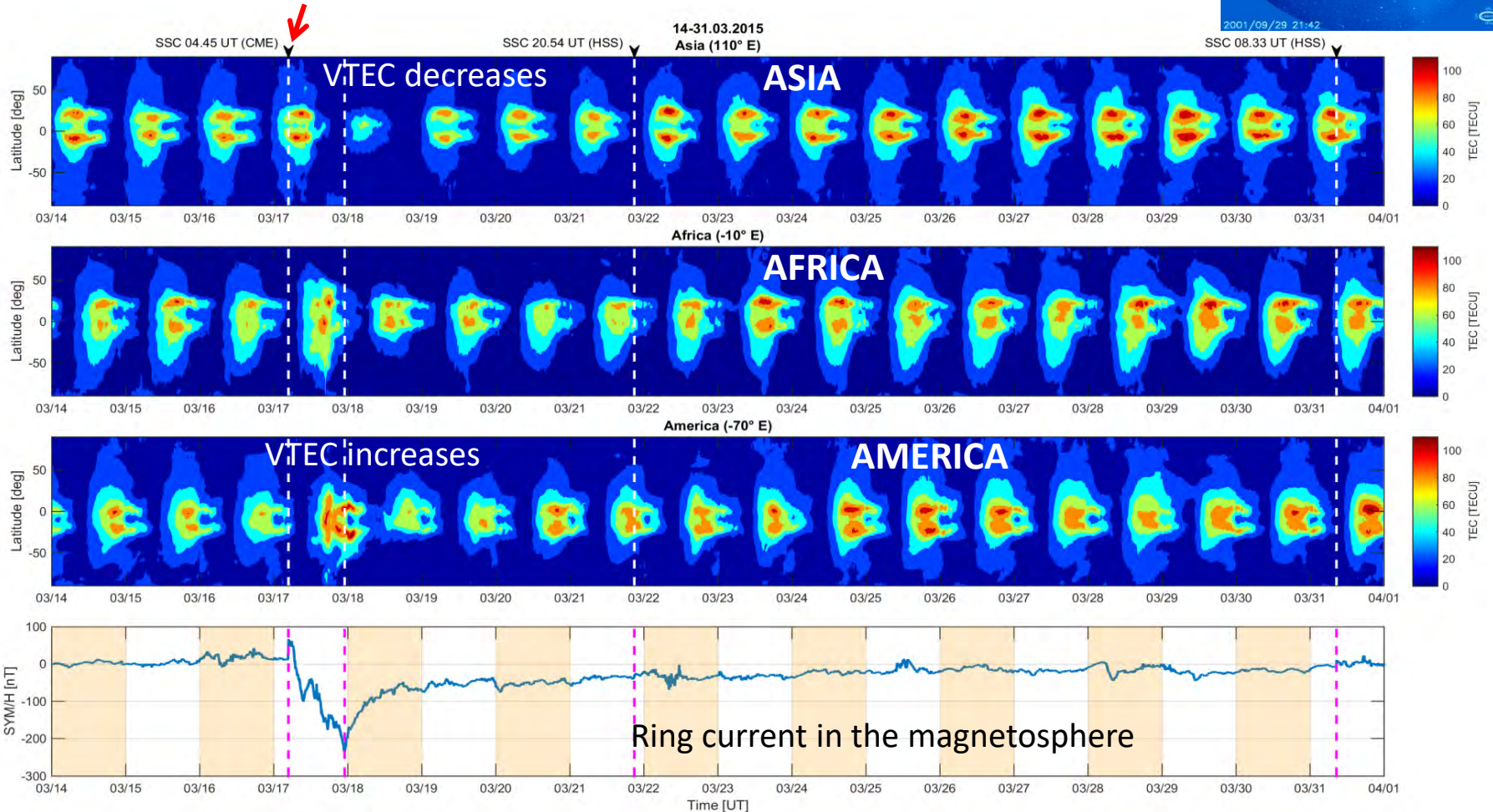
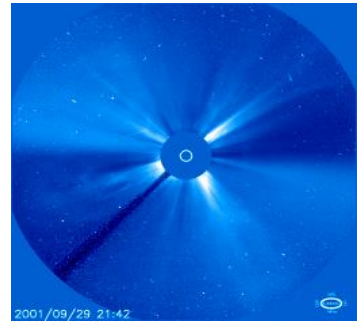
Fuller-Rowell, T. J., M. V. Codrescu, R. J. Moffett, and S. Quegan (1994), Response of the thermosphere and ionosphere to geomagnetic storms, *J. Geophys. Res.*, 99(A3), 3893–3914, doi:10.1029/93JA02015.

Fuller-Rowell, T. J., Codrescu, M. V., Rishbeth, H., Moffett, R. J., & Quegan, S. (1996). On the seasonal response of the thermosphere and ionosphere to geomagnetic storms. *Journal of Geophysical Research*, 101(A2), 2343–2353. <https://doi.org/10.1029/95JA01614>

MAGNETIC STORM of St PATRICK'S DAY : MAPS of VTEC

Variations near the magnetic Equator due to a CME (~200 GPS stations)

Impact of a CME (solar event, on March 15 ~ 04.45 - 02.00UT)

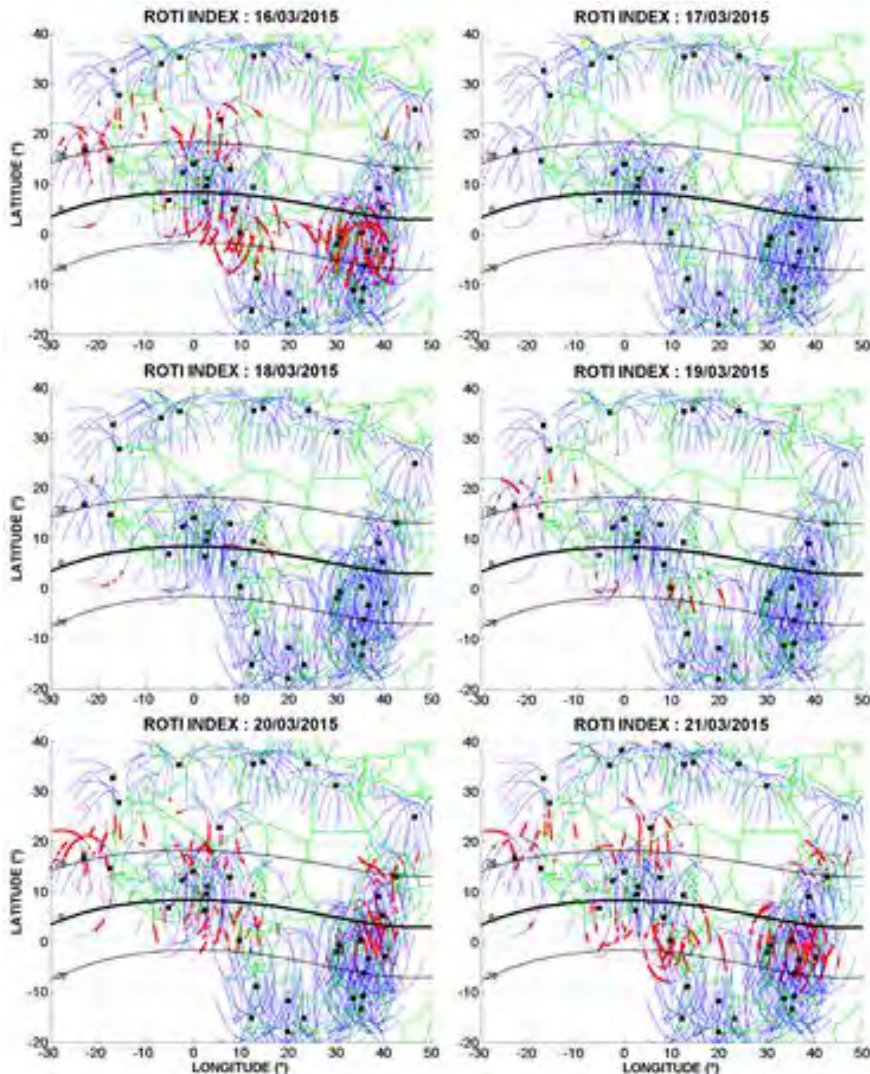


Nava,, et al., "Middle and low latitude ionosphere response to 2015 St. Patrick's Day geomagnetic storm", J. Geophys. Res. Space Physics,121, 3421–3438, doi:10.1002/ 2015JA022299.

DISTURBED IONOSPHERE [DDEF]

Storm March 17, 2015 /equinox

Dst < -200 nT, SSC at 04.45 UT



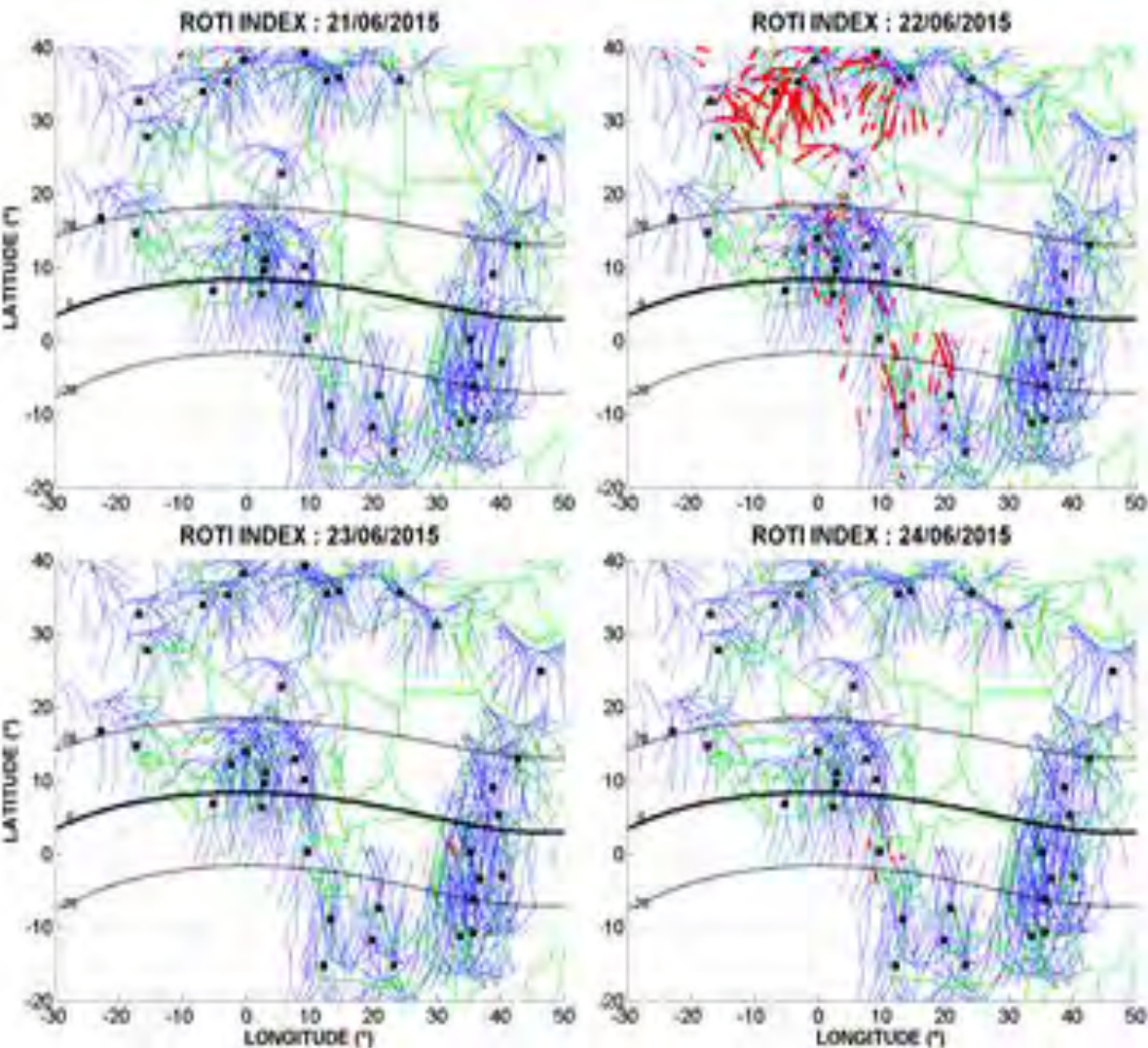
$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$

Rate of change of total electron content index (ROTI) maps over African region during St. Patrick's Day storm, 16– 21 March 2015. Thin blue lines show ROTI ≤ 1.5 TECU/min, while red squares represent ROTI > 1.5 TECU/min. Black squares indicate Global Navigation Satellite System station used to produce ROTI maps

Inhibition of scintillations over the whole earth during several days : DDEF effect long duration

DISTURBED IONOSPHERE [PPEF]

Storm June 22, 2015 / solstice / Dst < -200 nT, SSC at 18h33



$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$

Storm started at 18.33 UT,
it is the time of the PRE

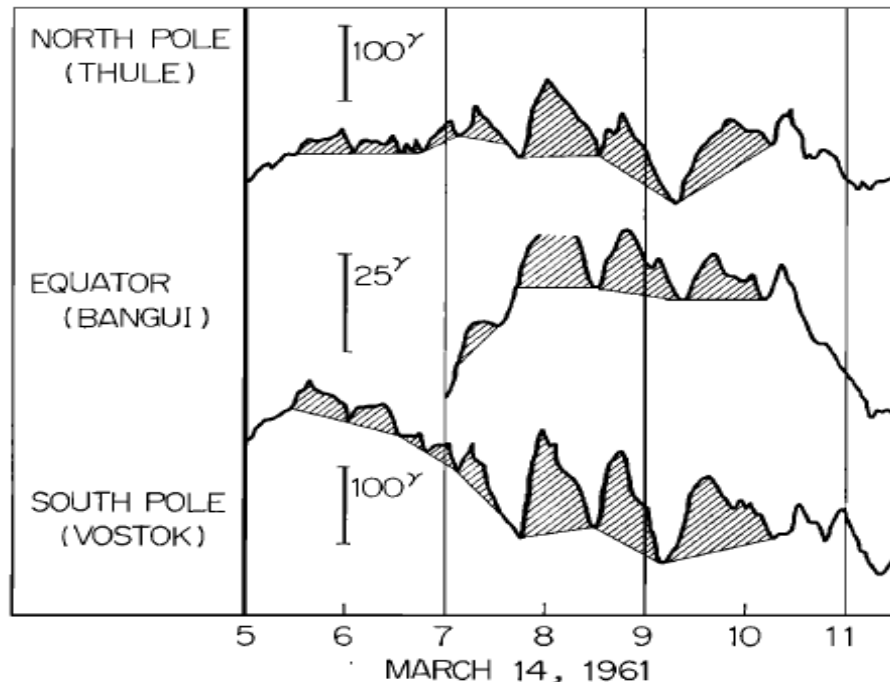
Increase of scintillations
PPEF effect
short duration

DISTURBED IONOSPHERE [PPEF]

Prompt penetration of the magnetospheric convection electric field

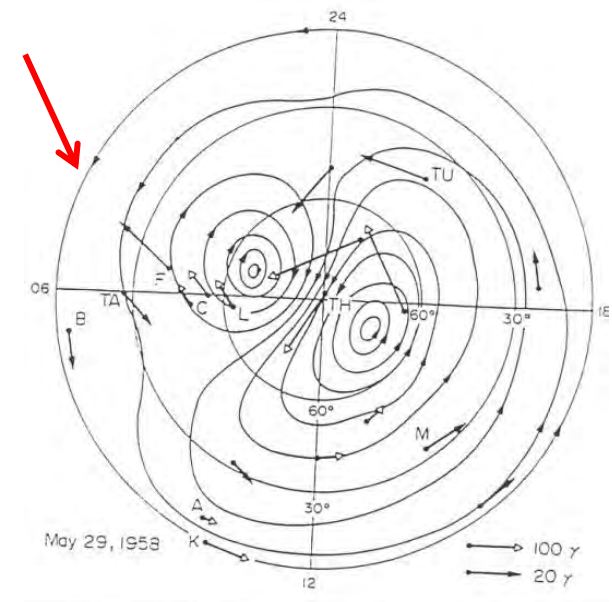
Electrodynamic coupling between AURORAL and EQUATORIAL regions

The magnetic equivalent current system DP_2



Train of DP_2 fluctuations (shaded). Geomagnetic latitudes of these stations are 88.9 (Thule), 05.0 (Bangui), and -89.1 (Vostok).

DP_2 , Nishida, 1968, JGR, Ce système de courant **s'étend** vers les basses latitudes (perturbation magnétique [Nishida et al., 1966])



IONOSPHERIC DISTURBED DYNAMO [DDEF]

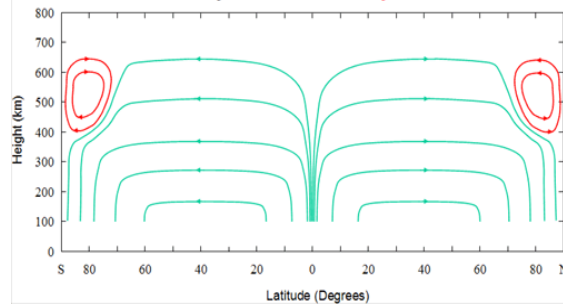
Magnetic disturbance from the Pole to the Equator : D_{dyn}

The Ionospheric Disturbance Dynamo (Blanc and Richmond, JGR 1980) : **model**

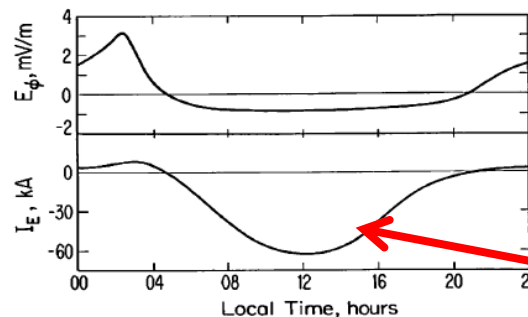
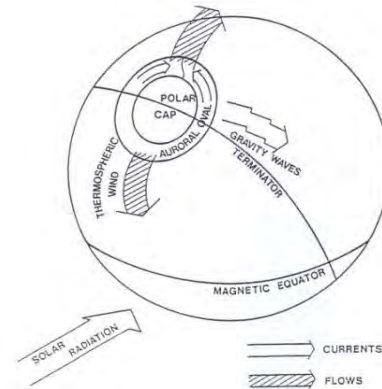
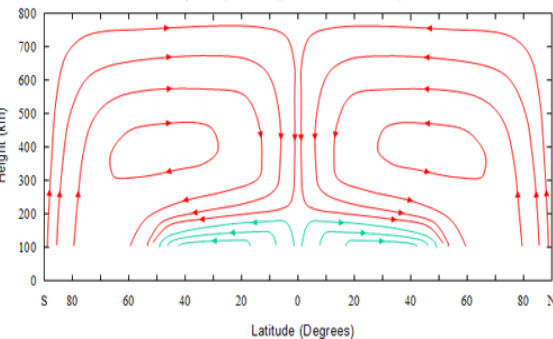
Le Huy and Amory-Mazaudier JGR 2005 : **magnetic disturbance D_{dyn}**

This physical process related to the circulation of thermospheric winds disturbed by the storm takes several hours to reach the equator

Schematic Representation of the **Modification** of Mean Thermospheric Circulation at Equinox by **Weak Auroral Activity**



Schematic Representation of the **Modification** of Mean Thermospheric Circulation at Equinox by **Very Strong Auroral Activity**



Blanc and Richmond, 1980.

JOULE HEATING in auroral zone [AE]

ΔV_n : disturbance of wind, circulation from pole to Equator
Gravity waves, HADLEY convection cell etc...

* ΔE_{dyn} : disturbance of Electric field due to storm winds

* ΔJ : Disturbance of ionospheric electric current

* ΔB : Disturbance of the Earth's magnetic field D_{dyn} due to a reversed electrojet

Disturbed magnetic field

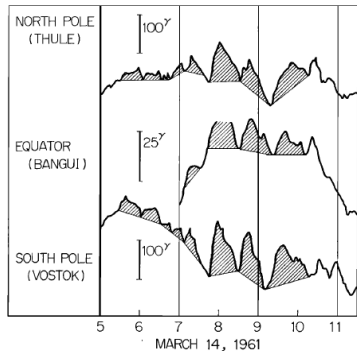


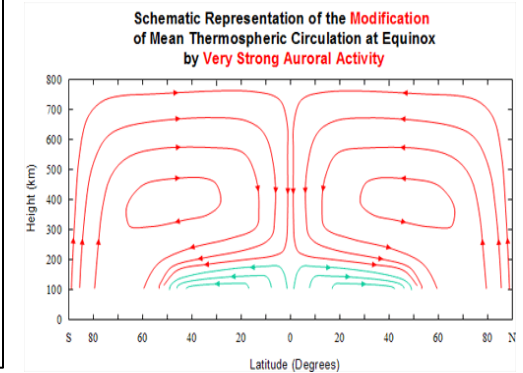
Fig. 1. Train of D_{st} fluctuations (shaded). Geomagnetic latitudes of these stations are 88.9 (Thule), 05.0 (Bangui), and -89.1 (Vostok).

Model of Fejer et al., (2008)

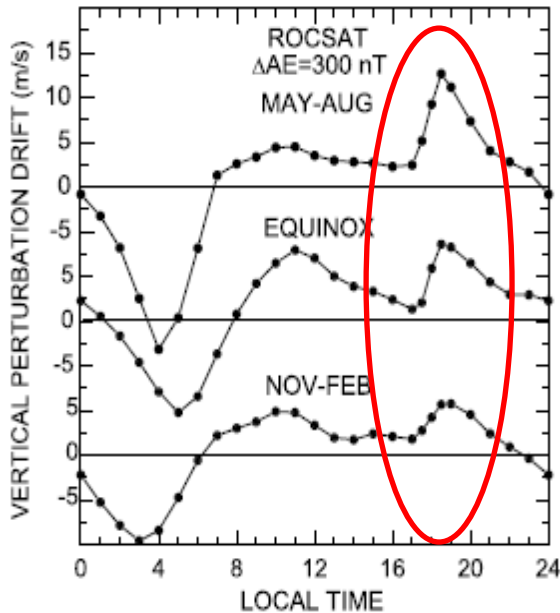
Geophysical Research Letters, 35, L20106.
<https://doi.org/10.1029/2008GL035584>

PPEF is an eastward E_y , **increases the PRE**
 DDEF is a westward E_y , **decreases the PRE**
 Eastward electric field => moves up
 Westward electric field => moves down

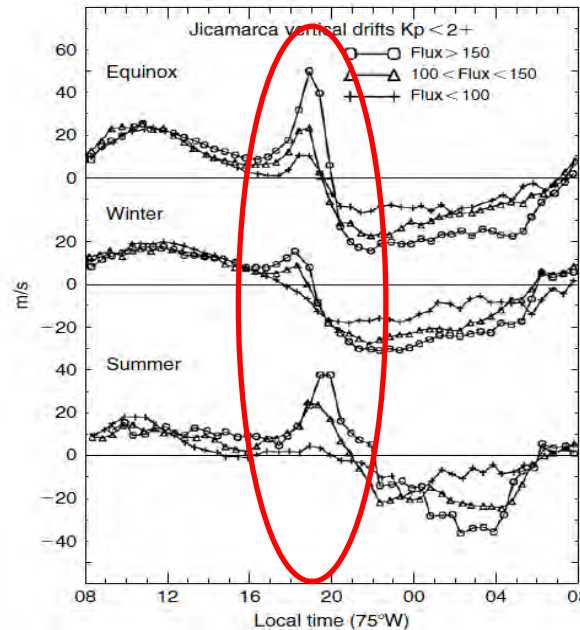
Disturbed thermospheric wind



PROMPT PENETRATION

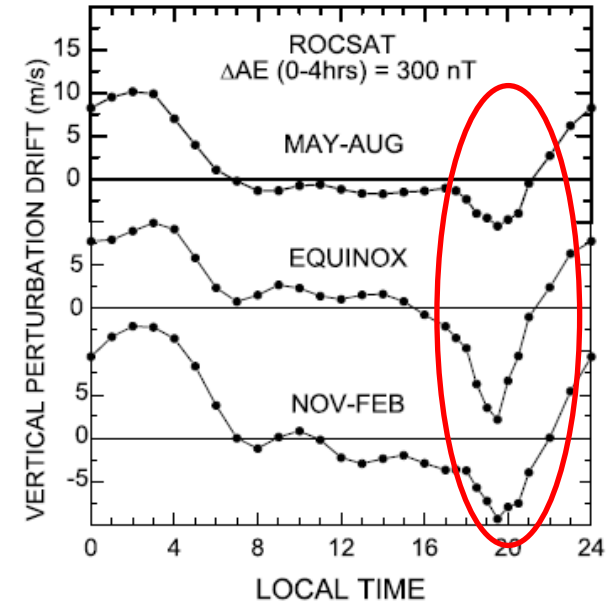


PPEF : Increase of PRE



Quiet day

DISTURBANCE DYNAMO



DDEF: Inhibition of PRE

Magnetic signatures [PPEF and DDEF]

Law of Biot and Savart

$$\Delta H = S_q + D_{\text{iono}} + D_{\text{mag}}$$

ΔH : H component of the Earth's magnetic field measured by magnetometers

S_q : regular variation of the Earth's magnetic field during magnetic quiet days

D_{iono} : magnetic disturbance due to the ionospheric electric currents

D_{mag} : magnetic disturbance due to the ionospheric electric currents (SYM-H, ASYM-H)

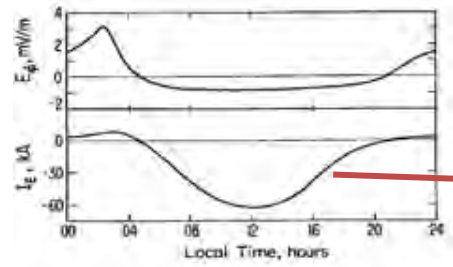
Disturbed ionospheric electric current

$$D_{\text{iono}} = \Delta H - S_q - D_{\text{mag}}$$

$$D_{\text{iono}} = DP_2 + D_{\text{dyn}}$$

Magnetic variations at three observatories located in three regions (from top to bottom): GUA (Asia), MBO (Africa), and KOU (America) from April 4-10, 2010.

/Law of Biot and Savart / Disturbed ionospheric current $D_{iono} = \Delta H - S_q - D_{mag}$

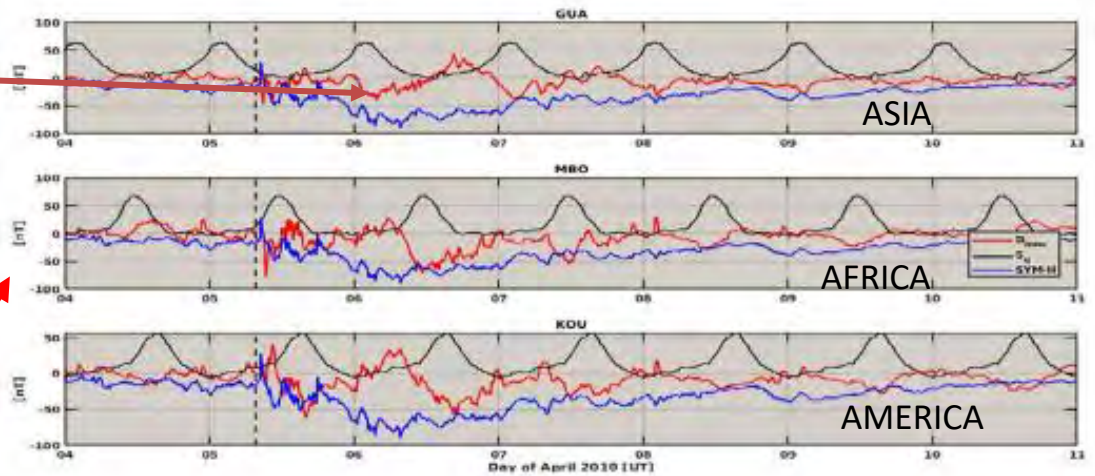


Blanc and Richmond, 1980

Top figure

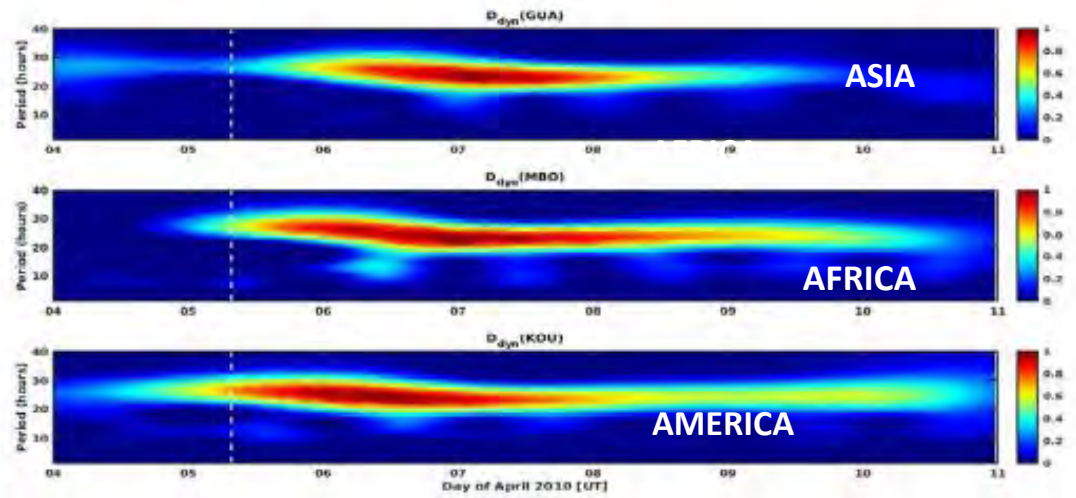
ΔH measured (blue),
 Regular S_q variation (black)
 $D_{iono} = DP_2 + D_{dyn}$ (red)

reversed from their observed normal quiet-day variation.

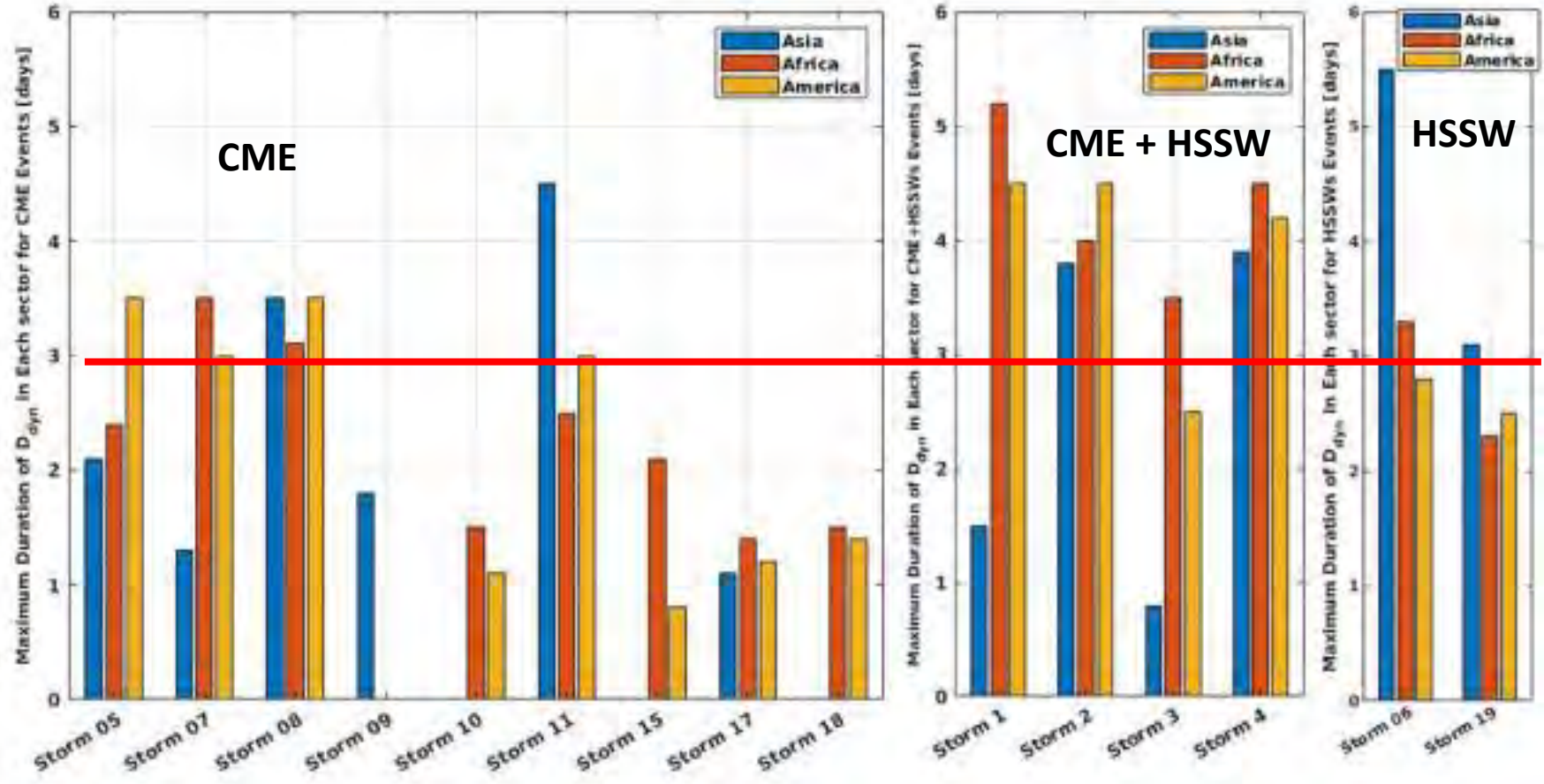
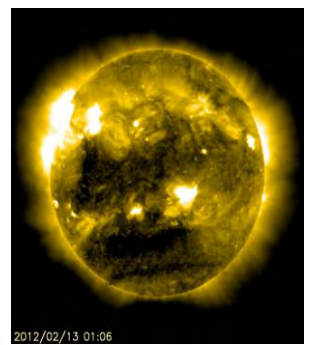
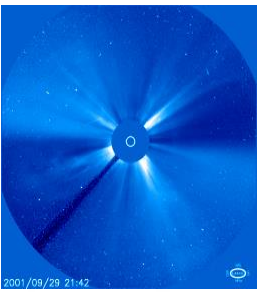


Bottom figure

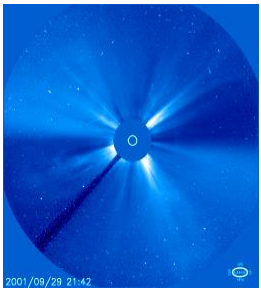
Disturbance dynamo (D_{dyn}) estimated **using wavelet based semblance analysis**. The vertical dashed line corresponds to the arrival of CME



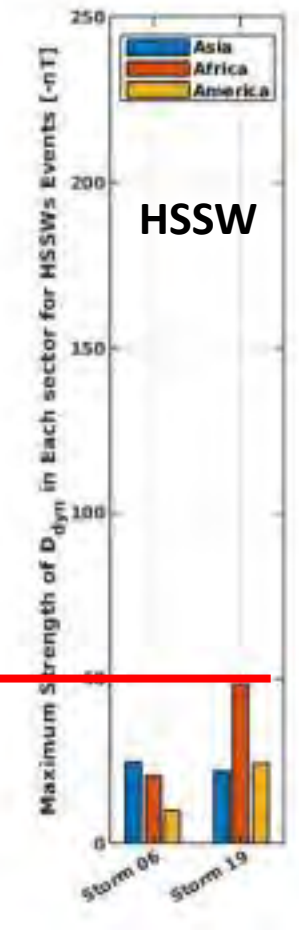
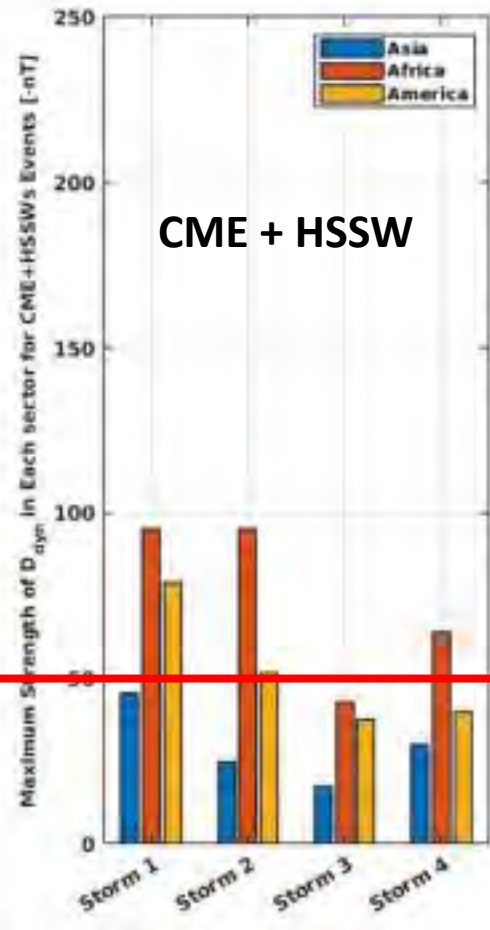
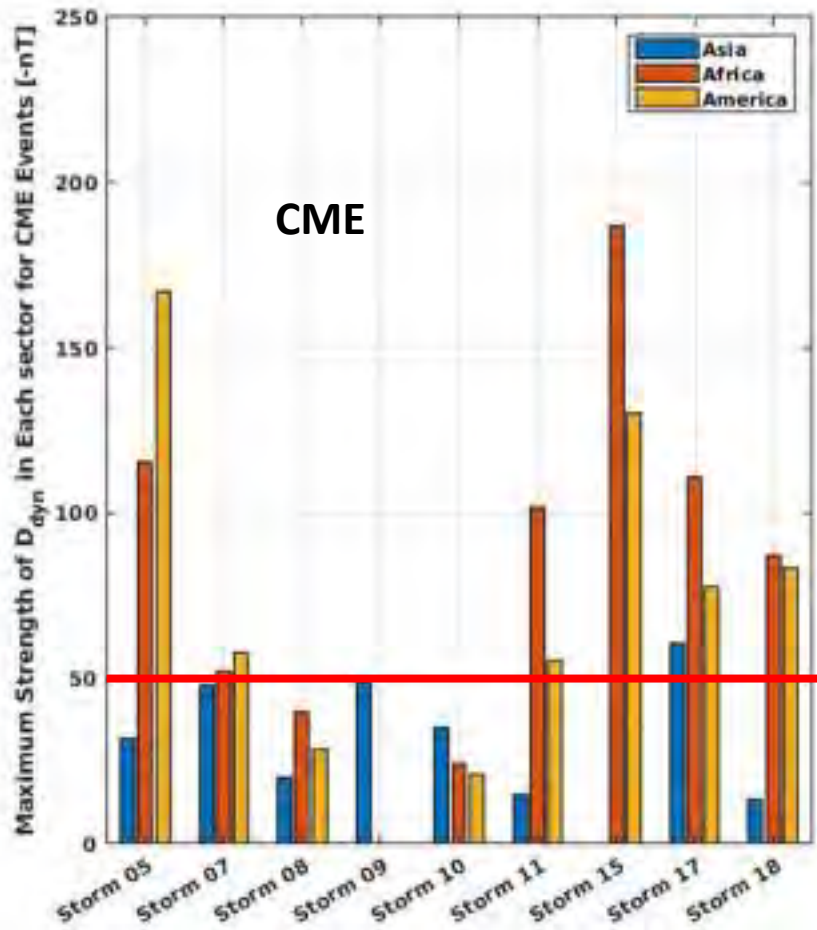
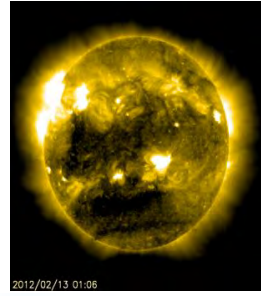
Maximum duration of **D_{dyn}** in days during each of the selected storm: (from left to right)



Younas, W., C. Amory-Mazaudier, M. Khan, M. Le Huy, Magnetic signatures of ionospheric disturbance dynamo for CME and HSSWs generated storms, Earth and Space Science, <https://doi.org/10.1029/2021SW002825>



Maximum strength of **D_{dyn}** in nT observed during each storm



Senegal -2009



Côte d'Ivoire -2016



8 PhD => 1993-2000
10 PhD => 2001-2010
55 PhD => 2011-2023

Côte d'Ivoire 2007



Burkina Faso-2012



Morocco-2016

Tunisia-2017



Cameroon-2018



Algeria -2017

DRC-2016



NECESSITY OF REVIEW PAPERS IN DIFFERENT FIELDS



atmosphere

an Open Access Journal by MDPI

Ionospheric and Magnetic Signatures of Space Weather Events at Middle and Low Latitudes: Experimental Studies and Modelling (2nd Volume)



Special Issue Editor

Dr. Christine Amory-Mazaudier

It is important to understand the physical mechanisms acting at the level of the Sun in the interplanetary environment, as well as the Earth's thermosphere and the ionosphere. This Special Issue will include articles reviewing mechanisms that have been known for several decades, as well as new original findings and articles concerning the perturbations generated by solar disturbances on these equatorial parameters through the electrodynamic coupling between high and low latitudes.

Submission Deadline: 1 March 2024

https://www.mdpi.com/journal/atmosphere/special_issues/4TP52DMQ2H



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005

ROLE OF GNSS IN THE SPACE WEATHER RESEARCH

Christine Amory-Mazaudier

*Sorbonne Université, Ecole polytechnique, Institut Polytechnique de Paris, Université Paris Saclay, Observatoire de Paris, CNRS,
Laboratoire de Physique des Plasmas (LPP), 75005 Paris, France*

christine.amory@lpp.polytechnique.fr

**United Nations/Finland Workshop on the Applications of Global Navigation Satellite Systems
Helsinki, 23-27 October 2023**

outlines

- Introduction : UN Projects
- Use of GNSS for Science
- Capacity building in Africa
- Capacity building in Asia
- Conclusion

United Nations Space Science Initiative [1991-2012]

- 1992-1994: IEEY International Equatorial Electrojet Year – IAGA **worldwide study**
- 1995 : GIRGEA – scientific network Europe Africa
- Since 2006 : GIRGEAA Europe Africa Asia

www.girgea.org

- 2005-2009: IHY International Heliophysical Year
Geophysics → Heliophysics
- 2010-2012 : ISWI International Space Weather Initiative
Science → daily life
- Since 2012 : ISWI network in United Nations

www.secretariat.org

77 National coordinators



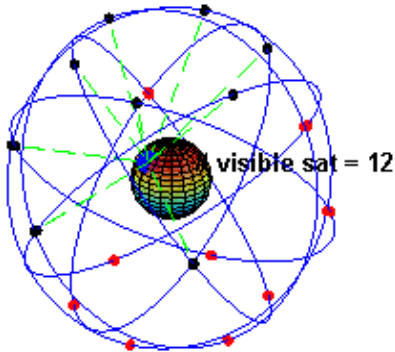
ISWI network: <http://www.iswi-secretariat.org>



1. Distribution of scientific tools
2. Training schools / GNSS and Physics of the Sun Earth's System
3. PhD => position in the country
4. Curricula in Universities

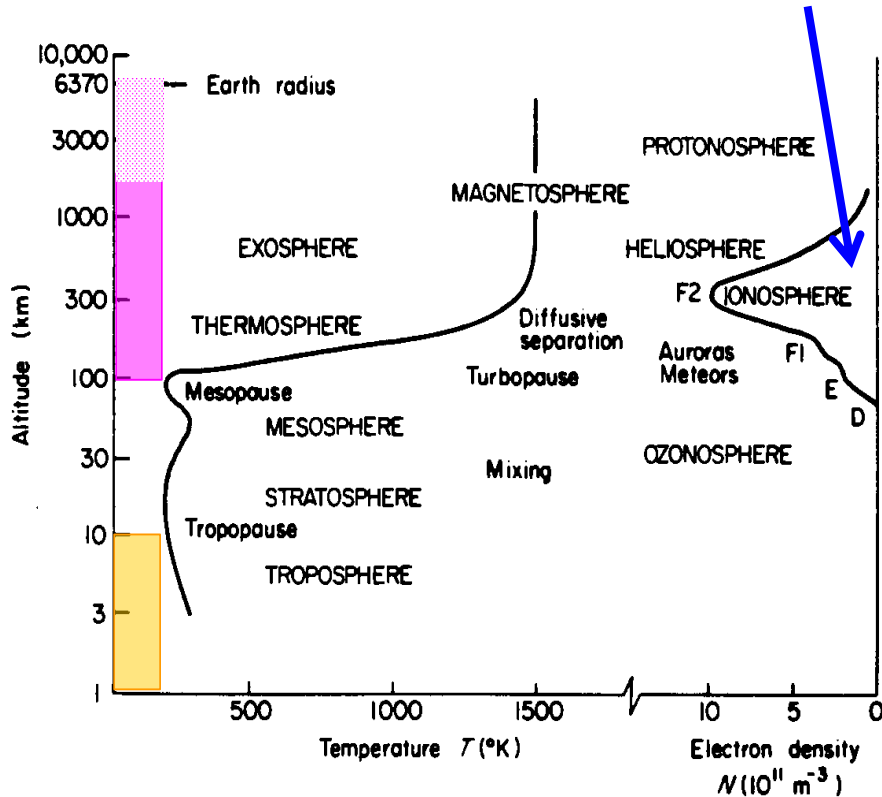
Use of GNSS for SCIENCE

The satellite signal is modified by ionosphere and troposphere



TEC

Total electron content



LAYERS

> 600 km EXOSPHERE
few collisions, Particles follow ballistic orbit

80-600 km THERMOSPHERE
Ionization by the solar X-EUV radiation
IONOSPHERE

30-80 km MESOSPHERE
Absorption of the radiation UV by the ozone layer

11-30 km STRATOSPHERE
Turbulence

0-11 km TROPOSPHERE
Meteorological phenomena

SPACE WEATHER EVENTS IN IONOSPHERE

The ionosphere is the largest source of perturbations for GNSS
Ionospheric electric currents are at the origin of variations of the Earth's magnetic field and Ground Induced Electric Currents (GIC)

Regular and irregular variations

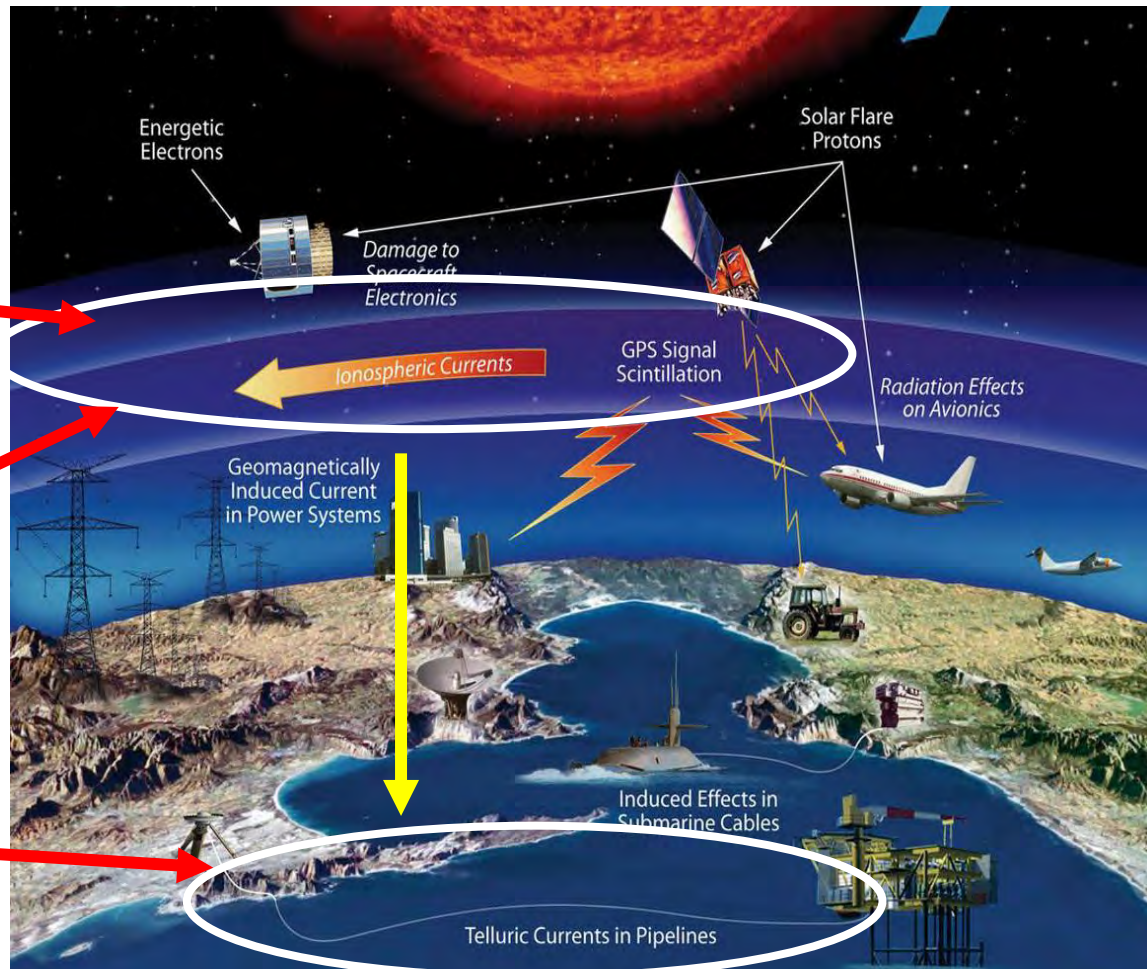
1) Ionization

Propagation of electromagnetic Waves

2) Ionospheric Electric current

3) Variations of the Earth's magnetic field and GIC

Nasa website



AT EQUATOR : scintillations a regular phenomenon

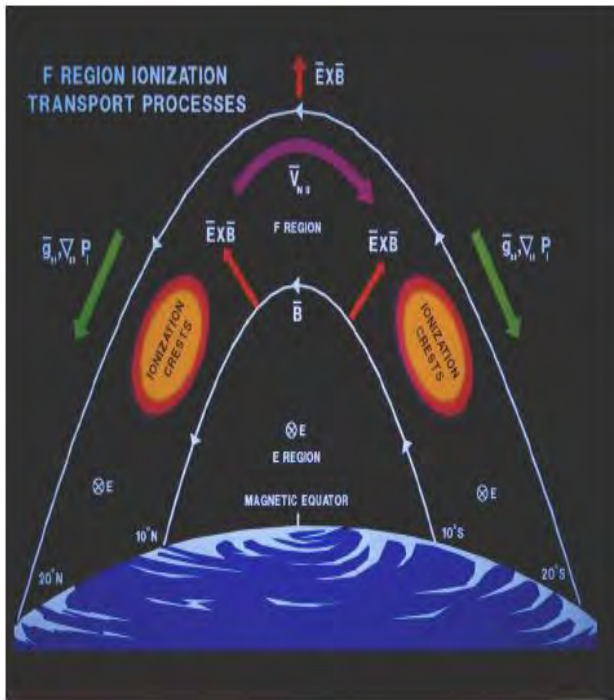
Ionospheric scintillation is the rapid modification of radio waves caused by small scale structures in the ionosphere : **Plasma Instabilities**

S_4 and ROTI indices derived from GNSS data

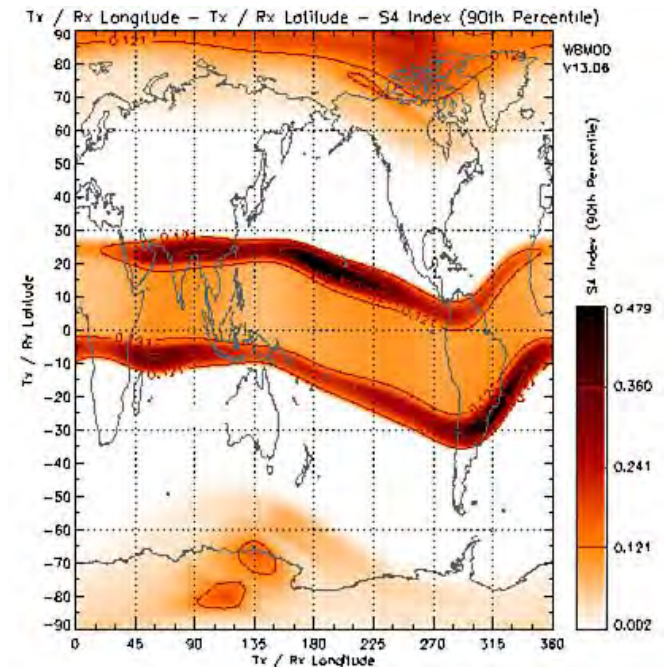
$$S_4 = \sqrt{\frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}}$$

I : intensity of the signal

$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$



Equatorial Fountain



Scintillation index at GPS L1 (1575.42 MHz) assuming constant local time 23.00 at all longitudes (from <http://www.sws.bom.gov.au>)

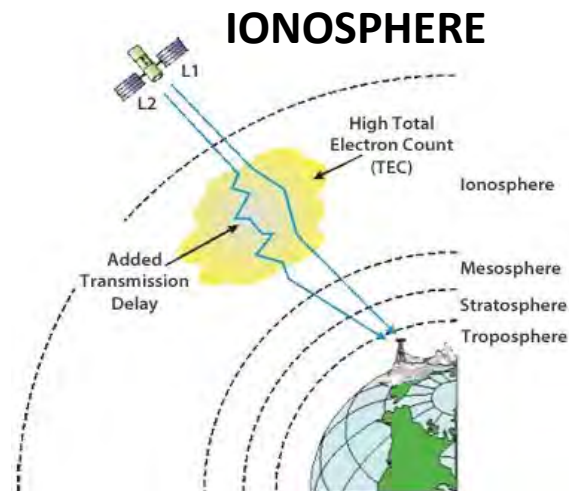
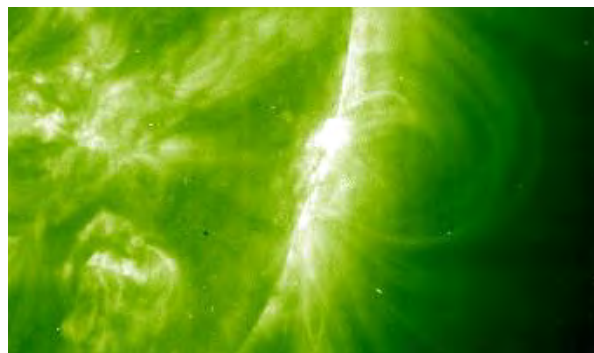
GLOBAL APPROACH OF OF THE SUN-EARTH SYSTEM

Electromagnetic emissions and particles [some large scale phenomena]

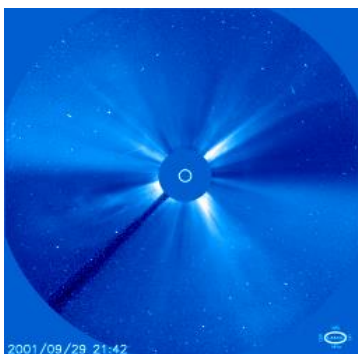
Sunspots



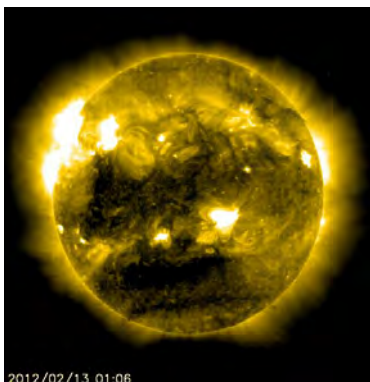
Big solar flare of November 2003



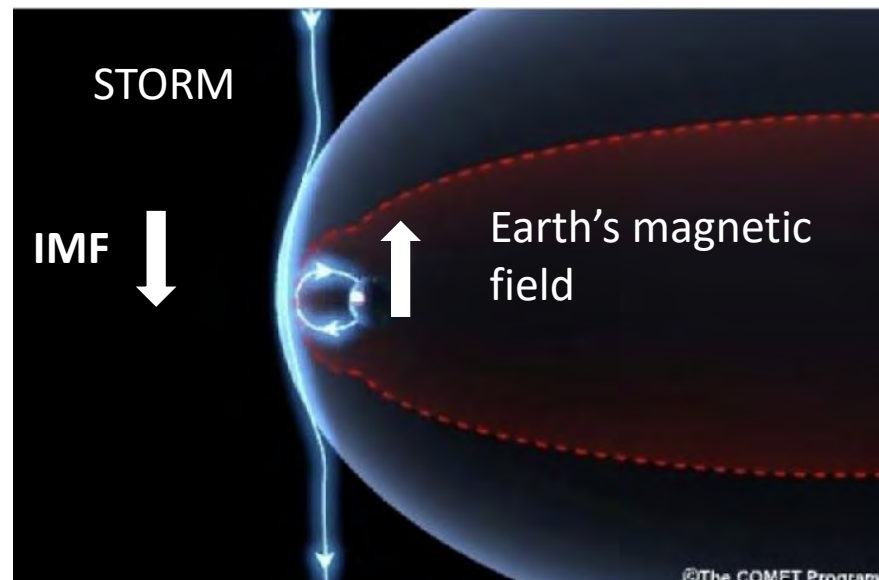
MAGNETOSPHERE



CME: Coronal Mass Ejection
Magnetic cloud
Billions of tons of solar mass



Coronal hole
HSSW – CIR
High speed solar wind



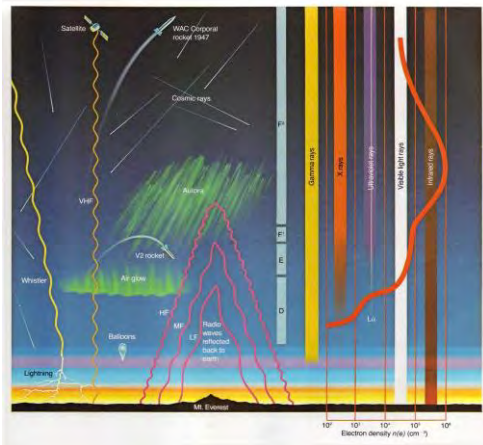
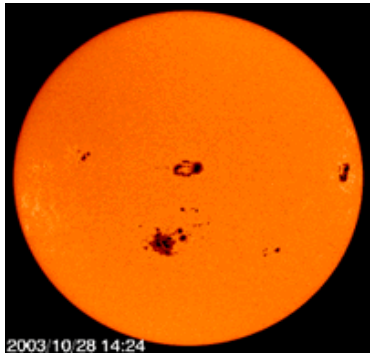
outlines

- Introduction : UN Projects
- Use of GNSS for Science
- Capacity building in Africa
- Capacity building in Asia
- Conclusion

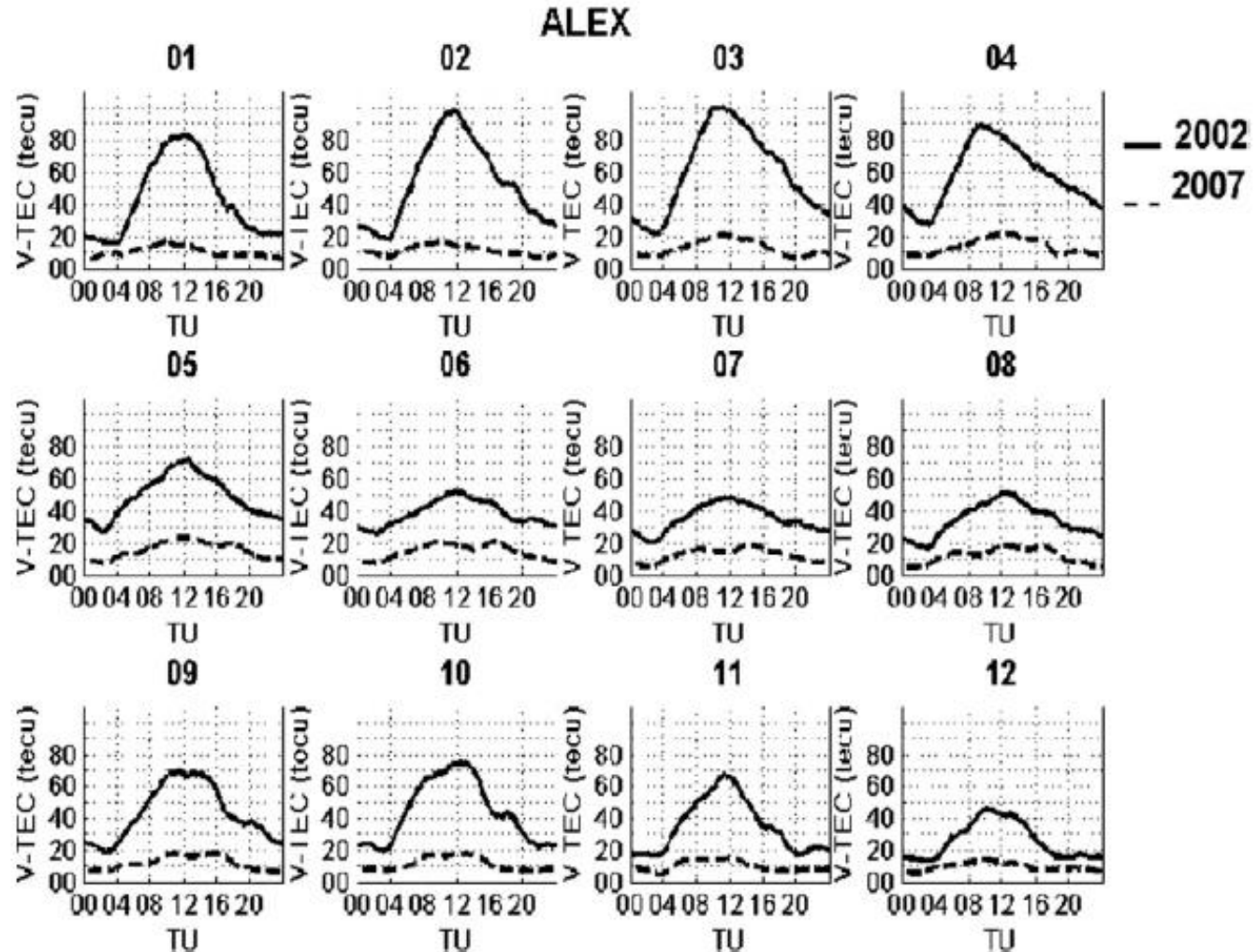
EGYPT Diurnal variations of VTEC for 2 years 2002 and 2007

2002 : maximum of sunspot cycle 23, 2007 : minimum of sunspot cycle 23

Study of ionosphere made in all the countries with GPS receivers



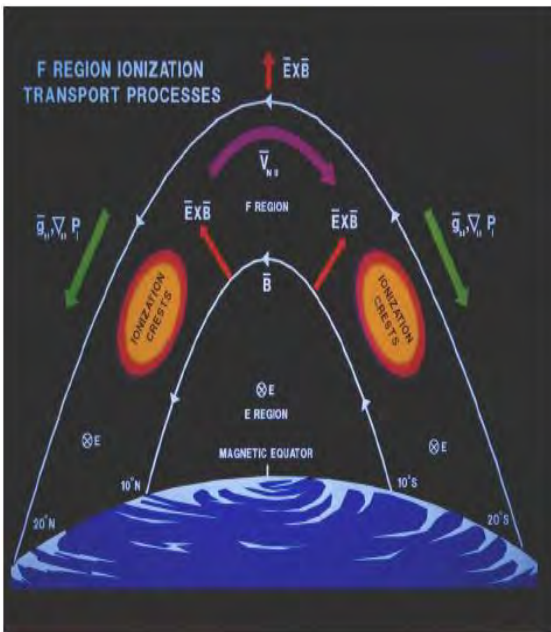
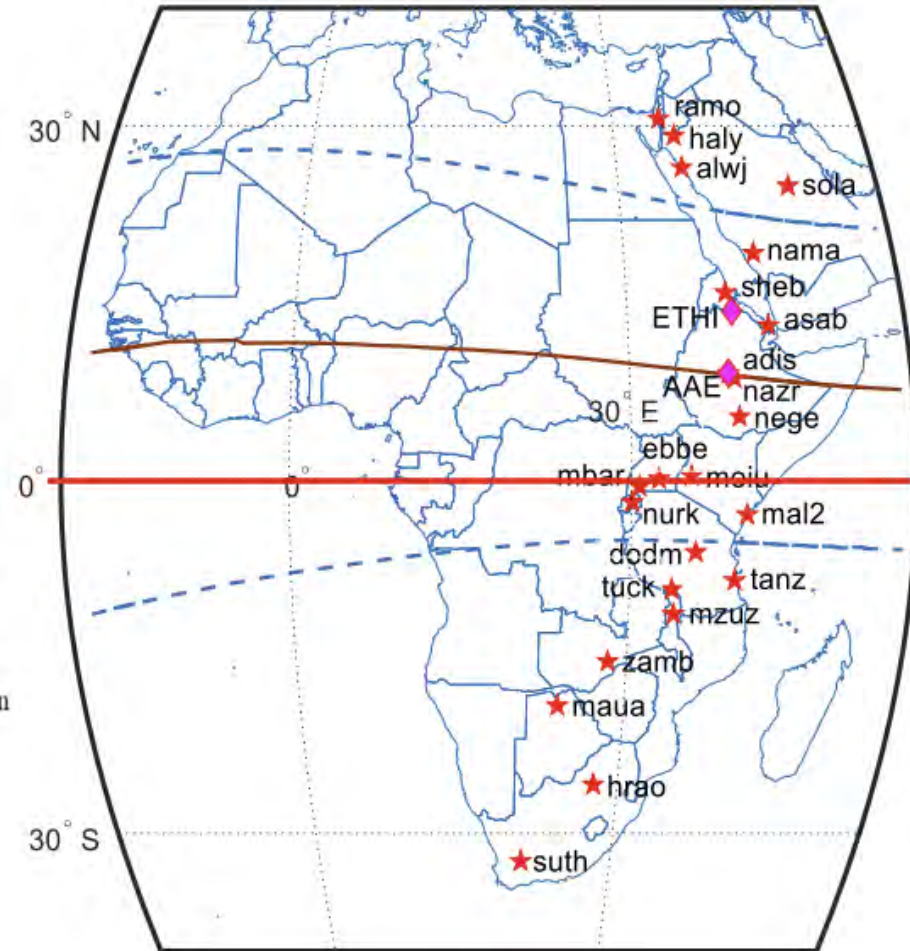
Regular Solar Radiations
UV, EUV, X rays



STUDY of IONOSPHERIC IRREGULARITIES IN EAST AFRICA using the ROTI index derived from the TEC

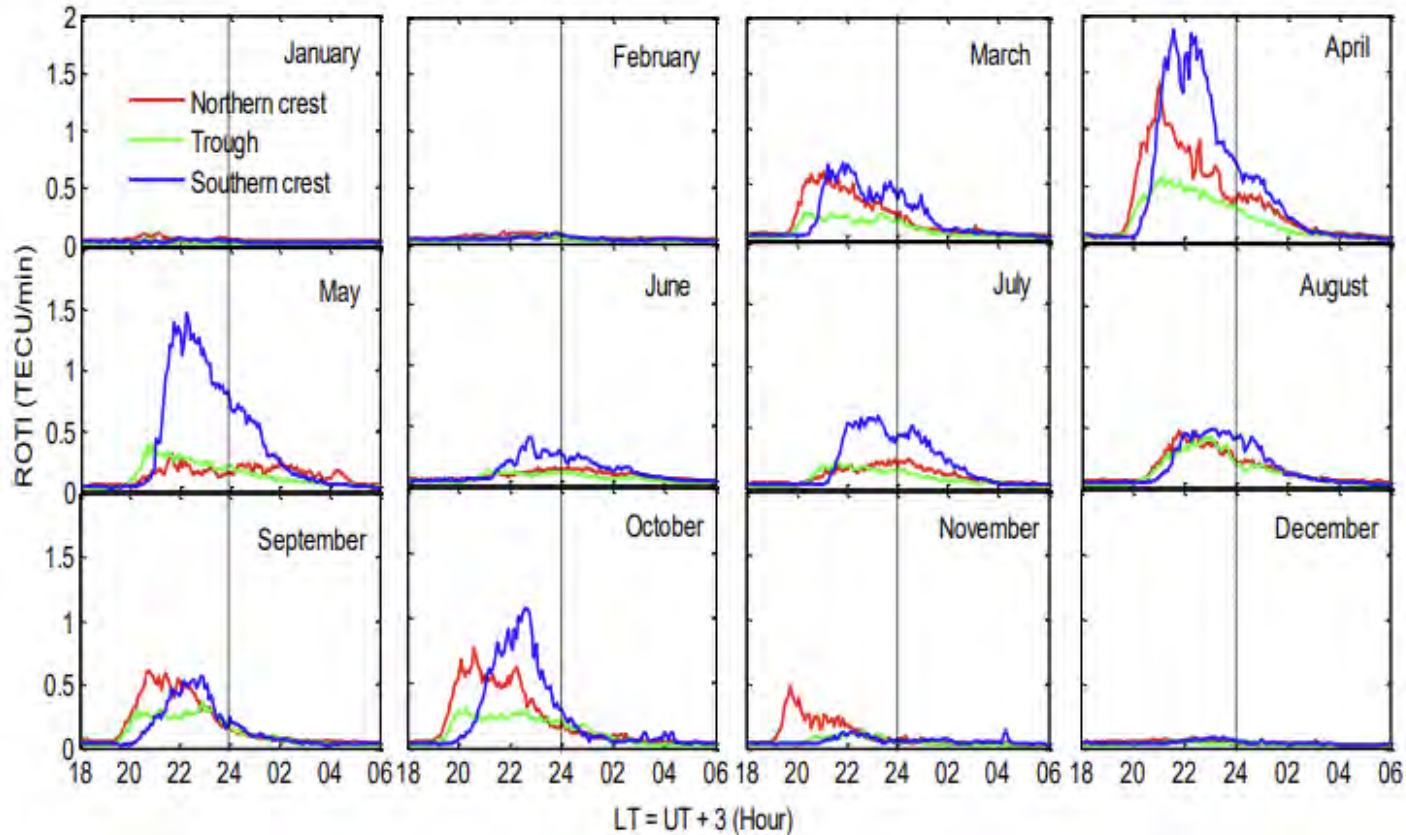
NIGERIA

$$\text{rot} = \frac{STEC_{k+1} - STEC_k}{\text{time}_{k+1} - \text{time}_k} * 60$$



Amaechi, P.A., E.O. Oyeyemi, A.O. Akala, E.O. Falayi, M. Kaab, Z. Benkhaldoun, C. Amory-Mazaudier, Quiet-time ionospheric irregularities over the African Equatorial Ionization Anomaly (EIA) region, Radio Science, 55, e2020RS007077. <https://doi.org/10.1029/2020RS007077>

Asymmetry between the Northern and Southern crests of the EIA due to the configuration between the magnetic equator and the geographic equator (influence of the neutral wind)



Monthly mean variation of quiet time irregularities over Northern crest (red line), trough (green line) and Southern crest (blue line), in 2013 (figure 5 of Amaechi et al., 2020)

Senegal -2009



Côte d'Ivoire -2016



8 PhD => 1993-2000
10 PhD => 2001-2010
After IHY [use of GPS]
55 PhD => 2011-2023

Côte d'Ivoire 2007



Burkina Faso-2012



Morocco-2016

Tunisia-2017



Cameroon-2018



Algeria -2017

DRC-2016





20/54 countries

Total PhD in Space weather
in Africa since IHY ~100

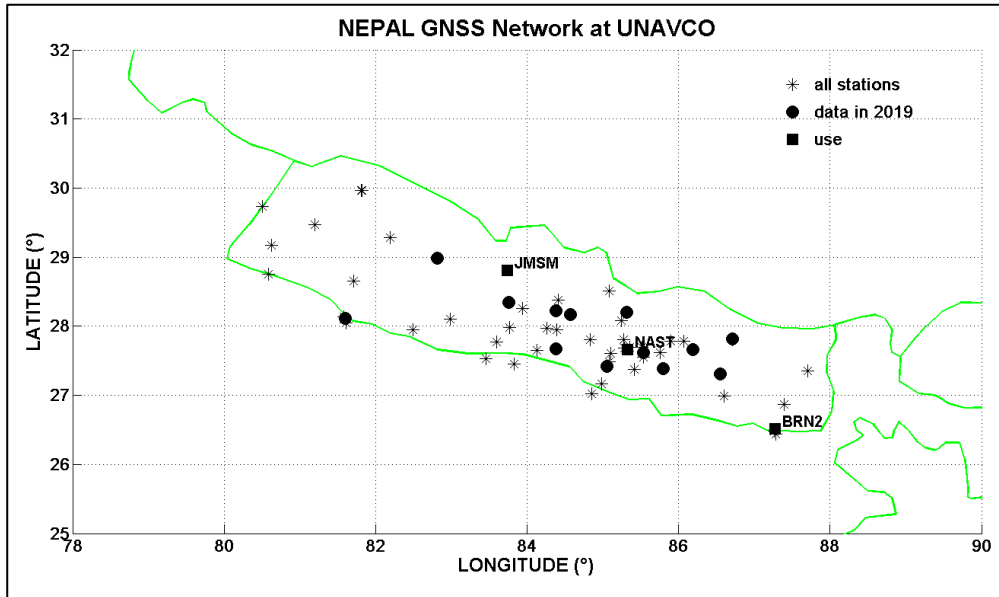
ISWI Coordinator for Africa
B. Rabiou from Nigeria

Algeria, Benin, Burkina Faso, Cameroon, Côte d'Ivoire, Egypt, Ethiopia, Guinea, Kenya, Morocco, Nigeria, Uganda, Republic of Congo, Republic Democratic of Congo, Rwanda, Senegal, South-Africa, Tunisia, Zambia
+ Ghana, Tchad

outlines

- Introduction : UN Projects
- Use of GNSS for Science
- Capacity building in Africa
- **Capacity building in Asia**
- Conclusion

NEPAL / CAPACITY BUILDING/SPACE WEATHER

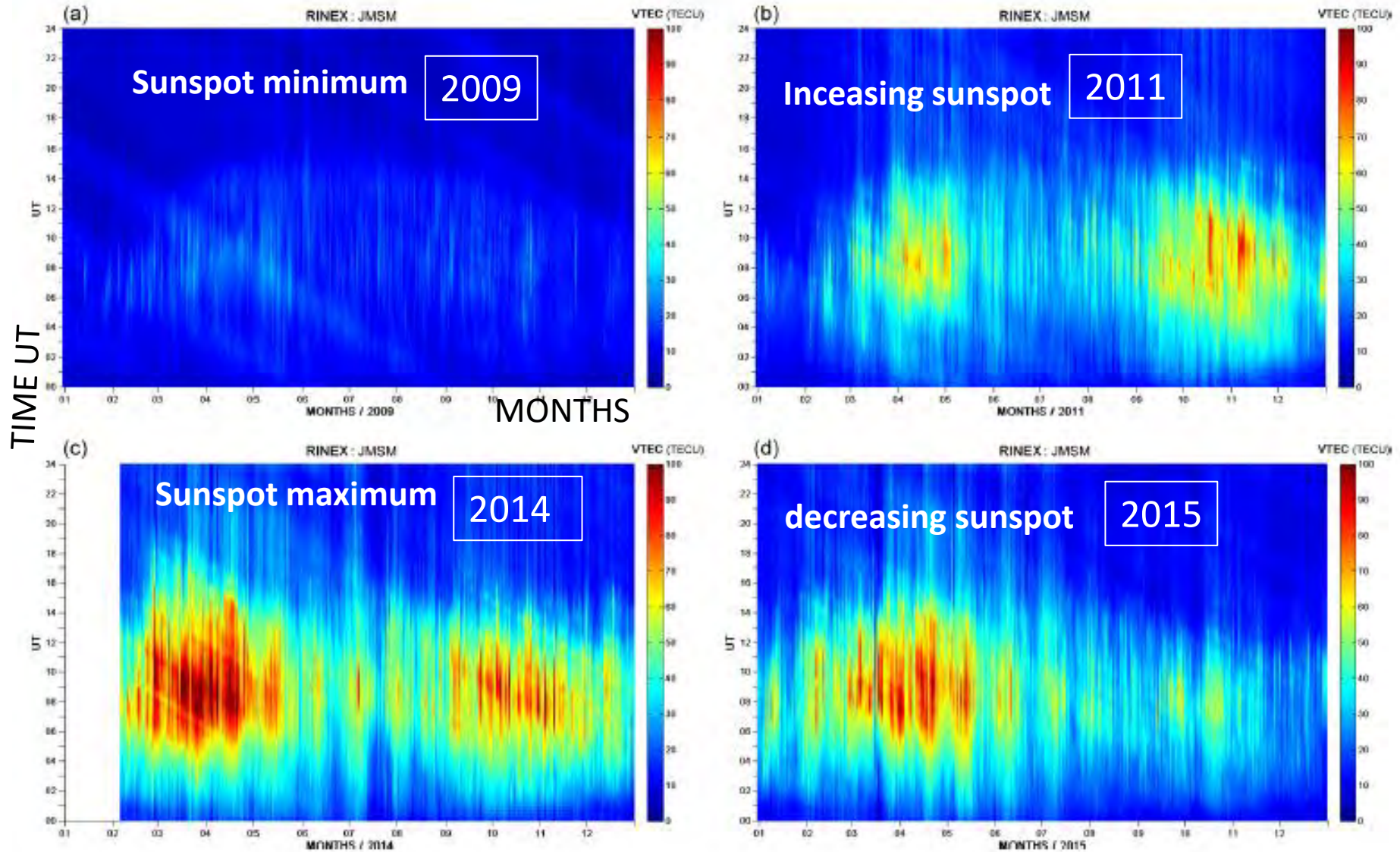


PhD of D. Pandit on September 23, 2022
Super substorms related signatures at middle and low latitudes ionosphere.



School organized by ICTP- September 2019





(a–d) A two-dimensional (2D) variation in vertical TEC according to UT at the JMSM station for one of the years of the minimum (2009), ascending (2011), maximum (2014) and descending (2015) phases of solar cycle 24.

TEAM of RESEARCH at KATHMANDOU/NEPAL



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Campus, Thamel,



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National school Telecom

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Sorbonne Universités



Dr. Binod ADHIKARI Lecturer and
Research Coordinator St. Xavier's
College, Maitighar



Drabindra PANDIT



Basudev GHIMIRE

2 PhD Students of the Institute of Science
and Technology ,Tribhuvan University.
and Lecturers : St. Xavier's College,

In NEPAL => Invitation to publish in the Journal Coordinates

GNSS

Space Weather, from the Sun to the Earth, the key role of GNSS

The goal of this paper is to give a clear view of the Sun Earth relationships that are complex. The phenomena acting at large scales and essentially related to dynamic and electromagnetic physical processes have been addressed. Besides physics, the work done to develop the training in Space Weather by focusing on Global Navigation Satellite Systems has also been presented. We present this paper as a series in two parts. In this issue the focus is on physics of the relationships Sun, Earth and Meteorology of Space. In March issue, GNSS training and capacity building would be discussed



Dr Christine Amory-Mazaudier

Senior Scientist,
University Pierre and
Marie Curie and Staff
Associate at ICIP
Recently awarded Marlet
Nicolet Medal for her work in Space Weather



Dr Roland Fleury

Associate Professor,
Microwave Department
of the 'MT Atlantique'
School of Engineering,
Brest campus, France.



Sharafat Gadimova

Programme Officer, the
United Nations Office
for Outer Space Affairs,
leads the organization
of the activities
on GNSS and the
development of the International Committee
on Global Navigation Satellite Systems



**Professor
Abderrahmane Touzani**

Director, African
Regional Centre for
Space Science and
Technology Education
- in French Language

ICRASEE-LR, Rabat, Morocco
was Professor in University
Mohammed V, Rabat, Morocco

This paper presents a study made for the Seminar on Space Weather and its effects on GNSS held in conjunction with United Nations/Nepal workshop on the applications of GNSS held in Kathmandu, 6 to 12 December 2016. The Seminar focused on cross-cutting area, in particular resiliency, the ability to depend on space systems and the ability to respond to the impact of events such as adverse space weather.

The aim is to give an outline of the Space Weather and its effects on GNSS receivers, and this in relation to the international organizations in charge of the harmonization of the various GNSS systems.

This article is composed of 3 parts:
Part I: Physics of the relationships Sun, Earth and Meteorology of Space, Part II: GNSS teaching and parameters that can be deduced from GNSS receivers, Part III: Building capacity of developing countries in using GNSS technology for sustainable development

From the Sun to the Earth, Space Weather and its effects

Emissions from the Sun

The sun is our star and it influences the terrestrial environment according to different channels,

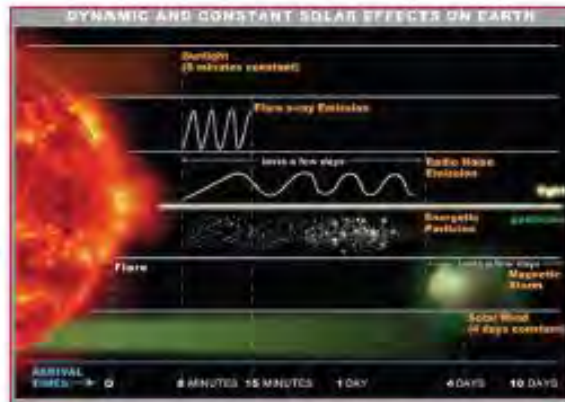


Figure 1: <http://www.nasa.gov/sites/default/files/0006main/04img02r26.jpg>

Amory-Mazaudier, C., R. Fleury, S. Gadimova, A. Touzani (Feb.2017), [Space Weather, from the Sun to Earth, the key role of Global Navigation Satellite Systems, Part I : From the Sun to the Earth, Space Weather and its effects,](http://www.mycoordinates.org)

[Coordinates a monthly magazine on positioning, navigation and beyond, http://www.mycoordinates.org](http://www.mycoordinates.org)

Amory-Mazaudier, C., R. Fleury, S. Gadimova, A. Touzani (March 2017), [Space Weather from the sun to the Earth, the key role of Global Navigation Satellite Systems- Part II: Training on daily global positioning system GPS data](http://www.mycoordinates.org)

[Coordinates a monthly magazine on positioning, navigation and beyond, http://www.mycoordinates.org,](http://www.mycoordinates.org)

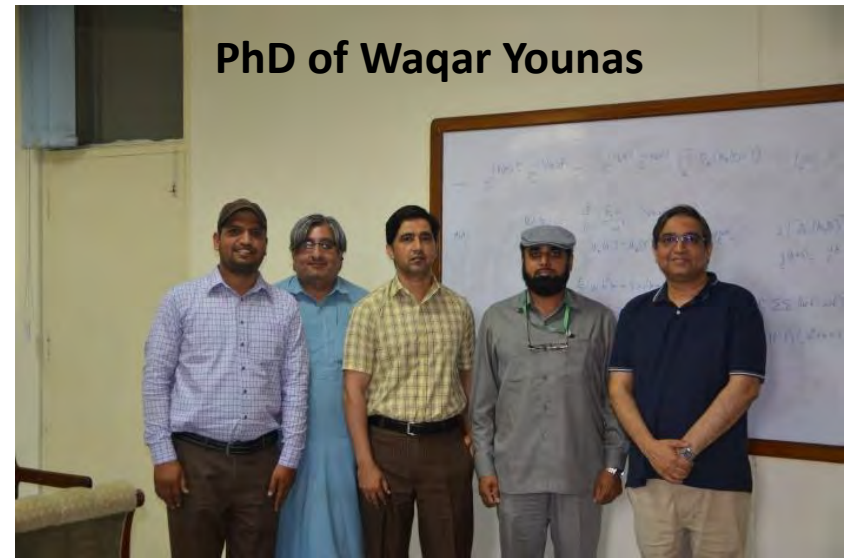
Software of Fleury free on the web

PAKISTAN/CAPACITY BUILDING

December 2019



PhD of Waqar Younas



PhD , May 31 2023, Quaid-I-Azam University, Islamabad
Title : *Ionospheric and magnetic changes induced by space weather at low-and-mid-latitudes.*

UNIVERSITY OF WAH
Department of Physics

Introduction to SPACE PHYSICS
Short Summer Course

This course is specially designed for undergraduate students and those Master's students willing to pursue research in Space Physics and in particular Space Plasma.

Speakers

- Dr. Christine Amory-Mazaudier → UMPG, France
- Mr. Waqar Younas → PhD Scholar, QAU
- Mr. Muhammad Mudassar Abbasi → University of Wah (UW)

Organizers

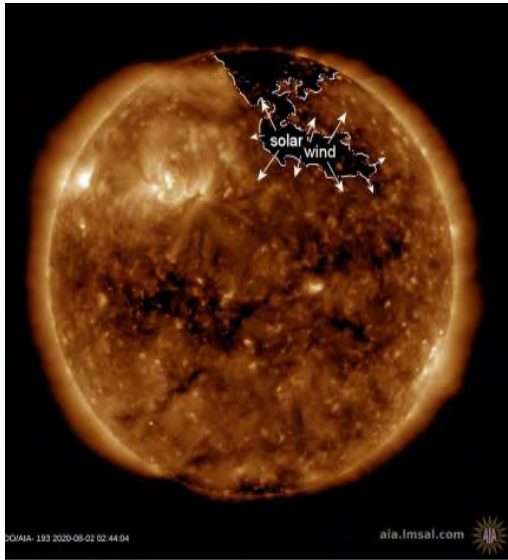
- Dr. Mattullah → Chairperson- UW
- Mr. M. Mudassar Abbasi → Lecturer-UW
- Mr. Muhammad Rizwan → Lecturer-UW

Course Duration: 18-29 July, 2022
Course Fee: 1,000 (For UW Students)
1,200 (For Outsiders)

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CORONAL HOLE



GEOPHYSICS => HELIOPHYSICS

Figure 1.(b) Variations of interplanetary and geophysical parameters, from top to bottom, B_z component of interplanetary magnetic field, solar wind speed, pressure, and SYMH index from 01 August 2020–10 August 2020

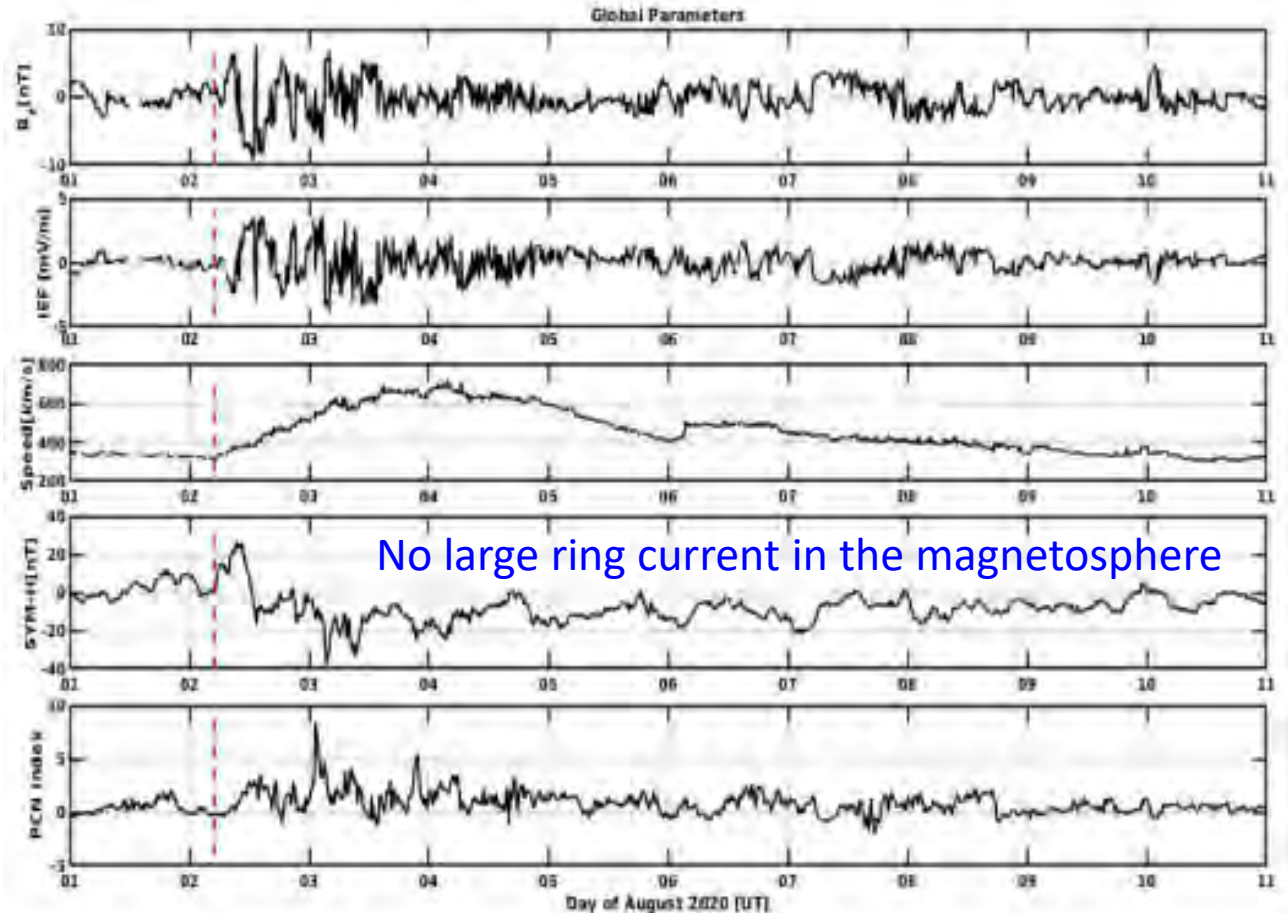


Figure 1. (a) Coronal hole in the northern part of sun as observed by AIA-193 on board Solar Dynamics Observatory (SDO) (Courtesy of NASA/SDO and the AIA, EVE, and HMI science teams)

Younas, W., Khan, M., Amory-Mazaudier, C., & Amaechi, P. O., Ionospheric response to the coronal hole activity of August 2020: A global multi-instrumental overview. *Space Weather*, 20, e2022SW003176. <https://doi.org/10.1029/2022SW003176>

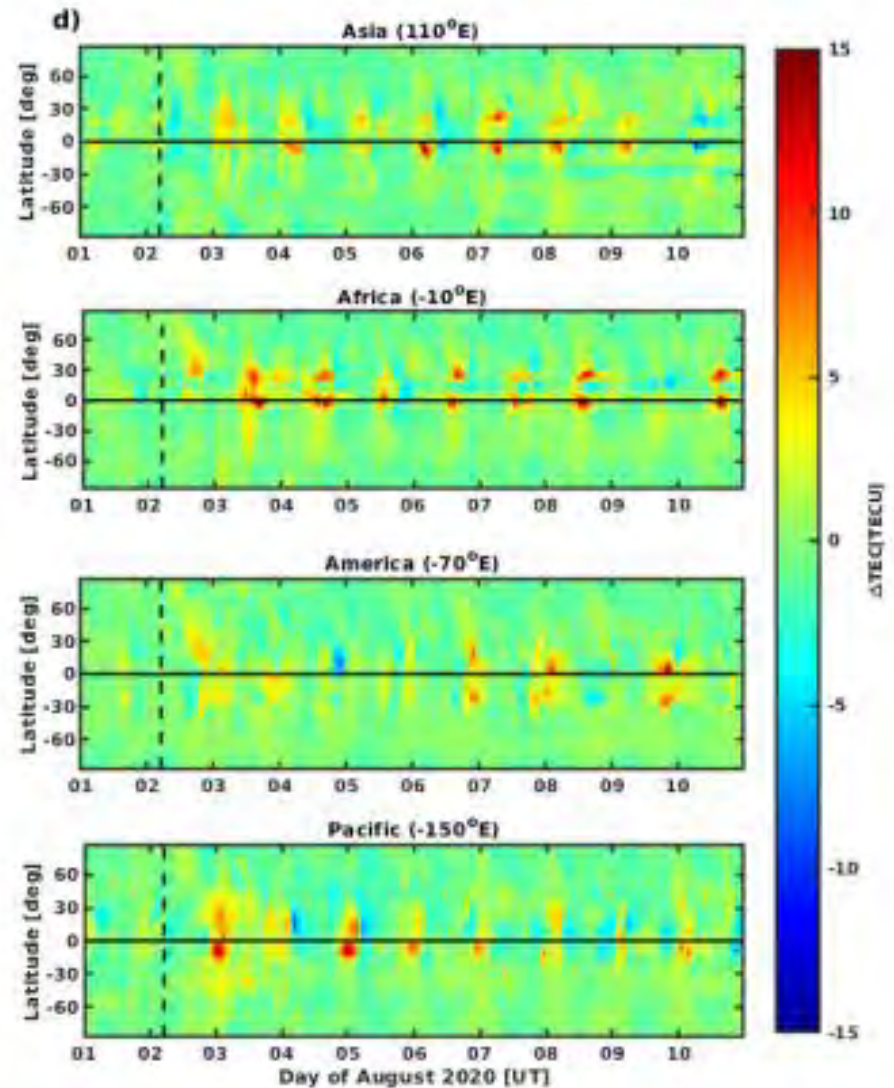
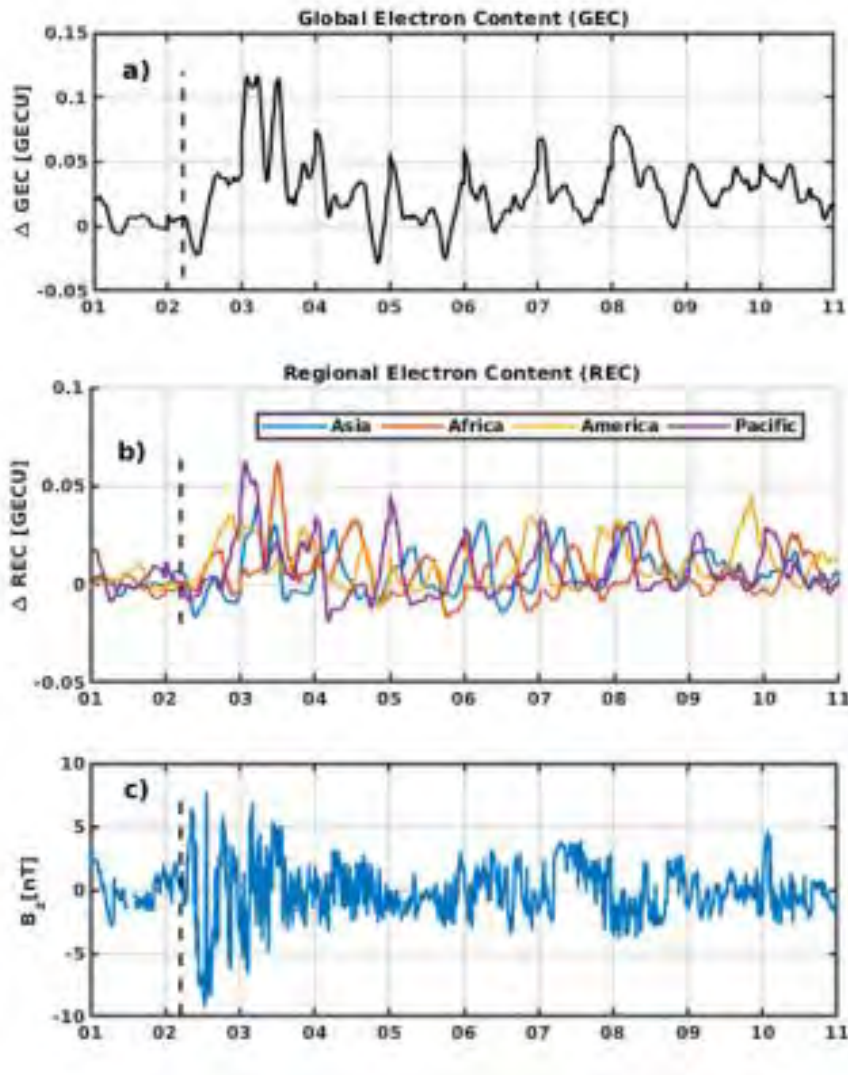
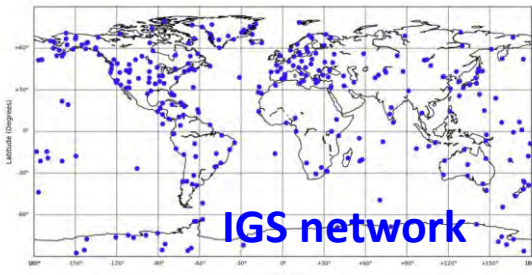


Figure 2. (a) ΔGEC (b) ΔREC in four longitudinal sectors Asia, Africa, America, and Pacific (c) B_z component of interplanetary magnetic field and (d) ΔvTEC at fixed longitudes, from top to bottom, Asia, Africa, America, and Pacific during 01 August–10 August 202

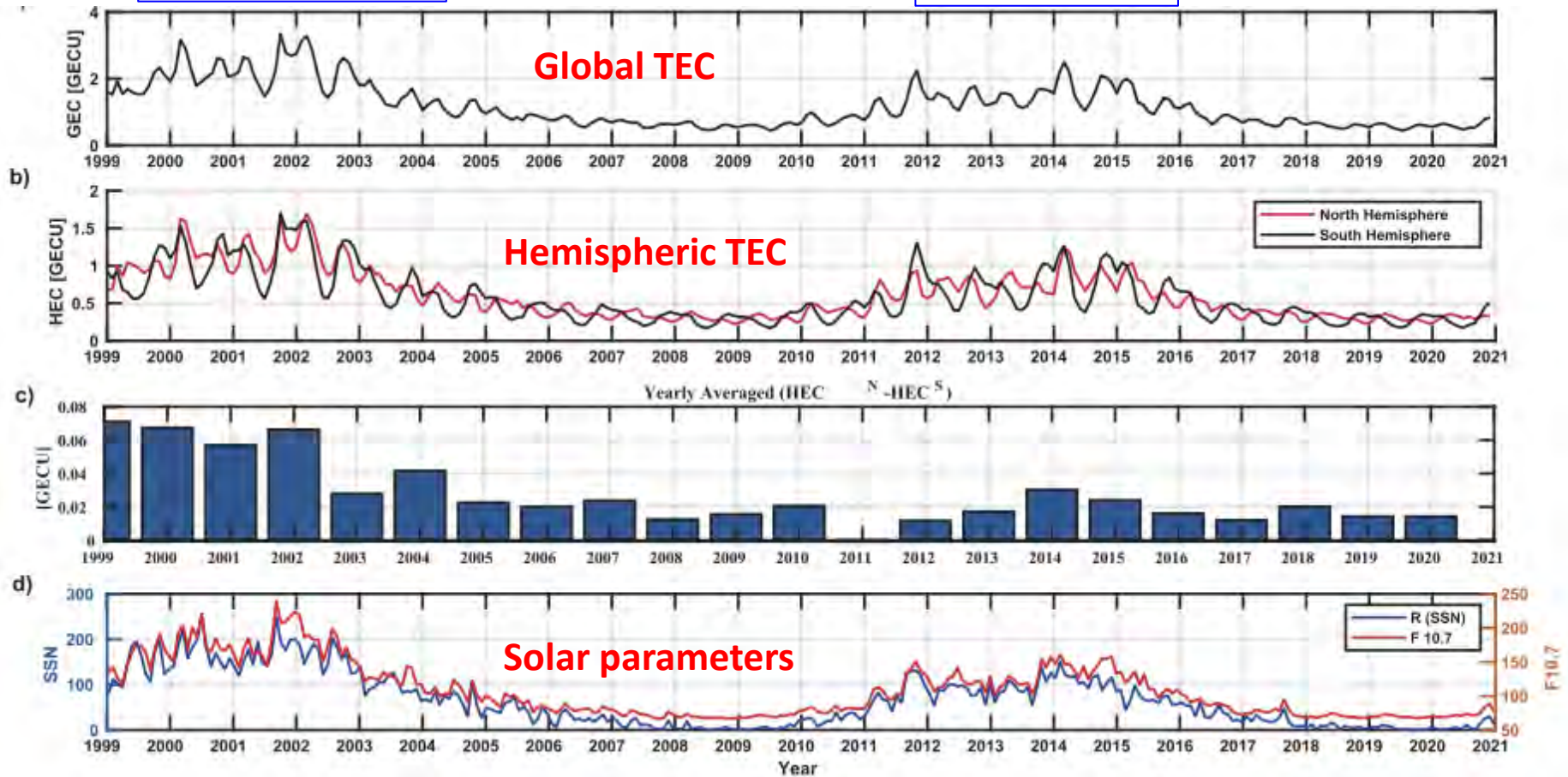


Climatology of global, hemispheric and regional electron content variations during the solar cycles 23 and 24



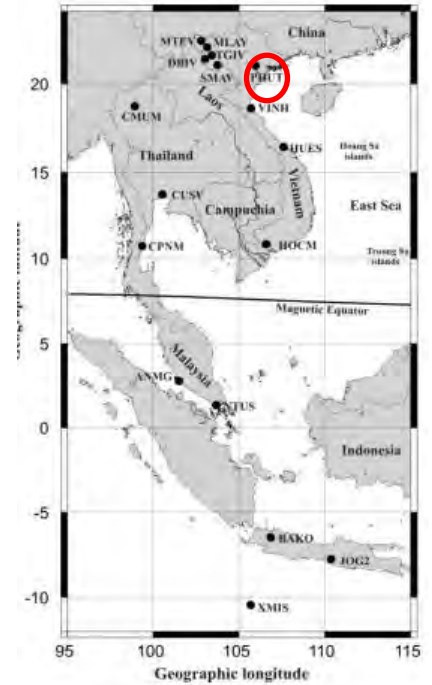
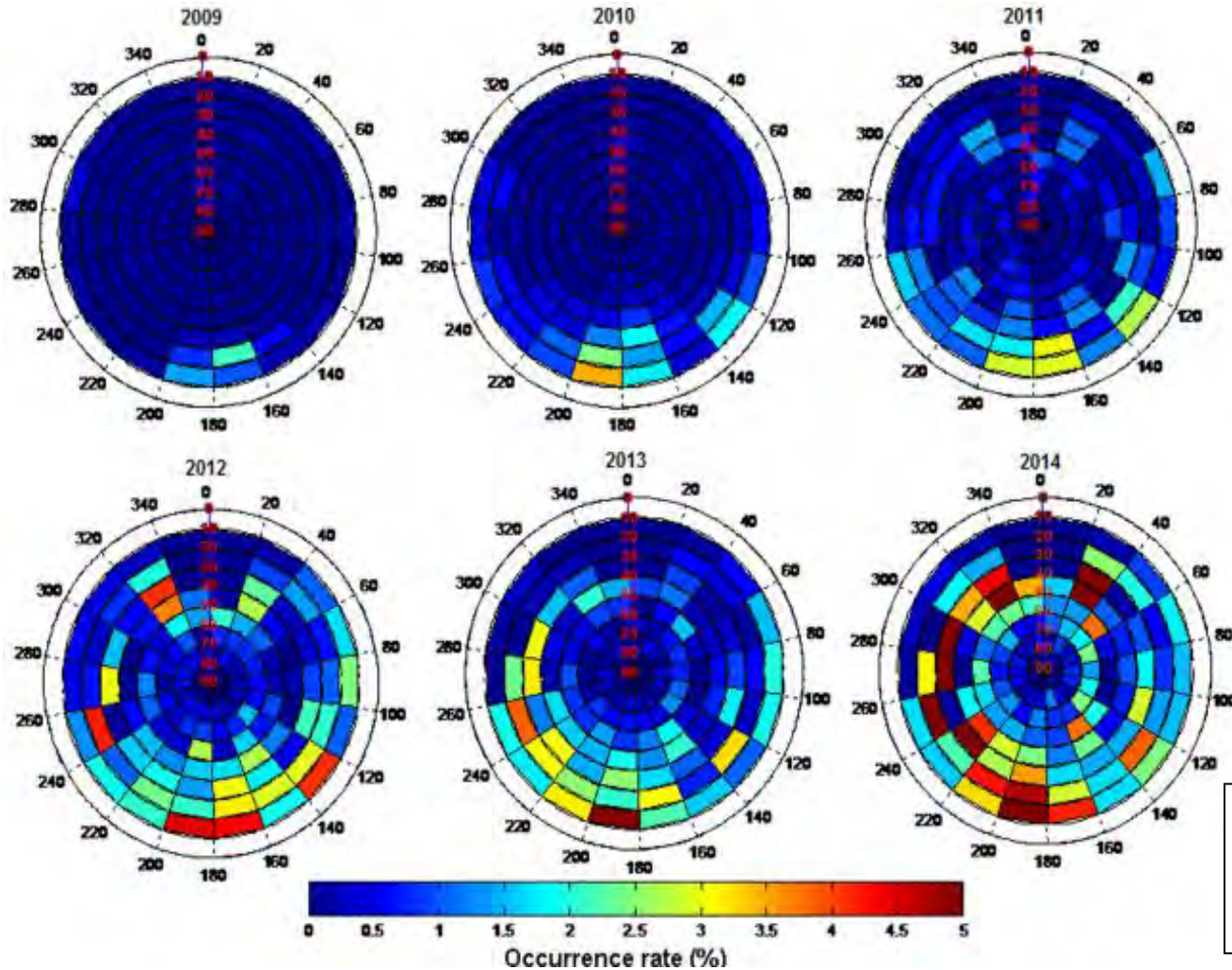
Solar cycle 23

solar cycle 24



VIETNAM

The directional distribution of scintillations observed from PHUT station during 2009–2014.



$$s4 = \sqrt{\frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}}$$

Tran Thi L., M. Le Huy et al., Climatology of ionospheric scintillation over the Vietnam low-latitude region for the period 2006-2014, *Advances in Space Res.* <http://dx.doi.org/10.1016/j.asr.2017.05.005>.

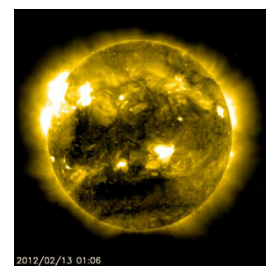
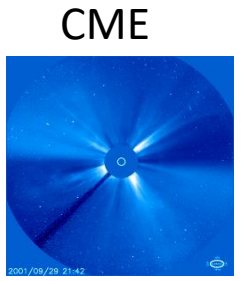
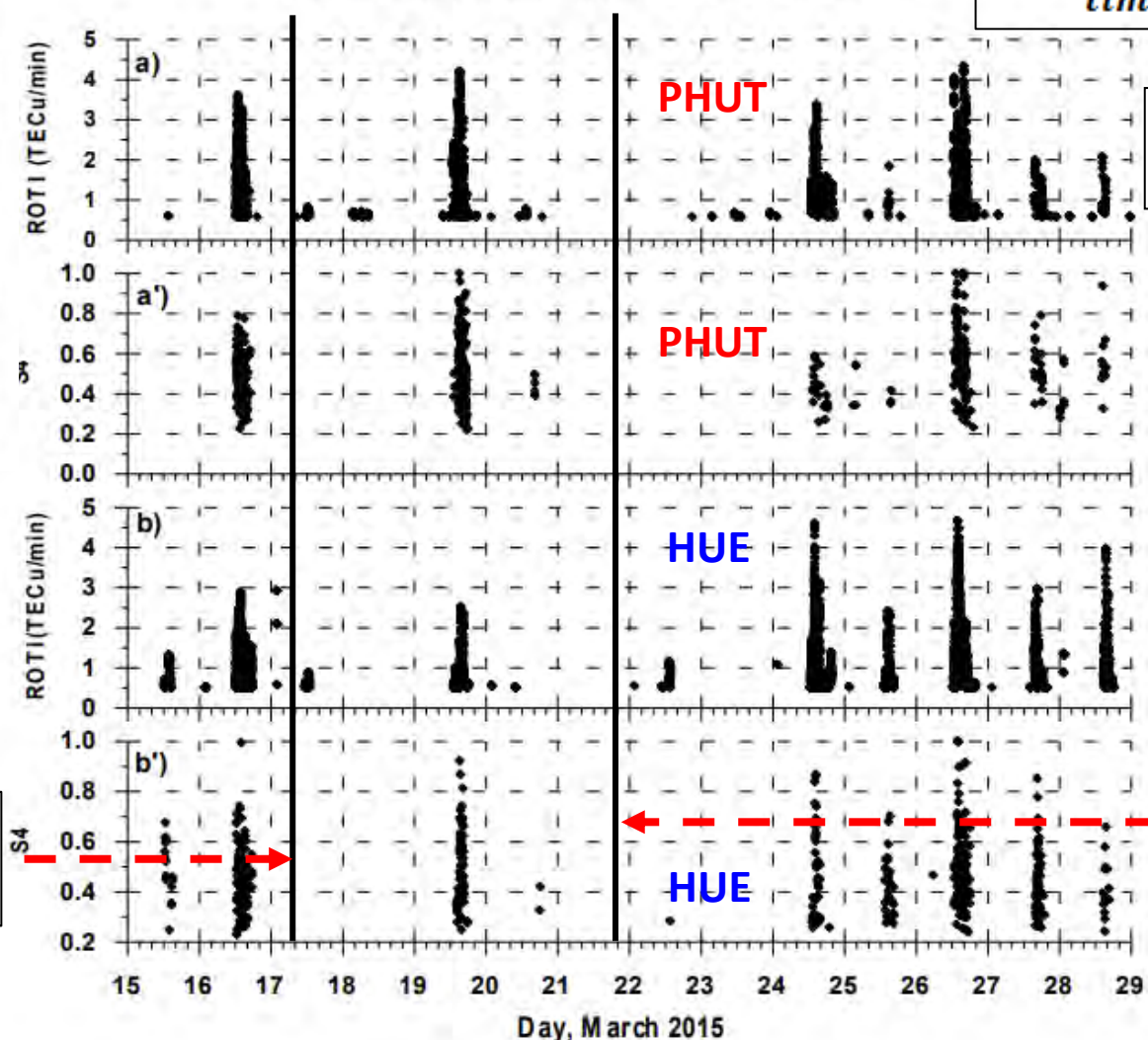
S₄ and ROTI index during storm event in Vietnam



Vietnam Journal of Earth Sciences Vol 38 (3) 267-284

$$rot = \frac{STEC_{k+1} - STEC_k}{time_{k+1} - time_k} * 60$$

$$s4 = \sqrt{\frac{\langle I^2 \rangle - \langle I \rangle^2}{\langle I \rangle^2}}$$

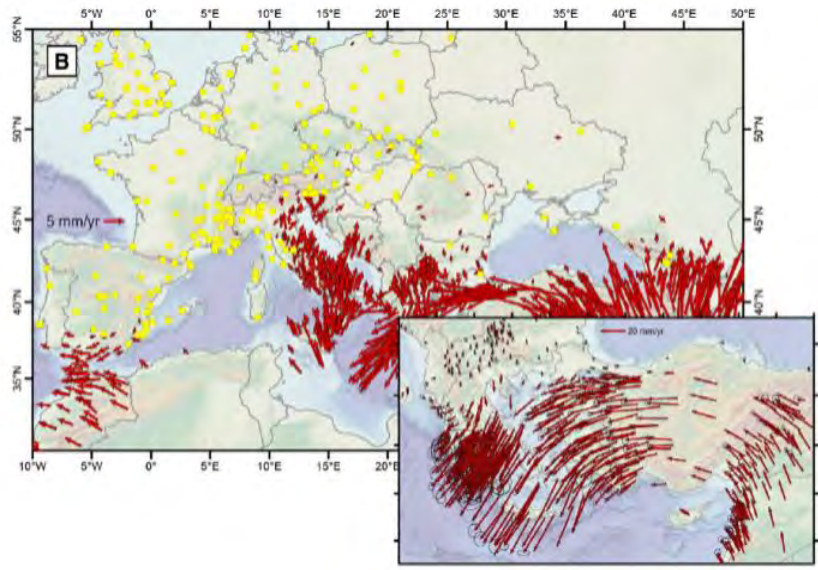


STORM SSC
March 17, 04.45UT

Arrival HSSW
March 21,
20.54UT

GNSS a universal tool for research and many applications in everyday life

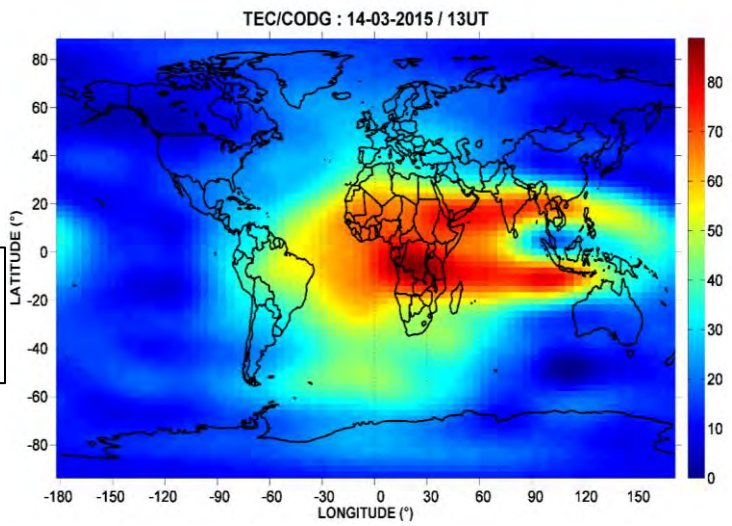
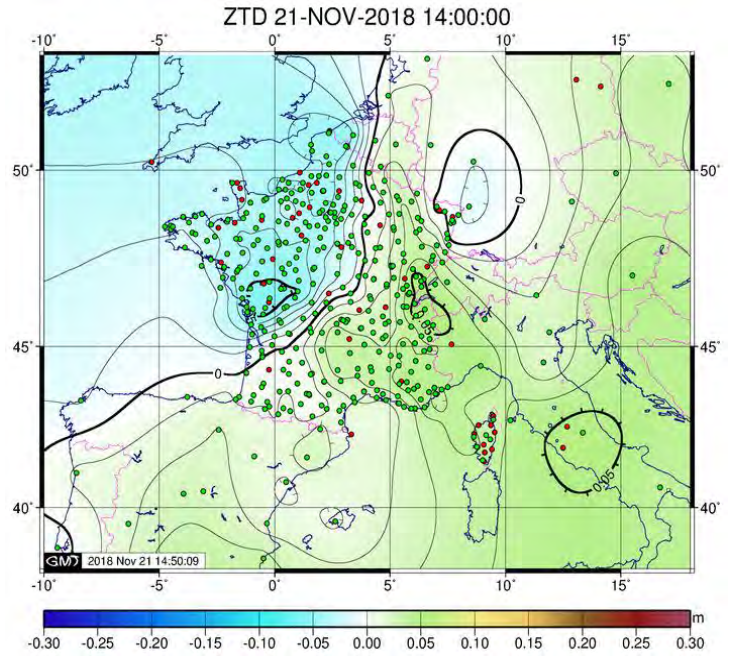
Nocquet (2012) GPS velocity field from the Euro Mediterranean region, relative to Eurasia. Yellow squares indicate velocities below 1 mm/yr. The inset illustrates the westward movement of Anatolia relative to Eurasia.



Post-processed ionospheric map of TEC from CODE on 14/03/2015 at 15UT

Figures and references in the paper Amory-Mazaudier, C. R. Fleury, F. Masson, S. Gadimova, E. Anas, Sun and Geosphere, Vol 14/1, pp. 71-79, 2019

ZTD values over France on 21/11/2018 at 14: 00UT
Zenithal Hydrostatic Delay, ZHD



CONCLUSION

The use of the GNSS technique has allowed the development of studies on the ionosphere in countries where the ionosphere was not studied for lack of scientific tools.

These studies carried out within the framework of the IHY 2007-2009) and ISWI (2010-2012) projects integrating a systemic approach of the Sun-Earth system have enabled the emergence of pioneers in the discipline of Space Weather in many countries.

These students had new data that led them to publish in the best journals, to have a position in their country and to be recognized internationally.

The strength of the GNSS technique is that it works continuously and it can capture all the variations of ionospheric ionization due to different physical phenomena and therefore study their impacts on ionosphere (geomagnetic storm, solar flare, eclipse, earthquake, stratospheric warming, quasi biennial oscillation, hurricane, etc...)

2024 ISWI Steering Committee Meeting and ISWI Exhibition

By Dr Shing Fung, NASA GSFC; 12 Feb 2024

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The ISWI steering committee meeting was held on 5-6 February 2024 in Vienna, Austria. The meeting agenda and presentations can be found on the ISWI website hosted by the UNOOSA

<https://www.unoosa.org/oosa/en/ourwork/topics/space-weather-events-and-activities.html>

A group photo of the ISWI annual meeting participants, both on-site and on-line, is below:



In addition to the annual meeting, the committee also held a week-long exhibition in the rotunda of the Vienna International Centre on 5-9 February 2024. The exhibition showcased several ISEI instrument networks (eCALLISTO, CHAIN, GIFDS, MAGDAS, OMTIs, RION, SOPHIE, and SCINDA) with display of data and some instrument hardware as well as display of posters describing the space weather

activities at regional and by several UN member states. Several photos of the exhibit are shown here:







Another significant event occurred during the ISWI annual meeting was that Dr. Nat Gopalswamy, ISWI Executive Director, became a **SCOSTEP Fellow**. The sequence of photos below show the presentation of SCOSTEP Fellow certificate and medal by, Dr. Kazuo Shiokawa, President of SCOSTEP, to Dr. Gopalswamy.





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