



IGRGEA LETTER

International Geophysical Research Group /Europe-Africa
International Geophysical Research Group /Europe-Asia

IGRGEA

At the end of the IEEY (International Equatorial Electrojet Year), in 1995, IGRGEA (International Geophysical Research Group Europe Africa) were organized to follow the research work initiated during IEEY, in 1992. Since January 2003 IGRGEA has been established at the Institute of Geophysics in Hanoi, Vietnam.

The last letter, No. 67, dated October 2023

BENIN

TOKPANOUDE Dèhouénagnon Judicaël defended his doctoral thesis on Friday 26 December 2025 at the National University of Science, Technology, Engineering and Mathematics (UNSTIM).

Title: *Multifractal characteristics of the solar wind and magnetosphere-solar wind interaction during shock events in Solar Cycle 24.*



Members of the jury :

Chair: MOUMOUNI Sounmaïla, Professor, National University of Science, Technology, Engineering and Mathematics (Benin)

Rapporteur : ZERBO Jean Louis, Professor
Nazi BONI University (Burkina Faso)

Examiner : HOVA Hoavo, Senior Lecturer, University of Kara (Togo)

Rapporteur : MAMADOU Ossénatou, Senior Lecturer,
University of Abomey-Calavi (Benin)

Rapporteur : KOUKPEMEDJI Aimé Audran, Senior Lecturer, National University of Science, Technology, Engineering and Mathematics (Benin)

Thesis supervisor: ADECHINAN Adébiyi Joseph, Senior Lecturer, National University of Science, Technology, Engineering and Mathematics (Benin)

First thesis in space weather in Benin

BURKINA FASO

OUEDRAOGO Pouraogo defended his thesis on 14 June 2025 at Norbert Zongo University, Burkina Faso
Title: *Study of variations in the Vertical Total Electron Content (VTEC) at the BF01 station in Ouagadougou from 2013 to 2021 using GNSS-CORS data*



Members of the jury :

Chair and External Examiner: Jean Louis ZERBO, Full Professor, Nazi BONI University, Burkina Faso
Internal Examiner: Christian ZOUNDI, Senior Lecturer, Norbert ZONGO University, Burkina Faso
External Examiner: Almoustapha ABOUBACAR, Senior Lecturer, Abdou MOUMOUNI University, Niger
Rapporteur: Doua Allain GNABAHOU, Senior Lecturer, Norbert ZONGO University, Burkina Faso
Thesis Supervisor: Frédéric OUATTARA, Full Professor, Norbert ZONGO University, Burkina Faso

BAZIE Nongobsom defended his thesis on 1 August 2025 at Norbert Zongo University, Burkina Faso
Title: *Variability of the electric field of magnetospheric convection (CECM) during periods of shock activity in solar cycle 24.*



Members of the jury :

Chair: Prof. Jean-Louis ZERBO, Nazi BONI University, Burkina

Editor - Writer : C. Amory-Mazaudier,

Laboratoire de Physiques des Plasmas, Ecole polytechnique Sorbonne Universités, 5 place Jussieu 75005 France
Tél : 33 (1) 45 11 42 37, email : christine.amory@lpp.polytechnique.fr



Examiner : Doua Allain GNABAHOU, Senior Lecturer, Norbert ZONGO University, Burkina Faso,
 Examiner : Adébiyi Joseph ADECHINAN, Senior Lecturer, National University of Science, Technology, Engineering and Mathematics, Republic of Benin,
 Examiner: M'Bi KABORE, Senior Lecturer, Nazi BONI University, Burkina Faso,
 Supervisor: Prof. Frédéric OUATTARA, Norbert ZONGO University, Burkina Faso

TAPSOBA Estelle Valérie defended her thesis on 16 November 2025 at Norbert Zongo University in Burkina Faso, becoming **the first woman to defend a thesis in space meteorology in Burkina Faso**.
 Title: *Study of the variability of equatorial plasma bubbles at seven African GPS stations during solar cycles 23, 24 and 25.*

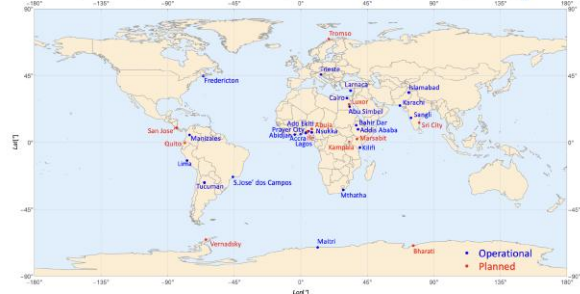


The members of the jury on the photo, from left to right:
 Director: Prof. Doua Allain GNABAHOU
 Examiner: Prof. Betaboalé NAON
 Chair: Prof. Jean-Louis ZERBO
 Candidate: Estelle
 Prof. Frédéric OUATTARA
 Prof. ABOUBACAR Al-Moustapha (Niger) attended remotely.

ITALIE ICTP

Bruno Nava (bnava@ictp.it) is installing low-cost GNSS stations in Africa; see the map below for installations that have been completed or are planned.

Low-Cost GNSS Receivers The "ICTP Network" (Jan 2026)



ICTP Workshop, 28 September to 11 October 2025.

Title: The International Reference Ionosphere (NeQuick): Improving the Representation of the Actual Ionosphere

Members of GIRGEA took part in this training course



Three Burkinabé participants

From left to right: Issiaka Kabore, Bruno Nava, Roger Nakolemma, Nongobsom Bazie

During this workshop, the students undertake a project and the projects are ranked. The project that came first compared the probability of occurrence of the Spread-F according to the IRI model.

Photo of the winners



From left to right: Bruno Nava (ICTP – Italy), R.K. Tshiangomba (Sapienza University of Rome, ING), K.S. Paul (Frederick Research Centre, Nicosia, Cyprus), L.M.A. Victoria (UNT-DLR, Argentina–Germany), S. Ndiaye (Iba Der Thiam University, Thiès – Senegal), Dieter Bilitza (George Mason University – USA)

CÔTE D'IVOIRE

On 4 June 2025, by Decree No. 2025-370, Côte d'Ivoire established a space agency, the ASCI (Côte d'Ivoire Space Agency). The decree sets out the creation, powers, organisation and operation of the SPACE AGENCY (ASCI).

The first GIRGEA student in Africa, Arsène Toka KOBEA, is currently Chief of Staff to the Minister for Research and has been a member of the Côte d'Ivoire Academy of Sciences since 2021.



MAROC

CHAFIK Bouchaib defended his doctoral thesis on Saturday 22 February 2025 at Chouaïb Doukkali University, El Jadida, Morocco.

[Chouaïb Doukkali University UCD]

Title: *Study on the development of a predictive model for geomagnetic storms using artificial intelligence.*



Members of the Jury:

Chair : KHOUILID Mohammed, Professor of Higher Education, Faculty of Science, El Jadida, UCD

Examiners:

- EL AKCHIOUI Nabil, Senior Lecturer, Faculty of Science and Technology, Al Hoceima, UCD

- CHERIF Walid, School of Information Sciences, Rabat, Mohammed V University

- BARKATOU Mohammed, Professor of Higher Education, Faculty of Sciences, El Jadida, UCD

Examiners:

- LAADISSI El Mehdi, Senior Lecturer, National School of Applied Sciences, El Jadida, UCD

- HAJJAJ Charaf, Senior Lecturer, Faculty of Science, El Jadida, UCD

Guest :

- MZILI Toufik, Senior Lecturer, Faculty of Science, El Jadida, UCD

Co-Supervisor:

- MISKANE Fatiha, Professor of Higher Education, Faculty of Science, El Jadida, UCD

Supervisor:

- NEBDI Hamid, Professor of Higher Education, Faculty of Science, El Jadida, UCD

First PhD thesis in Space Weather at Chouaïb Doukkali University.

NIGERIA

United Nations/Nigeria Workshop on the International Space Weather Initiative: Space Weather during a Moderate Solar Cycle No. 25

Co-organized by the United Nations Office for Outer Space Affairs and the National Space Research and Development Agency on behalf of the Federal Government of Nigeria

With the support of the International Committee on Global Navigation Satellite Systems (ICG) and the Nigerian Defence Space Agency.

Babatunde RABIU, the organiser for Nigeria, has been a member of the Nigerian Academy of Sciences since 2023.

Group Photo



Presentations by members of GIRGEA:

Monitoring the effects of Gamma-ray burst 221009A on the ionosphere using multiple instruments, Amira SHIMEIS, **Egypt

International Meridian Circle Project – Europe-Africa-Pacific Sector, Frédéric PITOUT, **France

Study of the effect of a strong magnetic storm on the ionosphere over the Algeria region using the ARIM model (Algerian Regional Ionosphere Model), Omar HAMMOU ALI, **Algeria

Electrodynamics of the Earth's magnetosphere at high latitudes: the geomagnetic superstorm of 22–23 June 2015, Inza GNANOU, **Burkina Faso

On the use of the ROTI and S4 indices for the study of plasma irregularities at low latitudes, Christine AMORY, **France

Studying ionospheric variation using low-cost, scientific-grade GNSS receivers over Abidjan (Ivory Coast), Kouadio Olivier OBROU, **Côte d'Ivoire



RWANDA

Théogène NDACYAYISENGA defended his thesis on 8 August 2025 at the School of Science, College of Science and Technology, Rwanda

Title: *Analysis of low-frequency solar radio bursts from the solar corona and their implications for space weather*



From left to right
Prof. Jeam Uwamahoro (Principal Director)
Associate Prof. Joseph Ntahompagaze (Examiner)
Mr Theogene Ndacyayisenga
Prof. Bonfils Safari (Coordinator)
Dr Innocent Nkurikiyimfura (Deputy Director)
Back row, from left to right
Dr Xavier Mushinzimana (Examiner)
Prof. Denis Ndanguza (Dean of the School of Science)

SENEGAL

Visit to the Sop-Niakhar Observatory site and meeting with Kader and Maria as part of the magnetic observatory repair mission



From left to right: Makhtar Samba NDIAYE, Kader TELALI, Maria BERGERARD-TIMOFEEVA and Amath NDAO

Master's Thesis Defences

Students Makhtar **Samba NDIAYE** (right) and **Absatou TOURE** defended their Master's theses on 7 March 2025.



Subject: *Study and implementation of a method for decoding archived EGNOS navigation messages relating to the ionosphere: Cases MT18 and MT26*

Members of the jury :

Chair: Prof. Cheikh SARR, Iba Der Thiam University, Thiès
Examiners :
Mr Herbert NGAYA, GNSS Expert, SatNav Africa
Prof. Issa DIAGNE, Cheikh Anta Diop University, Dakar
Supervisor : Rolland FLEURY, Lab-STICC, Institut Mines-Telecom Atlantique
Director: Prof. Idrissa GAYE, Iba Der Thiam University, Thiès.

The student **SIRA NDIAYE** defended her Master's thesis on 18 February 2026



Subject: *Knowledge extraction from databases for monitoring solar activity: forecasting cycles 26 and 27.*

Members of the jury :

Chair: Prof. Mouhamadou THIAM, Iba Der Thiam University, Thiès
Examiners: Dr Moustapha GNING TINE, Iba Der Thiam University, Thiès

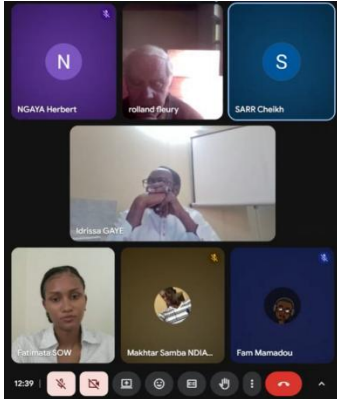


Supervisor : Dr Komlan BEDA, BemTECH, Dakar
 Director : Prof. Idrissa GAYE, Iba Der Thiam University,
 Thiès.

Examiner: Prof. Yacoub Idriss Halaw-law, University of
 N'djamena
 Thesis Supervisor: Prof. Ali Mahamat Nour, University of
 N'djamena.

The student **Fatimata SOW** defended her Master's
 thesis on 27 February 2026

M. ABDEL-RAZACK MOUSSA DAHAB et Moussa GUEILE



Subject : *Study of the morphology of the Equatorial
 Ionospheric Anomaly (EIA) at the longitude of Senegal
 using daily GIM/CODG vertical TEC mapping*

Members of the jury :

Chair: Prof. Cheikh SARR, Iba Der Thiam University, Thiès
 Examiners:

Mr Herbert NGAYA, GNSS Expert, SatNav Africa
 Supervisor: Rolland FLEURY, Lab-STICC, Institut Mines-
 Telecom Atlantique
 Director: Prof. Idrissa GAYE, Iba Der Thiam University,
 Thiès.

Two students have commenced their PhD research:

Mr Miskal Keumo RAKSEUNBE

*'Study of TEC variability over the city of N'Djamena
 during various geomagnetic events in Solar Cycle 24'*

Mr Abdelkerim ZEZERTI

*"Study of TEC variability based on CODG data from the
 town of Faya Largeau and comparison with data from
 N'Djamena during various geomagnetic activities in solar
 cycle 24"*

TCHAD

TUNISIE

In the field of the ionosphere, two research Master's
 theses were defended in December 2025 at the
 Department of Physics, Faculty of Exact and Applied
 Sciences, University of N'Djamena

The next GIRGEA conference, on the theme
 Artificial Intelligence for Space Weather: Physical and
 Numerical Foundations for Understanding and
 Forecasting the State of the Ionosphere
 will take place in Tunis from 15 to 26 June 2026
 It is being organised by **Ahmed AMAR and Mohamed
 RIAHI**.

Mr ABDEL-RAZACK MOUSSA DAHAB (on the left in the
 photo)

Below is the logo of their laboratory.

Topic: *'Study of ionospheric variability in total electron
 content (TEC) at Moundou and Aouzou (Chad) during the
 year 2024'*

Members of the jury :

Chair: Prof. Adoum Kriga, University of N'djamena.
 Examiner: Dr Adoum Mahamat Moussa, ENASTIC
 Thesis Supervisor: Prof. Ali Mahamat Nour, University of
 N'djamena.



Mr Moussa GUEILE (on the right in the photo)

Trois grands thèmes scientifiques sont prévus :

Topic: *'Study of ionospheric scintillation at the
 Youmousoukro station in Côte d'Ivoire during 2024'*

Members of the jury :

Chair: Prof. Amir Mougache, University of N'djamena

- soleil/géomagnétisme,
- vent solaire/magnétosphère/ionosphère,
- contenu total en électron



SITE INTERNET

On the website www.girgea.org, you will find all the GIRGEA newsletters sent out since May 1992. You can also download all of Rolland FLEURY's programmes for processing GPS data as well as certain radiosonde data.

To download the programmes, you will need a password, which Rolland will provide. Rolland's email address: rolland.fleury@imt-atlantique.fr

PUBLICATIONS

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