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* Editor: George Maeda, georgemaeda3[at]gmail.com
* Archive of back issues: ISWI Website https://iswi-secretariat.org/
* Send subscription request to: iswisupport@bc.edu
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Dear ISWI Newsletter Subscriber:

Please be reminded that this newsletter has two versions:
[1] Email version -- this gets distributed via email
directly to you but does not have the attachments.
[2] Web version -- this is the full version with attachments.

To view the Web version, go to this web page:
https://iswi-secretariat.org/
and click on "NEWSLETTERS".

As always, I seek material for this newsletter. Please
send in space-weather-related items to me, such as:
- event announcements
- post-doc fellowships
- scholarship news
- event reports
- ..... and so on.
Please keep any attachment to under 2 MB.

Cordially,
George Maeda
Editor of the ISWI Newsletter, since 2009.

CONTENTS OF THIS ISSUE:

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[01]----------

FROM: Maria Graciela Molina
DATE: Sun, Mar 9, 2025.

Dear ISWI colleagues,

We are pleased to announce the next ISWI Webinar of 2025
by Dr Mihailo Savić scheduled for March 26th, 2025
at 3 PM Central European Time (9 AM EDT; 7:30 PM IST).

Starting this year, ISWI Webinar will be scheduled every 2-month.

To watch past Webinars, please check the following link:
https://cdaw.gsfc.nasa.gov/webinars/ISWI/

Remember to register for the virtual seminar by sending
an email to: iswisupport@bc.edu
Please include "ISWI Seminar Registration" in the subject line. There is a limit of 300 participants, so please register your interest as soon as possible. The MS Teams link will be sent to registered participants 2 days before the event.

With kind regards,
Graciela Molina
on behalf of the ISWI Seminar Committee
https://iswi-secretariat.org/home-page/organization/iswi-webinar-committee/

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Title: Cosmic Rays and Space Weather: Interactions and Implications
Speaker: Mihailo Savić, Institute of Physics Belgrade

Abstract:

Cosmic-ray physics may not strictly fall under the umbrella of space weather, but it is deeply interconnected with it, sharing significant overlaps in phenomenology, instrumentation, analysis techniques, and related disciplines. One of the most evident connections is the modulation of cosmic rays by heliospheric phenomena driven by solar activity. Variations in the Sun's magnetic field, solar wind, and transient disturbances—such as coronal mass ejections (CMEs) and solar energetic particle (SEP) events—alter the flux of cosmic rays reaching Earth. Consequently, cosmic-ray detectors serve as valuable tools for studying space weather, providing indirect yet critical insights into solar and interplanetary conditions. This is particularly relevant for assessing space weather effects on the near-Earth environment and predicting potential hazards to infrastructure and human activity.
Beyond their utility as space weather proxies, cosmic rays also exert a direct, though subtler, influence on Earth's environment. At high altitudes, cosmic rays contribute to radiation exposure, affecting airline crews, frequent fliers, and, more critically, astronauts in space. Their interactions with the atmosphere produce secondary particles that can impact biological systems and electronic instrumentation, posing challenges for high-altitude aircraft, satellites, and space missions. Furthermore, cosmic rays have been associated with various climate-related and geophysical effects.
Given these multifaceted connections, this talk will present key areas of interest in cosmic-ray research, the analytical methods and techniques developed, and their contributions to a broader

understanding of space weather phenomena. Integrating cosmic-ray studies with space weather research enhances the ability to monitor and predict space weather impacts, improves the understanding of cosmic ray-induced effects on Earth's environment, and refines methodologies applied in both fields.

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[02]----------

IGRGEA LETTER, NO. 68, FEBRUARY 2025

Please see this pdf:
irgea letter n° 68– February 2025.pdf
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[03]----------

NASA Launches New Space Telescope and Suite of Solar Satellites

The SPHEREx telescope will create the most colorful map of the cosmos,
while the four satellites of the PUNCH mission track the evolution of
the solar wind in three dimensions.

By Katrina Miller, THE NEW YORK TIMES; March 11, 2025

https://www.nytimes.com/2025/03/11/science/spacex-nasa-spherex-punch-launch.html

Or view this pdf:
NYT; suite of solar satellites.pdf
002

[04]----------

RE: Request to share information about a postgraduate course in Spanish

FROM: Ana Elias
DATE: 20 Feb 2025

I would like to announce to the ISWI Community a postgraduate course,
in Spanish, which will be online. The announcement is the following:

Postgraduate Course **"Introduction to the Study of the Ionosphere: Physics, Variability, Data Analysis Techniques, and Trend Estimations"** in Spanish, 26 March-22 April 2025

El Doctorado en Ciencias Exactas e Ingeniería de la Facultad de Ciencias Exactas y Tecnología (FACET), de la Universidad Nacional de Tucumán (UNT) invita a participar del Curso de Postgrado: "Introducción al Estudio de la Ionosfera: Física, Variabilidad, Técnicas de Análisis de Datos y Estimaciones de Tendencias"

Se desarrollará entre los días 26 de marzo y 22 de abril, 2025

Modalidad: Virtual

Carga horaria: 60 horas

Objetivos: En este curso se estudiará la física de la ionosfera, sus características generales y sus variaciones en distintas escalas de tiempo. Se estudiarán y aplicarán modelos teóricos y semi-empíricos, siguiendo con métodos estadísticos de análisis de datos y de series de tiempo, detección de tendencias y análisis de forzantes. Estos temas se desarrollarán en 13 capítulos. El objetivo de este Curso de Postgrado es introducir al alumno en temas de física de la atmósfera superior, física espacial, física de plasmas y geofísica en general, junto con técnicas de análisis de datos, y generar inquietud por los últimos avances y los temas de investigación más activos en esta área.

Unidades del programa: 1. Atmósfera neutra, 2. Campo magnético de la Tierra, 3. Actividad solar y geomagnética, 4. Física de la ionosfera, estructura y variabilidad, 5. Dinámica del plasma ionosférico, 6. Propagación en la ionosfera, 7. Características de la ionosfera a latitudes medias y bajas, 8. Características de la ionosfera a latitudes altas, 9. Técnicas de medición de la ionosfera, 10. Cambio climático, 11. Modelos Ionosféricos, 12. Técnicas de análisis de datos, 13. Variaciones a largo plazo en la ionosfera.

(Programa completo en https://docs.google.com/document/d/1KDjKDvWinsn9iHuzAfcU89z9x7-a4jRn/edit?usp=drive_link&ouid=117036567394452213209&rtpof=true&sd=true)

Destinatarios:
Licenciados en Física, Licenciados en Matemática, Ingenieros, o carreras afines.

Ver más información e inscripción en:
https://drive.google.com/file/d/1Z75BJVy1Vt898UFZV-Kupi9WbGSx2LUb/view?usp=drive_link

Contacto: Ana G. Elias (aelias@herrera.unt.edu.ar)
& Blas F. de Haro Barbas (bdeharo@herrera.unt.edu.ar)

Flyer:
https://drive.google.com/file/d/1nnNfFg6B0uk4pFvfl4tt0epRZoe_4Kal/view?usp=drive_link

Warmest regards,
Ana
Ana G. Elias
Universidad Nacional de Tucuman
Facultad de Ciencias Exactas y Tecnologia
Departamento de Fisica
4000 Tucuman - Argentina

[05]----------

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

N° 68 FEBRUARY 2025

001

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 Hanoï, Vietnam.

The last letter, No. 67, dated October 2023

BURKINA FASO

Saguedo SAWADOGO defended his thesis on December 21, 2024

Thesis title: "*Variability of the TEC during periods of recurring geomagnetic activity at the Koudougou GPS station during the solar cycle 24"*

Members of the Jury:

President and Rapporteur: Professor Saïdou MADOUGOU

Rapporteur: Professor Jean Louis ZERBO

Rapporteur: Professor Olivier Kouadio OBROU

Examiner: Doctor Doua Allain GNABAHOU

Thesis director: Professor Frédéric OUATTARA

From the left to the right : Dr Doua Allain GNABAHOU, Saguedo SAWADODO, Pr Frédéric OUATTARA et Pr Jean Louis ZERBO, Pr Saïdou MADOUGOU (Niger) et Pr Olivier Kouadio OBROU (Côte d'Ivoire) were remotely.

Tinlé PAHIMA defended his thesis on August 9,2024

Title of the thesis: "*Study of the variability of the TEC during periods of fluctuating activity at the Koudougou Station during solar cycle 24"*

Members of Jury :

President and Rapporteur : Professor Olivier Kouadio OBROU

Rapporteur : Professor Jean Louis ZERBO

Rapporteur : Doctor Christian ZOUNDI

Member: Doctor Doua Allain GNABAHOU

Thesis director: Professor Frédéric OUATTARA

From the left to the right : Dr Christian ZOUNDI ; Tinlé PAHIMA ; Pr Frédéric OUATTARA ; Dr Doua Allain GNABAHOU et Pr Jean Louis ZERBO, Pr Olivier Kouadio OBROU were remotely.

CÔTE D'IVOIRE

Interferometer of NCAR has been installed at the observatory of the **University of Korhogo**.

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FRANCE

Frédéric PITOUT has been awarded the Gemini 2024 prize for collaboration between professionals and amateurs (pro-am) by the SF2A and SAF.

The French Society of Astronomy and Astrophysics (SF2A) and the Astronomical Society of France (SAF) have awarded the Gemini 2024 prize to the application 'Solar observation at the Pic du Midi with CLIMSO' submitted by Frédéric Pitout from the Observatory Midi-Pyrénées and Franck Vaissière, an amateur astronomer and president of the Associated observers association. Every year since 2020, the Gemini prize has been awarded for outstanding collaboration between professionals and amateurs (pro-am). CLIMSO is a national observation service dedicated to solar monitoring. It comprises two sunglasses and two (soon to be 3) coronographs installed at the Pic du Midi observatory. Routine observations are carried out entirely by around eighty amateur (or extra-academic) volunteers who have formed an association known as the Associated Observers (OA). A few particularly experienced AOs are also involved in instrumental and IT development.

https://saf-astronomie.fr/remise-du-prix-gemini-2024/

FRANCE THAÏLANDE

Rungployphan Kieokaew and Frédéric PITOUT, both from IRAP in Toulouse, and their Thai counterparts from MKITL in Bangkok, have obtained 2 years' funding for mobility between France and Thailand (as part of Campus France's Siam 2025 programme). In addition to developing a new collaboration, the scientific objective is to study magnetosphere-ionosphere-thermosphere coupling at low latitudes during violent solar events. To achieve this, the team will be relying to a large extent on instruments deployed in Thailand, which is ideally placed as it straddles the magnetic equator. The project involves senior researchers and PhD students from both countries.

GUINEA

The first school in Space Weather took place in Conakry from October 14 to 25. It was organized by Dr. René Tato LOUA and Dr. Jean Moussa KOUROUMA

René Tato LOUA

Jean Moussa KOUROUMA

The opening ceremony was chaired by:
Mr. Ousmane Gaoual DIALLO, Minister of Transport, Spokesperson for the Government of the Republic of Guinea
and
Mr. Alpha Bacar BARRY, Minister of Higher Education, Scientific Research and Innovation of the Republic of Guinea.

Photo of the opening ceremony

Organizations that funded the school

The report of the school is on the site :
www.girgea.org

ITALY_ICTP

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Two professors and 10 students from GIRGEA participated in the workshop organized by ICTP. « *African Capacity Building Workshop on Space Weather and Ionospheric research*. »

From the left to the right : C. AMORY-MAZAUDIER (France), LOUFTI Amal (Morroco), SAWADODO Gédeon (Burkina Faso), KONATE Mustapha (Burkina Faso), OBROU Olivier (Côte d'Ivoire), KOUASSI Nguessan (Côte d'Ivoire), GUENOUKPATI Koffi Amewouga (Benin), KABORE Issiaka (Burkina Faso), DIABY Kassamba Abdel Aziz (Côte d'Ivoire), GUEYE Penda (Senegal), DIOUF Modou Khabane (Senegal), SAWADOGO Yacouba (Burkina Faso).

NIGERIA/ BRAZIL

Oladayo Olayiwola Afolabi defended his thesis on April, 17, 2014

Title of the PhD : « *Study and modeling of Brazilian equatorial and Low-latitude ionosphere during geomagnetic disturbances*. »
Thesis supervisors: Dr. Claudia M.N Candido, Dr. Fabio Becker Guedes, Dr C. Amory Mazaudier

Members of Jury :
President: Dr Maria Paulette Pereira Martin -INPE
Dr Fabio Becker Guedes – Thesis director -INPE
Dr Claudia M. N. Candido, Thesis Director – UNIVAP
Dr C. Amory-Mazaudier, Thesis Director, LPP/ France
Dr Mendes Junior Internal Member -INPE
Dr S. O. Lomotey External Examiner, UESD/Ghana
Dr B. Rabiu, External Examiner, NASRDA/Nigeria

NIGERIA

Aderonke AKERELE defended her thesis on September 26, 2024 at Bowen University
Thesis topic: *« Variability of the Doppler Frequency shift of ionospheric radio signal within the Nigerian Equatorial Anomaly*. »
Thesis Director: Professor Babatunde Rabiu
External Examiner: Professor Elijah O. Falayi

PAKISTAN

Waqar YOUNAS defended his thesis in Physics on May 31, 2023 at the university Quaid-I-Azam au Pakistan sur le thème : *Ionospheric and Magnetic Changes Induced by Space Weather at Low- and Mid-Latitudes*
Waqar won the
2024 NASA Jack Eddy Postdoctoral Fellows!
He is at Boston University.

SENEGAL

Amath NDAO is currently working on his thesis in Senegal at Iba Der Thiam University in Thiès,
his thesis director is Idrissa Gaye.

Amath works on the relationship between the disturbed ionospheric dynamo and the ROTI index. He won the first prize for the best oral communication during the doctoral conferences coupled with the research days of the doctoral school of the Iba Der Thiam University of Thiès.

RDC

Dr Jean KIGOTSI KASEREKA who defended his thesis in 2017 became Budget Administrator at the University of Kinshasa.
Emannuel KANDOLO defended his thesis on 27 April 2024 at the University of KINSHASA.

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Title of thesis : 'Study of the temporal variability of lightning activity in InterTropical Africa'.

Photo of the defence

From left to right: **Pr Kisangala Muke Modeste**: Dean of the Faculty of Science and Technology, **Pr Kigotsi Kasereka Jean**: Budget Administrator, representing the Rector (unable to attend), **Ndiadia Kandolo Emmanuel**: Recipient, **Pr Phuku Phuati Edmond**: Chairman of the Jury, **Pr Ntombi muen Kabeya Médard**: Secretary of the Jury, **Pr Tondozi Keto François**: Promoter, **Pr Kabasele Yenga-Yenga**: Member of the Jury, **Pr Mbuyi Katshiatshia**: Member of the Jury, **Pr Mpia Nkanda Lobota** François: Member of the Jury.

RDC / BELGIQUE

Rodriguez YOMBO PHAKA defended his thesis on 11 January 2024 at the University of Liège in Belgium.

Title of the thesis defended in English: *« First MAX-DOAS observations of tropospheric NO_2 and H_2CO in Central Africa: impact on air quality and validation of the TROPOMI satellite instrument* »

Photo of the defence

From left to right Rodriguez Yombo, Dr Alexis Merlaud (researcher at BIRA-IASB), Pr Louis François (Université Liège), Pr Bertrand Tychon **(Université liège), Pr Mbungu Tsumbu (Université** de Kinshasa), Dr Gaia Pinardi (BIRA-IASB), Pr Emmanuel Mahieu (Université Liège : promoter)**.**

VIETNAM

Dung NGUYEN THANH defended her thesis on 6 December 2023 and was awarded his PhD on 28 June 2024.

Title of thesis: *'Plasma bubbles and characteristics of the equatorial ionisation anomaly over Vietnam and the adjacent region'.*

Supervisor: Dr. LE HUY Minh

Thesis co-supervisor: Dr. PHAM THI THU Hong.

Members of the Jury

President: Prof. Dr. BUI CONG Que

Rapporteur 1: Ass. Prof. Dr. NGO DUC Thanh

Rapporteur 2: Ass. Prof. Dr. LA THE Vinh

Rapporteur 3: Ass. Prof. Dr. PHAN THIEN Hương

Examiner, Secretary: Dr. NGUYEN VAN Duong

Examiner : Ass. Prof. Dr. VO THANH Quynh

Examiner : Dr. NGUYEN GIA Trong

Photo of the defence

From left to right Prof. Dr. NGUYEN VAN Tuyen, Dr. LE HUY Minh, PhD student NGUYEN THANH Dung, Prof. Dr. VU DINH Lam

PROJECT IMCP Europe-Africa-Pacific

The aim of the International Meridian Circle Europe-Africa-Pacific (IMCP-EAP) project is to carry out measurements of the neutral and ionised upper atmosphere along a meridian circle centred around longitudes 30° East and 150° West. It follows the same logic as the initial IMCP project, coordinated by the Chinese Academy of Sciences,

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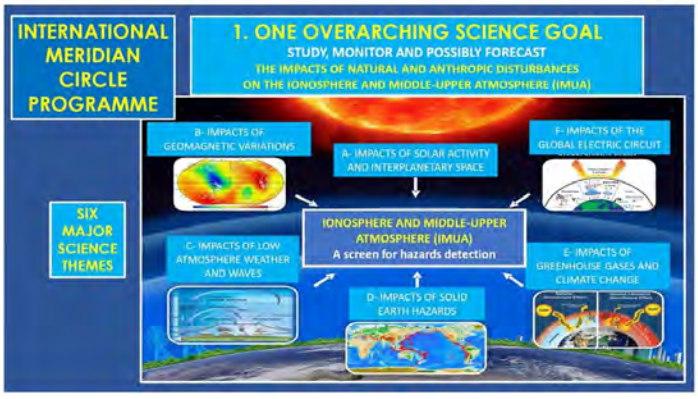
which aims to operate along the 120° East and 60° West meridian that will cross East Asia and the Americas. Quadrangulating in longitude with this meridian, the meridian circle of the IMCP-EAP project crosses the continents of Europe and Africa on one side, and Alaska and the Pacific on the other. This project poses a major organisational challenge, with 4 'pillars': the scientific objectives to be pursued, the network of instruments to be coordinated, access to and use of the data, and collaboration between the various countries and communities to be managed. The scientific objectives are classified into 6 themes according to the different sources of disturbance acting on the upper atmosphere:

A. solar activity ;
B. geomagnetic variations ;
C. the lower atmosphere
D. natural hazards associated with the solid Earth;
E. Greenhouse gases and climate change;
F. atmospheric electricity.

The project has been presented to the International Space Weather Initiative (ISWI), which has agreed to take it under its wing. To get this ambitious project off the ground, the coordinators of the various countries involved have been contacted (it's not too late to respond), a survey of available instruments is under way and a series of webinars has been initiated. We are also planning a session dedicated to the project at the ISWI workshop in Nigeria next October.



SITE INTERNET

At www.girgea.org, you will find all the GIRGEA letters sent since May 1992.
You can also download all Rolland FLEURY's softwares for processing GPS data and some ionosonde data. To download the softwares you need a password, which Rolland will provide.
Mail from Rolland:
rolland.fleury@imt-atlantique.fr

PUBLICATIONS

Afnan Tahir, Falin Wu, Munawar Shah, Christine Amory-Mazaudier, Punyawi Jamjareegulgarn, Tobias G. W. Verhulst and Muhammad Ayyaz Ameen, Multi-Instrument Observation of the Ionospheric Irregularities and Disturbances during the 23–24 March 2023 Geomagnetic Storm, Remote Sens. 2024, 16, 1594.
https://doi.org/10.3390/rs16091594.

Alok Kuman Ranjan, MV Sunil Krishna, C. Amory-Mazaudier, R. Fleury, S. Sripathi, Geeta Vichare, W. Younas Variability of Ionosphere Over Indian Longitudes to a Variety of Space Weather Events During December 2006, 2023, Space Weather, 21, e2023SW003595.
https://doi.org/10.1029/2023SW003595

Baki, P., Babatunde A. Rabiu, Christine Amory-Mazaudier, Rolland Fleury, Pierre J. Cilliers, Joseph Adechinan, Emran Anas, Aziza Bounhir, Claudio Cesaroni, Bienvenue Dinga, Patricia Doherty, Idrissa Gaye, HassenGhalila, GRODJI Oswald Didier Franck, John B. Habarulema, Bruno Kahindo, Ayman Mahrous, Honoré Messanga, Patrick Mungufeni, Bruno Nava, Melessew Nigussie, Joseph Olwendo, Patrick Sibanda, René Tato Loua, Jean Uwamahoro, Naima Zourar, Jean-Louis Zerbo, The Status of Space Weather Infrastructure and Research in Africa 2023, *Atmosphere* **2023**, *14*(12), 1791; https://doi.org/10.3390/atmos14121791

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Bazié Nongobsom , Kaboré Salfo, Guibula Karim , and Ouattara Frédéric, Response of the Magnetospheric Convection Electric Field (MCEF) to Geomagnetic Storms During the Solar Cycle 24 Maximum Phase. International Journal of Geophysics Volume 2025, Article ID 9888419, 19 pages. 2024.
https://doi.org/10.1155/ijge/9888419

Dama Alfred Stéphane, Kaboré Salfo, Sandwidi Sibri Alphonse and Ouattara Frédéric, Variability of the electric field of magnetospheric convection in recurrent activity during the solar cycle 24. International Journal of Physical Sciences. Vol. 18(4), pp. 129-137, 2023.
DOI: 10.5897/IJPS2023.5039.

Diakite, Y., Zoundi, C, Kabore, M, Zerbo, J.L., Statistical Study of the Geoeffectivity of Halo Coronal Mass Ejections Associated with X-Class Flares during Solar Cycles 23 and 24. Open Journal of Applied Sciences (2024), 14, 950-960. doi:10.4236/ojapps.2024.144062

Falayi, E.O., PO Amaechi, JA Oluwafemi. Analysis of total electron content over the African low-latitude region during the maximum phase of solar cycle 24 (2012–2014). Journal of Atmospheric and Solar-Terrestrial Physics 258, 106235, 2024.

Gnanou, I., Kabore, S., Gyebre, A., Zoundi, C., Zerbo, J. and Ouattara, F. Effect of High-Speed Solar Winds Turbulence Upstream of the Earth's Magnetosphere: Case of the Outer Minima of Solar Cycles 20, 21, 22, 23 and 24. Open Journal of Applied Sciences, 13, 1145-1162. 2023. doi.org/10.4236/ojapps.2023.137091.

Ibifubara Humphrey, Adeyinka David Adewoyin, Nsikan Ime Obot, Paul Obiakara Amaechi, Nneka Fidelia Afuwape, Olamide Florence Humphrey Investigation of the effect of specific gravity and pH on the fermentation period of a single and combined algae species as a potential bioethanol feedstock.. Next Research 1, 100015, 2024

Inza Gnanou, Salfo Kabore, Moustapha Konate, Abdoul Fatao Cisse, Christian Zoundi and Frederic Ouattara, Magnetospheric disturbances in gnevyshev gaps: case of solar cycles 20 to 24. International Journal of Advanced Reseach (IJAR), 12(12),459-468., 2024.
doi.org/10.21474/IJAR01/20043.

Kaboré Salfo, Segda Abdoul Kader, Gyébré Aristide Marie Frédéric and Ouattara Frédéric, Statistical Study of the Occurrence of Coronal Mass Ejections (CMEs) from 1996 to 2018 (Solar Cycles 23-24). Journal of Modern Physics, 15, 2238-2255. 2024. https://doi.org/10.4236/jmp.2024.1512091

Kaboré Salfo, Guibula Karim, Gyébré Aristide Marie Frédéric & Ouattara Frédéric.Statistical Study of the Occurrence of Coronal Holes in the Solar Corona During Solar Cycle 24. pplied Physics Research; Vol. 16, No. 2; 2024 ISSN 1916-9639 E-ISSN 1916-9647 Published by Canadian Center of Science and Education, 2024. doi:10.5539/apr.v16n2p87

Kaboré Salfo, Gyébré Aristide Marie Frédéric, Gnanou Inza and Ouattara Frédéric, Diurnal variability of the magnetospheric convective electric field (MCEF) from 1996 to 2019: Comparative investigation into the signatures of the geoeffectiveness of coronal mass ejections and magnetic clouds. Scientific Research and Essays. Vol. 18(3), pp. 45-55. 2023.
DOI: 10.5897/SRE2023.6772.

Kerrache, F., Ammar, A. Ikhlef, R., NaitAmor, S., Bouyahiaoui, Z., Daiffallah, K., ... & Shimeis, A. (2024). Observations and numerical simulations of the effects of the Gamma ray burst 221009A on the lower ionosphere. Journal of Geophysical Research: Space Physics, 129(7), e2023JA031721.

Kigotsi, J. K., Soula S., Athier G., Lisika L. K., Lee Keun-Ok, 2024. Analysis of the lightning activity during 18 years in the Congo Basin. /Atmos. Res./, 309, 107577.
Doi : 10.1016/j.atmosres.2024.107577

Koala, S., Kabore, M., Zoundi, C., Ki, I., Sawadogo, Y, Zerbo, J.L, Long-term Variations in Albedo, Solar Flux, and Climatic Parameters in Burkina Faso (1984-2022). Physical Science International Journal (2024), 28 (5):67-79.
https://doi.org/10.9734/psij/2024/v28i5849.

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Koala, S., Bere, W.P., Sawadogo, Y., Ki, I., Zerbo, J.L, Long-term Distributions and Structure of the Solar Wind during Solar Cycles 23 and 24. International Journal of Geosciences (2023) 14, 813–826. https://doi.org/10.4236/ijg.2023.149043

Makela, J., W. Qjan, C. , Monstein, C.,Habarulema, J. B., Groves, K., Jakowski, N., Amory, C., Ground-based infrastructure for improve space weather specification at low latitudes, Vol. 55, Issue 3 (Heliophysics 2024 Decadal Whitepapers), doi: 10.3847/25c2cfeb.eb22a102

Mohamed, H.S. , C. Amory-Mazaudier , O. M. Shalabiea, A. Mahrous, delayed response of low latitudes TEC during thirty-six geomagnetic storms from 2014 to 2017, July 2023, JASTP doi:10.1016/j.jastp.2023.106109

Ndiadia, K.E., P. L. Rostha, F. K. Tondozi, M. J. M. Tshitenge, K. J. C. Kayembe, and P. E. Phuku, "Study of the correlation between lightning activity and convective rain over Equatorial Africa," 2022 36th International Conference on Lightning Protection (ICLP2022), 2022, IEEEXplore, pp. 354 358,https://doi.org/10.1109/ICLP56858.2022.9942590

Ndiadia, K.E., P. L. Rostha, F. K. Tondozi, M. J. M. Tshitenge, K. J. C. Kayembe, and P. E. Phuku, "Comparative study of lightning activity over north vs south Equatorial Africa," 2022 36th International Conference on Lightning Protection (ICLP2022), 2022, IEEE Xplore, pp. 359-363, https://doi.org/10.1109/ICLP56858.2022.9942454.

Oladayo O. Afolabi, C. M. N. Candido, F. Becker-Guedes and C. Amory-Mazaudier, Study and Modelling of the Impact of June 2015 Geomagnetic Storms on the Brazilian Ionosphere, Atmosphere 2024, 15, 597.
https:// doi.org/10.3390/atmos15050597

Oyeyemi, E.O., AO Akala, D Okoh, OO Odeyemi, B Olugbon, PO Amaechi, OJ Oyedokun, OR Idolor. Responses of the Nigerian low-latitude ionosphere to geomagnetic storms of the ascending and maximum phases of solar cycle 24. Advances in Space Research 73 (8), 4296-4313, 2024.

Pham Thi Thu Hong, Christine Amory Mazaudier, Minh Le Huy, Susumu Saito, Dung Nguyen Thanh, Ngoc Luong Thi, Hung Luu Viet, Thang Nguyen Chien; Thanh Nguyen Ha, Michi Nishioka, Septi Perwitasari, Occurrence rate of equatorial Spread F and GPS ROTI in the ionospheric anomaly region over Vietnam, Vietnam Journal of Earth Sciences, 2024, 46(4), 553-569, https://doi.org/10.15625/2615-9783/2136.

Sawadogo, Y., Kaboré, M., Koala, S., Mandé, A., Zerbo, J.L, Total Electron Content Diurnal and Seasonal Variations and Response to Solar Events at Koudougou Station in Burkina Faso. International Journal of Geosciences, 14, 827–839. https://doi.org/10.4236/ijg.2023.149044

Saguedo Sawadogo, Doua Allain Gnabahou, Sibri Alphonse Sandwidi and Frédéric Ouattara Frédéric, GPS-TEC Response to Recurrent Geomagnetic Storms during Solar Cycle 24 Declining Phase http://dx.doi.org/10.1155/2023/4181389,

Saguedo Sawadogo, Doua Allain Gnabahou, Tinlé Pahima, Frédéric Ouattara, Solar activity: Towards a standard classification of solar phases from cycle 1 to cycle 24. http://dx.doi.org/10.1016/j.asr.2023.11.011,

Saguedo Sawadogo, Doua Allain Gnabahou, Tinlé Pahima, Frédéric Ouattara, Total Electron Content during Recurrent and Quiet Geomagnetic Periods at the Koudougou Station in Burkina Faso http://dx.doi.org/10.4236/ijaa.2023.133015

Tapsoba Estelle Valérie, Doua Allain Gnabahou, Rolland Fleury and Frédéric Ouattara, Study on Automated Detection of Equatorial Plasma Bubbles EPB. Int. J. Adv. Res. 12(06), 858-866. http://dx.doi.org/10.21474/IJAR01/18949

Tinlé Pahima, Doua Allain Gnabahou, Sibri Alphonse Sandwidi, Frédéric Ouattara, TEC Variability during Fluctuating Events at Koudougou Station during Solar Cycle 24 http://dx.doi.org/10.4236/ijg.2022.1310047

Editor- Writer : C. Amory-Mazaudier,
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Tinle Pahima, Doua Allain Gnabahou ,Sibri Alphonse Sandwidi , Frederic Ouattara, Koudougou Station TEC's Variability Seasonal Anomalies Analysis During Fluctuating Events Over Solar Cycle 24 https://doi.org/10.5539/apr.v15n1p50

Uluma Edward, Chali Idosa Uga , Solomon Otoo Lomotey , Athwart Davis Odhiambo , Fashae Joshua Bankole , Kouassi Nguessan , Muniafu Wilberforce, Boniface Ndinya and Omondi George, Observation of Travelling Ionospheric Disturbances over Morocco during the Godzilla Sand and Dust Storm of 15th to 26th June 2020 Using GNSS, International Astronomy and Astrophysics Research Journal Volume 6, Issue 1, Page 18-39, 2024, Article no.IAARJ.118250.

Wilberforce Muniafu, Edward Uluma, Solomon Otoo Lomotey, Kouassi Nguessan, Fashae Joshua Bankole, Chali Idosa Uga, Boniface Ndinya and George Omondi, Ionospheric Total Electron Content Response to the Intense Geomagnetic Storm of 10th -11th May 2024 over Low, Mid and High Latitude Regions Asian Journal of Research and Reviews in Physics Volume 8, Issue 4, Page 19-36, 2024; Article no.AJR2P.123863 ISSN: 2582-5992

Yombo Phaka, R. (2024). First MAX-DOAS observations of tropospheric NO_2 and H_2CO in Central Africa: impact on air quality and validation of the TROPOMI satellite instrument [Doctoral thesis, Université de Liège]. ORBi- University of Liège. https://hdl.handle.net/2268/309575

Yombo Phaka, R., Merlaud, A., Pinardi, G., Friedrich, M. M., Van Roozendael, M., Müller, J.-F., Stavrakou, J., De Smedt, I., Hendrick, F., Dimitropoulou, E., Bopili Mbotia Lepiba, R., Phuku Phuati, E., Djibi, B. L., Jacob, L., Fayt, C., Mbungu Tsumbu, J.-P., & Mahieu, E. (30 October 2023). Ground-based Multi-AXis Differential Optical Absorption Spectroscopy (MAX-DOAS) observations of NO_2 and H_2CO at Kinshasa and comparisons with TROPOMI observations. Atmospheric Measurement Techniques, 16, 5029--5050. doi:10.5194/amt-16-5029, 2023. https://hdl.handle.net/2268/307125

Yombo Phaka, R., Holenu Mangenda, H., Vuni Simbu, A., Bakambana Ndambi, R., Bopili Mbotia Lepiba, R., & Aloni Komanda, J. (10 February 2022). Suivi de la qualité de l'air dans la ville de kinshasa par mesures mobiles du NO_2 atmosphérique en différents points géographiques. «Environment, Ingénierie & Développement (EID), 86. doi:10.46298/eid.2022.8379 https://hdl.handle.net/2268/266165

Younas, W., Khan, M., Amory-Mazaudier, C., & Fleury, R. (2023). Reply to "comment on Ionospheric and magnetic signature of a Space weather event on August 2018: CME and HSSWs by Kader et al. (2023)". Journal of Geophysical Research: Space Physics, 128, e2022JA030943, https://doi.org/10.1029/2022JA030943

Younas, W., Khan, M., and C. Amory-Mazaudier, Longitudinal Features of Day- and Night-time Ionospheric Annual Variations During the Solar Cycles 23 and 24, Advances in Space Research, DOI: 10.1016/j.asr.2024.01.033

Younas, W., Majid Khan, C. Amory-Mazaudier and Youkitoshi Nishimura, Spatio-Temporal Features of Ionospheric Disturbances Resulting from March 2023 Geomagnetic Storm: Comparisons with 2015 St. Patrick's Day Storm, 2024, Advances in Space Research, https://doi.org/10.1016/j.asr.2024.10.042

Zaka Komenan, Olivier Obrou et Christine Amory-Mazaudier, Cinquième edition de l'école IMAO en Côte d'Ivoire, n°121, Page 18-19, La Météorologie mai 2023.

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NASA Launches New Space Telescope and Suite of Solar Satellites

The SPHEREx telescope will create the most colorful map of the cosmos, while the four satellites of the PUNCH mission track the evolution of the solar wind in three dimensions.

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By Katrina Miller

March 11, 2025

Two NASA missions launched from the California coast and soared toward the stars late Tuesday night, overcoming a week of delays to get to orbit. Both aim to unravel mysteries about the universe — one by peering far from Earth, the other by looking closer to home.

The rocket's chief passenger is SPHEREx, a space telescope that will take images of the entire sky in more than a hundred colors that are invisible to the human eye. Accompanying the telescope is a suite of satellites known collectively as PUNCH, which will study the sun's outer atmosphere and solar wind.

The launch has been postponed several times since late February for mission specialists to perform additional checks on the SpaceX Falcon 9 rocket and NASA spacecraft. Gloomy weather also contributed to a scrubbed launch on Monday night. But that was forgotten on Tuesday as SPHEREx and PUNCH lifted off from the Vandenburg Space Force Base against the black expanse of clear California sky at 11:11 p.m. Eastern time.

Roughly two minutes later, the rocket's reusable booster separated from the upper stage and flipped back toward Earth for a controlled landing near the launch site.

Forty-two minutes into the launch, SPHEREx floated away from the rocket's upper stage. The four PUNCH satellites, released in pairs, followed suit about 10 minutes later. In the hours that followed, mission control teams on the ground established communications with the spacecraft as they orbited approximately 400 miles above Earth's terminator, the line separating day and night on our planet, and over the north and south poles. This type of orbit is known as sun-synchronous because it keeps the spacecraft oriented in the same position relative to our sun.

That's advantageous for both spacecraft. PUNCH will have a clear view of the sun around all times, while SPHEREx will stay pointed away from it, avoiding light from our home star that could mask fainter signals from faraway stars and galaxies.

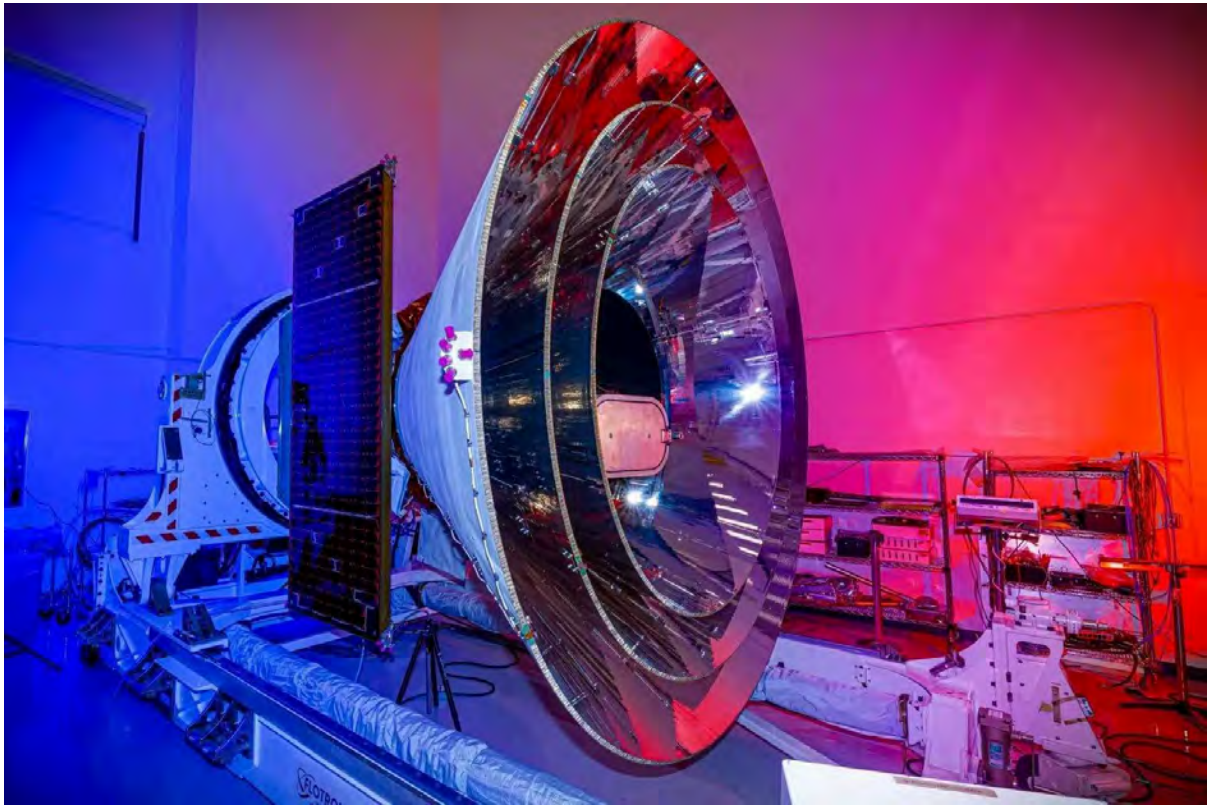
Charting the cosmos

SPHEREx is short for Spectro-Photometer for the History of the Universe, Epoch of Reionization and Ices Explorer. The mouthful of a name is fitting for the vastness of its goal: to survey the entire sky in 102 colors, or wavelengths, of infrared light.

“It’s really the first of its kind,” said Olivier Doré, a cosmologist at NASA’s Jet Propulsion Laboratory and the mission’s project scientist. By contrast, NASA’s Wide-field Infrared Survey Explorer, which retired in 2011, mapped the sky in just four hues of infrared.

Scientists will use the data from SPHEREx to study how the total light emitted by galaxies has changed through cosmic time and to chart where frozen water and other ingredients essential for life exist across the Milky Way.

“It’s thought that the oceans on Earth originated from these interstellar ice reservoirs,” said James Bock, a cosmologist at the California Institute of Technology and principal investigator for the mission.



NASA's SPHEREx spacecraft after completing environmental testing in November 2024 in a facility in Boulder, Colo. NASA/JPL-Caltech/BAE Systems

A three-dimensional map charting the uneven clumping of galaxies across the universe today — some parts thick with galactic gas and dust, others more sparse — will also help physicists learn more about inflation, the rapid ballooning of the cosmos that occurred a split second after the Big Bang.

According to Dr. Bock, tiny irregularities emerged as matter spread across the early universe. But inflation "blew them up to cosmic scales," he said, and the imprint of those irregularities is preserved in the overarching structure of today's cosmos.

Physicists have long used measurements of the cosmic microwave background — the light left over from the Big Bang — to study inflation. But a galactic survey will allow them to gain an understanding of the physical processes that drove that extreme expansion.

"This is an idea that has been around, but we're really the first experiment designed to look for this," Dr. Bock said.

SPHEREx, which looks like a giant megaphone, will record around 600 images each day for more than two years, capturing light from millions of stars in our cosmic backyard and even more galaxies beyond it.

Using a technique called spectroscopy, the telescope will separate the light into different wavelengths, like a glass prism splitting white light into a rainbow of colors. The color spectrum of an object in space reveals information about its chemical makeup and distance from Earth.

At the end of its run, SPHEREx will have sampled the whole sky four times. "We'll have spectra of every kind of celestial object — planets, stars, comets, asteroids, galaxies," Dr. Doré said. "And every time we look at the sky in a different way we discover new phenomena."

Tracking the solar wind

According to Craig DeForest, a heliophysicist at the Southwest Research Institute, hot plasma continuously streaming from our sun washes over everything in the solar system, including us. It is the solar wind.

“We are not separate from our star,” he said. “We are bathed in it.”

Dr. DeForest is the principal investigator for PUNCH, which stands for Polarimeter to Unify the Corona and Heliosphere. Data taken with PUNCH will elucidate the boundary where the sun ends and the solar wind begins. The two-year mission will also help forecasters better predict the potential effects of space weather, from power outages to glittering northern lights.

Many solar missions focus on observing the sun’s outer atmosphere, known as the corona. “It’s like studying human biology with only an electron microscope,” Dr. DeForest said — great for looking at cells, bad for learning about anatomy.

A solar array deployment test on one of the PUNCH satellites at Astrotech Space Operations on Vandenberg Space Force Base in California last month. Alex Valdez/USSF 30th Space Wing/NASA

PUNCH is designed to measure both the corona and the broader cocoon of solar wind swaddling our solar system. The mission consists of four 140-pound satellites, each around the size of a suitcase.

One satellite carries a coronagraph, which will take pictures of the sun's corona. The other three are equipped with cameras to capture wider views of the solar wind as it leaves the corona and permeates the solar system.

Each satellite has three polarizing filters, through which only waves of light aligned in a particular direction can pass. That's similar to the way polarized sunglasses block glare. By measuring polarized light, scientists will be able to reconstruct the position, speed and direction of the corona and the solar wind in three dimensions.

For the first time, they will also be able to track the evolution of coronal mass ejections, violent blasts of solar material, as they make their way to Earth and induce space weather.

Joseph Westlake, the director of heliophysics at NASA, likened the data that PUNCH will collect to measuring a baseball after it has been thrown by a pitcher. Everything up until the ball leaves their hands, Dr. Westlake explained, is captured by missions like NASA's Parker Solar Probe and the Solar Dynamics Observatory.

"But actually seeing the ball as it goes from the hand to the home plate is PUNCH," Dr. Westlake said. "It takes what we see at the sun and connects it to what we experience on Earth."

Katrina Miller is a science reporter for The Times based in Chicago. She earned a Ph.D. in physics from the University of Chicago. More about Katrina Miller

“Space Weather Station” – G Maeda saw this at the MIT Museum on 15 Feb 2025

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