
* ISWI Newsletter – Vol. 15 No. 011 17 November 2023 *
* 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=PLa0qa4cng0GF3cKuj6Yz5kqG1BQ-Akkhr> *

Dear ISWI Participants:

This is the November issue.
So the next issue is the last one for 2023.

If you would like to make any sort of
announcement in the December issue, please
send to me before 10 December.

-- Editor.

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[01]-----

Report #1 for "ISWI Space Weather School 2023"

See:
Student_summary_ISWI_School_Zambia.pdf
001

The first paragraph of it:

"Greetings, ISWI community! We are Claire, Aderonke,

Rehab, and Vincent, and we are delighted to share our recent experience at the 2023 ISWI Space Weather School, which unfolded from September 26 to 30 at the Grand Palace Hotel in the vibrant city of Lusaka, Zambia. We are pleased to announce that the school was a great success! "

[02]-----

Dear ISWI participants,

The United Nations Office for Outer Space Affairs is pleased to inform you that the recording of the thirteenth webinar on the International Space Weather Initiative, Dr. Doug Roland - NASA' s Geospace Dynamics Constellation: Exploring our Connected Atmosphere, which took place on Wednesday, 27 September 2023, is now available on the YouTube channel of the Office:

https://youtu.be/XOG_GbHPQWU

The current, as well as all previous ISWI webinar sessions can be accessed through the website of the Office at:

https://www.unoosa.org/oosa/en/ourwork/psa/bssi/iswi_webinars.html

Best regards,
Patrick

[03]-----

FROM: Maria Graciela Molina
DATE: 24 Oct 2023
TO: ISWI members

Dear colleagues,

We invite you to submit abstracts to the XIV COLAGE 2024 Space Weather session organized by the Asociación Latinoamericana de Geofísica Espacial (ALAGE / <https://alage.org/>).

The conference will take place from 8-13 April 2024 at the Library Raúl Rangel Frias-UANL on the occasion of the Total Solar Eclipse in Mexico in 2024 (<https://www.rice.unam.mx/colage2024/>).

More info about the session below.

Title: Space Weather

Description:

Session "Space Weather" is mainly devoted to all contributions related to the Sun-Planets interaction and Space Weather. Among the covered topics (but not limited to) are monitoring, analysis and modelling, understanding and forecasting the state of the Sun, the interplanetary and planetary environments, the radiation at ground level, the solar and non-solar driven perturbations that affect them, and forecasting and now-casting the possible impacts on biological and technological systems, R20 and O2R, among other assets. Additionally, we strongly encourage new contributions regarding instrumentation and instrument networks (especially in Latin America) as well as the development of new methods and procedures in the field of Data Science applied to Space Weather.

Submit an abstract to: <https://www.rice.unam.mx/colage2024/>
The deadline for all submissions is 8 January 2024

Sincerely,

M. Graciela Molina
Yaireska Collado-Vega
Clezio De Nardini

[04]-----

AGS Newsletter, Oct 2023, Vol. 6, No. 10

See:
Vol. 6No10_AGS_october_2023.pdf
002

[05]-----

8 NOV 2023; Dear George,

Please find below the announcement of an open position at DLR Neustrelitz, Germany.

Many thanks and all the best,
Daniela

Research position at DLR Neustrelitz, Germany

The Institute for Solar-Terrestrial Physics at DLR Neustrelitz, Germany, is opening a new position on the topic of Space Weather. For further information please follow the link:

https://www.dlr.de/dlr/jobs/en/desktopdefault.aspx/tabid-10596/1003_read-52197/

[06]-----

Report #2 for "ISWI Space Weather School 2023"

See this PDF:
2023 ISWI SUMMER SCHOOL (LUSAKA - ZAMBIA) Report_105022 by Stephen Tete from Ghana Fred Joe NAMBALA from Zambia and Dr Chigo Ngwira from USA Final.pdf
003

[07]-----

Report #3 for "ISWI Space Weather School 2023"

See this PDF:
A_Zambian_Student_Perspective_of_ISWI_School_Article_by_Ivwananji_Nanyinza_Dr_Chigomezyo_Ngwira_Final.pdf
004

[08]-----

Report #4 for "ISWI Space Weather School 2023"

See this PDF:
Exploring Space Weather Through ISWI1_12th Nov 2023 Krishna Sarkar PhD Scholar Assam University_Fj Nambala.pdf
005

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

ISWI Space Weather School 2023

Greetings, ISWI community! We are Claire, Aderonke, Rehab, and Vincent, and we are delighted to share our recent experience at the 2023 ISWI Space Weather School, which unfolded from September 26 to 30 at the Grand Palace Hotel in the vibrant city of Lusaka, Zambia. We are pleased to announce that the school was a great success!

A cohort of 30 students (including ourselves!) had the privilege of being guided by over a dozen renowned scholars, who took us on a tour starting from the Sun's interior, progressing through the solar atmosphere, interstellar medium, and Earth's magnetosphere, culminating in Earth's ionosphere. Our fellow students and us represented 12 countries, primarily from the African continent, with participants hailing from South Africa, Ghana, Egypt, Malawi, Zimbabwe, India, the United States, Mozambique, Congo, Nigeria, Ethiopia, and, of course, Zambia.

This year's school was the first ISWI school ever held in Zambia and also the first to be followed by the African Geophysical Society conference, an enriching addition that many of us had the privilege to attend. The school and conference were hosted by the Physics Society of Zambia, an organization officially recognized just last year. We extend our heartfelt gratitude to the numerous sponsors whose unwavering support made this memorable experience a reality and whose logos are included below.

The school began with a captivating lecture by Dr. Alphonse Sterling, introducing us to the Sun's interior and atmosphere and inspiring us with spectacular visuals of sunspots, granules, solar flares, and coronal mass ejections. Dr. Nat Gopalswamy expanded our knowledge of various solar eruptions and their consequences for space weather on Earth, while Dr. Pertti Makela led us on an exploration of solar energetic particles, emphasizing the results of recent studies and remaining open questions. Rounding out our study of the Sun, Dr. Neal Hurlbert introduced us to how solar data is captured and the various databases and tools available to help us dive into the research on our own.

Bringing our studies closer to Earth, Dr. Jim Roeder helped us understand the dynamics of the magnetosphere and their coupling to the solar wind above and the ionosphere below. We then dove into the ionosphere, beginning with an introduction to its fundamentals and electrostatics led by Dr. John-Bosco Habarulema and Dr. Endawoke Yizengaw. Given that a significant portion of the students specialized in ionospheric research, the ensuing discussions were filled with many questions. Subsequently, Dr. Anthea Coster explained the power of incoherent scatter radar as a method of sensing the ionosphere, and explained how the auroral region can have a large effect on the rest of the ionospheric system. Dr. Jade Morton and Dr. Susan Skone each described their work on innovative methods for sensing the ionosphere using radio occultation with satellites in LEO and GNSS measurements. Finally, Dr. Denny Oliveria introduced us to the thermosphere and unveiled the intricate interplay between ionospheric dynamics and thermospheric density, which, in turn, impacts the drag experienced by satellites in orbit.

Complementing the informative lectures, we also had valuable hands-on sessions that immersed us in various datasets and research tools, equipping us with the practical experience needed to navigate real scientific data. These sessions included introductions to resources such as Helioviewer, the CDAW data center, the Community Coordinated Modeling Center (CCMC), and the Madrigal database. Additionally, we benefited from an intensive Python bootcamp, which swiftly enhanced our coding proficiency to meet the demands of today's scientific landscape.

In addition to the technical science presentations, Dr. Mark Moldwin played a pivotal role in acquainting us with essential "soft skills" that are indispensable for our careers. He emphasized the significance of effective science communication, open publishing, and the proactive promotion of our research.

Beyond the formal sessions, the informal interactions with the lecturers and each other during coffee breaks and lunches proved to be an invaluable source of career guidance and constructive feedback. These moments allowed us to forge connections with both our fellow space physics graduate students and with distinguished experts from across the globe, nurturing our emerging professional networks. We eagerly anticipate the prospect of collaborating with the colleagues we've met this week.

Our time in Zambia has proven exceptionally rewarding, and we are deeply grateful for the warm hospitality and relentless dedication of the school organizers, particularly Dr. Chigomezyo Ngwira and Dr. Nat Gopalswamy. Their tireless efforts in securing funding from diverse sources made it possible for many of us to partake in this enriching experience. Beyond their support in sponsoring our participation and orchestrating an exceptional scientific program, they also infused an element of enjoyment into our journey by introducing us to a Zambian cultural festival. This unique cultural immersion allowed us to witness traditional crafts, mesmerizing dance performances, and partake in the enchantment of Zambian storytelling.

Our heartfelt appreciation extends to all the organizers, instructors, and fellow students who collectively transformed this experience into something truly extraordinary. The wealth of knowledge we've gained during this immersive experience is bound to play a pivotal role in shaping our future careers. Thank you for this remarkable opportunity.



ISWI School Sponsors/Partners 26-30 September 2023, Lusaka Zambia



Claire Gasque, University of California, Berkeley

Aderonke Adekemi Akerele, United Nations African Regional Centre for Space Science, Technology and Education, Nigeria

Rehab Abdulmajed, Egypt Japan University of Science and Technology, Egypt

Vincent Ledvina, University of Alaska, Fairbanks

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.

AGS-2023 Conference Report



Dr. Chigo

The 6th African Geophysical Society International Conference was held in Lusaka, Zambia, from October 2 - 4, 2023, and was a significant gathering of experts and researchers in the field of geophysics. The conference featured a diverse and comprehensive schedule of talks, covering a wide range of topics, with an overarching theme of "Advancing Science & Technology in Developing Nations." Here is a summary of the conference highlights :

Day 1 - Monday, October 2

The conference opened with a warm welcome from Dr. Chigo Ngwira and

AGS President, Prof Olivier Obrou followed by an opening address by a representative from the Zambian Ministry of Technology and Science. Dr. Lee-Anne McKinnell was fondly remembered in a touching tribute by John Bosco Habarulema. The day revolved around critical themes such as space weather, the African Space Program, and the development of operational space weather capabilities. Speakers shared their insights into various subjects, including the challenges and prospective solutions in the African space program and the implementation of a real-time ionospheric data assimilation framework for space weather decision support. These discussions provided a comprehensive view of the current state and future prospects of geophysics in the African context. The day concluded with a session on the dynamics and electrodynamics of the ionosphere.

Day 2 - Tuesday, October 3

The second day of the conference was equally engaging, focusing on topics related to magnetosphere, ionosphere, and lower atmosphere coupling. Throughout the day, participants delved into subjects such as electron pitch angle distributions,

magnetospheric dynamics, and the auroral streamer current wedge. The talks also explored electric current structures in the magnetosheath and the reliability of OMNI data for predicting solar wind conditions. Another session highlighted machine learning and remote sensing studies, featuring research on atmospheric pressure, ionospheric electron density modeling, and the use of artificial neural networks. The day concluded with insights on data, instrumentation, outreach, and education in the field of geophysics. In particular, Dr. Olu Jonah shared that he is working on a project to establish a network of semi-autonomous precision GNSS stations filling the largely unexplored area along the geomagnetic equatorial and low-latitude regions over the African continent. If you would be interested in using such a network, or if you live or work in any of the countries shown in the map on the Google Form please take a minute to complete the form at: <https://forms.gle/g3XHkARpWkwBbjGH6> and feel to send email to Olu Jonah at olu.jonah@sri.com for any further questions. In the evening, a student poster session provided a platform

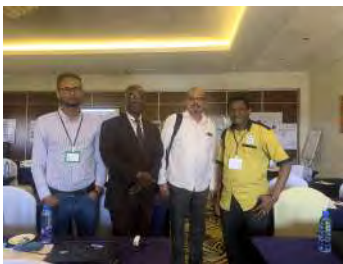
for young researchers to showcase their work and network with other scientists and presenters.



AGS-23 participants

Day 3 - Wednesday, October 4

The final day of the conference covered topics related to the low-latitude ionosphere, solar and heliosphere, and miscellaneous geophysical studies. Researchers discussed the observation of scintillation in Zambia, characterization of the equatorial ionization anomaly, effects of nonlinear wave propagation in the ionosphere, and modeling ionospheric vertical drifts. The day also featured discussions on solar eruptions, cosmic ray solar modulation, and coronal cavity stability. The conference concluded with open discussions and closing remarks, marking the end of a successful event. Overall, the African Geophysical Society 2023 Annual Conference in Lusaka, Zambia, provided a comprehensive platform for experts and researchers to share their latest findings, collaborate, and address critical issues in the field of geophysics. The conference contributed to the advancement of knowledge and the strengthening of networks in this vital scientific field.



Empowering African Researchers : Advancements in Space Weather Studies at the Malindi Workshop

by C. CESARONI

The National Institute of Geophysics and Volcanology (INGV), the Italian Space Agency (ASI), and the International Centre for Theoretical Physics (ICTP) have jointly organized the **Eastern Africa Capacity Building Workshop on Space Weather and Low-latitude Ionosphere**, at the “Luigi Broglio - Malindi Space Center (BSC)” in Malindi, Kenya, from 3rd October until October 12th.

This international event has gathered around 30 students and young researchers from various African nations, offering them a unique opportunity to enhance their knowledge. Renowned international educators are conducting lectures, and participants are engaged in experimental activities using advanced ionospheric measurement instruments provided by INGV at the BSC.

The study of the Earth’s ionosphere plays a pivotal role in the understanding of our planet and in the development of predictive tools and mitigation strategies to address the harmful effects of adverse space weather conditions on technological systems and human health.

However, achieving these goals requires a global coverage of measurements obtained from both ground-based instruments and satellites. Unfortunately, many regions worldwide, including Africa, still lack such crucial measurements.

In response to this challenge, approximately four years ago, INGV and ASI joined forces in the NORISK project (*New Observatory for Real-time Ionospheric Sounding over Kenya*) under the existing framework agreement established in 2017 between the two institutions. Coordinated by INGV research scientist Dr. Claudio Cesaroni, the project led to the establishment of a multi-instrumental permanent Ionospheric Observatory at BSC.

Giancarlo Santilli, NORISK Project Manager at ASI, emphasized that the observatory is already operational, housing an ionosonde and a GNSS receiver for ionospheric monitoring. It provides real-time data

freely accessible to the entire scientific community.

Furthermore, Bruno Nava, an ICTP researcher, highlighted an essential aspect of the project: organizing training activities for African students and young researchers. This initiative enables them to actively contribute to scientific research in space-related fields and related sciences in their home countries.



Group photo of the Eastern Africa Capacity Building Workshop on Space Weather and Low-latitude Ionosphere

This collaborative effort represents a significant leap forward in space science research in Africa. By empowering young minds and fostering international cooperation, we are shaping the future of space weather studies on the continent.

Stay tuned for more updates on this groundbreaking initiative and its impact on the African scientific landscape or visit the project website <http://norisk.rm.ingv.it>.

International Colloquium on Equatorial and Low-Latitude Ionosphere (ICELLI) 2023

by BABATUNDE RABIU
UNITED NATIONS AFRICAN REGIONAL CENTRE FOR SPACE SCIENCE AND TECHNOLOGY EDUCATION - ENGLISH, OBAFEMI AWOLowo UNIVERSITY CAMPUS, ILE IFE, NIGERIA



Prof. B. Rabiou

The International Colloquium on Equatorial and Low-Latitude Ionosphere (ICELLI), was held at University of Ilorin, Nigeria between 4th and 8th September 2023. At prime, 53 physical and 73 virtual participants from 21 countries participated in the Colloquium, which was jointly organized by United Nations African Regional Centre for Space Science and Technology Education in English; Network of Space-Earth Environmentalist; Scientific Committee on Solar Terrestrial Physics PRESTO/SCOSTEP; Boston College, USA; UN International Space Weather Initiative; Institute for Space-Earth Environmental Research (ISEE), Nagoya University, Japan; University of Ilorin, Nigeria; University of Oslo, Norway; JSPS Program; Abdus Salam International Centre for Theoretical Physics, Italy; and African Geophysical Society. The 7th edition like others, featured lectures, tutorials and hand on sessions on topics geared towards understanding of the Sun and its impact on space weather; the dynamics of the equatorial ionosphere, and how space weather impact on space-dependent technologies. The participants visited the Space Environment Research Laboratory, Abuja, Digisonde facility and other observational facilities at the University of Ilorin, and the NigerBEAR radar at Bowen University Iwo.



ICELLI-23 participants

ISWI Space Weather School 2023

by CLAIRE GASQUE, UNIVERSITY OF CALIFORNIA, BERKELEY
ADERONKE ADEKEMI AKERELE, UNITED NATIONS AFRICAN REGIONAL CENTRE FOR SPACE SCIENCE, TECHNOLOGY AND EDUCATION, NIGERIA
REHAB ABDULMAJED, EGYPT JAPAN UNIVERSITY OF SCIENCE AND TECHNOLOGY, EGYPT
VINCENT LEDVINA, UNIVERSITY OF ALASKA, FAIRBANKS



Greetings, ISWI community ! We are Claire, Aderonke, Rehab, and Vincent, and we are delighted to share our recent experience at the 2023 ISWI Space Weather School, which unfolded from September 26 to 30 at the Grand Palace Hotel in the vibrant city of Lusaka, Zambia. We are pleased to announce that the school was a great success! A cohort of 30 students (including ourselves!) had the privilege of being guided by over a dozen renowned scholars, who took us on a tour starting from the Sun's interior, progressing through the solar atmosphere, interstellar medium, and Earth's magnetosphere, culminating in Earth's ionosphere. Our fellow students and us represented 12 countries, primarily from the African continent, with participants hailing from South Africa, Ghana, Egypt, Malawi, Zimbabwe, India, the United States, Mozambique, Congo, Nigeria, Ethiopia, and, of course, Zambia.

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the enchantment of Zambian storytelling. Our heartfelt appreciation extends to all the organizers, instructors, and fellow students who collectively transformed this experience into something truly extraordinary. The wealth of knowledge we've gained during this immersive experience is bound to play a pivotal role in shaping our future careers. Thank you for this remarkable opportunity.



Announcement : AfAS-2023 Early-Career Seed Research Grant Laureates

by CHARLES TAKALANA
HEAD OF SECRETARIAT | ASSISTANT
GENERAL SECRETARY | AFRICAN ASTRONOMICAL SOCIETY (AFAS)

We are delighted to announce the recipients of the 2023 Early-Career Seed Research Grant, an initiative by the African Astronomical Society (AfAS). Launched by the AfAS Early-Career Researcher Sub-Committee in 2021, this grant aims to support research in Astronomy, Astrophysics, and Space Science, by postgraduate students and early-career researchers across Africa. The laureates will receive funds to facilitate their research-related travel, lodging, and equipment purchases :

- Euro 1200 for PhD/Post-Doc candidates

- Euro 800 for MSc students
Please join us in congratulating the 2023 laureates :

1. Dr Mona Elhalaby (Early-career researcher)

Nationality : Egypt

Institution : National Research Institute of Astronomy and Geophysics (NRIAG), Egypt

Project: "X-ray Properties and Scaling Relations of Galaxy Clusters at redshift > 0.2 in the X-CLASS Survey"

2. Ms Ogochukwu Chibueze (PhD Student)

Nationality : Nigeria

Institution : North-West University, South Africa

Project : "Multiwavelength study of blazars at redshift > 1 using the H.E.S.S telescope"

3. Ms Ange Cynthia Umuhire (PhD Student)

Nationality : Rwanda

Institution : University of Rwanda

Project : "Characterization of coronal mass ejections from the associated high frequency type II solar radio bursts"

4. Mr Albert Kuntu Forson (MSc Student)

Nationality : Ghana

Institution : University of Mauritius

Project : "Design and Development of an L-Band Four-Element Interferometer for the Study of Galactic Neutral Hydrogen Emission"

We extend our warmest congratulations to the laureates and look forward to the positive impact their research will have on the astronomical sciences on the continent.

Poem of the month : Count On Me, My Friend

by BY JOYDIP DUTT

When the world weighs you down
When unfavorable situations make you frown
Count on me, my friend

When the world gives you trouble
When your agonies seem to have doubled
Count on me, my friend

When everything around is a mess
When you can't handle so much stress
Count on me, my friend

When everything seems to fall apart
When someone has broken your heart
Count on me, my friend

When you need someone to hug you tight
When you need someone to say, "Everything will be all right,"
Count on me, my friend

<https://www.familyfriendpoems.com/poem/count-on-me-my-friend>



International Space Weather Initiative (ISWI) Summer School, Zambia 2023

By

Stephen Tete, MSc Student, Ghanaian, Egypt-Japan University of Science and Technology, Egypt, 11th November 2023

Fred Joe Nambala, Lecturer and Researcher, Zambian, University of Zambia, 11th November 2023

Fred Joe

Chigomezyo Ngwira, Government Contractor, Zambian, NASA Goddard Space Flight Center, USA, 12th November 2023

The 2023 International Space Weather Initiative (ISWI) Summer School was held at the Grand Palace Hotel in Lusaka, Zambia, from 26th to 30th September. The school hosted a total of 31 participants, out of which six were undergraduate students, eleven MSc and fourteen were PhD students who hail from Cameroon, Egypt, Ethiopia, Ghana, India, Kenya, Mozambique, Nigeria, South Africa, Uganda, the United States of America (USA), and Zambia. Also represented were astute professors, lecturers, satellite communication and aviation specialists, and scientists from noble universities and well-established institutions, including the National Aeronautical and Space Administration (NASA), Catholic University of America, University of Calgary, University of Michigan, Aerospace Corporation, and University of Colorado. The local organizers were the Physics Society of Zambia with support from the Scientific Committee On Solar-Terrestrial Physics-PREdictability of variable Solar-Terrestrial cOupling (SCOSTEP-PRESTO), Catholic University of America, Michigan University, University of Calgary, Copperbelt University, University of Colorado, NASA, and the USA's National Science Foundation. The NSF supported four of the lecturers and two students.

The school spanned five days of intensive lectures and hands-on training in Solar and Ionospheric Physics, Geomagnetism, and Space Weather. The mornings were devoted to lectures and presentations on Sun-Earth systems, Python Programming, space-borne and ground-based instrumentations, and the state-of-the-art machine learning application in Space Environment. In the afternoons, instructors engaged the participants in hands-on sessions, including extracting and analyzing radio burst, coronal mass ejections or CMEs and solar flare information from open-source databases. Participants also investigated thermospheric density and its influence on satellite drag. "I think this training has made me curious; it has, also, defined my career path", said one student. Such was the success of the 2023 ISWI Summer School held in Lusaka, Zambia.



Figure 1: On the last day of the Lusaka 2023 ISWI Summer School



Figure 2: After the last lecture and closing of the school.



Figure 3. A group photo of the participants of the 2023 ISWI School held in Lusaka, Zambia.



Figure 4: Lecture in session.



Figure 5: Participants concentration on a presentation.



Figure 6: Graduates show their certificates



Figure 7: ISWI School participants mingling with locals and exhibitors at a cultural event, Showgrounds, Lusaka.

**RECEIVED BY ISWI NEWSLETTER
DURING NOVEMBER OF 2023.**

G. Maeda, Editor.

A Zambian Student Perspective of the International Space Weather Initiative School

by

Ivwananji Nanyinza, 3rd Year BSc in Physics Student, Zambian, Mulungushi University, Zambia,
11th November 2023

Chigomezzyo Ngwira, Government Contractor, Zambian, NASA Goddard Space Flight Center,
USA, 12th November 2023

ISWI also known as the **International Space weather Initiative** is a program of international cooperation to advance space science by a combination of instrument deployment, analysis and interpretation of space weather data from the deployed terrestrial instruments in conjunction with space-borne instruments data, to train the next generation of scientists, and to inform the general public. Its goal is to develop a physical insight to understand science, and to reconstruct and forecast near earth space weather by means of analysis, modelling, education, training, and public outreach.

The 2023 ISWI Summer School took place on 26-30 September 2023 in Lusaka, Zambia at the Grand Palace Hotel. This was the first ever such school that has been held in Zambia. It comprised of student participants from different fields of Earth and Space Sciences, e.g., astronomy/astrophysics, space science, solar physics, computer scientists and mathematicians to highlight a few. The school participants came from several countries including Botswana, Cameroon, Egypt, India, Kenya, Nigeria, Mozambique, United States, Uganda, South Africa, Ethiopia, Ghana, and Zambia. The local organizing team composed of Mr. Properly Simpemba, Mr. Fred Joe Nambala, Dr. Patrick Sibanda, Dr. Rekha Rajan, Mr. Peter Banda, and Dr Chigomezzyo Ngwira.

The school schedule was fully packed. In the morning, breakfast was served in the hotel restaurant, after which our lectures began. We had a coffee break around mid-morning, then a group lunch, and another coffee break later in the afternoon. The food served by the hotel was nice. The hotel staff was welcoming, open and had hospitality skills making you not to miss home. The school was very well balanced as we got to meet new people from different places and learn about their countries, their studies, and their career plans. It also taught me about the value of having good relationships with everyone and not just knowing how to solve physics!! Lol.

The school lecturers comprised of experts from different part of the world teaching us specific topics in space science. Our lecturers included Drs Nat. Gopalswamy, Alphonse Sterling, Mark Moldwin, Pertti Makela, Chigomezzyo Ngwira, John-Bosco Habarulema, Jade Morton, Anthea Coster, Susan Skone, Endawoke Yizangaw, Neal Hurlburt, Jim Roeder, Denny Oliveira, and Mr. Gift Sichone. Apart from the regular lectures, we also had **hands-on activities**, which focused on the practical application of what we had learnt, the data analysis tools, and additional information on the sources of data. My favourite hands-on activity was viewing the sun and its sun spots using [@Jhelioviewer.com](https://www.jhelioviewer.com) and how to have access to this information and the historical recorded data.

When away from the school activities, both students and lecturers had the opportunity to appreciate Zambian culture and hospitality by exploring the country that included visits to the Lusaka National Museum, the Central Business Area, Kamwala Market, Kabwata Cultural Village, the Levy

Mwanawasa Shopping Mall. All these places were interesting, and our visitors took the initiative to chat with our local people and learn a little bit of the local languages. On 29th September, the entire group had a rare opportunity of attending a National Arts and Cultural Exhibition where each province of Zambia presented something about the local people's customs and traditions. We watched different types of dances and sat down for some interesting stories from a local person told in Chi-Tonga, a local language, while an interpretation was done in English. The students and visitors really enjoyed the richness of the Zambian culture and its tourist attractions. We even had participants that visited the Luangwa and Zambezi National Park. I hope that one day most, if not all, of those who attended the school will come back as tourists.

I would like to acknowledge Dr. Chigomezyo Ngwira and Mr. Fred-Joe Nambala for taking their time to review and edit this article.



Figure 1: Members of the 2023 ISWI School Local Organising Committee



Figure 2: Graduates show their certificates.



Certificate of Attendance
Mustafa Nassar Sayed Ahmed

Certificate of Attendance
Mapalo Phin

Figure 3: Space Weather expert and his student ISWI School participants share a light moment.



Figure 4: Dinner time on last day of 2023 ISWI School.



Figure 5: 2023 ISWI School Meetings Poster Shown As Physics Society of Zambia.



Figure 6: Student participants relaxing during tea break time.



Figure 7: Witnessing cultural dances at Lusaka SShowgrounds.



Figure 8: During the award ceremony and last 2023 ISWI School dinner.

REFERENCE

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G. Maeda, Editor.

Exploring Space Weather Through ISWI: A Journey to Understand the Sun's Impact

by

**Krishna Sarkar, PhD Scholar, Assam University, Indian, 12th
November 2023, India**

**Fred Joe Nambala, Lecturer and Researcher, University of Zambia,
Zambian, 13th November 2023, Zambia**

Space weather refers to the varying conditions in the solar system, with the most significant phenomena attributed to the Sun. Understanding space weather is crucial as it impacts various aspects such as satellite communications, ground-based instruments, spacecraft operations, life on Earth, etc. The International Space Weather Initiative (ISWI) plays a leading role in investigating space weather through educational programs and various experiments. This article summarizes the recent ISWI space weather summer school held in Zambia, which brought together researchers, scientists and students from around the world to enhance and share their knowledge.

ISWI is an international program to study and understand the complexities of space weather. Through a series of educational initiatives and experiments, it is trying to solve the mysteries of space weather and the associated impact on our Earth's systems and the world. Moreover, ISWI is working toward accurate and efficient space weather forecasting. One of its significant contributions is to organize such schools, workshops, and other events that not only educate students but also provide a platform to interact with leading experts in the field of space weather.

The recent ISWI space weather summer school was hosted by the Physics Society of Zambia at the Grand Palace Hotel in Lusaka from September 25 to 30, 2023. Zambia is a fast-growing landlocked region in Southern Africa with geographical attributes ranging from latitude 8° to 18° South of the equator, and longitude between 22° and 34° East of the Greenwich Meridian. Zambia's low-mid latitude provides an ideal platform to observe ionospheric irregularities, the equatorial ionization anomaly, spread-F and various atmospheric phenomena.

The ISWI school participants from all over the world were researchers, scientists, and students as representatives from various institutions and organizations, viz., NASA, SCOSTEP, NSF, University of Calgary, Copperbelt University, University of Michigan, Kwame Nkrumah

University, Catholic University of America, Mulungushi University, and University of Zambia. This diverse gathering enriched the learning experience.

The ISWI summer school commenced with illuminating lectures, including an introduction to the Sun by Alphonse Sterling and a coding session on Python by Gift Sichone. The following day, Dr. Nat Gopalswamy explained solar phenomena: coronal mass ejection, solar flares, etc., in an easily comprehensible manner. The program was thoughtfully structured to explore the journey of solar radiation from the Sun to its absorption by the Earth's atmosphere. Experts such as Endawoke Yizengaw and John Bosco Habarulema discussed ionospheric concepts and their irregularities. Prof. Jade Morton delved into the world of navigation through the Global Navigation Satellite System and how irregularities affect radio signals. In addition, numerous brilliant researchers and scientists from all over the world enlightened us with their expertise.

The hands-on sessions relating to Python Programming, solar activity and magnetospheric activity provided participants with practical experience in data handling and analysis. Various models and data sources were explored, with a special emphasis on the SCINDA network, which offers a valuable opportunity to study different properties of the Earth-Sun system. Furthermore, Prof. Mark Moldwin enlightened participants on open data access and sharing for scientific contributions, emphasizing the importance of open science. At the end, a certificate distribution ceremony and grand celebrations were performed on completion of ISWI space weather school.

In addition to studying space weather, the organizing committee arranged cultural experiences for the participants, taking them to a festival to immerse themselves in the arts and culture of Zambia. This provided a unique opportunity to appreciate Zambia's rich heritage. To top it off, the participants had the chance to savor the delicious Zambian cuisine, with the staple food known as Nshima being a particular delight, and do site-seeing at nearby tourists' attractions.

The ISWI school held in Zambia offered a remarkable journey into the fascinating world of space weather. It united minds from around the globe, providing a platform for learning, collaboration, and cultural enrichment. By exploring the complexities of space weather, this international initiative helped us better understand the impact of the Sun on our technological infrastructure and the very existence of life on Earth. ISWI's efforts with the collective knowledge and experience of its participants on space weather science present promising future directions.



Figure 1: First day of the ISWI Summer School group photo



Figure 2: Online presentation on NASA space weather activities.



Figure 3: Evening outing to Lusaka Showgrounds for a Zambia provinces' cultural day.



Figure 4: NASA ISWI scientists on graduation day.



Figure 5: Some 223 ISWI Summer School Local and International Organizers.

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