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Article 1:

Interoperable Database for Citizen Science Observations of STEVE

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STEVE (**S**trong **T**hermal **E**mission **V**elocity **E**nhancement) is a subauroral aurora-like phenomenon that is related to untypical high temperatures and ion drift velocities in SAID (**Sub**auroral **I**on **D**rift). Citizen Scientists recognized the peculiarity of this phenomenon and brought it to the attention of the scientific community. Figures 1 and 2 show photographs from two STEVE observations in Canada. MacDonald et al. [1] reported for the first time on the connec-

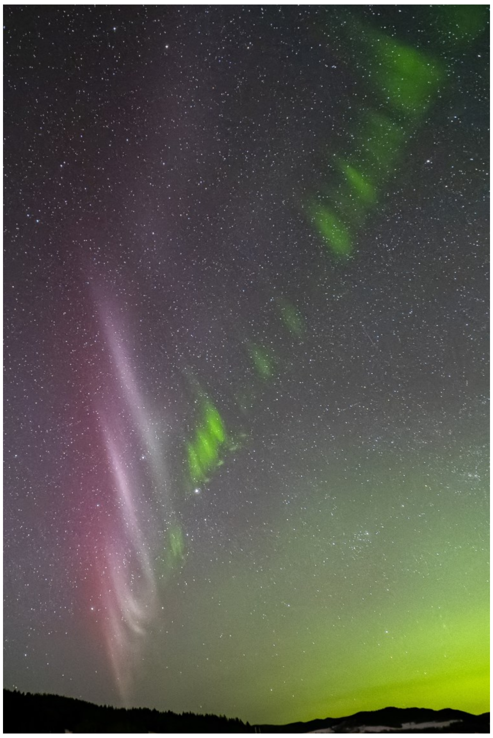

Figure 1. Steve observed on April 10 2018 in Alberta, Canada. Credit: Alexei Chernenkoff.

tion of STEVE with SAID. Follow-on studies, several of them utilizing citizen science images [2–9], reveal a multitude of previously unknown aurora-untypical characteristics e.g., STEVE's spectral composition, height, not-field aligned optical structures in the lower height regime of STEVE, and its location. Although optical structures that we now associate with STEVE have occasionally been reported by aurora observers in the past and are sporadically mentioned in older literature [10–12], this phenomenon has hardly been studied before citizen scientists noticed aurora-untypical characteristics of STEVE [13].

Citizen science observations are still of great importance for the research on STEVE. They help to localize the regions where STEVE occurs and allow the detection of its extent and structure from different perspectives with a high spatial and temporal resolution down to the sub-1s time regime not covered by professional ground instruments. This enables the analysis of small-scale and short-lived substructures in STEVE by combining contemporaneous images from different locations [9, 14]. Citizen science images also add ground truth to satellite data and allow the identification of yet unknown substructures in STEVE due to the high spatial and temporal resolution that consumer digital cameras can achieve today.

An interoperable database for citizen science observations of STEVE is now available [15]. This database summarizes 1000+ single observations that have been reported by aurora observers with images or videos in social media and other publicly accessible sources. The listed observations cover the period from January 1999 to November 2022. Figures 3 and 4 show the numbers of observation days per year and month for listed observations reported with date and time. The database includes observations with date and time for 217 days and important metadata e.g., date, time, location, and geomagnetic data. A detailed description of the database and its content was recently presented at the AGU fall meeting [16]. Further details like selection criteria for listed observations, optical substructures identified in STEVE, and the Terms of Use are summarized in eight supplemental documents released with the database [15].

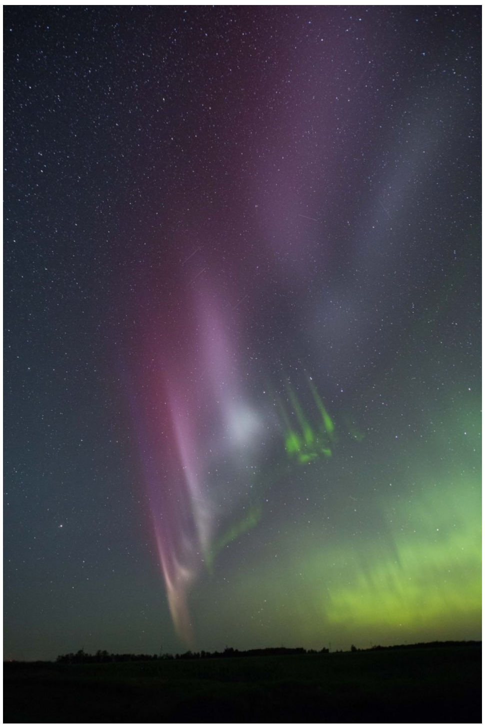

Figure 2. Steve observed on August 29 2022 in Manitoba, Canada. Credit: Donna Lach.

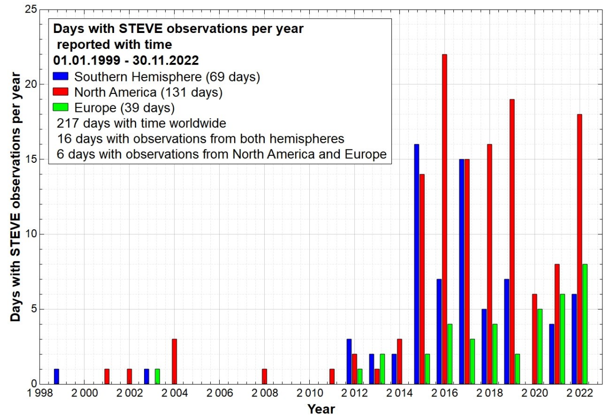

Figure 3. Statistic for citizen science observations of STEVE. Days with STEVE observations per year for the period January 1999 to November 2022.

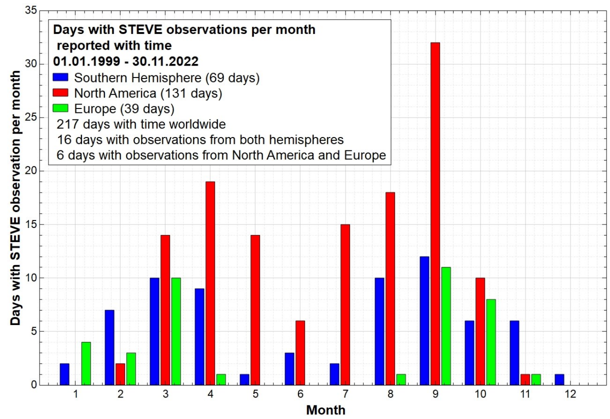

Figure 4. Statistic for citizen science observations of STEVE. Days with STEVE observations per month for the period January 1999 to November 2022.

The database was developed as a freely accessible tool giving full access to the implemented data. It is a useful tool that helps to identify STEVE events that can be studied in detail through a combination of citizen science data and data from professional ground- and space-based instruments.

References:

[1] MacDonald, E. et al.(2018). New science in plain sight: Citizen scientists leads to the discovery of optical structure in upper atmosphere, Science Advances, 4 (3), eaaq0030. https://doi.org/10.1126/sciadv.aaq0030

[2] Archer, W. E. et al. (2019). The Vertical Distribution of the Optical Emission of a STEVE and Picket Fence Event, Geophysical Research Letters, 46 (19), 10719–10725. https://doi.org/10.1029/2019GL084473

[3] Chu, X. et al. (2020). Morphological Characteristics of Strong Thermal Emission Velocity Enhancement Emissions, JGR Space Physics, 125e, e2020JA028110. https://doi.org/10.1029/2020JA028110

[4] Martinis, C. et al. (2021). First Simultaneous Observation of STEVE and SAR Arc Combining Data From Citizen Scientists, 630.0 nm All-Sky Images, and Satellites, Geophysical Research Letters, 48 (8), e2020GL092169. https://doi.org/10.1029/2020GL092169

[5] Martinis, C. et al. (2022). Rainbow of the Night First Direct Observation of a SAR Arc Evolving Into STEVE, Geophysical Research Letters, 49, e2022GL098511. https://doi.org/10.1029/2022GL098511

[6] Mende, S. B. and Turner, C. (2019). Color Ratios of Subauroral (STEVE) Arcs, Journal of Geophysical Research: Space Physics, 127 (7), 5945–5955. https://doi.org/10.1029/2019JA026851

[7] Mende, S. B. et al. (2019). Subauroral Green STEVE Arcs: Evidence for Low-Energy Excitation, Geophysical Research Letters, 46, 14256-14262. https://doi.org/10.1029/2019GL086145

[8] Nishimura, Y. et al. (2019). Magnetospheric Signatures of STEVE: Implications for the Magnetospheric Energy Source and Interhemispheric Conjugacy, Geophysical Research Letters, 46, 5637–5644. https://doi.org/10.1029/2019GL082460

[9] Semeter, J. et al. (2020). The Mysterious Green Streaks Below STEVE, AGU Advances, 1(4), e2020AV000183. https://doi.org/10.1029/2020AV000183

[10] Hunnekuhl, M. and MacDonald, E. (2020). Early Ground-Based Work by Auroral Pioneer Carl Størmer on the High-Altitude Detached Subauroral Arcs Now Known as “STEVE”, Space Weather, 18 (3). https://doi.org/10.1029/2019SW002384

[11] Hunnekuhl, M. (2019). Historical STEVE candidates, Open Science Framework. http://doi.org/10.17605/OSF.IO/WJGDS

[12] Hunnekuhl, M. and MacDonald, E. (2019). A new dataset of STEVE phenomenon related observations spanning multiple solar cycles, AGU fall meeting presentation, session SM11C-3299. https://doi.org/10.17605/OSF.IO/A5NU3

[13] Størmer, C. (1935). Remarkable Aurora-Forms from Southern Norway. I. Feeble Homogeneous Arcs of Great Altitude, Geofysiske Publiskasjoner, 11 (5). http://www.ngfweb.no/geophysica_norvegica.html#toppen

[14] Hunnekuhl, M. et al. (2021). Robust techniques to improve high quality triangulations of contemporaneous citizen science observations of STEVE, AGU fall meeting presentation, session SA35F. https://doi.org/10.17605/OSF.IO/KB62D

[15] Hunnekuhl, M. (2022). STEVE event list v2.2, Open Science Framework. https://doi.org/10.17605/OSF.IO/YTDZV

[16] Hunnekuhl, M. and MacDonald, E. (2022). Interoperable Database for Citizen Science Observations of STEVE, AGU fall meeting presentation, session SH51D. https://doi.org/10.22541/essoar.167214489.91300242/v1

Article 2:

Development of ionosonde and magnetic data based in Cote d’Ivoire

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During the International Equatorial Electrojet Year (1992–1993) (translated in french as l’Année Internationale de l’Electrojet Equatorial, (AIEE)); several instruments were installed in countries located along the magnetic equator. Among others, the city of Korhogo (Latitude: 9°33’ N; Longitude: 5°46’O; dip Latitude: -0.67°) in Cote d’ivoire received an ionosonde (type IPS-42 of Kel Aerospace) that was used to collect ionospheric data for almost a decade, spanning from 1992 to 2001. In addition, a chain of ten magnetometers across the magnetic equator during the same campaign (AIEE), was used to collect magnetic data covering a shorter period (1993-1994). The ionosonde’s data collection was a success until it was interrupted by the 2002 rebellion, which divided the country into two parts for the following decade. The equipment was vandalized during this period. The raw data were available, however, they were saved on several hard drives scattered in many places (mostly in Korhogo and Abidjan). This project is an opportunity to secure the data and make them available for the scientific community. This database is accessible online at the following web address https://ufrssmt.edu.ci/lasmes. The data are made available freely under certain circumstances. The user is entitled to download the raw data or plot the processed ones online. We are grateful to the SCOSTEP/PRESTO program which has provided the means to achieve this goal for the benefit of the scientific community. We plan to include the GNSS data to this database in the near future.

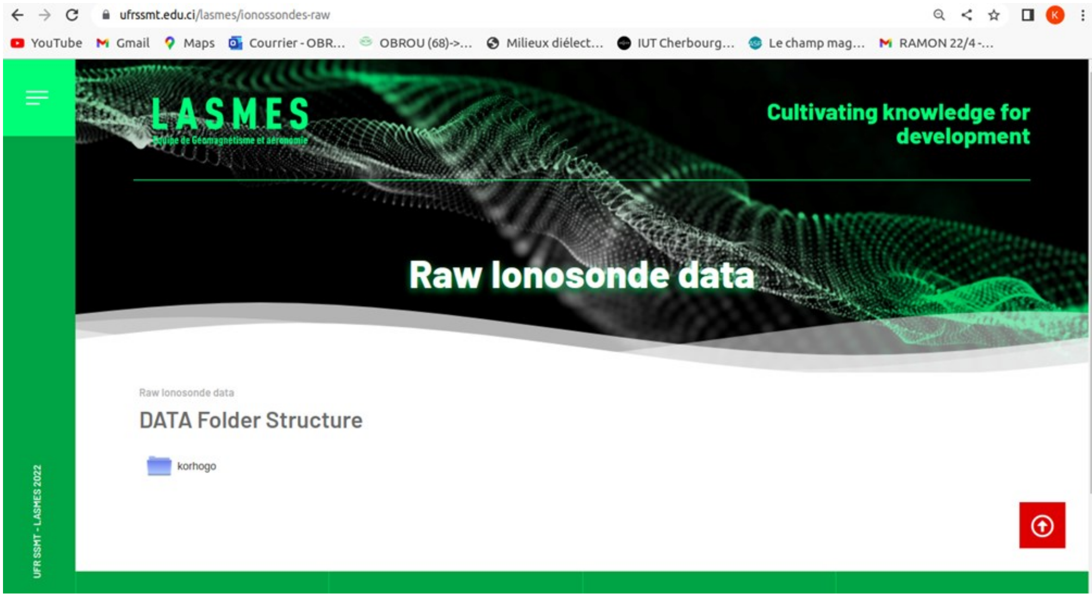

Figure 1. An overview of the web page showing how to download the raw ionosonde data.

Article 3:

The Argentinian-Chilean Validated Ionospheric Database (ACVID)

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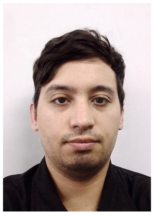

Miguel Nacud


Jorge Namour


Sergio Tarulli


Miguel Martinez-Ledesma


Lorenzo Pasquale

The ionosphere of the Southeast region of Latin America has a large variability due to its multiple local and global interconnections (such as the EIA, SAMA, etc.). Nevertheless, this area is known to be highly undersampled and requires a large observational effort to fully understand its global dynamics and internal teleconnections. Nowadays, thanks to the ubiquity of GNSS receivers, there exist different national GNSS networks that allow TEC measurements along the South American continent. Even so, up to date, very few studies have considered the vertical distribution of the ionosphere of such a geographic region, and the information about the layers' distribution and dynamics is key to solving its multiple unknowns and improving the accuracy of current ionospheric models.

To solve this constraint, we aim to create and maintain the first validated ionospheric database for ionosonde measurements of the southern region of Latin America (i.e., the Argentinian-Chilean-validated ionospheric database, ACVID). This project was initiated with the support of the SCOSTEP/PRESTO program and currently involves 11 persons among researchers, interpreters, and programmers.

This is an international and multi-institutional effort to provide open access and validated data (manually corrected) to the scientific community. Although automatic scaling is essential for space weather studies, the algorithms used usually fail to scale some features of ionograms or may have considerable estimation errors. Thus, manual correction is required to add reliability to the data (crucial for climatological studies). Moreover, such validated data is required to generate reference curves and trends that help to understand the dynamics and morphology of possible irregularities, and also can be used to issue space weather alerts when significant changes from the reference occurred. Therefore, this work focuses on the manual scaling of raw data obtained from the ionosondes deployed at institutions within the collaboration and the integration of all the measurements from both countries into a centralized database that will be available in the Tucumán Space Weather Center TSWC portal (https://spaceweather.facet.unt.edu.ar/). Currently, in Argentina, there are two AIS-INGV (Tucumán and Bahía Blanca) deployed in collaboration with INGV, both providing continuous autoscaled data in real-time. While in Chile, there is a single IPS-42 ionosonde providing ionospheric measurements but its ionograms are manually scaled (there is no automatic scaling) under request and for specific periods (see Figure 1). In addition, the Chilean ionosonde is not installed in a single place but it can be relocated to two main locations within the country, in Chillán and in La Serena. It is worth mentioning that the Argentinian and Chilean ionosonde locations present similar latitudes. Hence, studies of Chillán (36.6°S, 72.0°W) - Bahía Blanca (38.7°S, 62.3°W), and Tucumán (26.9°S, 65.4°W) - La Serena (29.9°S, 71.3°W) would provide the possibility to carry out simultaneous analyses on different sides of the Andes, for example for the study of AGWs/TIDs or under particular campaigns such as solar eclipses (Barbás De Haro et al., 2021; Bravo et al., 2020; 2022).

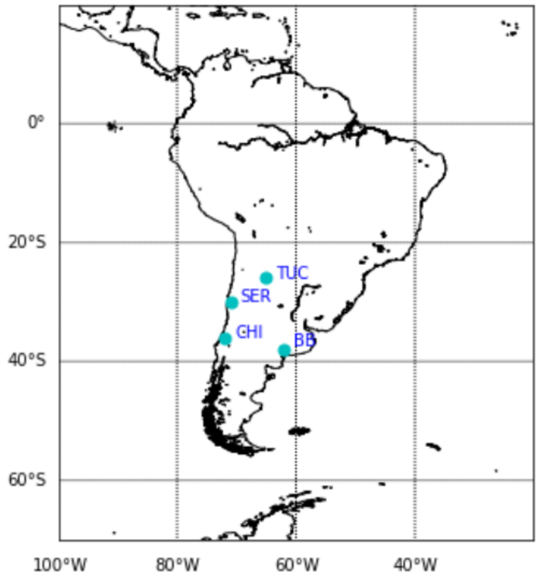


Figure 1. Map and location of each ionospheric station.

Currently, the ACVID has two modes for data retrieval: (a) online selection of already validated data (for download or for plotting); (b) under request, for specific time intervals, with different resolutions when possible, and with the possibility to add additional information besides the standard corrected measurement (e.g. detailed information using descriptive letters).

Figure 2 shows a couple of corrected ionograms, the first from Tucumán and the other from La Serena.

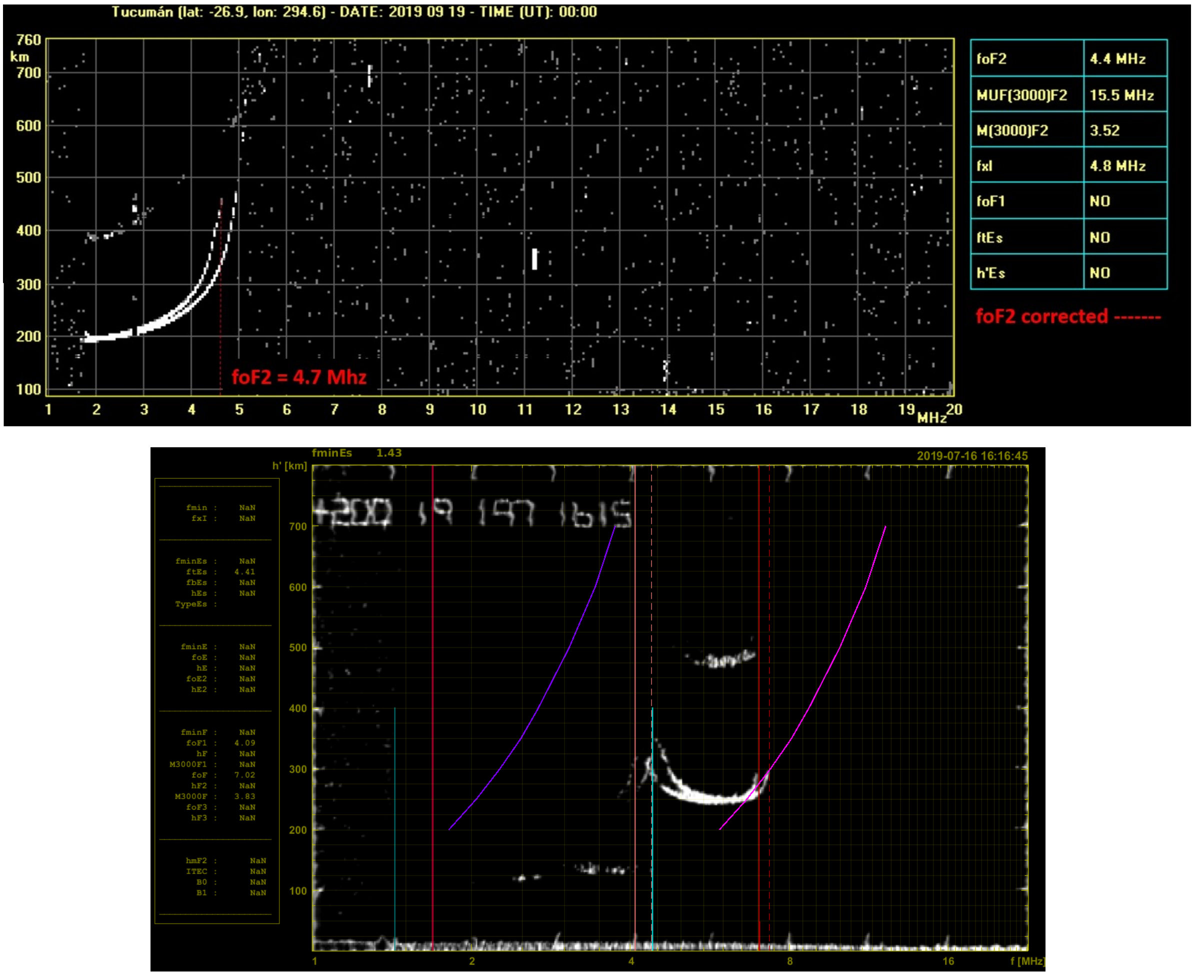


Figure 2. An example of (a) an ionogram from Tucumán which automatic scaling software was not giving optimal values, requiring an interpreter, and (b) an ionogram from La Serena manually scaled.

In summary, the Argentinian-Chilean-validated ionospheric database (ACVID) is a new tool open to the community that allows access to quality data from ionosonde measurements in the southern region of Latinoamerica.

References:

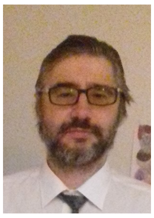
"Longitudinal variations of ionospheric parameters near totality during the eclipse of December 14, 2020" (2021). B. Barbás De Haro, M. Bravo, A.G. Elias, M. Martínez-Ledesma, G. Molina, B. Urra, J.V. Venchiarutti, C. Villalobos, J.H. Namour, E. Ovalle, E.D. Guillermo, E. Carrasco, L. De Pasquale, E. Rojo, R. Leiva. Advances in Space Research, Volume 69, Issue 5, https://doi.org/10.1016/j.asr.2021.12.026.

"First report of an eclipse from Chilean ionosonde observations: Comparison with total electron content estimations and the modeled maximum electron concentration and its height" (2020). M. Bravo, M. Martínez-Ledesma, A. Foppiano, B. Urra, E. Ovalle, C. Villalobos, J. Souza, E. Carrasco, P. R. Muñoz, L. Tamblay, P. Vega-Jorquera, J. Marín, R. Pacheco, E. Rojo, R. Leiva, M. Stepanova. Journal of Geophysical Research: Space Physics, 125, e2020JA027923. https://doi.org/10.1029/2020JA027923.

"Ionospheric Response Modeling under Eclipse Conditions: Evaluation of December 14, 2020, Total Solar Eclipse Prediction over the South American sector" (2022). Manuel A Bravo , María Graciela Molina, Miguel Martinez-Ledesma, Blas de Haro Barbás, B. Urra, A. G. Elias, J. Rodrigues de Souza, C. Villalobos, J. Namour, E. Ovalle, J. V. Venchiarutti, S. Blunier, J. C. Valdés-Abreu, E. Guillermo, E. Rojo, L. de Pasquale, E. Carrasco, R. Leiva, C. Castillo Rivera, A. Foppiano, M. Milla, P. Muñoz, M. Stepanova, J. Valdivia and M. Cabrera. Frontiers in Astronomy and Space Sciences. https://doi.org/10.3389/fspas.2022.1021910.

Article 4:

Improvement of GLE database - providing verified records for systematic analysis of strong SEP events and assessment of their terrestrial effects



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An omnipresent flux of high-energy particles, that is cosmic rays, consisting mostly of protons and alpha-particles enter in the Earth's atmosphere and produce a complicated nuclear-electromagnetic-meson cascade. In the cascade fraction of the initial primary particle energy reaches the ground as secondaries, eventually being registered by convenient instruments, whilst the majority is dissipated by ionization of the ambient air. The majority of cosmic rays (CRs) originate from the Galaxy known as galactic cosmic rays (GCRs). The Earth is sporadically hit by solar energetic particles (SEPs), accelerated during explosive energy releases on the Sun. Occasionally, when the energy of the SEPs is in the GeV range, they can produce an atmospheric cascade similarly to GCRs, whereas the secondary particles being registered by neutron monitors (NMs). These events are called ground-level enhancements (GLEs) (Aschwanden, 2012; Poluianov et al., 2017).

A widely used multi-instrument for GLE registration is the global neutron monitor network (Mishev and Usoskin 2020). Over the years, NMs have been successfully used for continuous recording of CRs intensity and their variations. Accordingly, a database of NM data covering the period over several solar cycles of GLEs registration exists, which gives the basis for their analysis (Usoskin et al., 2020).

Both GCRs and SEPs are the most significant contributor to various terrestrial effects such as the increased, relative to ground level, radiation exposure of aircrew, specifically over the polar region, as well as the increased atmospheric ionization. In order to assess those effects, a detailed study is necessary, considering explicitly features of SEPs, namely their spectral shapes as well as their time evolution during major solar proton events.

It is known that CRs are the main source of ionization in the troposphere and stratosphere and determine the complex radiation field at aviation altitudes. The effect of energetic particles of galactic or solar origin entering into the Earth's atmosphere on atmospheric physics and chemistry is a topic of increased interest over the last years (Bazilevskaya et al., 2008; Rozanov et al., 2012; Mironova et al., 2015) as well as the assessment of aircrew exposure (ambient dose) due to CR, specifically during GLEs (Lilensten and Belehaki, 2009 ;Vainio et al, 2009). For reliable assessment of those effects it is necessary to possess the corresponding basis, that is trustworthy NM records, which allow one to perform the analysis.

Here we revised the existing international database of GLEs (Usoskin et al., 2020) and corrected erroneous records in sense of time synchronization, jumps, and caveats. Accordingly, the corresponding documentation was created. The GLE DB [http://gle.oulu.fi] is stored in MySQL on a server belonging to the University of Oulu, Finland. The GLE DB possesses a convenient interface that allows quick look and access as well as to query any event and any station upon request (Figure 1).

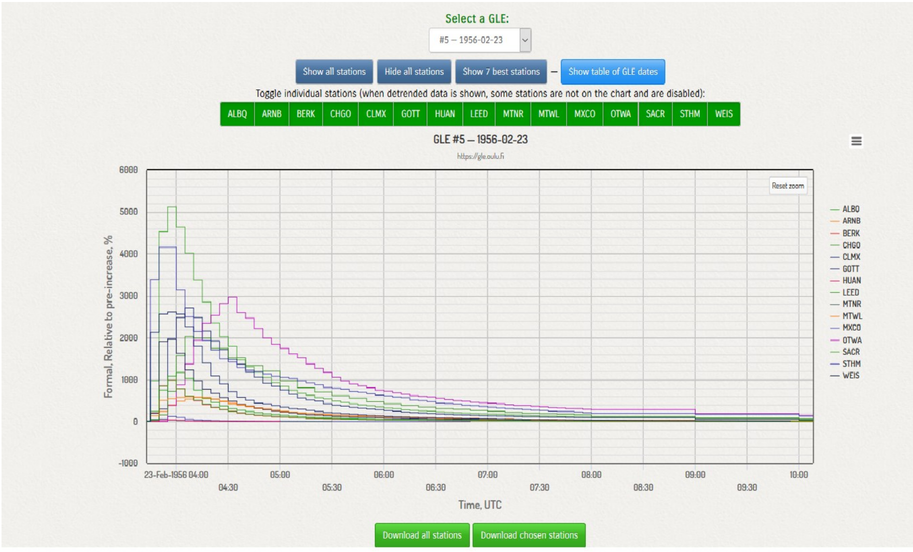

Figure 1. Screenshot of the relative count rate increases for GLE # 5 stored in the GLE database.

There are several methods for the reconstruction of GLE particle characteristics, namely their spectral and angular features using NM data (e.g. Cramp et al., 1997; Vashenyuk et al., 2006; Mishev et al., 2022). In general, the analysis of GLEs using records stored in the GLE database is based on modeling of the global NM network (Figure 2) response with n model parameters and optimizing the modeled response over m experimental data points, that is, the number of NMs. In such a way it is possible to unfold the spectra, pitch angle distribution, and apparent source position of GLE-causing SEPs, using the geomagnetosphere as a giant spectrometer. Since GLE events differ from each other in sense of spectra, anisotropy, evolution and duration, only individual events can be considered. Therefore, for each event, it is necessary to possess the corresponding verified NM record. This means that for every event each NM record must be checked for errors, which shall be eventually identified and corrected, achieved in the frame of this task.

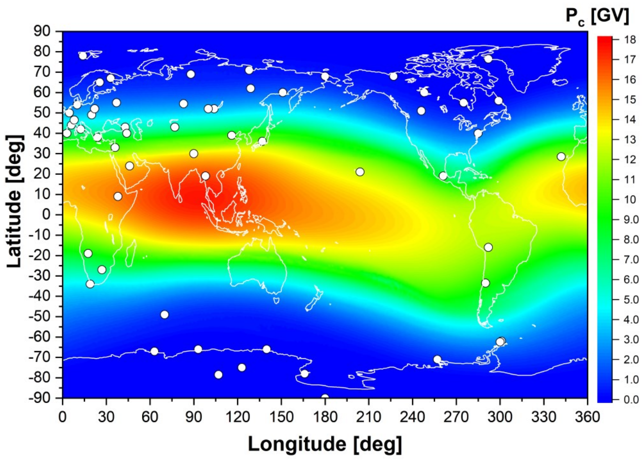

Figure 2. Map of the current global NM network, circa December 2022.

References:

Aschwanden, M. Space Sci. Rev., 171 (1-4), 3–21, 2012

Bazilevskaya, G.A., et al., Space Sci. Rev., 137, 149–173, 2008

Cramp, J., M. et al., J. Geophys. Res., 102 (A11), 24237–24248, 1997.

Lilensten, J., and A. Belehaki. Acta Geophys., 57 (1), 1–14, 2009

Mironova, I., et al., Space Science Reviews, 96, 2015

Mishev A., I. Usoskin, J. Space Weather Space Clim. 10, 17, 2020

Mishev A. L., et al., Solar Physics 297, 88, 2022

Rozanov E. et al., Surveys in Geophysics, 33(3-4), 483-501, 2012

Usoskin I. et al., Astron. Astrophys., 640, A17, 2020

Vainio, R. et al., Space Science Reviews, 147 (3-4), 187–231, 2009

Vashenyuk, E., et al., Adv. Space Res., 38 (3), 411–417, 2006

Highlight on Young Scientists 1:

Pathways of Magnetosphere-Ionosphere-Thermosphere Coupling

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Kevin Pham

Complex interactions between the magnetosphere, ionosphere and thermosphere can have profound consequences for geospace. They entail electrodynamic coupling and mass exchange, acting both independently and cooperatively. Modeling of the electrodynamic coupling allows phenomena such as solar flares (Liu et al) and solar eclipses (Chen et al.) illustrates how they can influence all geospace. In addition, simulations of the mass coupling between regions proposed pathways for inducing global sawtooth oscillations (Brambles et al., 2011) and determines whether dayside reconnection is locally or globally controlled (Zhang et. al., 2017).

In investigating the effect of electrodynamic coupling on geospace, we employed the Multiscale Atmosphere Geospace Environment (MAGE) model that couples the magnetosphere, ring current, and ionosphere-thermosphere at high resolution. As seen in Figure 1, MAGE results show neutral density signatures that match those observed by CHAMP and GRACE spacecraft significantly better than empirical specifications Weimer (Weimer, 2005) (Figure 1). Surprisingly, MAGE's improvement at low latitudes is due to its production of realistic traveling atmospheric disturbances that transport perturbations globally (Pham et al., 2022).

We begin simulating the importance of mass coupling by performing a simple numerical experiment. When physics-based ion outflow is added to the MAGE modeling suite, changes in irradiance of the model thermosphere corresponding to solar minimum and maximum produce different ion transport paths through the lobes and different magnetotail states (Figure 2): an asymmetric tail (top) and a symmetric tail (bottom) (Pham et al., 2021). This controlled experiment proves that a physics-based ion outflow model is required to fully understand the dynamics of the geospace system.

The results of these studies suggest that the different coupling pathways within geospace cannot be treated in isolation. Efforts to physically describe and model the various regions are necessary to investigate the global consequences of local phenomena.

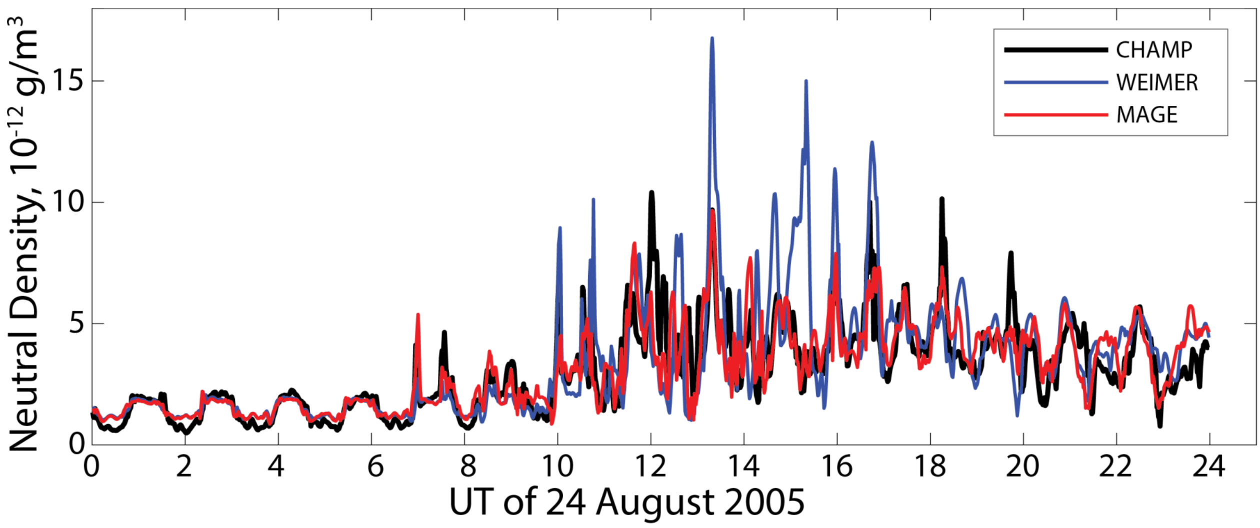

Figure 1. Comparison of the neutral density observed by CHAMP (black), simulated using the WEIMER empirical specification of the high latitude convection (blue), and simulated using the MAGE whole geospace coupled model (red). MAGE reproduces the observed 1-minute resolution neutral density more faithfully.

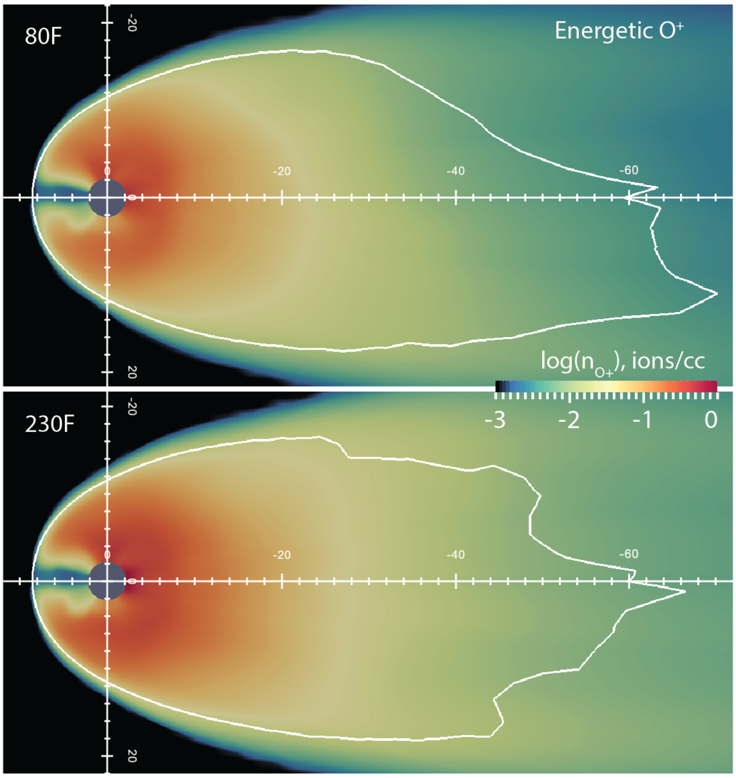

Figure 2. Log density of O^+ population (color scale) in the magnetospheric equatorial plane for simulation with 80 (top) and 230 (bottom) solar flux units for the solar irradiance in the thermosphere. White contours correspond to the magnetic x-line.

References:

Brambles, O. J., Lotko, W., Zhang, B., Wiltberger, M., Lyon, J., & Strangeway, R. J. (2011). Magnetosphere sawtooth oscillations induced by ionospheric outflow. Science, 332(6034), 1183–1186. https://doi.org/10.1126/science.120286

Chen, X., Dang, T., Zhang, B., Lotko, W., Pham, K., Wang, W., et al. (2021). Global effects of a polar solar eclipse on the coupled magnetosphere-ionosphere system. Geophysical Research Letters, 48, e2021GL096471. https://doi.org/10.1029/2021GL096471

Liu, J., W. Wang, L. Qian, W. Lotko, A. Burns, K. Pham, G. Lu, S. Solomon, L. Liu, W. Wan, B. Anderson, A. Coster, F. Wilder (2021). Solar flare effects in the Earth's magnetosphere. Nature Physics, 17, 807–812. https://doi.org/10.1038/s41567-021-01203-5

Pham, K. H., Lotko, W., Varney, R., Zhang, B., Liu, J. (2021). Thermospheric impact on the magnetosphere through ionospheric outflow. Journal of Geophysical Research: Space Physics, 126, e2020JA028656. https://doi.org/10.1029/2020JA028656

Pham, K. H., Zhang, B., Sorathia, K., Dang, T., Wang, W., Merkin, V., et al. (2022). Thermospheric density perturbations produced by traveling atmospheric disturbances during August 2005 storm. Journal of Geophysical Research: Space Physics, 127, e2021JA030071. https://doi.org/10.1029/2021JA030071

Weimer, D. R. (2005), Improved ionospheric electrodynamic models and application to calculating Joule heating rates, J. Geophys. Res., 110, A05306, doi:10.1029/2004JA010884.

Zhang, B., O. J. Brambles, P. A. Cassak, J. E. Ouellette, M. Wiltberger, W. Lotko, and J. G. Lyon (2017), Transition from global to local control of dayside reconnection from ionospheric-sourced mass loading, J. Geophys. Res. Space Physics, 122, 9474–9488, https://doi.org/10.1002/2016JA023646.

Meeting Report 1:

The 10th VERSIM workshop

Claudia Martinez-Calderon

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Figure 1. A group photo of the participants of VERSIM 2022.

The 10th VERSIM workshop was held on November 7 – 11, 2022 in Sodankylä, Finland in a hybrid format with 17 online and 35 in-person presentations (11 talks by ECRs and 6 by students). As VERSIM is a highly international community, we had 68 participants from 14 different countries including the United States, Japan, New Zealand, India, Korea, China, and multiple European nations. The presentations ranged across a variety of topics including both data analysis and theoretical studies, effects of lightning-generated whistlers, non-linear wave-particle interactions, the response of the D-region, pulsating aurora, simultaneous wave/ particle events, etc.

We also held the 1st VERSIM School on the weekend before the workshop with 4 lecturers and 14 participants (including 4 students and 8 ECRs). The school had introductory tutorials over an array of VERSIM topics given by experts of the community and included a visit to the Sodankylä Geophysics Observatory and the VLF receiver at Kannuslehto.

Meeting Report 2:

European Space Weather Week 2022

Mateja Dumbović

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Figure 1. Official design for the ESWW2022.

The European Space Weather Week (ESWW) took place in hybrid form in Zagreb, Croatia 24-28.10.2022. and was supported by SCOSTEP. The meeting had 325 in-person and 140 online participants from 47 countries, giving in total 142 talks and presenting in total 216 posters.

The meeting brought together diverse groups working on different aspects of Space Weather and Space Climate: scientists, engineers, satellite operators, power grid technicians, communication and navigation specialists, people working in aviation, space weather service providers. ESWW's scientific sessions and topical discussion meetings covered the full chain of Sun-to-Earth space weather and space climate-related topics such as solar eruptions in the solar atmosphere as well as in the interplanetary space, solar energetic particles, Earth's magnetosphere and radiation belts, ionospheric interactions, solar activity influence on cosmic rays and different layers of the Earth atmosphere, etc. Full meeting information is available at the meeting website: https://www.stce.be/esww2022.

Meeting Report 3:

International Workshop on Machine Learning for Space Weather: Fundamentals, Tools and Future Prospects

M. Graciela Molina[1,2,3,4] and Yenca Migoya-Orué[5]
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[3]Consejo Nacional de Investigaciones científicas (CONICET), Buenos Aires, Argentina
[4]Istituto Nazionale Geofisica e Vulcanologia (INGV), Rome, Italy
[5]The Abdus Salam International Centre for Theoretical Physics (ICTP) , Trieste, Italy

M. Graciela Molina

Yenca Migoya-Orué

The International Workshop on Machine Learning for Space Weather was held in the CONAE headquarters (Argentinian Space Agency) Buenos Aires, Argentina from 7 to 11 November 2022, in a hybrid mode. As an outside ICTP activity it had a regional scope in Latin America, where this kind of activity was the first of its kind. A total of 78 participants (17 onsite and 61 online) and 23 speakers represented 32 countries. Most of the onsite participants were from Latin America and online participants connected from different developing countries. The activity was locally organized by the Facultad de Ciencias Exactas y Tecnología (FACET) of the Universidad Nacional de Tucumán (UNT) with the sponsorship of SCOSTEP, ICG, CONAE, BC and Fundación Sadosky.

During the mornings the participants received lectures on the following topics: Space Weather (SW) fundamentals, Ionosphere, Machine Learning (ML) Basic Concepts, Deep Learning, ML techniques applied to SW and main challenges. In the afternoons the participants assisted to hands-on sessions related to Open source tools for ML. On last day, a session was dedicated to a selection of works from students.

Figure 1. Workshop on Machine Learning for Space Weather group photo.

Further details, program and presentations are available at: https://indico.ictp.it/event/9840/overview.

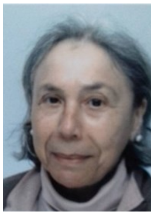
Meeting Report 4:

5th edition of the IMAO school in Côte d'Ivoire

Zaka Komenan[1], Olivier Obrou[1] and Christine Amory-Mazaudier[2]
[1]Université Félix Houphouët Boigny, Abidjan, Côte d'Ivoire
[2]LPP, Sorbonne Universités, Paris, France


Zaka Komenan


Olivier Obrou


Christine Amory-Mazaudier

The 5th edition of the "**I**SWI **M**aghreb **A**frique de l'**O**uest" school initially planned in Burkina Faso, took place in Abidjan in the Bingerville Centre of Excellence of the Houphouët Boigny University from 17 to 28 October 2022. It was organized by the GIRGEAA, "Groupe International de Recherche en Géophysique Europe Afrique Asie".The acronym IMAO is changed to IMAOC in order to introduce Central Africa. Many media followed the opening ceremony of the school.

There were 14 different nationalities represented at the school, involving 29 students and 14 teachers from Algeria, Burkina-Faso, Cameroon, Ivory Coast, France, Guinea, Morocco, Palestine, Republic of Congo, Democratic Republic of Congo, Rwanda, Senegal, Tunisia and Vietnam.

This school celebrated the 30th anniversary of the International Year of the Equatorial Electrojet (1992) and the centenary of the discovery of the equatorial electrojet (1922).

Figure 1 shows the students and some of the teachers who participated in the school. There are three girls from Burkina Faso, Congo Brazzaville and Senegal.

Figure 1. A group photo.

In the framework of the IMAO schools, there are presentations on Sun-Earth system by specialists of different disciplines. Each morning is devoted to scientific readings in a given field and the afternoons to practical work. The fields covered were the physics of the Sun, the Magnetosphere, the Ionosphere, the atmosphere and the Earth's magnetic field.

The Ivory Coast covered all local costs (food, accommodation, supplies, room etc.) and sponsors provided airfare for teachers and students. The list of sponsors is in table 1.

Table 1: list of the sponcers

ICG United Nations of the International Commission of GNSS
SCOSTEP: Scientific Committee on Solar Terrestrial Physics
ICTP: International Centre for Theoretical Physics
INSU: National Institute of Sciences of the Universe
CNFGG: French National Committee for Geodesy and Geomagnetism
LPP/CNES: Laboratory of Plasma Physics, National Center for Space Studies
University Norbert Zongo /Burkina Faso
MESRI, Ministry of Higher Education, Research and Innovation / Burkina Faso
University of Toulouse/ Laboratoire d'aérologie/France
University Iba Der Thiam de Thiès/ Senegal

During this school contacts are established between teachers and students. These contacts lead to supervision of students in the context of their PhD. Since 1992 there were 73 PhD including 60 in Africa. Other PhD were defended in Spain, France, India, Indonesia, Nepal, and Vietnam.

The report of the school is on the website www.girgea.org.

Upcoming meetings related to SCOSTEP

Conference	Date	Location	Contact Information
5th Symposium of the Committee on Space Research (COSPAR)	Apr. 16-21, 2023	Singapore	https://www.cospar2023.org/
PRESTO Workshop & School	May 29-Jun. 2, 2023	Trieste, Italy	https://indico.ictp.it/event/10176
IUGG 2023	Jul. 11-20, 2023	Berlin, Germany	https://www.iugg2023berlin.org/
XXXVth URSI General Assembly and Scientific Symposium	Aug. 19-26, 2023	Sapporo, Japan	https://www.ursi-gass2023.jp/
AGU Fall Meeting 2023	Dec. 11-15, 2023	San Francisco, CA, USA	https://www.agu.org/fall-meeting
45th COSPAR Scientific Assembly	Jul. 13-21, 2024	Busan, South Korea	https://www.cospar2024.org/
XXXII IAU General Assembly	Aug. 5-16, 2024	Cape Town, South Africa	https://www.iau.org/science/meetings/future/symposia/
11th SCAR Open Science Conference	Aug. 19-23, 2024	Pucon, Chile	

Announcement 1:

SCOSTEP Bureau meeting on 18 November 2022

Kazuo Shiokawa (SCOSTEP President)[1] and Keith Groves (SCOSTEP Scientific Secretary)[2]
[1]Center for International Collaborative Research (CICR),
Institute for Space-Earth Environmental Research (ISEE),
Nagoya University, Nagoya, Japan
[2]Boston College, Boston, MA, USA

Kazuo Shiokawa

Keith Groves

The SCOSTEP Bureau meeting was held at 1300-1643 UT on 18 November 2022 via online. The attendees were: Kazuo Shiokawa (President), Daniel Marsh (Vice President), Keith Groves (Scientific Secretary), Nat Gopalswamy (Past President), Lucilla Alfonsi (SCAR), Jorge Chau (URSI), Mamoru Ishii (WDS), Yoshizumi Miyoshi (COSPAR), Pravata Mohanty (IUPAP), Renata Lukianova (IAGA), and Peter Pilewskie (IAMAS). The following items were discussed during this meeting.

1. discussion/decision items

- Approval of the Minutes from the last Bureau Meeting held on 2 December 2021
- Action Items from last Bureau meeting were reviewed.
- Budget of 2022 and 2023 were reviewed and decided.
- Bylaws to define scientific Discipline Representatives (SDRs) was decided.
- Selection procedure to select new SDRs were discussed. The selection was initiated.
- STP-16 venue proposals were discussed. Full proposal is requested to the candidate countries.
- Applications for two new SCOSTEP membership were discussed. They were forwarded to the Council for their approval.
- Selection procedure of the new Award Selection Committee members was discussed.

2. Report items

- Membership Committee report
- Reports from Participating Bodies
- Scientific Secretary (SS) Office Updates
- Updates of ISC, UN_STSC, UN_COPUOS, and ISWI activities
- PRESTO Updates
- School activities supported by SCOSTEP
- Current status of SCOSTEP online capacity building lectures
- SCOSTEP Distinguished Science and Young Scientist Awards 2022
- SCOSTEP Visiting Scholar (SVS)
- SCOSTEP Comic Book Updates

The next Bureau will be sometime in the first half of 2023, and the next SCOSTEP Council meeting will be held during the 28th IUGG General Assembly on 11-20 July 2023 at the Messe Berlin – City Cube, Berlin, Germany. During this Council meeting, election of President and Vice President will happen. The full report of the Bureau meeting will be opened from the SCOSTEP website after approval of the Bureau minutes at the next Bureau meeting.

The purpose of the SCOSTEP/PRESTO newsletter is to promote communication among scientists related to solar-terrestrial physics and the SCOSTEP's PRESTO program.

The editors would like to ask you to submit the following articles to the SCOSTEP/PRESTO newsletter.

Our newsletter has five categories of the articles:

1. Articles— Each article has a maximum of 500 words length and four figures/photos (at least two figures/photos).
   With the writer's approval, the small face photo will be also added.
   On campaign, ground observations, satellite observations, modeling, etc.
2. Meeting reports—Each meeting report has a maximum of 150 words length and one photo from the meeting.
   With the writer's approval, the small face photo will be also added.
   On workshop/conference/ symposium report related to SCOSTEP/PRESTO
3. Highlights on young scientists— Each highlight has a maximum of 300 words length and two figures.
   With the writer's approval, the small face photo will be also added.
   On the young scientist's own work related to SCOSTEP/PRESTO
4. Announcement— Each announcement has a maximum of 200 words length.
   Announcements of campaign, workshop, etc.
5. Meeting schedule

Category 3 (Highlights on young scientists) helps both young scientists and SCOSTEP/PRESTO members to know each other. Please contact the editors if you know any recommended young scientists who are willing to write an article on this category.

TO SUBMIT AN ARTICLE

Articles/figures/photos can be emailed to the Newsletter Secretary, Ms. Mai Asakura (asakura_at_isee.nagoya-u.ac.jp). If you have any questions or problem, please do not hesitate to ask us.

SUBSCRIPTION - SCOSTEP MAILING LIST

The PDF version of the SCOSTEP/PRESTO Newsletter is distributed through the SCOSTEP-all mailing list. If you want to be included in the mailing list to receive future information of SCOSTEP/PRESTO, please send e-mail to "scostep_at_bc.edu" or "scosteprequest_at_bc.edu " (replace "_at_" by "@") with your name, affiliation, and topic of interest to be included.

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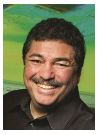

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