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Article 1:

A Spectral Solar Irradiance Monitor (SoSpIM) on the JAXA Solar-C Space Mission

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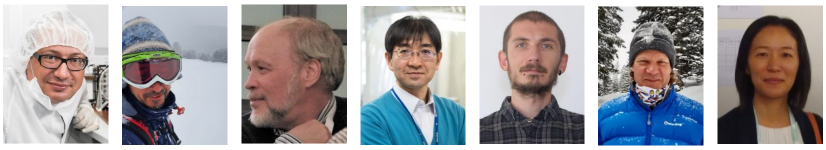

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As a fundamental step towards answering how the plasma universe is created and evolves, and how the Sun influences the Earth and other planets in our solar system, the JAXA Solar-C mission (Shimizu et al., 2020) is designed to comprehensively understand how mass and energy are transferred throughout the solar atmosphere. The EUV High-Throughput Spectroscopic Telescope (EUVST) onboard does this by observing all the temperature regimes of the atmosphere from the chromosphere to the corona simultaneously. As well as the EUVST, there will be a Solar Spectral Irradiance Monitor (SoSpIM). Solar-C was selected by

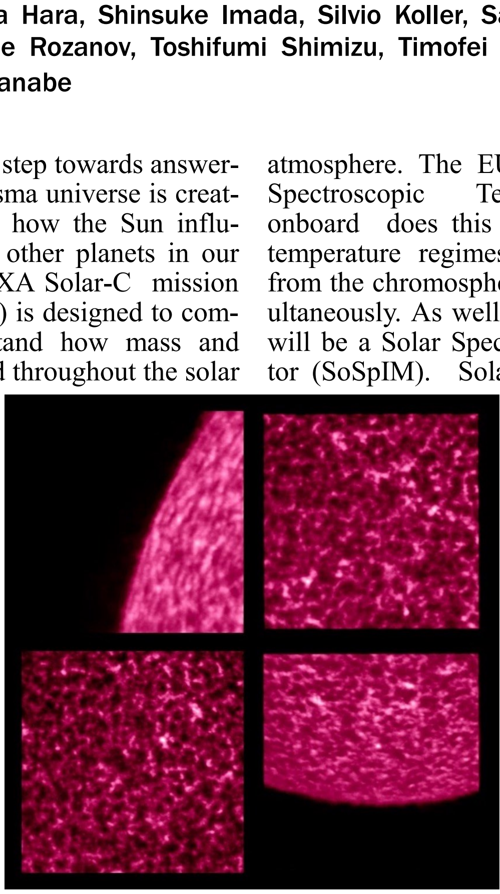

Figure 1: First light images from the Lyman alpha telescope on Solar Orbiter EUI

JAXA as the next M-class solar mission, and the launch is in 2026.

SoSpIM will work hand-in-hand scientifically with EUVST, by providing the full Sun irradiance at sub-second time cadence combined with the spatially resolved spectroscopy from EUVST. The SoSPIM instrument will specifically address two aspects. These are:

- Understand how the solar atmosphere becomes unstable, releasing the energy that drives solar flares – achieved through probing fast time cadence solar flare variations.
- Measuring solar irradiance that impacts the Earth's thermosphere and the mesosphere, linking to spatially resolved measurements of the solar atmosphere with EUVST.

In order to achieve these goals, the SoSpIM instrument will monitor the spectrally resolved solar irradiance with sub-second time cadence. A key advantage of having a 'Sun-as-a-star' instrument onboard the mission is that all solar flares will be visible from Earth. SoSpIM will provide high time resolution measurements in 2 channels (a) in the corona through channel 1 (EUV) and (b) in the lower atmosphere through channel 2 (Lyman alpha). Lyman-alpha is known to be the most prominent line of the solar spectrum and is formed in the mid- and upper-chromosphere. The recently launched Solar Orbiter carries a Lyman alpha imager (see Figure 1), and will provide an insight to the spatial location of Lyman alpha emission.

We intend to use SoSpIM data for the now-casting of the Earth's upper atmosphere in response to the solar irradiance enhancement caused by solar flares (e.g. TIME-GCM, Qian et al, 2009, and a new model GAIA, Watanabe et al., 2021, EAGLE model,Bessarab et al., 2020) An example is shown using the EAGLE model to study the atmospheric response to X9.3 flare on 06.09.2017 and showed pronounced response of the atmospheric state. Figure 2 illustrates simulated tropical NO_y signal (%) relative to the background. Highly significant NO_y increase by up to 150% is visible in the upper mesosphere. We expect a more accurate solar irradiance data forecast obtained from the SOLAR-C space mission data.

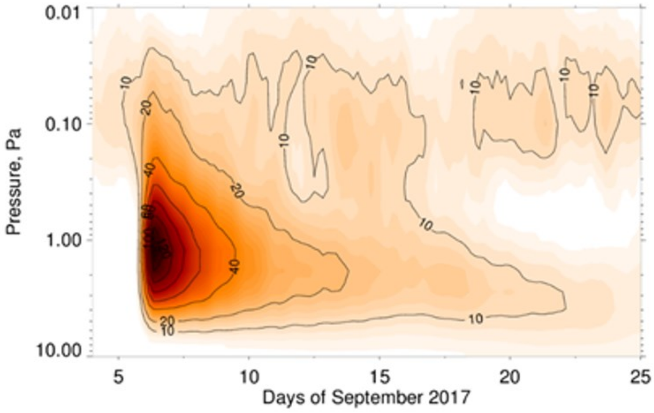

Figure 2: Simulated response of the tropical and subtropical NO_y (%) to the X9.3 solar flare of 6 September 2017.

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Article

Highlight on Young Scientists

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Article 2:

A Potential Space Weather Impact on the National Power Grid in Sudan

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In magnetosphere electrodynamics, several disturbances coupled to earth electromagnetic structure have been known to elucidate the impact on several conducting metallic based long systems. For instance, impact on power grids could be inducing currents that penetrate into them, known as geomagnetically induced currents (GICs). However, observations records of this impact dominate systems that located in/close to higher latitudes, where disturbance driven amplitudes electrojets are localized. Nevertheless, observations of such ground impact at low- mid latitudes have been attributed to other mechanisms, rather than the disturbances amplitude enhancements, i.e. to disturbances spectral content. However, there have been numerous of studies that reported evidencing of GICs enhancements in low-mid latitude locations, see e.g.[1][2][3][4][5].

Importantly, investigations of hazardous GIC impact on power grids in low- mid latitude locations become of great interest, in particular most of these locations lay where developing or least developed countries are located. Power grids in such countries are more vulnerable to outages and maintenance challenges. Consequently, economics and societal effects of space weather impact on power grids in these countries are much serious.

This study focuses on to carry out investigations on the possibility of space weather disturbances spectral content to cause blackouts in the power grid in Sudan. The date and time of blackouts records, in the power grid in the period 2001-2013, were collected from the Sudanese Electricity Distribution Company Ltd (SEDC), Soba Center[6]. Preliminary investigations were carried out by checking the corresponding time series plots of the final *Dst* index data[7], for the occurrence of features of storms, storm sudden commencement (SC) type of storms, and sudden impulse (SI) within date and time of blackouts. Results of these preliminary investigations were so interesting that 18 out of total 37 blackouts events records were correspond to a *Dst* showing variety features, e.g. recovery phase of a severe SC storm ($D_{ST} \leq -150nT$), initial, main and recovery phase of major SC storm ($-50nT \geq D_{ST} > -150nT$), and recovery phase of minor SC storm $D_{ST} > -50nT$, see Figure 1. Moreover, using available ground geomagnetic data, obtained from some low- mid latitude observatories of the chain of Magnetic Data Acquisition System

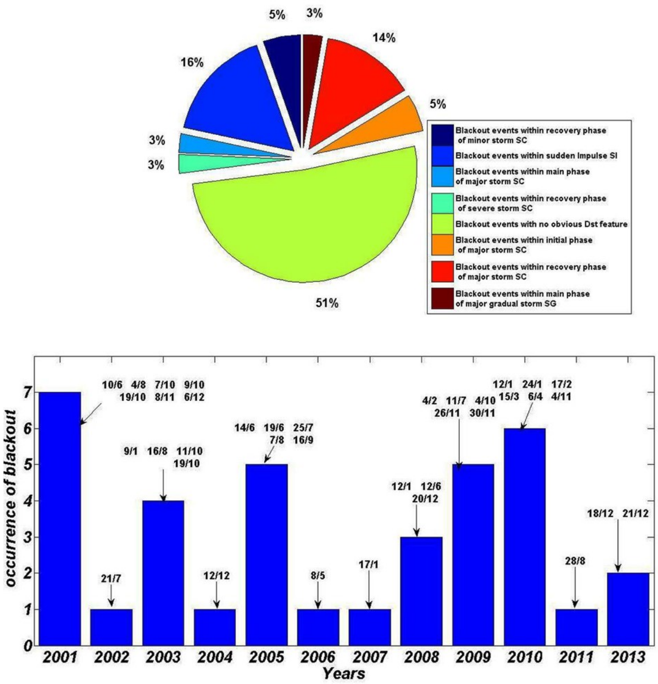

Figure1 : Upper part is a pie chart showing blackout events records during the time span: 2001: 2013, it shows 49 % of blackout events happened within variety features shown by the final *Dst* index[7], e.g. 14% (red color part in the pie chart) of blackout events happened within a recovery phase of major storms, a sudden commencement (SC) type of storms; While the lower part shows occurrence of blackouts Vs years in the time span: 2001: 2013, the arrows indicate dates when blackout events recorded, in Day/Month format.

(MAGDAS) of Kyushu University, Japan[8]; further investigations were carried out on these 18 blackouts events in order to proof spectral content, by checking dynamic magnetograms for the occurrence of continues pulsations. Results showed occurrence of low –mid latitude Pc5 pulsations globally distributed, mostly global mode, see Figure 2.

To this end, it is very important to urge maintenance of the single and the only geomagnetic ground observatory in Sudan, which belongs to the MAGDAS chain of observatories. Additionally, it is also necessary to stimulate accomplishment of future campaigns to deploy observatories in the country, not just limited to magnetometers but could include ionospheric probes. We undertake responsibility to continue future network-

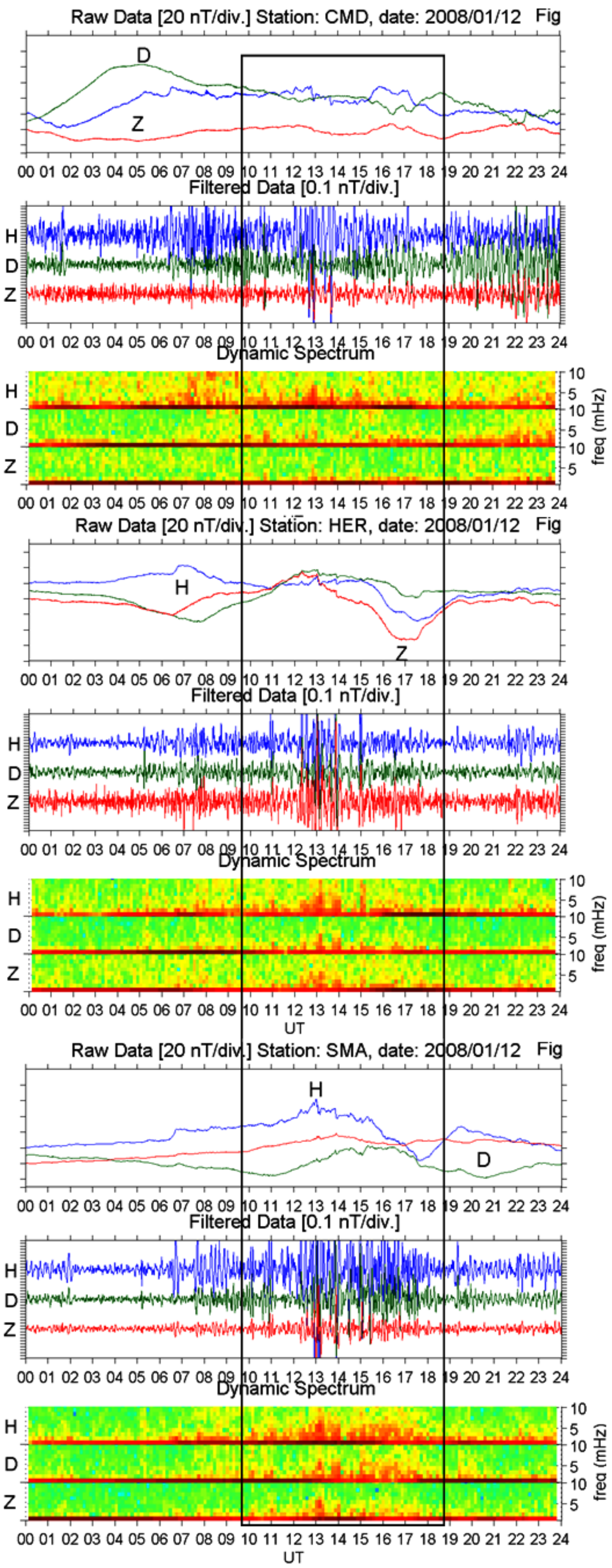

Figure 2: show stacked magnetograms of three low- mid latitude ground magnetometers stations of the MAGDAS[8] chain, from upper to lower: Camden (CMD) (L -value is 1.94), Hermanus (HER) (L-value is 1.83), and Santa Maria (SMA) (L-value is 1.12), respectively; between the rectangle shape it shows a simultaneous global pulsations continuous (Pc) pulsations (filtered frequencies range are: 1:10 mHz), with global distribution appearance, mainly a Pc 5 (range: 1.67: 6.67 mHz), these pulsations are within the time of the blackout event of the day: January 12, 2008.

ing in order to attract international scientific community concern for supporting us to reach our ultimate goal which is to be able to locally model GIC in Sudan.

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Article 3:

A New High Resolution Solar Spectral Irradiance Variability Model for Solar-Terrestrial Studies

Odele Coddington

O. Coddington and J. Lean

A new solar spectral irradiance (SSI) variability model spanning wavelengths from 115 nm to 500 nm and the time period from 1978 to 2020 has been developed [Lean et al., in prep] with higher spectral resolution than the 1-nm NRLSSI2 model that prescribes the NOAA Solar Irradiance Climate Data Record (CDR) [Coddington et al., 2016]. This new Naval Research Laboratory model, NRLSSI2***h***, has spectral resolution 0.1 nm to 310 nm and up to 0.5 nm above that. The absolute scale and variability of the NRLSSI2h model, when binned to 1-nm, is equivalent to that of the NRLSSI2 model which can therefore be used to extend the new model to wavelengths beyond 500 nm. NRLSSI2h, with 10x better spectral resolution at ultraviolet wavelengths, promises enhanced utility for:

- Sun-climate studies, by better capturing variability in solar spectral features co-located with spectral features in Earth atmospheric gas absorption cross sections (**Figure 1**), and
- solar irradiance research by better isolating variable solar emission and absorption features attributable to the Sun's atmospheric composition, which theoretical solar irradiance models (one example being Shapiro et al., 2015) must accurately specify to reliably estimate solar irradiance change (**Figure 2**).

NRLSSI2h and NRLSSI2 are observation-based, empirical models, developed from space-based SSI observations and proxies of faculae and sunspots. The models use multiple linear regression to determine the net incremental change in SSI that occurs with changes in faculae and sunspots, which respectively enhance and deplete the irradiance relative to the "quiet" irradiance level when the Sun is devoid of these features. Their proxy inputs are identical, namely the Mg II index for facular brightening and, for sunspot darkening, the number, area, and location of individual sunspots. The models differ, however, in the resolution of the space-based SSI observations used to formulate the model coefficients. For NRLSSI2, these were Solar Radiation and Climate Experiment (SORCE) observations spanning 115 nm to 2400 nm and binned to 1-nm.

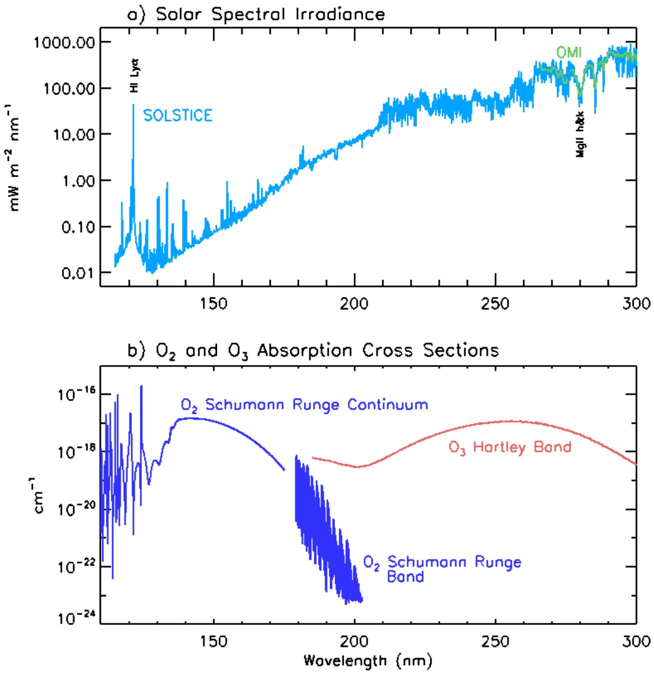

Figure 1: (top) The solar irradiance spectrum at 0.1 to 0.3 nm spectral resolution as observed by SORCE SOLSTICE and AURA OMI and (bottom) the wavelength-dependent absorption coefficients of oxygen (O_2) and ozone (O_3) between 115 and 300 nm.

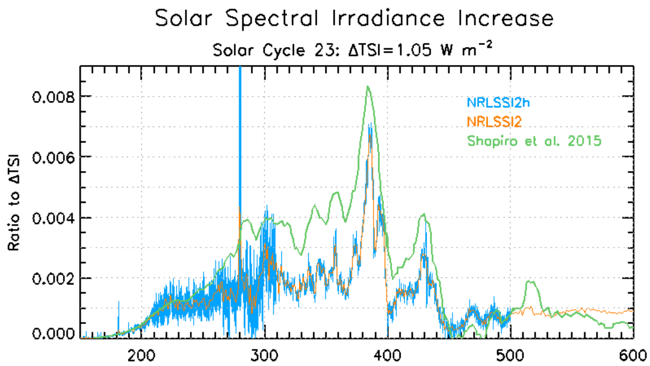

Figure 2: The ultraviolet and visible spectrum of irradiance change over the 11-year solar cycle estimated by the empirical NRLSSI2 and NRLSSI2h models and a theoretical solar radiative transfer code. The higher spectral resolution of the NRLSSI2h model better isolates the enhanced variability in solar lines.

For NRLSSI2h, SORCE observations from 115 nm to 310 nm at their native 0.1 nm resolution were combined with AURA Ozone Monitoring Instrument (OMI) observations from 310 nm to 500 nm at 0.3 nm to 0.5 nm resolution. NRLSSI2 model validation with independent SSI observations demonstrated its superior performance relative to alternative solar irradiance variability models at wavelengths up to 500 nm on time periods of several solar rotation cycles [Coddington et al., 2019]. As solar cycle 25 activity continues to increase, additional model validation is made possible by the high-quality observations of the TSIS-1 mission (**Figure 3**) that is continuing the daily space-based solar irradiance record into the post-SORCE era [Coddington and Woods, 2020]. The TSIS observations also provide the absolute scale for a new SSI reference spectrum of at least 0.01 spectral resolution spanning 202 to 2730 nm [Coddington et al., 2021]; several variants are also produced at lower, fixed, spectral resolution. Recently, this new reference spectrum has been extended from 115 to 200,000 nm [Coddington et al., in prep].

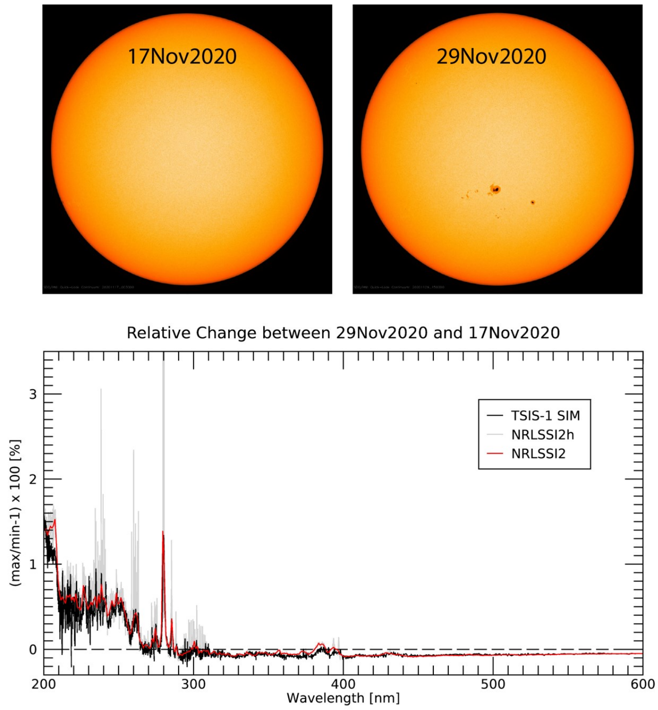

Figure 3: The ultraviolet and visible spectrum of irradiance change during a sunspot-dominated solar rotation in late November, 2020 as observed by the TSIS-1 SIM instrument at variable resolution and modeled by NRLSSI2 and NRLSSI2h.

These new high-resolution datasets - the daily NRLSSI2h estimates and the absolute irradiance reference spectrum – add value to the various solar irradiance and Sun-climate research activities performed by SCOSTEP members. For example, initial estimates suggest the peak oxygen absorption of solar HI Lyman alpha radiation shifts to lower altitudes when estimated using NRLSSI2h instead of NRLSSI2 (**Figure 4**).

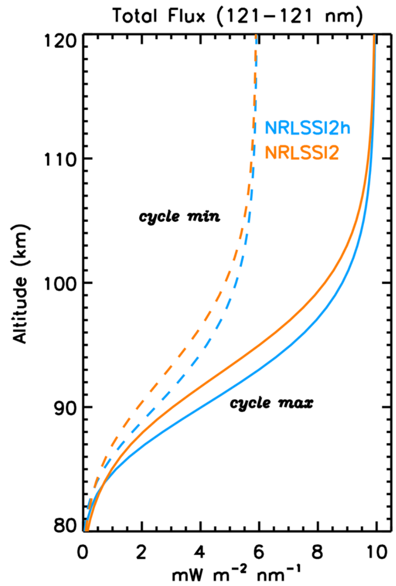

Figure 4: The solar cycle change in the vertical profile of Earth atmospheric energy deposition in the Lyman-alpha band (121-122 nm) when using the NRLSSI2 and NRLSSI2h models as the solar forcing input.

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Highlight on Young Scientists 1:

Verification of Solar Spectral Irradiance on Exploiting Trace-Gas Concentrations from Satellite Measurements

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Ozone Monitoring Instrument (OMI) has been remotely sensing ozone layer and key air pollutants (O_3, NO_2, and aerosols) from space since 2004. It measures backscattered radiation in 270-500 nm, along with measurements of the solar irradiance. The retrieval of ozone profiles from the spectral range 270-330 nm is highly sensitive to wavelength and slit function uncertainties and forward model simulation errors. A well calibrated high-resolution solar spectral irradiance is of importance for characterizing wavelength assignment and slit functions by means of matching the solar Fraunhofer absorption lines between measured and reference spectra as well as for convolution process in forward model simulation.

In this work we focused on impacts on OMI ozone profiles retrievals due to switching the current solar reference (SAO2010[1]) to the recently published solar reference (TSIS-1 HSRS[2]) which spans 202 nm to 2730 nm at 0.01 to ~ 0.001 nm spectral resolution. As shown in Fig.1, radiometric uncertainties of SAO2010 range from 10-25 % below ~ 305 nm to ±5% above, but TSIS-1 HSRS are excellently matched with the reference within ~ 1 % or less over the spectral range. In fitting OMI slit shapes as a Gaussian, derived slit widths differ by 0.02 nm due to different solar reference datasets, with fitting uncertainties being smaller (by 0.5 %) when TSIS-1 HSRS is used as a reference to OMI irradiance measurements. In performing ozone retrievals from OMI earthshine measurements, the fitting residuals decrease by up to ~ 5 % due to using the new solar reference data while relative changes of ~ 2-3 % in tropospheric column ozone (Fig.2). Based on this study, we would like to recommend the use of the TSIS-1 HSRS for trace-gas retrievals from UV measurements.

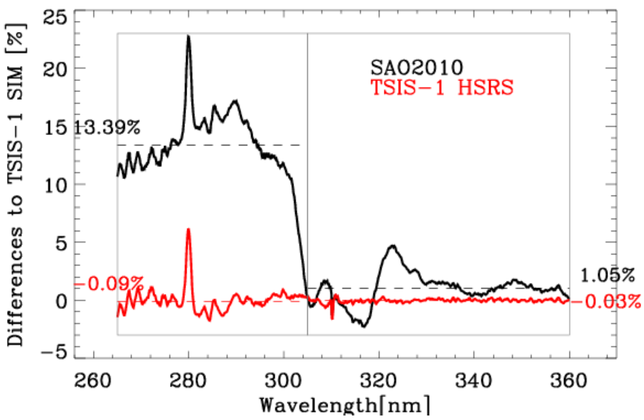

Figure 1: Evaluation of irradiance scales of high-resolution solar reference datasets against TSIS-1 SIM reference spectrum at spectral resolution of TSIS-1 SIM, with the mean values of individual differences below and above 305 nm.

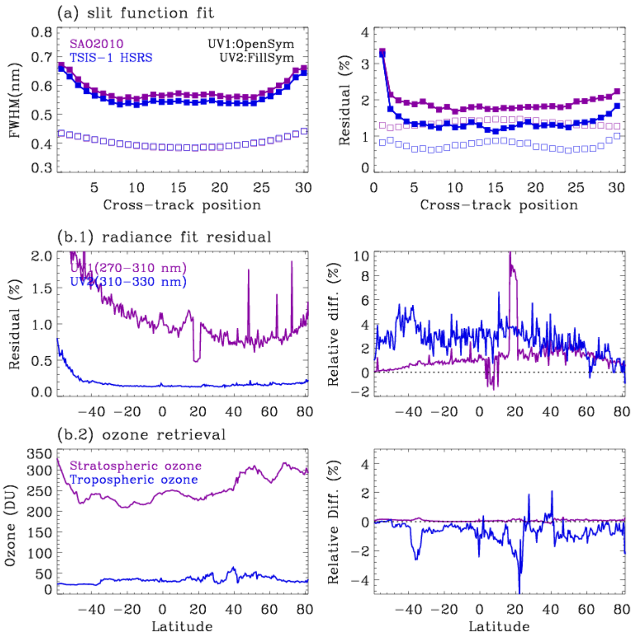

Figure 2. (a) Impacts of using different solar reference datasets on fitting slit widths from OMI irradiance measurements. Note that slit widths represent a Full width at Half Maximum (FWHM) of Gaussian slit function. Residuals are calculated as $\sqrt{\frac{1}{N}\sum\left|\frac{I_{OMI}-I_{SIM}}{I_{OMI}}\right|^2} \times 100\ (\%)$ **where** I_{OMI}/I_{SIM} **is measured/simulated spectrum. (b) Same as (a), but for performing ozone retrievals from OMI radiance measurements; In left panels, the evaluated variables are derived when using TSIS-1 HSRS, with comparison to SAO2010 based retrievals in right panels (SAO2010 – TSIS-1 HSRS).**

Data Availably

[1]SAO2010:https://www.cfa.harvard.edu/atmosphere/links/sao2010.solref.converted

[2]TSIS-1 HSRS: https://www.essoar.org/doi/10.1002/essoar.10506142.1

Acknowledgement

This work is funded by Basic Science Research Program through the National Research Foundation of Korea (NRF) funded by the Ministry of Education (2020R1A6A1A03044834).

Highlight on Young Scientists 2:

Analyses of Historical Extreme Space Weather Events

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Quantitative analyses of extreme geomagnetic storms are beyond just scientific interests. Our ever-increasing dependency on technological infrastructure has made our society increasingly vulnerable to these storms (Riley *et al.*, 2018). Nevertheless, their occurrences are significantly rare. Although the standard *Dst* index has been used since the International Geophysical Year (IGY: 1957–1958), only five geomagnetic storms surpassed the extreme-storm threshold (minimum $Dst \leq -400$ nT) during this interval, and only one was identified as a superstorm (minimum $Dst \leq -500$ nT) (Riley *et al.*, 2018; Meng *et al.*, 2019).

Contrastingly, historical evidence shows that there were more extreme storms and superstorms before the IGY. The geomagnetic superstorms of September 1859, February 1872, and May 1921 have been considered as benchmarks (minimum $Dst \approx -900$ nT) of such extreme weather events (Cliver and Dietrich, 2013; Hayakawa *et al.*, 2018, 2019b). In this case report, our team has reconstructed the *Dst* estimates (*Dst**) with data completeness and reasonable longitudinal separations for historical storms using historical magnetograms in the mid/low magnetic latitude.

Our team has identified at least four geomagnetic superstorms between 1900 and 1956 based on the abovementioned benchmarks; accordingly, we have reconstructed the *Dst** time series of these four superstorms and measured their magnitudes (Figure 1). With respect to the most powerful geomagnetic storm by the standard *Dst* index (the March 1989 storm; minimum *Dst* = -589 nT; Boteler, 2019), these results have quantitatively visualised unique cases of historical geomagnetic superstorms surpassing this benchmark (Hayakawa *et al.*, 2019a, 2020a, 2020b; Love *et al.*, 2019a, 2019b).

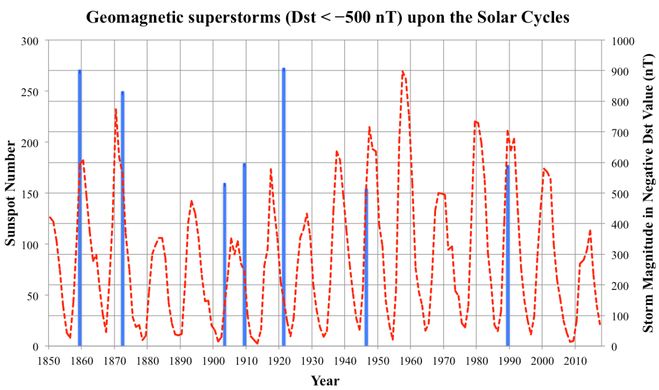

Figure 1: Geomagnetic superstorms contextualised upon the solar cycles based on the SILSO International Sunspot Number (Clette and Lefèvre, 2016).

One superstorm (in October 1903; minimum $Dst^* \approx -531$ nT; Figure 2) even occurred immediately after the minimum of a weak solar cycle (Hayakawa *et al.*, 2020a). This and similar case studies will form the basis for future discussions on extreme geomagnetic storms.

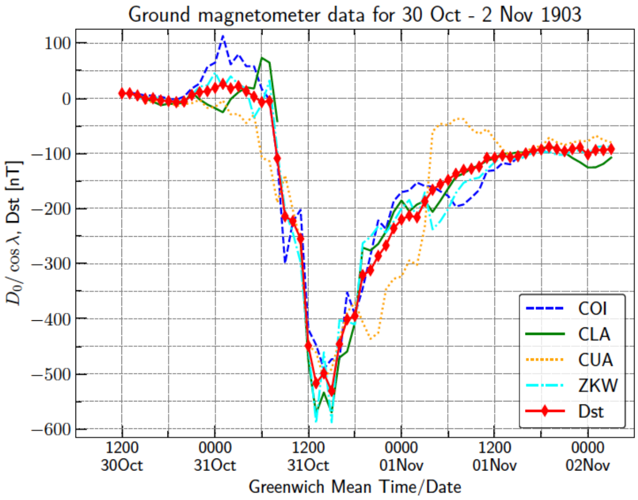

Figure 2: *Dst time series for the geomagnetic superstorm in October 1903 (Hayakawa *et al.*, 2020a).**

Acknowledgment

This work was supported in part by JSPS Grant-in-Aids JP17J06954 and JP20K22367, JSPS Overseas Challenge Program for Young Researchers, the 2020 YLC collaborating research fund, and the research grants for Mission Research on Sustainable Humanosphere from Research Institute for Sustainable Humanosphere (RISH) of Kyoto University and Young Leader Cultivation (YLC) program of Nagoya University. Our team thanks WDC for Geomagnetism at Edinburgh for providing geomagnetic baselines and British magnetograms, WDC for Geomagnetism at Kyoto for providing the Dst index and individual magnetic measurements, and WDC SILSO for providing international sunspot numbers.

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Meeting Report 1:

The 3rd ISEE Symposium "PWING-ERG Conference and School"

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Kazuo Shiokawa

Yoshizumi Miyoshi

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The 3rd ISEE Symposium "PWING-ERG Conference and School" was held on March 8-12, 2021 via online. This conference was held as the completion of the PWING project and as the 5th year anniversary of the ERG (Arase) mission. The school was held in the first 1.5 days with six lectures and two training courses for graduate-course students. The ISEE Award presentation and commemorative lecture was held in the afternoon of March 11. The 264 participants from 37 countries have registered in this conference and joined discussion on the dynamics of the inner magnetosphere based on latest ground and satellite measurements and modeling. This conference was supported by ISEE, Nagoya University, JSPS (PWING project: 16H06286), ISAS/JAXA (Arase Project), NICT, SCOSTEP, and SGEPSS. The conference site with details of the conference and school is at https://is.isee.nagoya-u.ac.jp/pwing-erg/.

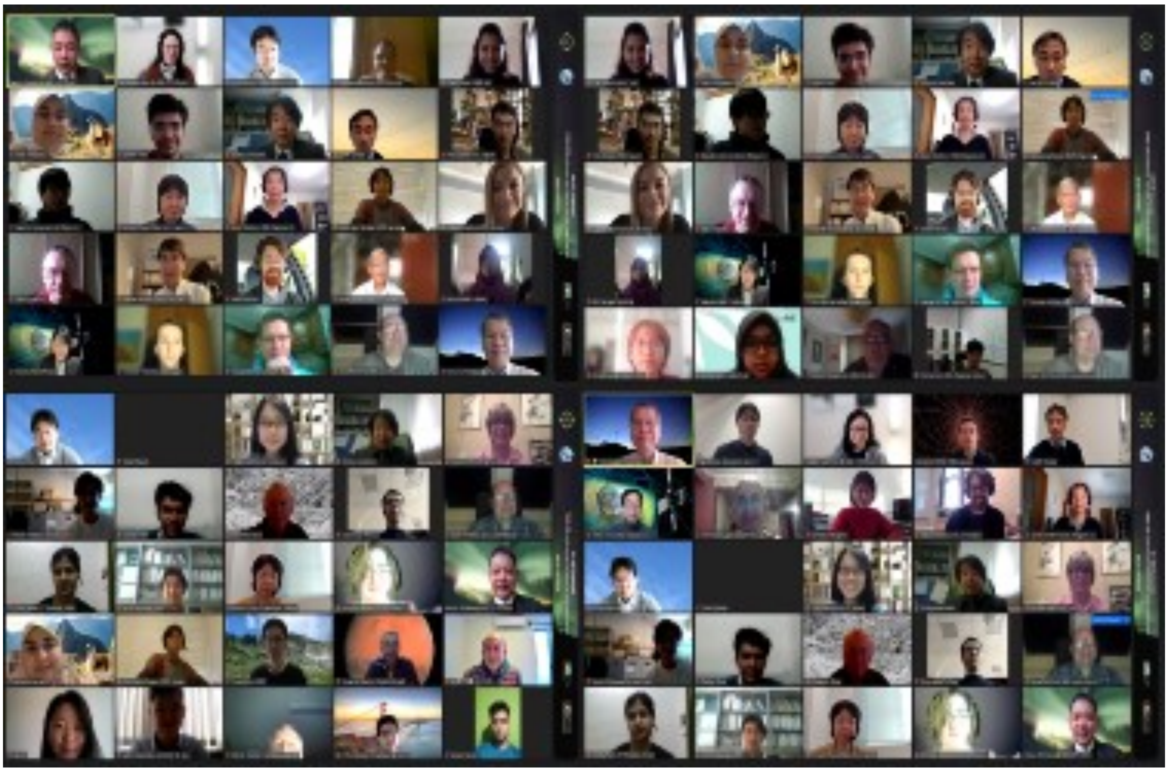

Figure 1: Zoom Group Photo of the participants of the PWING-ERG Conference and School (multiple pages are combined with some overlaps)

Upcoming meetings related to SCOSTEP

Conference	Date	Location	Contact Information
EGU General Assembly 2021	Apr. 25-30, 2021	Vienna, Austria	https://www.egu2021.eu/
ISWI/SCOSTEP Iberian Space Science Summer School	July 26-30, 2021	Online	
AOGS 2021	Aug. 1-6, 2021	Suntec, Singapore	https://www.asiaoceania.org/aogs2021/public.asp?page=home.html
IAU 2021 General Assembly	Aug. 16-27, 2021	Busan, Korea	http://www.iauga2021.org/
IAGA 2021	Aug. 22-27, 2021	Hyderabad, India	http://www.iaga-iaspei-india2021.in/
URSI GASS 2021	Aug. 28- Sep.4, 2021	Rome, Italy	https://www.ursi2021.org/
The 30th IUPAP General Assembly	Oct. 20-22, 2021	Beijing, China	
AGU Fall Meeting 2021	Dec. 13-17, 2021	New Orleans, LA, USA	https://www.agu.org/fall-meeting
SCOSTEP's 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15)	Feb. 21-25, 2022	Alibag, India	https://scostep.org/stp-symposia/
EGU General Assembly 2022	Apr. 3-8, 2022	Vienna, Austria	
COSPAR 2022	Jul. 16-24, 2022	Athens, Greece	http://www.cosparathens2022.org/
AOGS 2022	Aug. 14-19, 2022	Melbourne, Australia	
AGU Fall Meeting 2022	Dec. 12-16, 2022	Chicago, IL, USA	https://www.agu.org/fall-meeting
IUGG 2023	In July, 2023	Berlin, Germany	
AGU Fall Meeting 2023	Dec. 11-15, 2023	San Francisco, CA, USA	https://www.agu.org/fall-meeting

Please send the information of upcoming meetings to the newsletter editors.

Announcement 1:

A New Pillar 3 Activity: What Is the Impact of Spectral Resolution on Calculations of Solar Energy Deposition in the Earth's Atmosphere?

O. Coddington and S. Misios

Odele Coddington

Stergios Misios

New datasets of solar spectral irradiance (SSI) at higher spectral resolution have recently been developed. For example, the TSIS-1 SSI observations with differences approaching 10% at some wavelengths from other reported solar irradiance spectra [Coddington and Woods, 2020], forms the basis of a new solar irradiance reference spectrum spanning 202 to 2730 nm with a spectral resolution of at least 0.01 nm developed by adjusting high spectral resolution solar line data to the irradiance scale of the more accurate, but lower spectral resolution, TSIS-1 Spectral Irradiance Monitor (SIM) instrument [Coddington et al., 2021]. Additionally, a new Naval Research Laboratory (NRL) solar irradiance variability model, called NRLSSI2***h***, was recently developed [Lean et al., in prep; Coddington and Lean, 2021]. It spans the years 1978 through 2020 and has up to 10x greater spectral resolution at wavelengths from 115 nm to 500 nm relative to that of the current, operational, 1-nm resolution NRLSSI2 model that spans a broader wavelength range and longer time period.

These new solar irradiance datasets provide an opportunity to update the default SSI used to model the mean state of the atmosphere and to evaluate Earth's response to solar forcing at higher spectral resolution. Molecules in Earth's atmosphere, such as oxygen and ozone, alter the incoming solar irradiance through wavelength-dependent absorption and photochemical effects, which in turn affects atmosphere temperatures and drives dynamical variability, particularly at heights greater 50 km. For example, one initial estimate suggests the peak oxygen absorption of solar HI Lyman a radiation shifts to lower altitudes when estimated using NRLSSI2h as opposed to NRLSSI2 [Coddington and Lean, 2021]. A

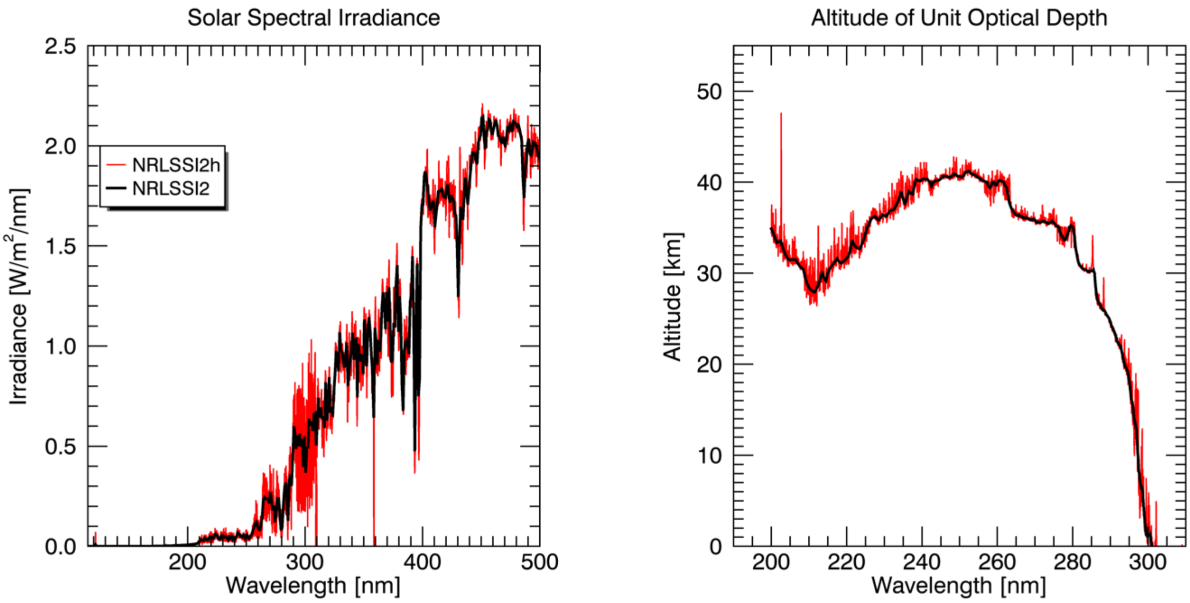

Figure 1: Differences in the resolution of the extraterrestrial solar spectral irradiance (left) impact the depth of the atmospheric deposition within Earth's atmosphere as estimated with the Modtran 6.0 radiative transfer software package (right).

second initial estimate suggests changes also occur in the deposition depths of solar irradiance at longer wavelengths (**Figure 1**).

Chemistry-climate models play an important role in identifying the response of Earth's atmosphere to changes in the absolute magnitude and variability of the solar forcing because they contain a myriad of the radiative and chemical processes that simulate Earth's climate. Would these models extract new information about Earth's climate when considering higher spectral resolution solar features potentially co-located with spectral features of absorbing gases in Earth's atmosphere? To address this question, Odele Coddington (odele.coddington@lasp.colorado.edu) and Stergios Misios (smisios@noa.gr) are seeking to ***develop a working group under PRESTO Pillar 3 to apply these new solar irradiance datasets in comparative chemistry-climate model studies of the impact of spectral resolution on calculations of solar energy deposition in the Earth's atmosphere***. We invite SCOSTEP members to initiate their interest in this activity through an initial email. This email list will be used to form the basis of the new working group to guide the scope and architecture for the targeted climate modeling studies.

Files of the TSIS-1 daily irradiance, the hybrid absolute reference spectrum and the NRLSSI2h irradiance variability estimates are available for use by the SCOSTEP community for these studies.

References

Coddington, O., and T. N. Woods (2020), An Overview of the Total and Spectral Solar Irradiance Sensor (TSIS-1) Mission, SCOSTEP/PRESTO Newsletter, Vol. 24, July 2020.

Coddington, O., and J. Lean (2021), A New High Resolution Solar Spectral Irradiance Variability Model for Solar-Terrestrial Studies, SCOSTEP/PRESTO Newsletter, Vol. 27, April 2021.

Coddington, O., E. C. Richard, D. Harber, P. Pilewskie, T. N. Woods, K. V. Chance, X. Liu, and K. Sun (2021), The TSIS-1 Hybrid Solar Reference Spectrum, *Earth and Space Science Open Archive*, doi: 10.1002/essoar.10506142.1 (under consideration at *Geophys. Res. Lett.*)

Lean et al., O. Coddington, S. V. Marchenko, M. T. DeLand, and M. Snow (2021), A New Model of Solar Ultraviolet Irradiance Variability with 0.1-0.5 nm Spectral resolution (in prep).

Announcement 2:

News from the Office of the SCOSTEP Scientific Secretary

Patricia Doherty

Patricia Doherty
SCOSTEP Scientific Secretary, Institute for Scientific Research (ISR), Boston College, Boston, MA, USA

The office of the SCOSTEP Scientific Secretary has been active with a new membership drive, the Visiting Scholar Program, grant funding opportunities and the 2021 Distinguished Service Award.

We have also recently activated a dedicated website to SCOSTEP and a twitter account. Please view the website at: https://scostep.org. The website will be updated regularly for new opportunities and information relevant to our membership. Please also follow SCOSTEP on Twitter: @scostep1 and encourage the use of **#scostep** in your own solar-terrestrial tweets.

If you are not already enrolled in our mailing list, please send a note to scostep[at]bc.edu to be added to this mailing list. All announcements and updates are broadcast to the mailing list.

Finally, if you have any questions related to the activities and opportunities of SCOSTEP, please contact me the Office of the SCOSTEP Scientific Secretary at scostep[at]bc.edu.

Announcement 3:

NEW MEMBER COUNTRIES

Patricia Doherty
SCOSTEP Scientific Secretary, Institute for Scientific Research (ISR), Boston College, Boston, MA, USA

We are pleased to announce that Poland has joined SCOSTEP as a member country.

Poland is sponsored by the Space Research Centre of the Polish Academy of Science in Warsaw. Institutions active in solar-terrestrial physics in Poland include the Space Research Centre, the Institute of Geophysics and the Institute of Geological Sciences of the Polish Academy of Science. In addition programs are active at a number of universities including the University of Warsaw, the University of Warmia and Mazury, Wroclaw University, the University of Zielona Gora and the Military University of Technology. The National Adherent Representative for Poland is Dr. Hanna Rothkaehl, Head of the Space Plasma Physics Department at the Space Research Center, Polish Academy of Science.

SCOSTEP is actively seeking new member countries. A membership committee, chaired by Dr. Jorge Chau of the Leibniz-Institute of Atmospheric Physics, is actively identifying and reaching out to potential member countries. Please contact Jorge Chau or Patricia Doherty for more information.

SCOSTEP has three main activities that address the needs of the solar terrestrial physics community worldwide: (1) Scientific programs, (2) Capacity building and outreach, (3) International Scientific Meetings. A SCOSTEP member country will have a say in the policy and functioning of SCOSTEP because the country will be represented in the SCOSTEP Council by a National Adherent Representative. The National Adherent Representative serves as a close liaison between SCOSTEP and the respective Adherents. The National Adherent Representatives also provide valuable advice in establishing the SCOSTEP scientific programs and as members of the General Council (GC) the Adherents participate in the governing and decision making of SCOSTEP.

Countries are now invited to apply for membership. The process begins with a responsible scientific body writing to the President of SCOSTEP seeking membership. The application letter should include the following: (i) list of solar-terrestrial physics activities in the country and the institutions that carry out these activities, (ii) the name and address of the responsible institution, (iii) the membership category, and (iv) the proposed name of the National Adherent Representative. After approval by the Bureau, the application will be presented to the SCOSTEP Council, which considers and acts on the admission of new member nations.

In most countries the Academy of Sciences administers SCOSTEP affairs including selecting the National Adherent Representative from the solar-terrestrial physics community to the SCOSTEP General Council (GC) and sending annual dues to the SCOSTEP secretariat.

For more information on country membership applications, please contact the Scientific Secretary (SCOSTEP [at] bc.edu).

Announcement 4:

UPDATE on the SCOSTEP VISITING SCHOLARS – 2020 and 2021

Patricia Doherty
SCOSTEP Scientific Secretary, Institute for Scientific Research (ISR), Boston College, Boston, MA, USA

The purpose of the SCOSTEP Visiting Scholar (SVS) Program is to provide training for graduate students from developing countries in established laboratories of solar-terrestrial physics for periods of 1 to 3 months.

Due to the travel restrictions imposed by the COVID pandemic, most of the SVS 2020 awardees have not yet started their training programs. As such, the 2020 recipients of the SCOSTEP SVS program have until the end of 2021 to complete their training program, with the agreement of the host laboratory.

An announcement for the 2021 SVS applications was made on January 15, 2021 with a deadline of February 28, 2021. The awardees of the 2021 program will be announced soon. The 2021 SVS recipients will have until the end of 2022 to complete their training period.

For more information on the SVS program, please visit the SCOSTEP website: https://scostep.org/svs

Announcement 5:

SCOSTEP/PRESTO GRANT OPPORTUNITIES

Patricia Doherty
SCOSTEP Scientific Secretary, Institute for Scientific Research (ISR), Boston College, Boston, MA, USA

SCOSTEP/PRESTO has funding opportunities available to support campaigns, meetings and databases relevant to the PRESTO themes.

SCOSTEP/PRESTO Campaigns and Meetings: Proposals are accepted annually to support campaigns and meetings relative to the PRESTO topics. The deadline for proposals for 2021 was December 31, 2020. The Scientific Secretary is currently working with the 2021 awardees to support these awards. More information on these activities will be provided in reports from the awardees following the activities. Announcements of opportunity will be issued in September 2021 for the 2022 award period.

SCOSTEP/PRESTO Databases: A new Announcement of Opportunity was recently released for **SCOSTEP/PRESTO Database Proposals**. These grants are to support the development of databases of solar-terrestrial data that are strictly related to one or more PRESTO Pillars and contribute to the PRESTO activities. PRESTO funding for databases will be up to $5000 USD. The grants can be used to cover expenses for software, manpower, computer servers, web-site maintenance. The deadline for the proposals is April 1, 2021. More information is available on the database proposals is on the SCOSTEP website: https://scostep.org/grant-proposals/

SCOSTEP Capacity Building Funds: SCOSTEP is currently accepting proposals for organizing schools for capacity building of students and young scientists in solar-terrestrial physics by (1) providing up to $5000 for participant support and by (2) endorsing lecturers for the school from SCOSTEP Science Disciplinary Representatives (SDRs), National Adherent Representatives and other SCOSTEP-related officers. Please see the SCOSTEP website for more information: https://scostep.org/capacity-building/

Announcement 6:

SCOSTEP 2021 DISTINGUISHED SERVICE AWARD

SCOSTEP is pleased to announce that the

2021 Distinguished Service Award is given to

Dr. Franz-Josef Lübken
Director, Leibniz Institute for Atmospheric Physics (IAP)
Professor, University of Rostock, Germany

Franz-Josef Lübken

Citation: For unique and meritorious service to SCOSTEP activities and interests at an international level, which have visibly influenced outreach and high-level research in solar-terrestrial physics.

Dr. Franz-Josef Lübken is recognized as a dedicated scientific member of various SCOSTEP entities and has contributed to make SCOSTEP a lively international network resulting in original research and outstanding education. His dedication is demonstrated by his commitment to serve as Vice-President of SCOSTEP from 2011-2019 and his outstanding contributions to the scientific programs of SCOSTEP. He has also served as the Chairman of the German SCOSTEP Committee since 2010.

Within CAWSES (2004-2008), Dr. Lübken was chair of the Scientific Theme "Atmospheric Coupling Processes" that included three working groups and initiated eight projects dedicated to hydro- and electrodynamic processes from the polar to equatorial middle atmosphere and ionosphere.

To further the success of CAWSES, Dr. Lübken chaired the team to define the program for CAWSES-II for 2009-2013. A certainly outstanding success within CAWSES-II was the organization of the SCOSTEP Symposium STP-12 in Berlin in 2010. The exciting program and opportunities to build strong networks is a hallmark success of CAWSES II. During this time, he further engaged the CAWSES community in compiling special topical sections in international ISI-listed journals such as JGR, thereby ensuring the international visibility of new results from SCOSTEP.

During VarSITI (2014-2018), Dr. Lübken led the scientific element ROSMIC which included four working groups from solar influences to vertical atmosphere coupling. Within ROSMIC, several modelling and instrumental campaigns were proposed and realized.

Education and capacity building within SCOSTEP were further essential interests of Dr. Lübken. As the Director of IAP, he committed IAP to engage with the SCOSTEP Visiting Scholar Program. He also gave lectures at the 2013 ISWI/SCOSTEP School on Space Sciences held in Nairobi, Kenya. Besides his many international efforts Dr. Lübken's engagement to expand and develop SCOSTEP topics within Germany has been outstanding.

This award recognizes Dr. Lübken's many unique and meritorious services to SCOSTEP activities and interests at an international level, which have visibly influenced outreach and high-level research in solar-terrestrial physics.

The purpose of the 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 "patricia.doherty_at_bc.edu" or "sean.oconnell.2 at bc.edu" (replace "_at_" by "@") with your name, affiliation, and topic of interest to be included.

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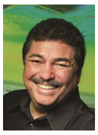

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