



**The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)
ANNUAL REPORT (1 JANUARY – 31 DECEMBER, 2020)**

Prepared by Patricia H. Doherty, SCOSTEP Scientific Secretary

SCOSTEP is a thematic body of the International Science Council (ISC). Its long term objectives include promoting international interdisciplinary programs of finite duration in solar-terrestrial physics, specifically to:

- Develop and sustain student interest in Sun-Earth connections
- Promote efficient exchange of data and information between solar and terrestrial scientists in all countries
- Seek projects and programs that cross over transitional boundaries of physical regions and focused scientific disciplines

SCOSTEP is engaged in science, capacity building and public outreach to achieve these objectives in cooperation with other scientific organizations and scientific unions of the ISC. These other organizations are the Participating Bodies of SCOSTEP. These include COSPAR, IAGA/IUGG, IAMAS/IUGG, IAU, IUPAP, SCAR, URSI and WDS. The SCOSTEP Bureau consists of representatives of all of these scientific bodies, making it a truly interdisciplinary body.

The report that follows covers the period of 1 January to 31 December 2020. It reflects the activities carried out by the organization and its scientific programs. The year 2020 was a challenging period for SCOSTEP due to the worldwide COVID pandemic. This primary challenges were due to travel limitations that affected the ability of on-site programs and the SCOSTEP Visiting Scholar Program. However, SCOSTEP continued to reach out to the solar-terrestrial physics community by participating in and hosting virtual programs; providing grant opportunities for virtual meetings, workshops, and database development; the launch of a series of online seminars; and the SCOSTEP Visiting Scholar program. SCOSTEP also held its annual awards program for Distinguished Scientist, Distinguished Young Scientist and Distinguished Service awards.

This report provides details on these activities carried out in the year 2020. All of these events and opportunities were communicated to the SCOSTEP scientific community via the SCOSTEP Newsletters and public announcements on relevant scientific community mailing lists.

1. SCOSTEP EXECUTIVES AND BUREAU MEMBERS

The SCOSTEP Executives for the period 2019-2022 include:

President: Dr. Kazuo Shiokawa, Nagoya University, Japan
 Vice President: Dr. Daniel Marsh, NCAR (USA) and University of Leeds (UK)
 Past President: Dr. Nat Gopalswamy, NASA, USA

Scientific Secretary, Patricia Doherty, Boston College, USA

The SCOSTEP Bureau is comprised of the Executives named above together with representatives of SCOSTEP participating organizations. The representatives are appointed by the Secretary General of their organizations. For the quadrennial beginning in July 2019, the bureau members representing their organizations include: Yoshizumi Miyoshi (COSPAR), Renata Lukianova (IAGA/IUGG), Peter Pilewskie (IAMAS), Kyung-Suk Cho (IAU), Prasad Subramanian (IUPAP), Annika Seppälä (SCAR), Jorge Chau (URSI) and Aude Chambodut (WDS).

The SCOSTEP Bureau directs the scientific, administrative and financial activities of SCOSTEP. The Bureau meets at least once annually. In 2020, the SCOSTEP Bureau met virtually in April and December 2020.

2. CAPACITY BUILDING AND OUTREACH ACTIVITIES

SCOSTEP is actively involved in the advancement of Capacity Building and scientific excellence through its scientific programs and partnerships with the ISWI, ISC and URSI. Through its initiatives, e.g. Space Science Schools, SCOSTEP Visiting Fellowships (SVS), SCOSTEP facilitates the training, interaction and collaboration of young and early career scientists with the best of the STP scientific community.

2.1 WORKSHOPS AND SCHOOLS

Each year, SCOSTEP supports a number of workshops and schools. SCOSTEP support for these activities are used to support travel and subsistence for participants from developing countries. In the year of 2020, the number of workshops and schools was significantly limited due to the COVID pandemic. There was one workshop held in early 2020 prior to the worldwide travel limitations imposed by COVID. This was the COSPAR Capacity Building Workshop held in Bangalore, India.

COSPAR Capacity Building Workshop, Indian Institute of Astrophysics, Bangalore, India



C. Kathiravan

COSPAR Capacity-Building Workshop Indian Institute of Astrophysics Koramangala, Bangalore, India

The main objective of the COSPAR Capacity Building Workshop conducted at Kodaikanal Solar Observatory during January 6-17, 2020 (https://www.iiap.res.in/COSPAR_KSO2020/) is to encourage the scientific use of space and ground based data by scientists and young researchers from developing countries (https://www.iiap.res.in/COSPAR_KSO2020/?q=participants). This two-week workshop had two major components: (1) Introductory Lecturers (first week), and (2) The hands-on training session (second week). Scientists and young researchers from India, Africa, and Sri Lanka, took part in the program. The results obtained during the workshop are available in the form of presentations (https://www.iiap.res.in/COSPAR_KSO2020/?q=analysis) in the workshop website. It is being planned to publish the results in peer refereed journals. Thus, this Capacity-Building workshop

had provided a highly practical training to the young researchers which is expected to promote the research and developmental activities in the related research fields.

Scientific Organizing Committee: Nat Gopalswamy (USA, Chair), Christian Monstein, (Switzerland), Divya Oberoi (India), P. K. Manoharan (India), Nandita Srivastava (India), Pertti Makela (USA), Prasad Subramanian (India), Raffaella D’Amicis (Italy, COSPAR), S. P. Rajaguru (India), K. B. Ramesh (India), R. Ramesh (India), Seiji Yashiro (USA, Data Coordinator), A. Shanmugharaju (India), G. Thejappa (USA), C. Kathiravan (India), E. Ebenezer (India). Local Organizing Committee: M. N. Anand, E. Ebenezer (Co-Chair), G. V. S. Gireesh, V. Indrajit, C. Kathiravan (Co-Chair), P. Kumaravel, D. Parthiban, M. Rajalingam, R. Selvendran, C. Vivek, A. M. Udayakumar Sponsors: COSPAR, ISWI, IIA, DST (India), NASA and SCOSTEP.

Local Organizing Committee: M. N. Anand, E. Ebenezer (Co-Chair), G. V. S. Gireesh, V. Indrajit, C. Kathiravan (Co-Chair), P. Kumaravel, D. Parthiban, M. Rajalingam, R. Selvendran, C. Vivek, A. M. Udayakumar

Sponsors: COSPAR, ISWI, IIA, DST (India), NASA and SCOSTEP



Group Photo of COSPAR Capacity-Building Workshop

2.2 SCOSTEP VISITING SCHOLAR (SVS) PROGRAM

The SCOSTEP Visiting Scholar (SVS) program was held in 2020 – but its success was significantly affected by the COVID pandemic.

The objective of the SVS program is to provide training to graduate students from developing countries in established laboratories of solar-terrestrial physics for periods of 1 to 3 months. Eligibility for the SVS program is open to applicants from all countries but with an emphasis on applicants from developing countries. The program is open to Masters and PhD students with the requirement that the recipient has not received a PhD at the time of application to the program.

In 2020, SCOSTEP awarded 17 SVS awards. Due to the extenuating circumstances of COVID limitations, SCOSTEP extended the time for awardees to complete their award through 2021. Unfortunately, just two of the 2020 recipients have been able to carry out the award to date. One

of the recipients performed their award by connecting with their host virtually. The other was able to travel within countries in Africa to complete this award. Both of these successful awardees completed their SVS activities in 2021.

The 17 awardees included:

Ms Kamalam Thillaimaharajan (India, IIG, Mumbai) Tenure: NASA – GSFC, USA
Ms Vanina Lanabere (Argentina, University of Buenos Aires) Tenure: NASA – GSFC, USA
Mr Volkan Sarp (Turkey, Akdeniz University) Tenure: NASA – GSFC, USA
Mr Krushna Chandra Barik (India, IIG, Mumbai) Tenure: Kyushu University, Japan
Mr Jordi Tuneu (Brazil, CRAAM) Tenure: NASA – GSFC, USA
Ms Ishita Gulati (UK, Newcastle University) Tenure: IIG, Mumbai, India
Mr Alemayehu Mengesha Cherkos (Ethiopia, Addis Ababa University) Tenure: ISEE, Nagoya, Japan
Mr N. Koushik (India, ISRO) Tenure: Leibniz IAP, Rostock University, Germany
Mr Biswajit Ojha (India, IIG, Mumbai) Tenure: NASA – GSFC, USA
Mr Dibyendu Sur (India, IIG, Mumbai) Tenure: NASA – GSFC, USA
Mr Ayomide Olabode (Nigeria, Obafemi Awolow University) Tenure: IIG, Mumbai, India
Mr Habtamu Marew Alemu (Ethiopia, Bahir Dar University) Tenure: SANSA, South Africa
Ms Maya Prabhakar (India, Indian Institute of Astrophysics) Tenure: National Astronomical Observatories, Chinese Academy of Sciences, China
Mr Ephrem Tesfaye Desta (Ethiopia, Addis Ababa University) Tenure: NASA – GSFC, USA
Mr Angelikus Olla (Indonesia, Bandung Institute of Technology) Tenure: ISEE, Nagoya, Japan
Ms Han Ma (China, Institute of Geology/Geophysics, CAS) Tenure: Kyushi University, Japan
Mr George Ochieng Ondede (Kenya, Technical University) Tenure: NASRDA, Abuja, Nigeria

This is a very competitive program of SCOSTEP. As such, we invite worldwide laboratories to consider hosting students in the future. SCOSTEP provides the airfare for SVS awardees. The host laboratory is responsible for living expenses, visa fees, and other incidentals. For more information, contact Dr. Kazuo Shiokawa (shiokawa@nagoya-u.jp) or Patricia Doherty (Patricia.Doherty@bc.edu).

The full requirements together with the application procedure and list of host laboratories are available on the website: <https://scostep.org/svs-recipients-2020-2021/>

3. SCOSTEP/PRESTO ONLINE SEMINARS

Beginning in May 2020, SCOSTEP/PRESTO initiated a series of online seminars that deliver the latest scientific topics and/or instructive review presentations of solar-terrestrial physics that are related to SCOSTEP's PRESTO Program. This seminar series is partly in response to the current difficulties of hosting meetings in person. The seminars are open to scientists and students in all countries. The seminars are announced through the SCOSTEP-all and other mailing lists and on the SCOSTEP website at scostep.org.

The seminar speakers are invited by the PRESTO Steering Committee. They are widely announced through relevant mailing lists including the SCOSTEP-all mailing list and the SCOSTEP website at <https://scostep.org>. The length of the seminars are 60 minutes (maximum) including 15-minute question/discussion time using the Zoom meeting system. The seminars are only for scientific purposes and are not for commercial use. With the consent of the speaker, the seminars have been recorded and made available on the SCOSTEP website.

The speakers featured in 2020 include the following:

Prof. Kanya Kusano of Institute for Space-Earth Environmental Research, Nagoya University, Japan (May 26, 2020, 12:00-13:00 UT), with a title of “A challenge to Physics-based Prediction of Giant Solar Flares”.

Prof. Ilya Usoskin of University of Oulu, Finland (July 20, 2020, 12:00-13:00 UT), with a title of “Extreme solar events: A new paradigm”.

Dr. Joe Borovsky, Space Science Institute, USA (September 10, 2020, 22:00-23:00 UT), with the title of “Developing a Highly Predictable Geomagnetic Index to Gauge Magnetospheric Activity and Space Weather”.

Dr. Thomas Immel, Space Science Laboratory, UC Berkeley, USA (November 17, 2020, 23:00-24:00 UT), with a title of “The Ionosphere Connection Explorer – Results from the First Year on Orbit”.

4. SCOSTEP’s NEW SCIENTIFIC PROGRAM – PRESTO

As the VarSITI program ended in 2018, SCOSTEP spent 2019 initiating the new scientific program PRESTO (Predictability of the Variable Solar-Terrestrial Coupling) is the new scientific program for SCOSTEP. The PRESTO interval is 2020-2024.

PRESTO is a science program that seeks to improve the predictability of energy flow in the integrated Sun-Earth system on times scales from a few hours to centuries through promoting international collaborative efforts. PRESTO is sponsored by SCOSTEP. SCOSTEP is the only organization dealing with the coupled solar-terrestrial system under the umbrella of the International Science Council (ISC). PRESTO is the latest program of SCOSTEP in the modern space era, following a number of programs such as CAWSES (2004-2008), CAWSES-II (2009-2013) and VarSITI (2014-2018).

The Sun is a variable star and its variability influences the Earth’s space environment. Furthermore, changing solar magnetic fields, radiative and energetic particle fluxes force the Earth’s atmosphere and climate. Transient energetic events such as flares, coronal mass ejections (CMEs), interplanetary shocks, stream interaction regions (SIRs), corotating interaction regions (CIRs) and energetic particles adversely impact critical technologies based in space and on Earth that our society is increasingly dependent upon. At the same time, the middle and upper atmosphere/ionosphere are impacted by processes originating at lower altitudes, e.g., by

atmospheric gravity waves, tides and planetary waves and changes in radiatively active gases. Solar influence on climate is gaining increasing attention since variations in solar activity do not only impact middle atmosphere chemistry and physics, but have been shown to impact decadal variability at the Earth surface. This is in particular interesting and important for decadal climate predictions. With the enhanced understanding of causal connections in the Sun- Earth system maturing over the last several decades, fueled by both observations and theoretical modelling, we are in the position to transform this understanding to improved predictions of the Sun-Earth coupled system, which is of relevance to the society and the focus of the current PRESTO program. PRESTO is comprised of 3 pillars, Pillar 1: Sun, Interplanetary Space and Geospace; Pillar 2: Space Weather and the Earth's Atmosphere; Pillar 3: Solar Activity and Its Influence on the Climate of the Earth System. A detailed PRESTO presentation is available at: [http://www.issibj.ac.cn/Publications/ Forum_Reports/201404/ W020190620592906717714.pdf](http://www.issibj.ac.cn/Publications/Forum_Reports/201404/W020190620592906717714.pdf).

The chairs of this scientific program are: Dr. Ramon Lopez of the University of Texas at Arlington, TX, Dr. Jie Zhang of George Mason University in Fairfax, VA, and Dr. Eugene Rozanov of the Swiss Federal Institute of Technology, Zurich, Switzerland.

The SCOSTEP/PRESTO Newsletter Vol. 22, January 2020 includes the article “Introducing PRESTO – Predictability of the Variable Solar-Terrestrial Coupling.” This newsletter can be obtained from the website: <https://scostep.org/newsletter-archive/>

In early 2020, a contest was held to design a logo for the PRESTO program. Over 25 ideas were submitted for consideration. The PRESTO committee selected the winner based on its representation of the PRESTO concepts. It was designed by Mr. Vishal Jagatsing Pawar, a Master's Degree student in Atmospheric and Space Science at Pune University in Maharashtra, India. Mr. Pawar was awarded \$500 for his winning logo. The logo is displayed below and is now included on PRESTO materials.



The PRESTO Logo

In 2020, a leaflet describing the PRESTO program was also developed and made available to the community via the SCOSTEP website: <https://scostep.org/presto/>

In 2020, PRESTO also held an AGU Town Hall Meeting on December 15, 2020. This meeting described the pillars of PRESTO and the science questions that the pillars address. The meeting also included information on how the solar-terrestrial community could get involved in the PRESTO program together with what resources are available to support PRESTO-related activities.

Please watch for more news about PRESTO in 2021.

5. SCOSTEP GENERAL COUNCIL AND BUREAU MEETINGS

SCOSTEP organizes and conducts international solar-terrestrial physics (STP) programs of finite duration in cooperation with other International Science Council (ISC) bodies. Results from these programs are shared with the community of SCOSTEP scientists by joining in conducting meetings, conferences, and workshops and by publishing newsletters, handbooks and special journal issues.

5.1 GENERAL COUNCIL MEETING

SCOSTEP hosts a General Council meeting to update the general council members on SCOSTEP activities. The last General Council meeting was held in Montreal on July 13, 2019. This meeting provided an update on all of the SCOSTEP activities since their last meeting and included the results of the election of the new SCOSTEP Executives. The next General Council meeting is planned to coincide with the STP-15 meeting that will be held in February 2021. Due to the anticipation of extended travel restrictions due to COVID, the STP-15 meeting will be held in a hybrid format from Alibag, India on 21-25 February.

5.2 SCOSTEP BUREAU MEETINGS

Two bureau meetings were held in 2020. The first was held on April 10, 2020. The second bureau meeting on December 16, 2020. Both of these meeting were held virtually via a Zoom video conferencing.

SCOSTEP Bureau Meeting held via telecon on April 10, 2020.

Introductory remarks were made by the President, Dr. Kazuo Shiokawa summarizing the main SCOSTEP activities since the last Bureau meeting, held in September 2019. Eleven of the twelve Bureau members attended this meeting. The action item list was reviewed and updated.

The meeting included the following discussions:

- 1) A full financial accounting of SCOSTEP accounts included the 2019 final financial statement and the anticipated budget for 2020
- 2) Plans to develop a dedicated website for SCOSTEP
- 3) The development of dedicated mailing lists for the SCOSTEP Bureau and other member groups were identified. The SCOSTEP-all list includes over 1200 members
- 4) Update on PRESTO – logo contest, leaflet design, AGU town hall meeting
- 5) The SCOSTEP/PRESTO joint newsletters

- 6) Grant opportunities for campaigns and meetings
- 7) The development of guidelines for schools and workshops supported by SCOSTEP
- 8) A proposed PRESTO School and Workshop
- 9) Establishment of a committee to define the future selection of Scientific Discipline Representatives
- 10) The SCOSTEP Visiting Scholar Program
- 11) Award nominations
- 12) STP-15
- 13) Establishment of a membership committee to promote new SCOSTEP memberships

SCOSTEP Bureau Meeting held via telecon on December 16, 2020.

Due to continued COVID-19 limitations for travel, the December 2020 Bureau meeting was held in two ZOOM video conferences in order to accommodate the wide range of local time zones for SCOSTEP bureau members. Each member was asked to attend one of the meetings. The content of each meeting was identical and the SCOSTEP President, Vice President and Scientific Secretary attended both meetings. All 12 members of the Bureau participated in the December meetings.

Introductory remarks were made by the President, Dr. Kazuo Shiokawa summarizing the main SCOSTEP activities since the last Bureau meeting, held in April 2020. The action item list was reviewed and updated.

The meeting included the following discussions:

- 1) A full financial accounting of SCOSTEP accounts including the 2020 financial statement, budget and the anticipated budget for 2021
- 2) The new dedicated website for SCOSTEP was revealed and presented: <https://scostep.org>
- 3) Grant opportunities for campaigns and meetings
- 4) PRESTO Updates
- 8) A proposed PRESTO School and Workshop
- 9) Report of the Scientific Discipline Representatives Committee on the selection of future SDRs
- 10) The unfortunate effects of COVID on the SCOSTEP programs including the Visiting Scholar Program
- 11) Award winners of the SCOSTEP Distinguished Awards
- 12) STP-15 – finalized the SOC and the second circular to advertise the meeting
- 13) Membership committee report

6. SCOSTEP’s 15th QUADRENNIAL SOLAR-TERRESTRIAL PHYSICS SYMPOSIUM (STP-15), ALIBAG, INDIA. FEBRUARY 21-25, 2022

Plans are in progress for SCOSTEP’s 15th Quadrennial Solar-Terrestrial Physics Symposium (STP-15). The STP-15 will be held at Alibag, India, on February 21-25, 2022 with local organizing support by the Indian Institute of Geomagnetism. With anticipated travel restrictions due to COVID, this meeting will be held in a hybrid format.

The Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) organizes the Solar-Terrestrial Physics (STP) symposium once every four years. SCOSTEP is engaged in three major activities: long-term scientific programs, capacity building and public outreach. The scientific programs are of interdisciplinary in nature involving scientists from around the world. They are designed to advance our understanding of the solar-terrestrial relationship using space- and ground-based observations, cutting-edge models and theory. Under what ways the Sun affects the Earth and its environment over various time scales is the underlying theme of the scientific programs pursued under SCOSTEP. Having addressed the variability component during the recently concluded Variability of the Sun and its Terrestrial Impact (VarSITI) program, the new program of SCOSTEP, Predictability of the variable Solar-Terrestrial Coupling (PRESTO, 2020-2024), addresses the predictability component of those phenomena that have impact on the Sun-Earth system as a whole in various time scales.

The STP-15 will aim to gather eminent scientists from solar, magnetospheric, ionospheric and atmospheric physics communities to discuss and deliberate on the cutting-edge sciences pertaining to STP. STP-15 will address the predictability as a focus area in each of the traditional topics deliberated upon during the earlier STP meetings, namely, the mass and radiation chains and intra-atmospheric coupling.

The Scientific Organizing Committee (SOC) includes:

Kazuo Shiokawa, Japan (Chair), Daniel Marsh (USA), Nat Gopalswamy (USA), Aude Chambodut (France), Jorge Chau (Germany), Kyung-Suk Cho (South Korea), Yoshizumi Miyoshi (Japan), Renata Lukianova (Russia), Annika Seppälä (Finland), Prasad Subramanian (India), Peter Pilewskie (USA), Ramon Lopez (USA), Katja Matthes (Germany), Jie Zhang (USA), Allison Jaynes (USA), Emilia Kilpua (Finland), Spiros Patsourakos (Greece), Loren Chang (Taiwan), Duggirala Pallamraju (India), Nick Pedatella (USA), Odele Coddington (USA), Jie Jiang (China), Eugene Rozanov (Switzerland) and Subramanian Gurubaran (LOC chair, India)

7. 2020 SCOSTEP Awards

SCOSTEP was pleased to host a very successful awards program in 2020. These included the Distinguished Scientist, Distinguished Young Scientist and Distinguished Service Awards for 2020. These awards recognize the societal importance of studies in the field of solar-terrestrial physics and give credit to scientists who contribute significantly to these studies and to SCOSTEP activities. The awards include:

- SCOSTEP Distinguished Scientist Award - This award is given to recognize an outstanding contribution of a scientist to solar-terrestrial physics.
- SCOSTEP Distinguished Young Scientist Award - This award is given to young scientists who have achieved considerable success in solar-terrestrial physics and have taken an active part in SCOSTEP-related activities
- SCOSTEP Distinguished Service Award - This award is given to recognize unique contributions to SCOSTEP-related activities, to realization of its programs and events. This award is nominally made in odd years. Since no award was made in 2019, it was made retroactively in 2020.

Award nomination packages (nomination letters and nominee’s curriculum vitae) were received for a number of nominees. After careful consideration, the SCOSTEP Awards Committee selected the following finalists:

SCOSTEP Distinguished Scientist Award: Professor Qiugang Zong, Peking University
 SCOSTEP Distinguished Young Scientist Award: Dr. Mateja Dumbović, University of Zagreb
 SCOSTEP Distinguished Service Award: Dr. Sunanda Basu, NSF (retired)

Information about the awardees is included in the SCOSTEP/PRESTO Newsletter, Volume 25, October 2020. This is available on the website: <https://scostep.org/newsletter-archive/>

Congratulations to the award winners!

8. OTHER BUSINESS

8.1 NEW ADHERENT MEMBER - EGYPT

SCOSTEP is pleased to welcome Egypt as the newest SCOSTEP National Adherent. Egypt’s membership was unanimously approved by the SCOSTEP bureau and General Council in June 2020 by electronic vote. Dr. Dalia Elfiky was appointed as the National Adherent Representative for Egypt.

8.2 SCOSTEP AT STSC UN COPUOS, VIENNA

The President of SCOSTEP, Dr. Kazuo Shiokawa provided a report at the 57th Session of the STSC (Scientific and Technical Subcommittee) UN COPUOS on February 4, 2020 in Vienna, Austria. This presentation was an introduction to PRESTO: The new SCOSTEP 5-year Program in 2020-2024.

The Scientific Secretary, Patricia Doherty, also made this presentation to the International Space Weather Initiative steering committee meeting held on February 7, 2020 at the same venue.

8.3 NEWSLETTERS

SCOSTEP has produced 4 SCOSTEP/PRESTO Newsletters in 2020. To access the newsletters, please visit the website: <https://scostep.org/newsletter-archive/>

9. SUMMARY

In summary, the Scientific Committee on Solar-Terrestrial Physics (SCOSTEP) had a busy year in 2020 – even under COVID limitations. The year included PRESTO advancements together with the launch of a highly popular series of online seminars. These activities together with grant opportunities for meetings, campaigns and data based development; and the Distinguished Science and Service awards resulted in an active and productive year.

SCOSTEP looks forward to continued success in 2021.