

**Current status of the
SCOSTEP's PRESTO program
for predictability of the
variable solar-terrestrial
coupling**

**Kazuo Shiokawa
(SCOSTEP President)**

SCOSTEP

Scientific Committee on Solar-Terrestrial Physics



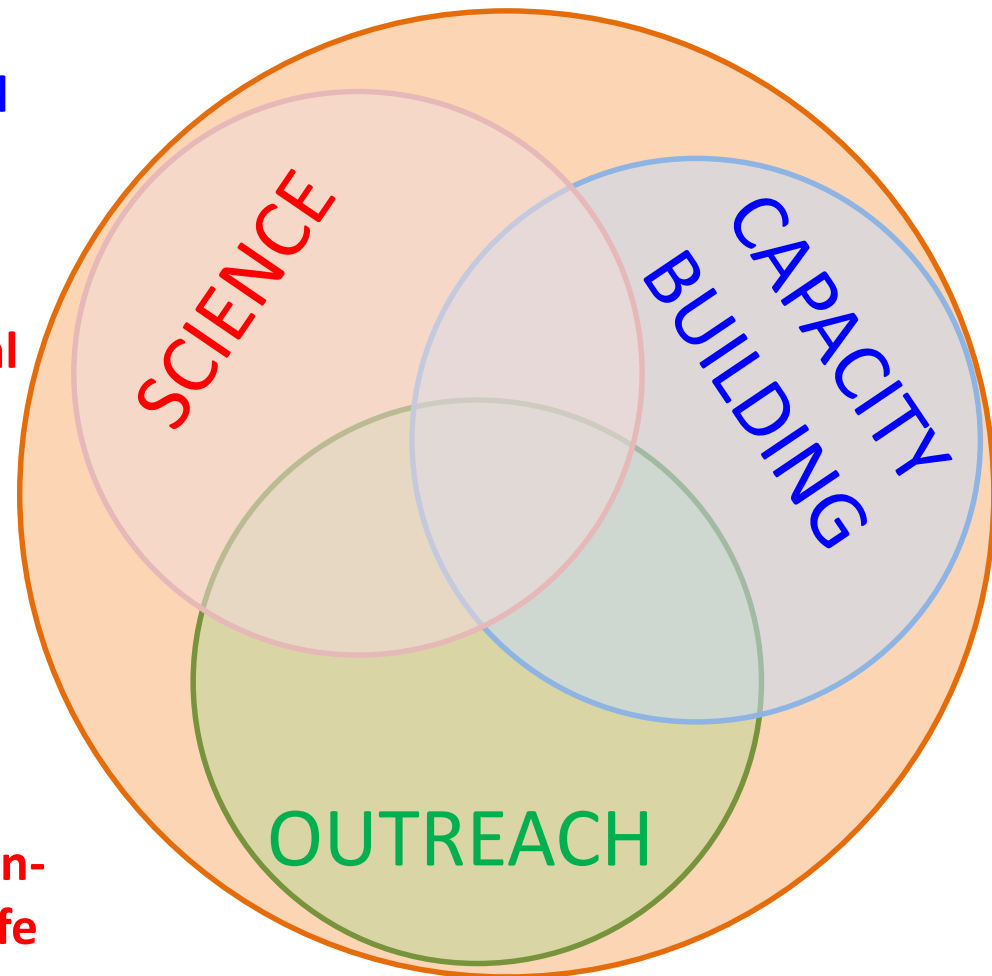
A thematic organization of the International Science Council (ISC).

Runs long-term (4-5 years) international interdisciplinary scientific programs of solar terrestrial physics since 1966

Interacts with national and international programs involving solar terrestrial physics elements

Engages in Capacity Building activities such as the Space Science Schools with UNOOSA/ISWI.

Disseminates new knowledge on the Sun-Earth System and how the Sun affects life and society as outreach activities



SCOSTEP

**Scientific Committee on
Solar-Terrestrial Physics**



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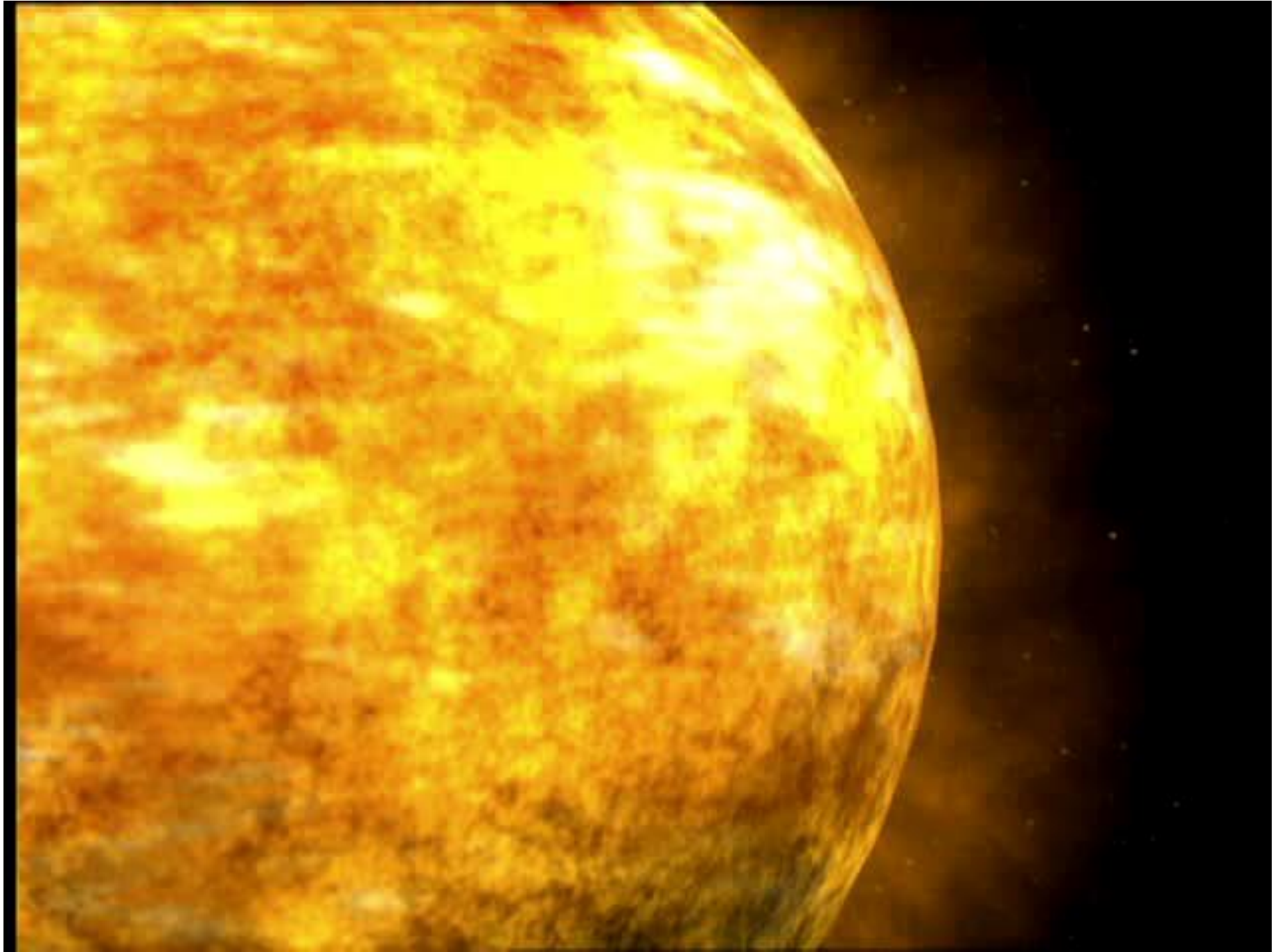
South Africa

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Taiwan

United Kingdom

USA



NASA schematic images

Sun

Challenging topics during and after VarSITI

long-term variability

short-term variability

sunspot evolution

solar dynamo evolution

axial dipole moment

heliosphere (MHD)

magnetosphere (MHD)
inner magnetosphere

ionosphere
thermosphere

mesosphere
stratosphere
troposphere

Earth

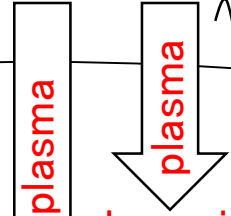
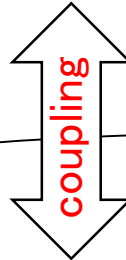


flare prediction

CME prediction
IMF-Bz prediction



storm/substorm development
radiation belt development



plasma dynamics
plasma instability

ionization → dynamics

flare UV/X-ray spectra

solar energetic particles (SEP)

composition → dynamics

dynamics
GWs/tides/PWs

satellite orbit anomaly

solar total and spectral irradiance

solar cycle variability

CR, solar and magnetospheric plasma

plasma damage to space/air vehicles, and astronauts,

geomagnetically induced current (GIC)

Interference of radio communication
GNSS positioning

climate change

anthropogenic effect



International interdisciplinary programs in solar-terrestrial physics operated by SCOSTEP

1976-1979: **IMS** (International Magnetosphere Study)

1979-1981: **SMY** (Solar Maximum Year)

1982-1985: **MAP** (Middle Atmosphere Program)

1990-1997: **STEP** (Solar-Terrestrial Energy Program)

1998-2002: **Post-STEP** (S-RAMP, PSMOS, EPIC, and ISCS)

2004-2008: **CAWSES** (Climate and Weather of the Sun-Earth System)

2009-2013: **CAWSES-II** (Climate and Weather of the Sun-Earth System-II)

2014-2018: **VarSITI** (Variability of the Sun and Its Terrestrial Impact)

2020-2024: PRESTO (Predictability of the variable Solar-Terrestrial Coupling)



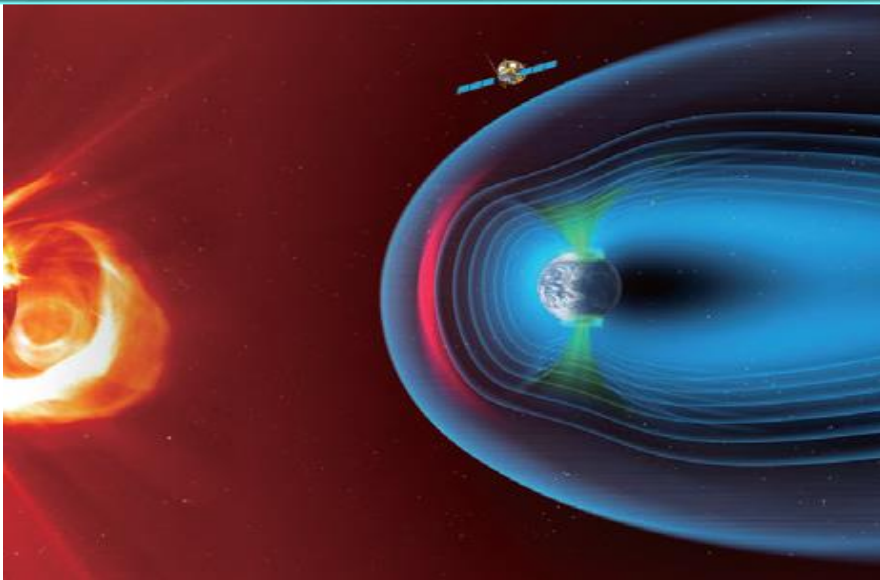
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SCOSTEP's international program in 2020-2024

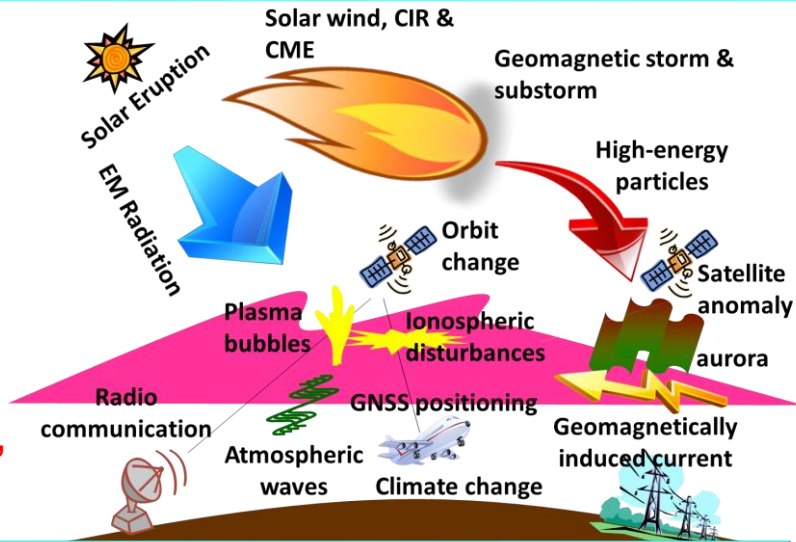
PRESTO: Predictability of the variable Solar-Terrestrial Coupling

PRESTO identifies **predictability** of the variable solar-terrestrial coupling performance metrics through **modeling, measurements, and data analysis** and to strengthen the **communication between scientists and users**

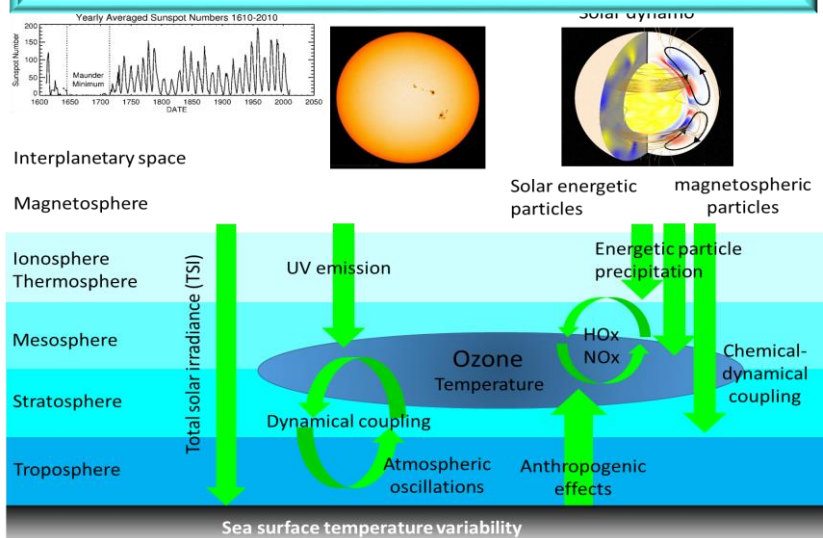
Pillar 1: Sun, interplanetary space and geospace



Pillar 2: Space weather and the Earth's atmosphere



Pillar 3: Solar activity and its influence on the climate of the Earth System



Modified from Gray et al. (2010)

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SCOSTEP's international program in 2020-2024

PRESTO: Predictability of the variable Solar-Terrestrial Coupling

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(Finland)**



**Spiros
Patsourakos
(Greece)**

Pillar 3: Solar activity and its influence on the climate of the Earth System



**Odele Coddington
(USA)**



**Jie Jiang
(China)**



**Stergios Misios
(Greece)**



SCOSTEP/PRESTO

Predictability of the Solar-Terrestrial Coupling

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, the Scientific Committee on Solar Terrestrial Physics.



Chair:
Ramon E.
Lopez

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- **SCOSTEP/PRESTO provides financial support for organizing international **campaigns** and **meetings** every year.**
- **SCOSTEP also provides financial support for **capacity building** activities.**

SCOSTEP-PRESTO ONLINE SEMINAR SERIES



1st SCOSTEP/PRESTO Online Seminar

Title: **A challenge to Physics-based Prediction of Giant Solar Flares**

Author: **Kanya Kusano** (Institute for Space-Earth Environmental Research, Nagoya University, **Japan**)

Date/time: May 26 (Tue), 2020, 12:00-13:00 UT

2nd SCOSTEP/PRESTO Online Seminar

Title: **Extreme solar events: A new paradigm**

Author: **Ilya Usoskin** (University of Oulu, **Finland**) Date/time: July 20 (Mon), 2020, 12:00-13:00 UT

3rd SCOSTEP/PRESTO Online Seminar

Title: **Developing a Highly Predictable Geomagnetic Index to Gauge Magnetospheric Activity and Space Weather**

Author: **Joe Borovsky** (Space Science Institute, **USA**) Date: September 10, 2020, 22:00-23:00 UT

4th SCOSTEP/PRESTO Online Seminar

Title: **The Ionospheric Connection Explorer - Results from the first year on orbit**

Author: **Thomas Immel** (University of California Berkeley, **USA**)

Date: November 17, 2020, 23:00-24:00 UT

5th SCOSTEP/PRESTO Online Seminar

Title: **Magnetospheric Response to Interplanetary Shocks: ULF Wave-Particle Interaction Perspective**

Author: **Q.-G. Zong** (Peking University, **China**) Date and Time: Jan 14 (Thu), 2021, 00:00-01:00 UT

6th SCOSTEP/PRESTO Online Seminar

Title: **Utilizing galactic cosmic rays as signatures of interplanetary transients**

Author: **Mateja Dumbović** (University of Zagreb, **Croatia**)

Date and Time: Jan 19 (Tue), 2021, 12:00-13:00 UT

7th SCOSTEP/PRESTO Online Seminar

Title: **Physics at the edge between Earth's atmosphere and space**

Author: **Franz-Josef Lübken** (Leibniz-Institute of Atmospheric Physics, **Germany**)

Date and Time: May 21 (Fri), 2021, 12:00-13:00 UT

SCOSTEP ONLINE CAPACITY BUILDING LECTURE SERIES

1st SCOSTEP Online Capacity Building Lecture

Speaker: [David G. Sibeck](#), NASA Goddard Space Flight Center, [USA](#)

Date and Time: Jan 22 (Fri), 2021, 01:00-02:00 UT

Topic: "**Motivation for soft X-ray imaging and plans for the STORM global imaging mission**"

2nd SCOSTEP Online Capacity Building Lecture

Speaker: [Ulrich Taubenschuss](#), Institute of Atmospheric Physics AS CR, [Czechia](#)

Date and Time: Mar 5 (Fri), 2021, 11:00-12:00 UTC

Topic: "**Processing of electric and magnetic signals onboard the THEMIS spacecraft and applications of polarization analysis**"

3rd SCOSTEP Online Capacity Building Lecture

Speaker: [Jacob Bortnik](#), [UCLA](#), [USA](#)

Date and Time: Mar 29 (Mon), 2021, 23:00-00:00 UTC

Topic: "**Machine-learning based reconstruction of the inner magnetosphere**"

4th SCOSTEP Online Capacity Building Lecture

Speaker: [Alphonse C. Sterling](#), NASA Marshall Space Flight Center, [USA](#)

Date and Time: Apr 29 (Thu), 2021, 00:30-01:30 UTC

Topic: "**An Overview of the Sun's Structure, and a Closer Look at Solar Magnetism and Activity**"

SCOSTEP/PRESTO Newsletter vol.21-27

Articles, Highlight of young scientists, Meeting reports, and Short news

SCOSTEP/PRESTO NEWSLETTER
Vol. 21, December 2019

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Kazuo Shikawa
Chair for International Collaborative Research (ICR), Institute for Space Earth Environmental Research (ISEE), Nagoya University, Nagoya, Japan

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COSSUP Cascahy Building Workshop

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Deadline Extension for Submission on JASTP Special Issue of V&T2019 and STP-14

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Vol. 22, January 2020

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Introducing PRESTO - Predictability of the Variable Solar-Terrestrial Coupling
R.E. Lopez, K. Mathes, J. Zhang
University of Texas at Arlington, Arlington, TX, USA
Helmholtz Center for Ocean Research Kiel, Kiel, Germany
Christiane-Brechtel-Universität zu Kiel, Kiel, Germany
George Mason University, Fairfax, VA, USA

Article 2:
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Upcoming Meetings

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Characterization of Coronal Mass Ejections With High Frequency type II Solar Radio Bursts
Ange Cynthia Umhale
Hiroshima University of Research, Higashi, Hiroshima
Hiro Institute: NASA - GSFC, Greenbelt, MD, USA

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Dragon Royal and Mateja Dumbovic
Laboratory Zagreb Astronomical Observatory, Zagreb, Croatia
Rijeka Observatory, Faculty of Geodesy, University of Zagreb, Zagreb, Croatia

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SCOSTEP/PRESTO NEWSLETTER
Vol. 24, July 2020

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An Overview of the Total and Spectral Solar Irradiance Sensor (TSIS-1) Mission
Olefin M. Coddington and Thomas N. Woods
Laboratory of Atmospheric and Space Physics, University of Colorado Boulder, Boulder, CO, USA

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SCOSTEP/PRESTO NEWSLETTER
Vol. 26, January 2021

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How Small-Scale Current Sheets and Magnetic Islands in the Solar Wind Help Understanding the Nature of Large-Scale Processes Behind Space Weather
Olga Khobrevá
Pushkov Institute of Terrestrial Magnetism, Ionosphere and Radio Wave Propagation of the Russian Academy of Sciences (PII), Moscow 125080, Russia, khobrev@pmlab.ru
Space Research Institute of the Russian Academy of Sciences (IRI), Moscow 119878, Russia

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Vol. 28, July 2021

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Figure 1. Three Pillars of PRESTO program.

Figure 1. The TSIS-1 instrument suite on the International Space Station.

Figure 1. Double solar (white-light and H-alpha) images of the Sun.

Figure 1. First light image from the Lyman-alpha telescope on Solar Orbiter EUI.

Capacity Building schools

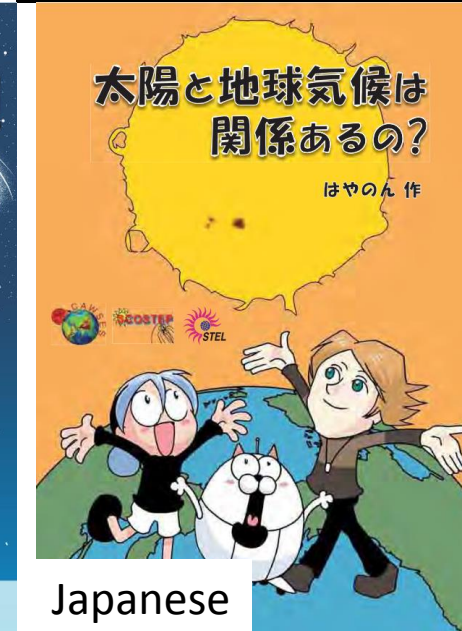
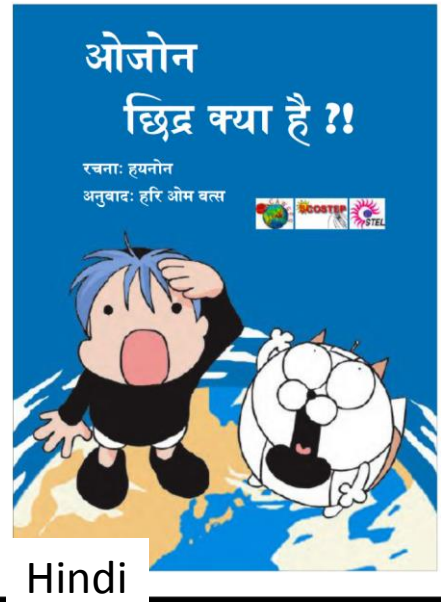
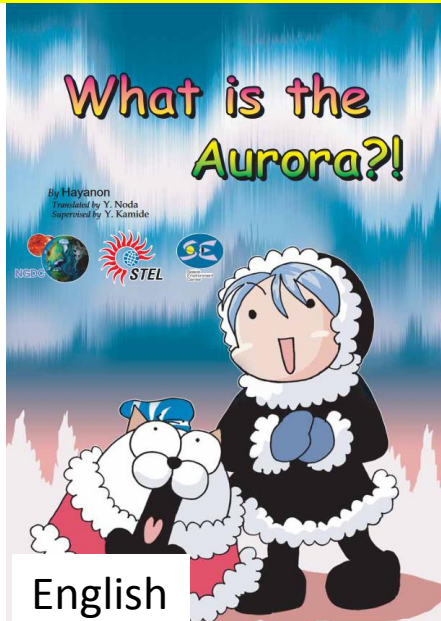
In 2020:

- Capacity Building workshop at COSPAR, 6-17 Jan. 2020, Bangalore, **India**

In 2021:

- The 44th Annual Scientific Seminar on Physics of Auroral Phenomena, 15-19 March 2021, Apatity, **Russia**
- The first summer school on space research, technology and application in Bulgaria, 5-11 July 2021, National Observatory Rozhen, **Bulgaria**
- ISWI/SCOSTEP Iberian Space Weather School, July 21-25, 2021, University of Coimbra, **Portugal**
- Describing and Analyzing Solar Data for a better prediction of Space Weather, TBD, 2021, Kigali, **Rwanda**

SCOSTEP - Science Comic Books



Summary

- **PRESTO** is the new **SCOSTEP** scientific program to run during **2020-2024** to understand **Predictability of the variable Solar-Terrestrial Coupling**
- Scientists from all over the world participate in the PRESTO program to understand predictability of **space weather and solar effect on climate**.
- Solar terrestrial science will reach as many **developing countries** as possible via SCOSTEP's **capacity building and outreach activities**

PRESTO: Predictability of the variable Solar-Terrestrial Coupling

SCOSTEP: Scientific Committee on Solar-Terrestrial Physics