SCOSTEP
Scientific Committee on Solar-Terrestrial Physics

The Scientific Committee on Solar Terrestrial Physics (SCOSTEP)

Nat Gopalswamy

President, SCOSTEP

"Strengthening international solar-terrestrial science for the benefit of society"

ICTP 2019 Trieste, Italy

What is SCOSTEP?

- SCOSTEP was established by ICSU in January 1966 as the Inter-Union Commission on Solar-Terrestrial Physics (IUCSTP).
- In September 1978, the XVIIth ICSU General Assembly ratified SCOSTEP's current constitution and SCOSTEP became a Scientific Committee of ICSU (aka interdisciplinary body)
- SCOSTEP is charged with the long-term responsibility of promoting international interdisciplinary programs of finite duration in solar-terrestrial physics. Specifically,

- to develop and sustain student interest in Sun-Earth connections
- to promote efficient exchange of data and information between solar and terrestrial scientists in all countries
- to seek projects and programs that cross over traditional boundaries of physical regions and focused scientific disciplines

- SCOSTEP is engaged in science, capacity building, and public outreach to achieve the above objectives in cooperation with COSPAR, IAGA, IAMAS, IAU, IUPAP, SCAR, URSI, and WDS

COSPAR - Committee on Space Research
IAGA - International Association of Geomagnetism and Aeronomy
IAMAS - International Association of Meteorology and Atmospheric Sciences
IAU - International Astronomical Union
IUPAP - International Union of Pure and Applied Physics
SCAR - Scientific Committee on Antarctic Research
URSI - International Union of Radio Science
WDS - World Data System

SCOSTEP & ICSU (Now International Science Council - ISC)

- SCOSTEP is one of the 17 Interdisciplinary bodies of ICSU
- Other bodies with overlapping interests: interdisciplinary bodies (COSPAR, CODATA, SCAR, WDS) and scientific unions (IAGA/IUGG, IAMAS, IAU, IUPAP, URSI)
- SCOSTEP Bureau consists of representatives from all these scientific bodies (except CODATA), making it a truly interdisciplinary body
- SCOSTEP is the only organization running scientific research programs of broad interest and implications to life on Earth

What Does SCOSTEP do?

- Runs long-term international interdisciplinary scientific programs in solar terrestrial physics since 1966
- Interacts with national and international programs involving solar terrestrial physics activities
- Engages in Capacity Building activities such as the annual Space Science Schools and SCOSTEP Visiting Scholar Program, Workshops

- Outreach activities (comics books; public lectures; UN Committee on Peaceful Uses of Outer Space (UNCOPUOS))

- Disseminates new knowledge on the Sun-Earth System and how the Sun affects life and society
- Quarterly Newsletters
- Website: www.yorku.ca/scostep
- Symposia
- Quadrennial Solar Terrestrial Physics (STP) Symposia
- Scientific papers in refereed journals

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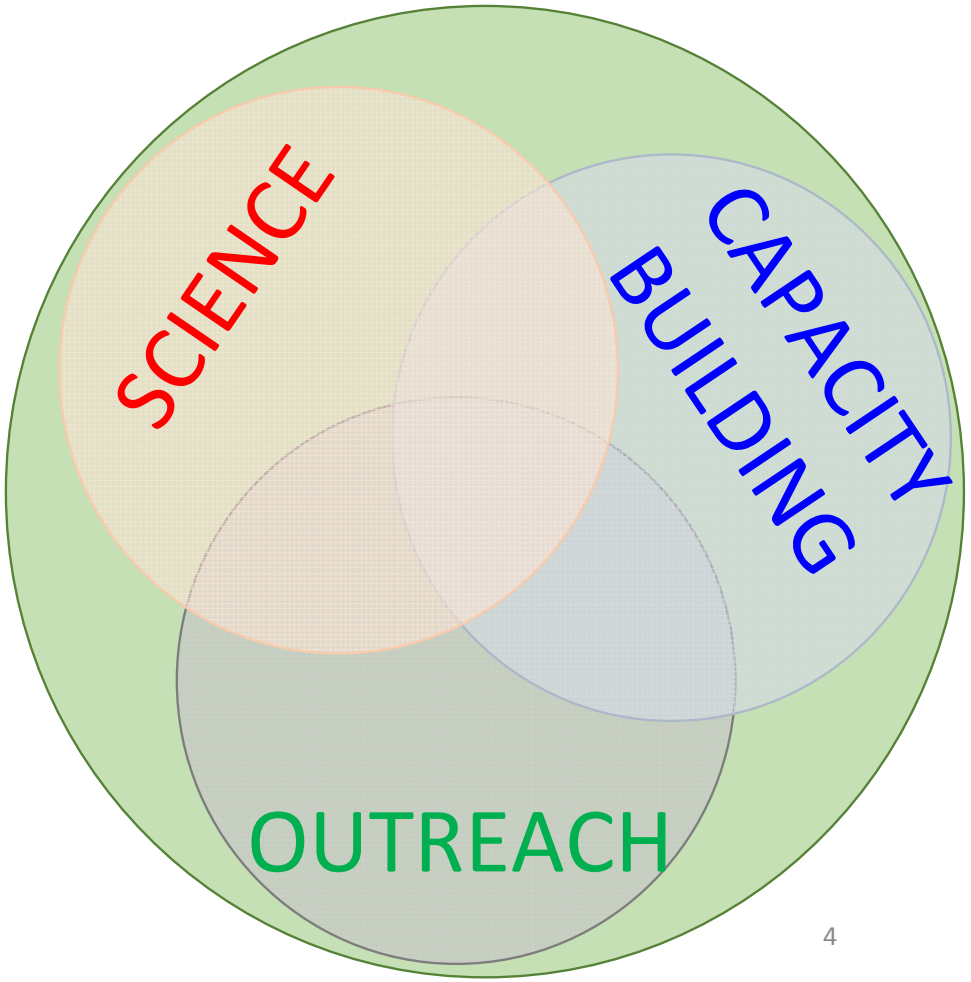


Capacity Building: One-day School

- Lectures by international experts that attended the VarSITI-2017 symposium
- Prepared students to absorb more of the symposium presentations
- Continued interaction between students and lecturers during the symposium
- Long-term collaboration

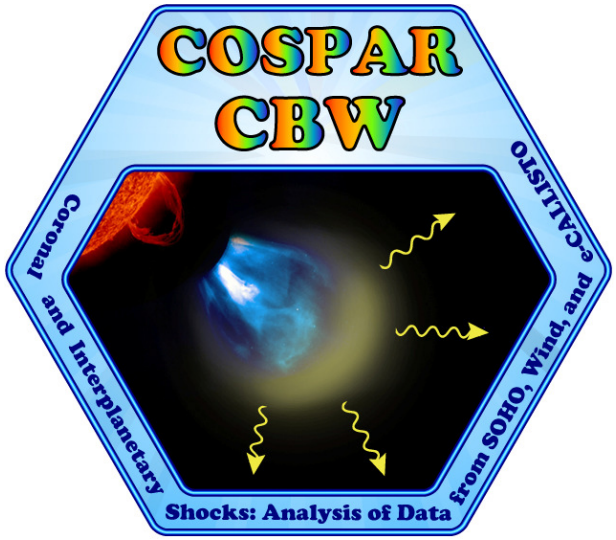
SCOSTEP Visiting Scholar (SVS) Program

- The objective is to train young scientists and graduate students from developing countries in established laboratories of solar terrestrial physics for 1-3 months
- Funding: SCOSTEP will provide the airfare, while the hosting lab will provide the living expenses (lodging, meals, ground transportation, visa fees and other incidentals)
- Frequency: At least four scholars each year, one each related to the four VarSITI themes
- Launched in January 2015
- More labs have come forward to host SCOSTEP Visiting Scholars
- 30 students benefited so far

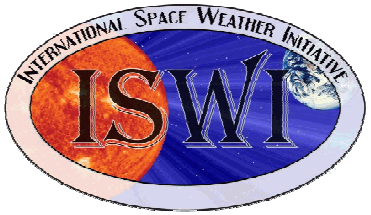
SVS Selection Committee

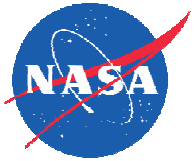
Nicole Vilmer (France) Chair
Mike Taylor (USA)
Babatunde Rabiu (Nigeria)
Alejandro Lara (Brazil)
Aki Yoshikawa (Japan)
Paul Baki (Kenya)

COSPAR Capacity Building Workshop on Shock Waves from the Sun May 21 - June 1, 2018, Mekelle, Ethiopia



- The main objective of the COSPAR Capacity-Building Workshops is to encourage the scientific use of space data by scientists in developing countries.
- The Mekelle workshop involved analysis of data from SOHO, STEREO, ACE, and Wind missions in conjunction with ground based radio data from ISWI instruments
- 35 PhD students from Ethiopia, African countries, and other countries in the region attended
- Scientists from Ethiopia, Greece, India, Italy, UK, USA lectured and ran hands-on activities in analyzing space- and ground-based data
- Agencies interested in space weather co-sponsored



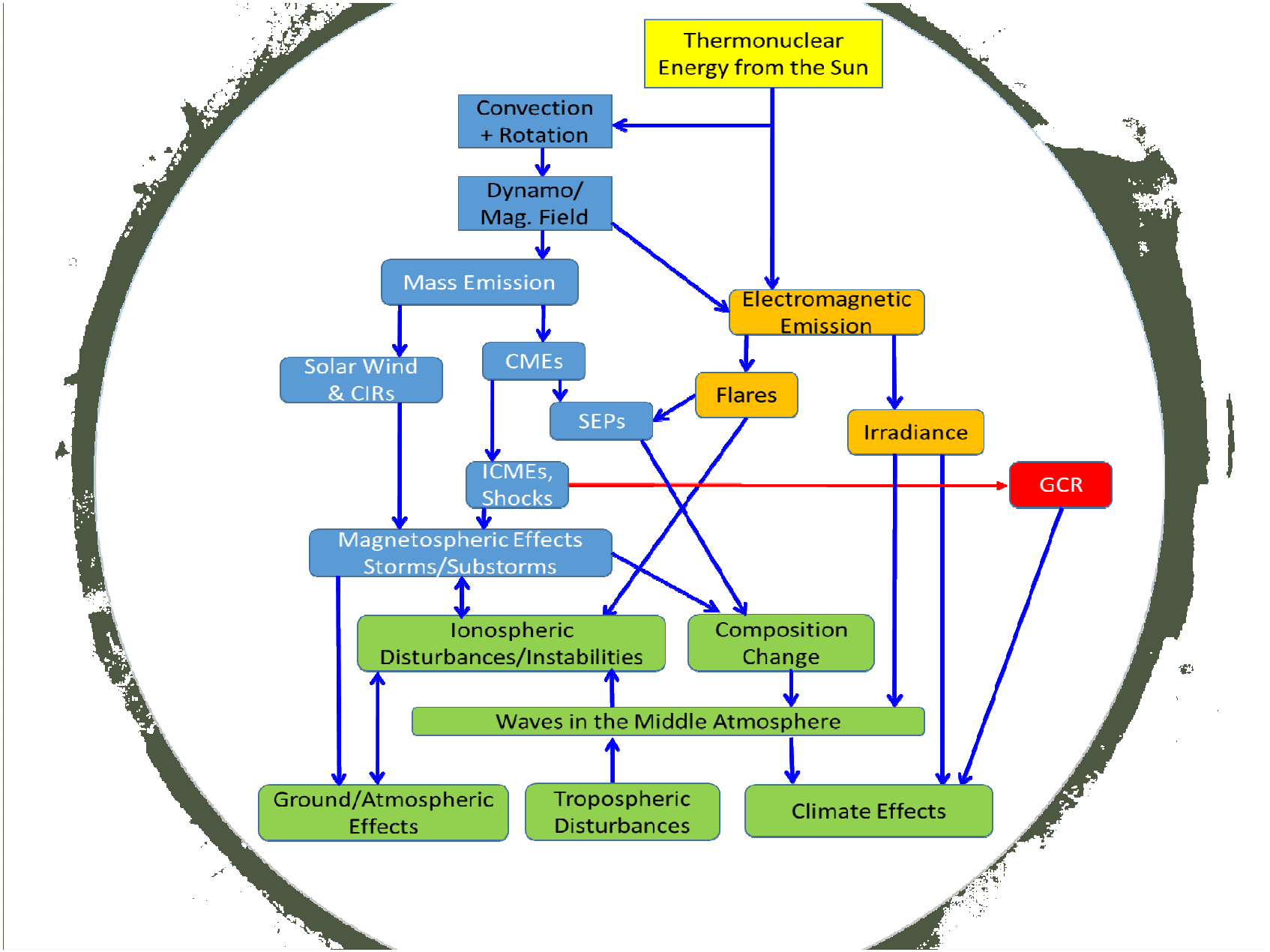


SCOSTEP Outreach: Comic Books

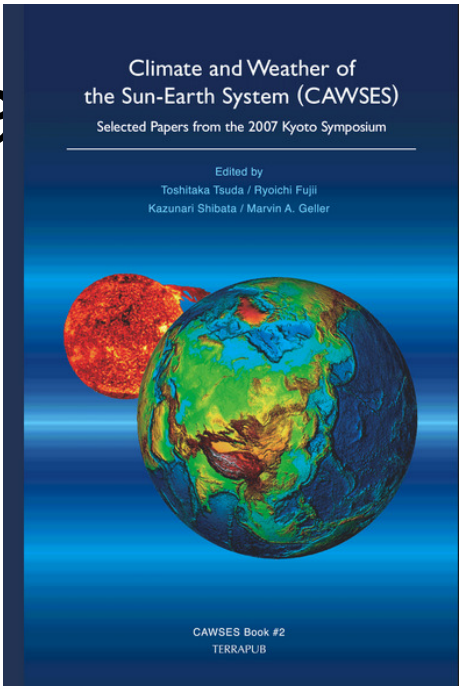
- To raise the awareness of general public on selected scientific topics (currently 9)
- Translated into many languages
- Blanks for new languages
- Available online: yorku.ca/scostep

SCOSTEP 14th Quadrennial Solar-Terrestrial Physics Symposium
July 9 – 13, 2018 Toronto, Canada

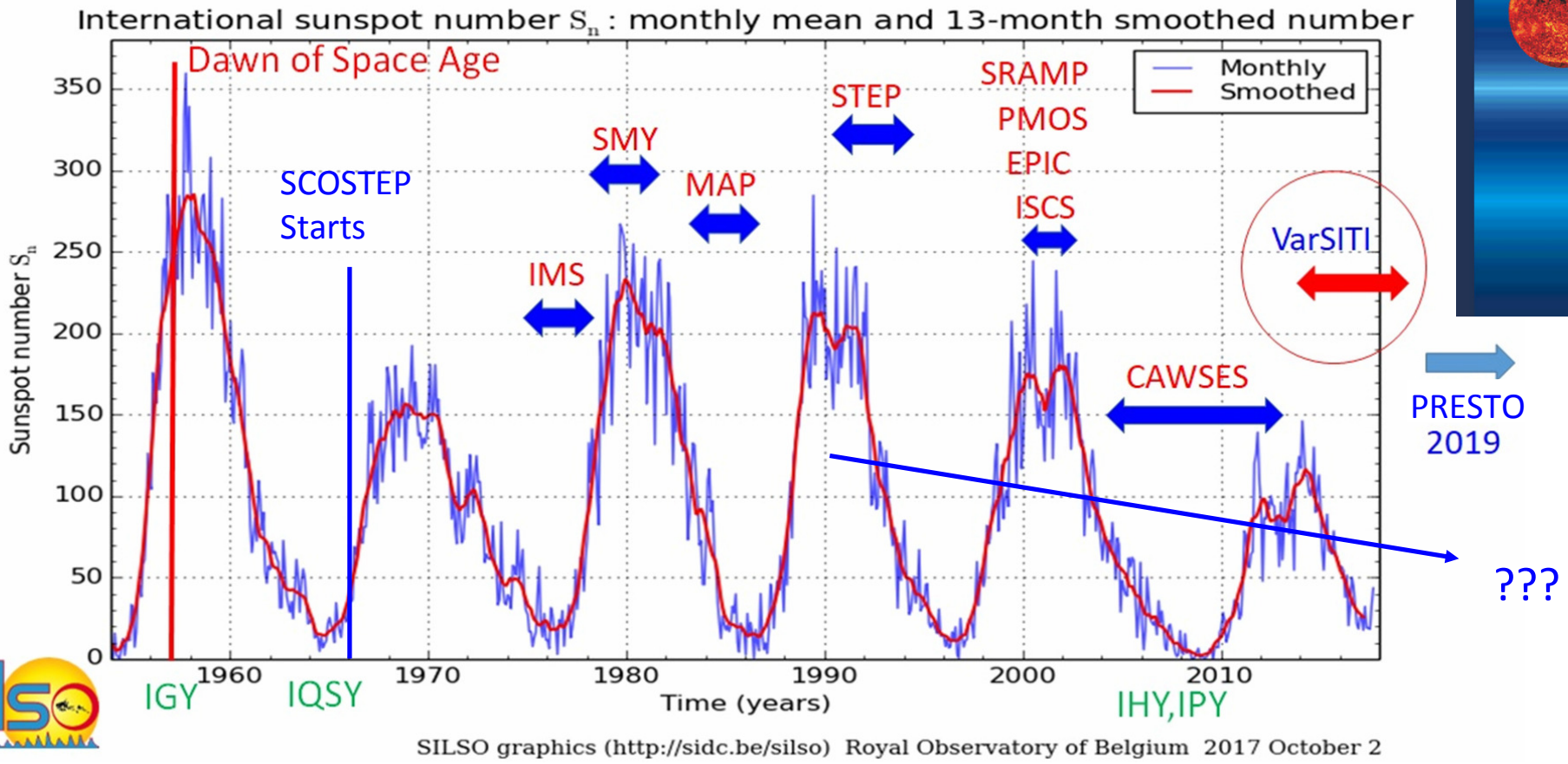
COSPAR . IAGA . IAMAS . IAU . IUPAP . SCAR . URSI . WDS


Thermonuclear Energy from the Sun
Convection + Rotation
Dynamo/ Mag. Field
Mass Emission
Electromagnetic Emission
Solar Wind & CIRs
CMEs
Flares
SEPs
Irradiance
ICMEs, Shocks
GCR
Magnetospheric Effects Storms/Substorms
Ionospheric Disturbances/Instabilities
Composition Change
Waves in the Middle Atmosphere
Ground/Atmospheric Effects
Tropospheric Disturbances
Climate Effects

Half a Century of SCOSTEP Progra



Solar Variability and SCOSTEP Scientific Programs



Variability of the Sun and Its Terrestrial Impact (VarSITI)

varsiti.org
launched on
January 13, 2014

2014-2018

Four Major Projects

SCOSTEP
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Co-chairs

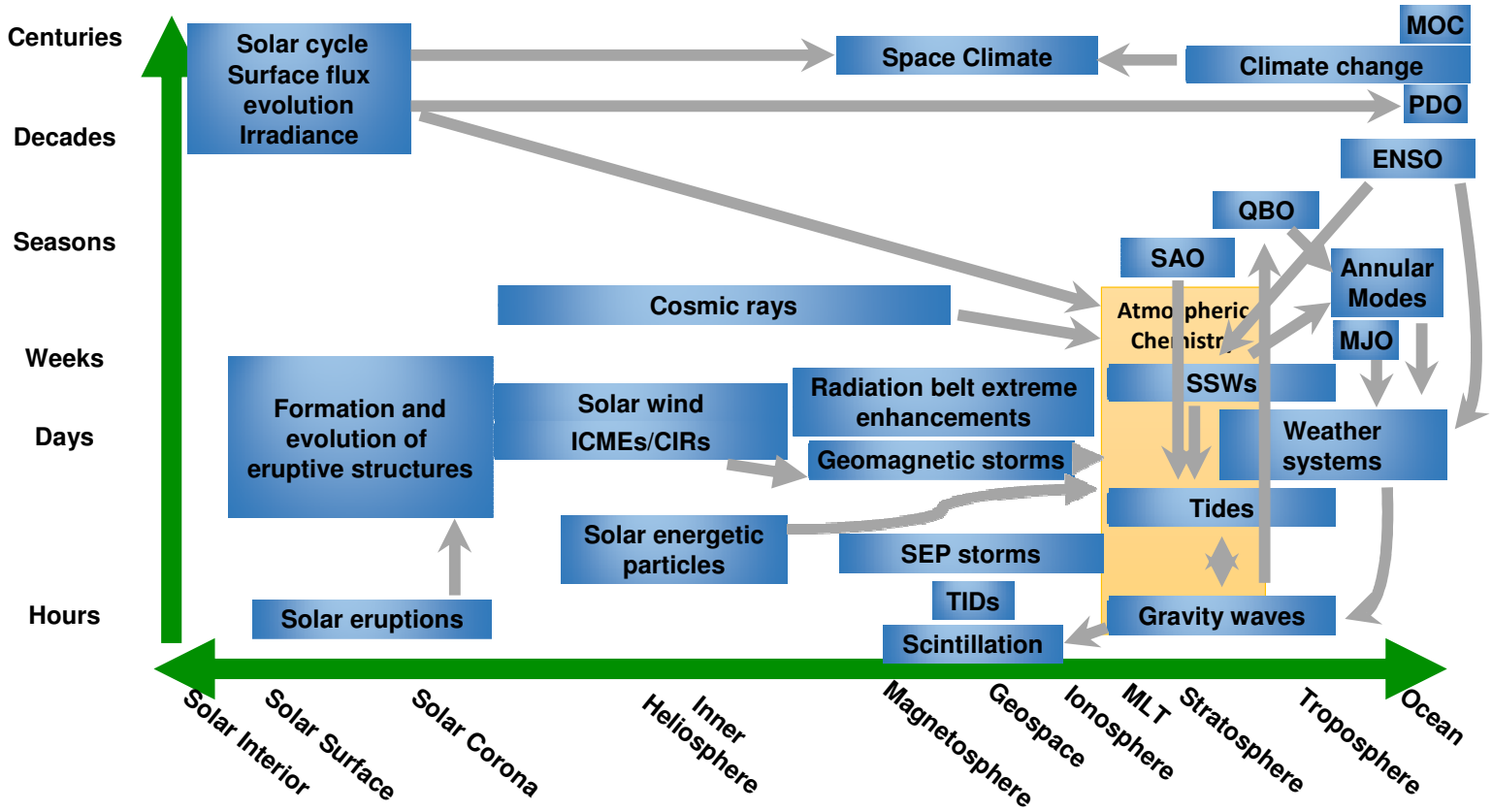
Kazuo Shiokawa (Japan)

Katya Georgieva (Bulgaria)

http://www.youtube.com/watch?v=couR4MyxNPY

An integrated view of solar-terrestrial prediction

Solar-Terrestrial phenomena in various spatial & temporal scales



PRESTO: 3 Pillars - 9 Focus Areas

1. Sun, Interplanetary Space and Geospace:

1.1 Occurrence and properties of flares and CMEs/CIRs and the propagation of CMEs/CIRs from the Sun to the Earth

1.2. Predictability of interplanetary shocks and energetic particle flux enhancements

1.3. Predictability of substorms and storms

1.4. Solar wind-magnetosphere coupling and internal magnetospheric dynamics

2. Space Weather and Earth System

2.1 Multiscale vertical and horizontal coupling between atmospheric regions and its effects on space weather

2.2 Effect of atmospheric waves on the global circulation in the middle and upper atmosphere

3. Solar Activity and its Influence on Climate

3.1 Understanding and predicting solar activity

3.2 Sub-seasonal to decadal variability of the terrestrial system

3.3 Centennial variability of the terrestrial system

NSP Committee

Ioannis Daglis (Greece) Chair

Daniel Marsh (USA)

Loren Chang (Taiwan)

Sergio Dasso (Argentina)

Sarah Gibson (USA)

Katja Matthes (Germany)

Dibyendu Nandy (India)

Olga Khabarova (Russia)

Annika Seppälä (New Zealand)

Rémi Thiéblemont (France)

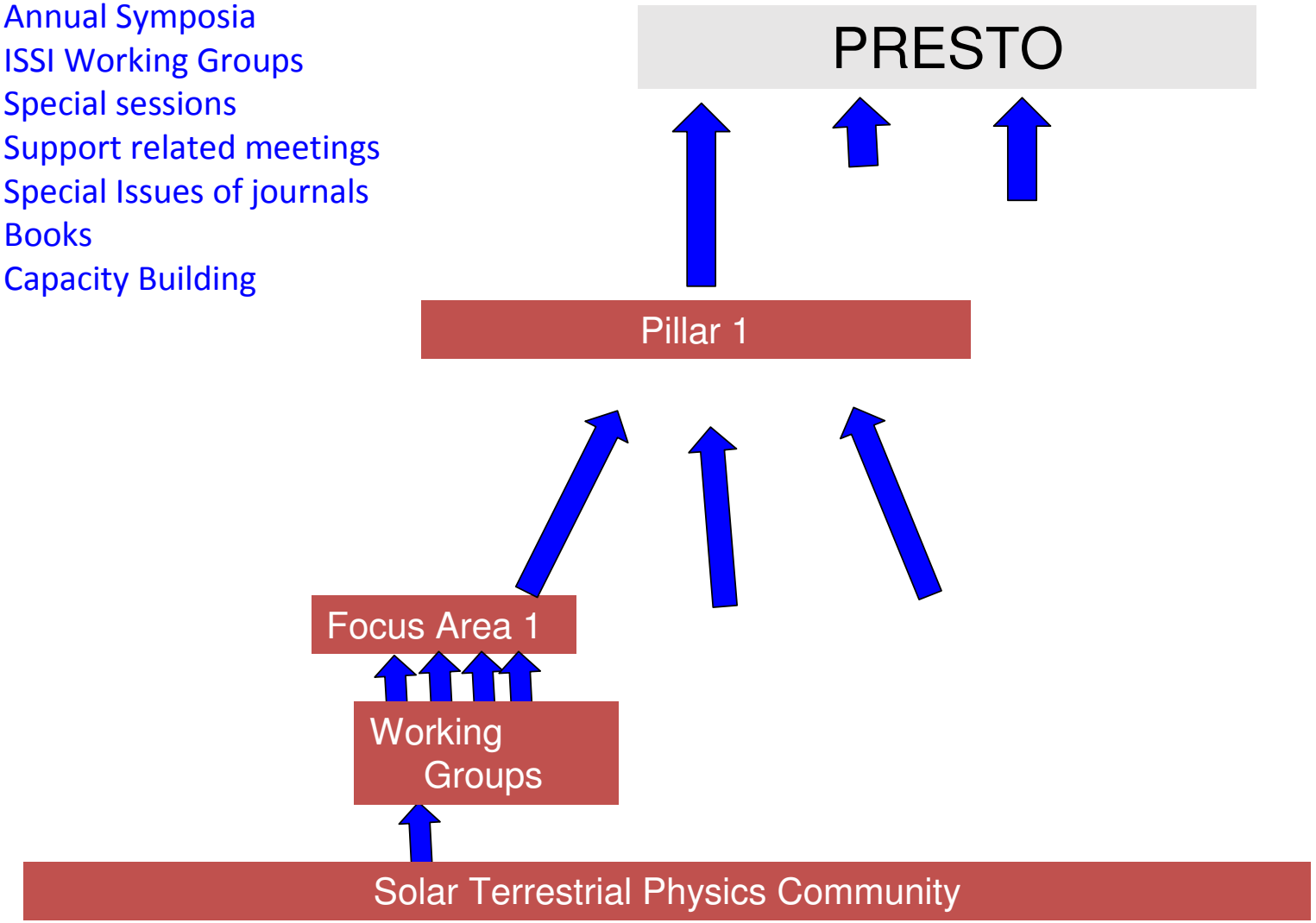
Qiu-Gong Zong (China)

Emilia Kilpua (Finland)

nat.Gopalswamy@nasa.gov

Projects and Working Groups

- Annual Symposia
- ISSI Working Groups
- Special sessions
- Support related meetings
- Special Issues of journals
- Books
- Capacity Building



Program co-chairs

Pillars
(Project co-leaders)

Focus Area leads

WG Chairs

Scientists

Summary

- SCOSTEP has been running long-term scientific programs over half a century
- SCOSTEP programs accumulate new knowledge in solar terrestrial physics
- VarSITI is the current scientific program that has engaged more than 1000 scientists worldwide
- We are in the final stages of developing the content and structure of the next scientific program: PRESTO
- PRSETO will seek additional support from National Funding Agencies

Highlights

- **VarSITI** brings together worldwide resources, including space- and ground-based data, virtual data bases, distributed modelling centers, and theories to make rapid progress in the projects.

- Encourages communication among sub-disciplines
- Runs a dedicated website, quarterly newsletter, organizes symposia
- 132 data bases relevant to STP research have been documented in http://www.varsiti.org
- Has supported ~50 professional meetings; conducted two VarSITI symposia
- Significant presence in Quadrennial Symposia (STP13, STP14)
- About 100 refereed articles published in 4 years

Significant Meetings (Publications)

- 2014 STP13 in Xi'An China (JGR)
- 2016 First VarSITI General Symposium, Albana, Bulgaria (JASTP)
- 2017 Second VarSITI General Symposium, Irkutsk, Russia (JASTP)
- 2018 STP14 in Toronto, Canada (TBD)
- 2019 VarSITI Final Symposium, Sofia, Bulgaria (TBD)
- Also, Project-specific workshops and publications
- ISSI working groups

VarSITI General Symposium 2017: July 10-15, 2017, Irkutsk, Russia

http://varsiti2017.iszf.irk.ru/index.php/conferences/varsiti

- Long-term variation of the Sun, geomagnetic activity, and climate
- Coupling between the Earth's atmosphere and space and its relation to quiet and active Sun
- Understanding Earth's space environment and its connection to Space Weather
- Sun to Earth campaign events study
- Atmospheric response to solar variability and modulation of its impact on timescales from minutes to decades
- Data archiving and analysis tools
- Advanced Concepts in Solar-Terrestrial Coupling in the Context of Space Weather (A Concepts and Tools School for Students)
- Special Issue in Journal of Atmospheric and Solar-Terrestrial Physics (JASTP): Advanced Concepts in Solar-Terrestrial Coupling in the Context of Space Weather (Spring 2018)

Sponsors

ФЕДЕРАЛЬНОЕ АГЕНТСТВО НАУЧНЫХ ОРГАНИЗАЦИЙ

RFBR RUSSIAN FOUNDATION FOR BASIC RESEARCH

VarSITI SCOSTEP ISEE NSF

PWING Rostec COSPAR

Prediction of Solar-Terrestrial Environment

研究拠点形成事業 Core-to-Core Program B.アジア・アフリカ学術基盤形成型 B. Asia-Africa Science Platforms 日本学術振興会

STP14 Sessions

- Mass Chain
- Electromagnetic Chain
- Intra-atmospheric Chain
- Special topics on
  Solar Terrestrial Physics

Keynote Speakers

- Irina Mironova (Russia)
- David Kendall (Canada)
- Spiro Antichos (USA)
- Larry Paxton (USA)

Science Content

Invited Talks
Contributed Talks
Poster Presentations
Panel Discussion