UN COPUOS 55th General Session – Vienna, 6 - 15 June, 2012

SCOSTEP: Understanding climate and weather of the Earth-Sun System

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Outline

- SCOSTEP's Mandate
- Brief History
- SCOSTEP Governance
- SCOSTEP Programs – past and current
- Capacity Building
- Outreach and Publications
- SCOSTEP and UN COPUOS

SCOSTEP's Mandate

- The **Scientific Committee on Solar-Terrestrial Physics** (SCOSTEP) is a *not-for-profit* international organization under the auspices of the International Council for Science (ICSU)
- SCOSTEP is ICSU's only body charged with the long-term responsibility to promote international, interdisciplinary programs in solar-terrestrial physics
- Works 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, and
  - seek projects and programs which cross over traditional boundaries of physical regions and focused scientific disciplines.

Brief History

- **January 1966** – at the XIth General Assembly of ICSU → the Inter-Union Commission on Solar-Terrestrial Physics (IUCSTP)
- **September 1972** – XIVth ICSU General Assembly → reorganizes IUCSTP → a *Special Committee for Interdisciplinary Solar-Terrestrial Physics programs of finite duration*
- **September 1973** – IUCSTP becomes SCOSTEP (*Scientific Committee on Solar-Terrestrial Physics*)
- **September 1978** – ratification of the current Constitution by the XVIIth ICSU General Assembly
  - SCOSTEP became a Scientific Committee of ICSU charged with *long-term responsibility to promote international interdisciplinary programs in solar-terrestrial physics.*
- **May 1982** – 1st SCOSTEP General Council Meeting
- **1988** – Revision of the SCOSTEP Constitution

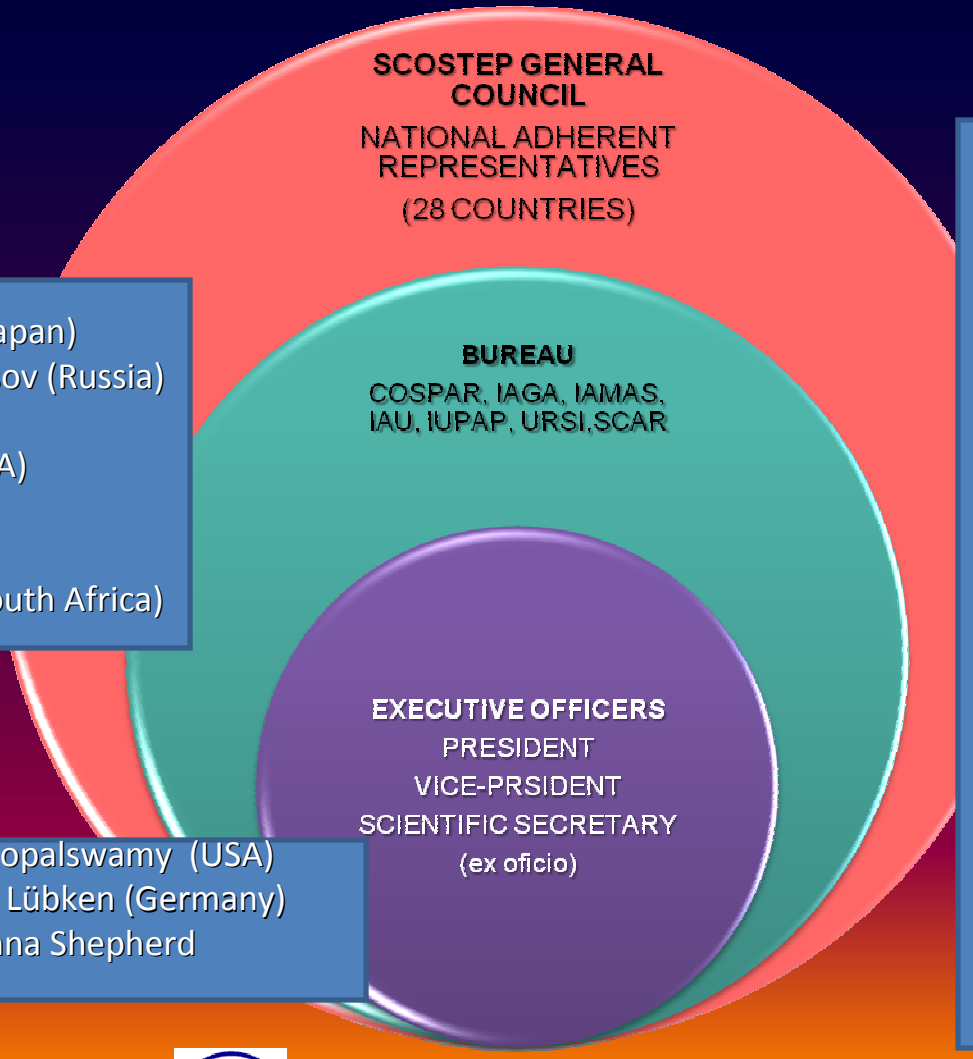
SCOSTEP Governance

- **Bureau:**
  - Directs scientific, administrative and financial activities
  - Selects the Scientific Secretary
- **General Council – Adherent Representatives:**
  - Reviews the scientific, financial and administrative activities of SCOSTEP
  - Refers matters to the Bureau for further consideration
- **International Science Discipline Representatives :**
  - Provide advice to SCOSTEP on scientific programs
  - Serve as links between national and regional activities in their fields and SCOSTEP international scientific programs
  - Lead within SCOSTEP and through other ICSU bodies in proposing new programs and participate in the Steering Committees and projects of ongoing programs

SCOSTEP Governance: Participating bodies

- ICSU – International Council for Science
- COSPAR – Committee on Space Research
- IAGA – International Association of Geomagnetism and Aeronomy
- IAMAS – International Association of Atmospheric Science
- IAU – International Astronomical Union
- IUPAP – International Union of Pure and Applied Physics
- IUGG – International Union of Geodesy and Geophysics
- SCAR – Scientific Committee on Antarctic Research
- URSI – International Union of Radio Science

SCOSTEP Governance



COSPAR – T. Nakamura (Japan)
IAGA & IUGG – V. Kuznetsov (Russia)
IAMAS – D. Siskind (USA)
IAU – N. Gopalswamy (USA)
IUPAP – M. Lester (UK)
SCAR – M. Candidi (Italy)
URSI – L.-A. McKinnell (South Africa)

President: Natchimuthuk Gopalswamy (USA)
Vice-President: Franz-Josef Lübken (Germany)
Scientific Secretary: Marianna Shepherd (Canada)

Australia, Austria, Belgium, Brazil, Bulgaria, Canada, China, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, India, Indonesia, Israel, Japan, New Zealand, Norway, Russia, Slovakia, South Africa, South Korea, Sweden, Taiwan, UK, USA

SCOSTEP Scientific Committee on Solar-Terrestrial Physics

SCOSTEP Affiliates

- ICSU Panel on World Data Centres
- World Data Centre System
- World Meteorological Organization (WMO)
- International Space Environment Service (ISES)

- National Adherent Representatives – 28 countries
- Scientific Discipline Representatives – 55 scientists from 26 countries

SCOSTEP Programs

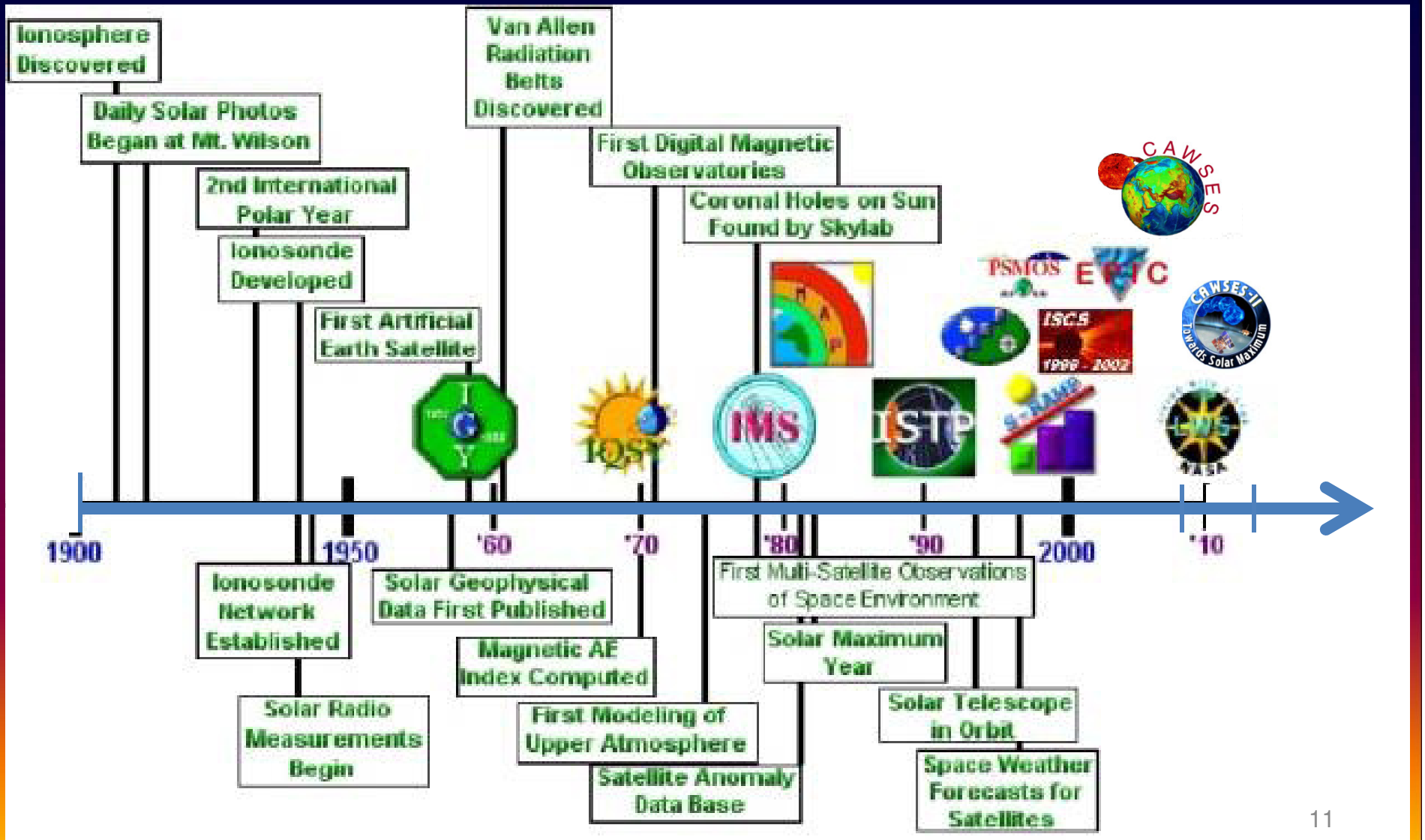
Some past SCOSTEP programs have been very comprehensive, such that virtually all of SCOSTEP's energy and resources were dedicated to the implementation of one large program

- IMS – 1976-1979 (International Magnetospheric Study)
- SMY – 1979-1981 (Solar Maximum Year)
- MAP – 1982-1985 (Middle Atmosphere Program)
- STEP – 1990-1997 (Solar-Terrestrial Energy Program)

SCOSTEP Programs – Cont'd

- 1998 - 2002 – Smaller programs pertaining to individual disciplines
  - **ISCS** (*International Solar Cycle Studies*) – **Solar Physics**
  - **PSMOS** (*Planetary Scale Mesopause Observing System*) – **Middle Atmosphere Physics**
  - **EPIC** (*Equatorial Processes Including Coupling*) – **Equatorial Physics**
  - **S-RAMP** – STEP-Results, Applications and Modelling Phase (*an event-oriented multi-regional studies*)
- 2004 - 2008 – **CAWSES** (*Climate and Weather of the Sun-Earth System*)
- 2009 - 2013 – **CAWSES II**: Towards Solar Maximum

Solar-Terrestrial research facilitated by SCOSTEP



CAWSES Strategy

- Collect data records to document with increasing fidelity various aspects of the Sun-Earth system.
- Use physically based models for assimilating observed data and deriving enhanced outputs for segments of the solar-terrestrial system.
- Mobilize SCOSTEP researchers to work together to understand variability throughout the entire solar-terrestrial system.

Scientific Motivation for CAWSES

- An International program to enhance understanding of the space environment
  - Integrated systems approach
  - Coordinated international activities – Observations & Modelling
  - Involvement of scientists in developed and developing countries
  - Educational opportunities for students
- Impact on life and society
  - Influence of solar variability on climate
  - Sensitivity of sophisticated technology to fluctuations in geospace environment → operational forecasting
  - Impact of near space environment on human activities in space

CAWSES II: Towards Solar Maximum

CAWSES II – the major international program of SCOSTEP – 2008 - 2013

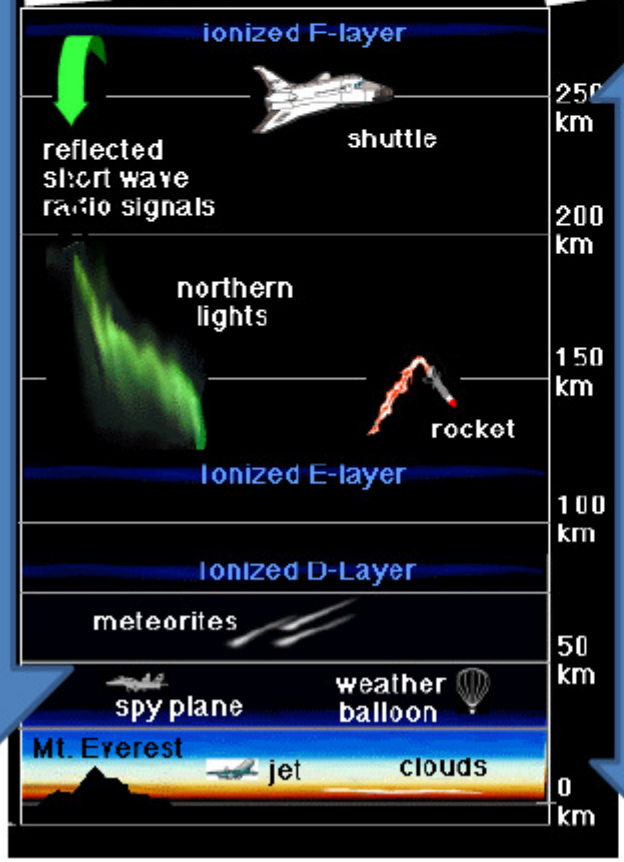
- Fundamental questions of how the coupled Sun-Earth system operates on timescales of minutes to millennia
- Questions that require coordinated inter-disciplinary international effort

CAWSES II Task Groups

Solar influences on the Earth climate

TG1

TG 3: Solar variability affect on geospace environment



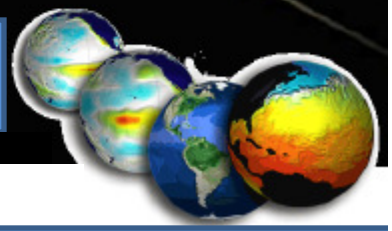
TG2

Effects of climate on geospace

Capacity building

TG4

Variable input from lower atmosphere on geospace



Informatics and eScience

Capacity Building

SCOSTEP/CAWSES cosponsors Space Science Schools run by the International Space Weather Initiative (ISWI).

2010 ISWI School – Bahir Dar, Ethiopia
2011 ISWI School – Tatranská Lomnica, Slovakia
2012 ISWI School – Bandung, Indonesia
2012-2015 ICSU Grant – Asia, Africa and South America

Algeria, Cameroon, D. R. Congo, Ethiopia, Ivory Cost, Kenya, Madagascar, Malawi, Nigeria, Rwanda, South Africa, Sudan, Tanzania, Uganda, and Zambia.

Japan-Peru: FMT Summer School and Data Analysis Workshop held July 20-27, 2011 at Hida Observatory, Kyoto University in Japan, and on July 28-31, 2011 at National Astronomical Observatory of Japan

International School on Atmosphere - Ionosphere Radars and Radio Sounding: Science and Applications, November 15-24, 2010, Taiwan

Co-sponsored by : NASA, USA, the European Office of Aerospace Research and Development (EOARD), UK; SCOSTEP/CAWSES, the International Center for Theoretical Physics (ICTP), Italy; Bahir Dar University, Ethiopia; Boston College, USA; Air Force Research Laboratory (AFRL), USA; University of Michigan, USA; Kyushu University, Japan; University of Calgary, Canada; Massachusetts Institute of Technology (MIT), USA; German Aerospace Center , Germany.

Outreach

Meet Mol and Mirubo, the robotic dog

SCOSTEP has been sponsoring a series of '***Comic Books***' designed to raise the awareness of the general public, and young people in particular, about issues in solar-terrestrial science.

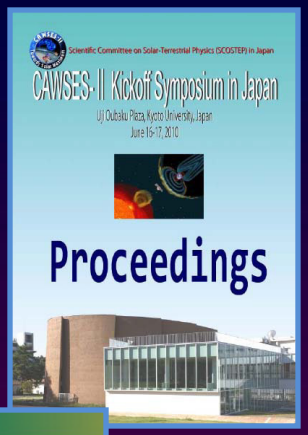
- An initiative of *Prof. Yosuke Kamide*, Solar-Terrestrial Energy Laboratory, Nagoya University, Japan.
- Originally produced in Japanese.
- Nine topics developed so far
- Books translated into 8 languages:

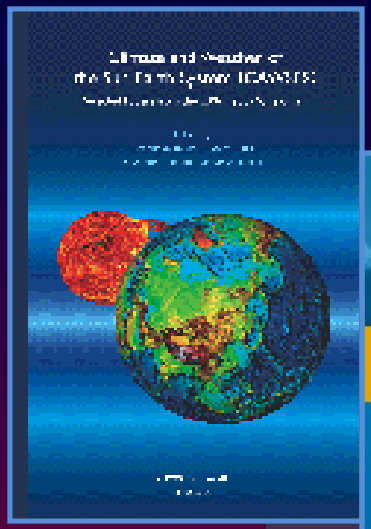
English, French, German, Italian, Russian, Spanish, Hindi and Korean.

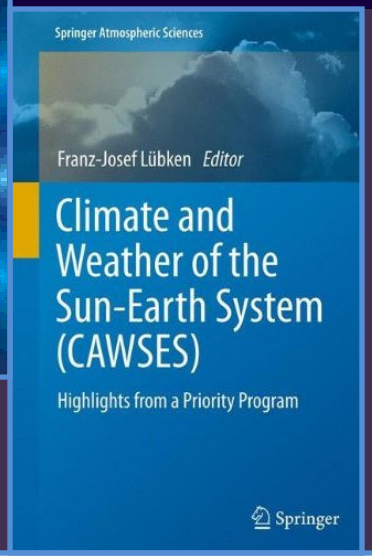
- Ongoing translations into 9 languages

Bulgarian, Chinese, Czech, Finnish, Hebrew, Marathi, Nigerian (Hausa, Igbo, Yoruba & Pidgin), Swedish and Thai.

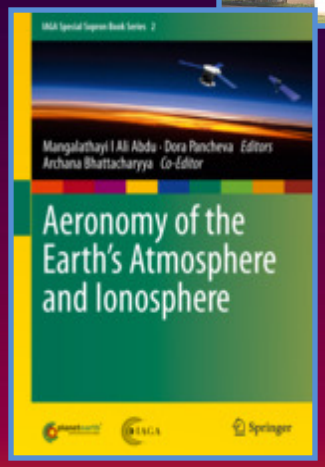
Publications





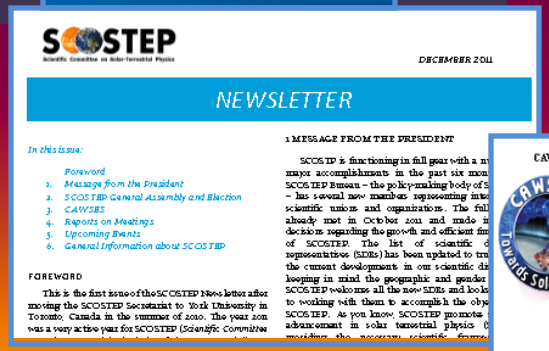


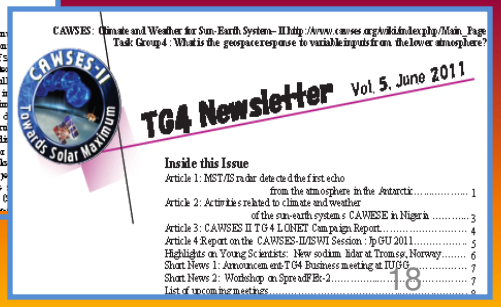
Climate and Weather of the Sun-Earth System (CAWSES): Highlights from a Priority Program *(The German Priority Program 2005-2011)*



Climate and Weather of the Sun-Earth System (CAWSES) Selected Papers from the 2007 Kyoto Symposium

Peer reviewed conference proceedings





Newsletters
http://www.yorku.ca/scostep/

SCOSTEP and UN COPUOS

- **COPUOS** reviews the scope of *international cooperation in peaceful uses of outer space, devises programs in this field and encourages continued research and the dissemination of information.*
- SCOSTEP promotes/provides the necessary scientific framework for international collaboration and dissemination of the derived scientific knowledge.
- SCOSTEP organizes/cosponsors Space Science Schools (e.g. IHY, ISWI) – an important capacity building activity; future schools in Indonesia, South Africa, and South America.
- SCOSTEP has high relevance and synergy to all COPUOS activities as applied to Sun-Earth connections. Therefore, it will be highly beneficial to have a stronger relationship between COPUOS and SCOSTEP.


Thank You!