



CAWSES: Climate and Weather of the Sun-Earth System

**Sunanda Basu, Boston University
Chair, Science Steering Committee,
CAWSES**

(Presented by David Sibeck)

*International Living with a Star Meeting
Vienna, Austria
April 24, 2005*



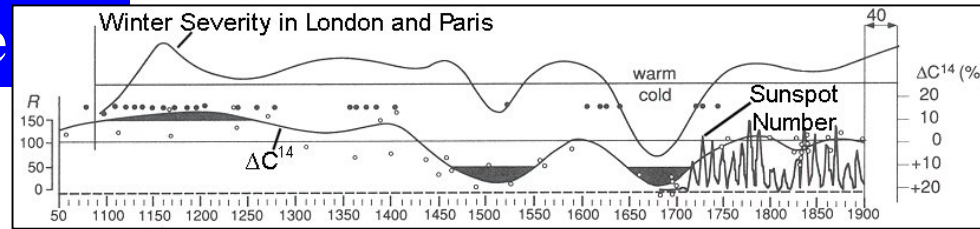
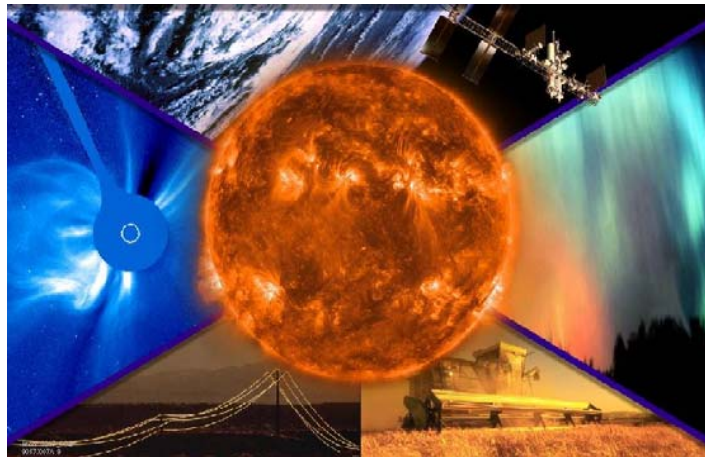
CAWSES Scientific Steering Group

- Chair: Sunanda Basu, BU, USA
- Jean-Louis Bougeret, CNRS, France
- Joanna Haigh, Imperial College, UK
- Yohsuke Kamide, STEL, Japan
- Arthur Richmond, NCAR, USA
- C.-H. Liu, NCU, Taiwan
- Lev Zelenyi, IKI, Russia
- D. Pallamraju, Scientific Coordinator
- L. Walsh, Program Admin.



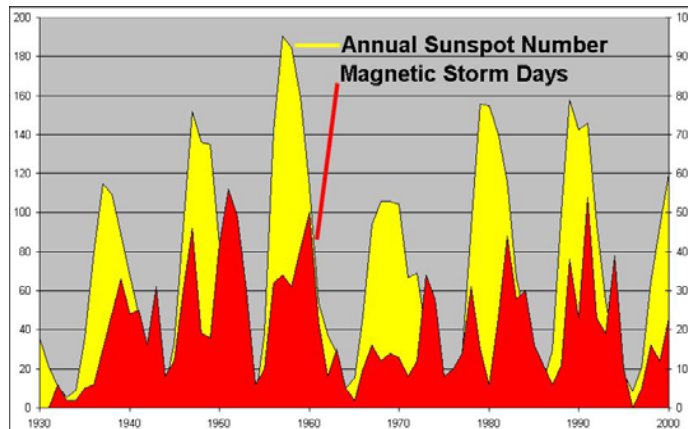
Four Themes under CAWSES

Solar Influence on Climate



Space Weather: Science and Applications

Atmospheric Coupling Processes



Climatology of the Sun-Earth System



Theme 1: Solar Influence on Climate

Co-Chairs: Michael Lockwood (UK) and Lesley Gray (UK)

WG 1.1: Assessment of Evidence for Solar Influence on Climate:

Juerg Beer (Switzerland), Lon Hood (USA), Judith Lean (USA), Augusto Mangini (Germany), Roddam Narasimha (India), Gerry North (USA), Ilya Usoskin (Finland), Warren White (USA).

WG 1.2: Investigation of Mechanisms for Solar Influence on Climate:

Ulrich Cubasch (Germany), R. Garcia (USA), Kuni Kodera (Japan), Jon Kristjansson (Norway), R. Bradley (USA).



Theme 2: Space Weather Science & Applications

Co-Chairs: Janet Kozyra (USA) and Kazunari Shibata (Japan)

Overview Theme2 Panel: Sun-to-Earth System Science

Santimay Basu (USA), Walter Gonzalez (Brazil), Anatoly Petrukovich (Russia), Rainer Schwenn (Germany), Wei Feng Si (China) and R. Sridharan (India), Working Group Leaders

Working Group on Enhanced Resolution Worldwide GPS TEC Maps:

Anthea Coster (USA), M. Hernandez Pajares (Spain), WG Leaders

Working Group on CAWSES/LAGA/GEM World Magnetospheric Observations:

Ian Mann (Canada), WG Leader

Working Group on Solar Observations:

Nat Gopalswamy (USA), WG Leader

Working Groups in Planning Stages

Subgroup on Continuous Solar H alpha Observations: TBD

Working Group on Worldwide Space Weather Applications: TBD

Working Group on Models, Simulations and Data Assimilation: TBD

Working Group on Worldwide Coordinated Data Analysis: TBD

Theme 3: Atmospheric Coupling Processes

Co-Chairs: Franz-Josef Luebken (Germany) and Joan Alexander (USA)

WG 3.1: Dynamical Coupling and its Role in the Energy and Momentum Budget of the Middle Atmosphere

Martin Mlynczak (USA), William Ward (Canada), David Fritts (USA), Nikolai Gavrilov (Russia), S. Gurubaran (India), Maura Hagan (USA), Alan Manson (Canada), Dora Pancheva (UK), Kauro Sato (Japan), Kazuo Shiokawa (Japan), Hisao Takahashi (Brazil), Robert Vincent (Australia) and Yi Fan (China)

WG 3.2: Coupling via Photochemical Effects on Particles and Minor Constituents in the Upper Atmosphere

Martin Dameris (Germany), Charles Jackman (USA), Ulf Hoppe (Norway), Manuel Lopez-Puertas (Spain), Daniel Marsh (USA), James Russell (USA), and David Siskind (USA)

WG 3.3: Coupling by Electrodynamics including Ionospheric Magnetospheric Processes

Gang Lu (USA), M. Yamamoto (Japan), Steve Cummer (USA), Peter L. Dyson (Australia), Inez S. Batista (Brazil), Archana Bhattacharya (India), Martin Fullekrug (Germany), and Roland Tsunoda (USA)

WG 3.4: Long-Term Trends in Coupling Processes (*inter-connected with 4.4*)

Theme 4: Space Climatology

Co-Chairs: Claus Froehlich (Switzerland) and Jan Sojka (USA)

WG 4.1: Solar Irradiance Variability

Judit Pap (USA) and Gerard Thuillier (France)

WG 4.2: Heliosphere Near Earth

Leif Svalgaard (USA)

WG 4.3: Radiation Belt Climatology

Takahiro Obara (Japan)

WG 4.4: Long-Term trends in Ionospheric and Upper-Atmospheric Variability (*inter-connected with 3.4*)

M. Jarvis (UK) and John Emmert (USA)

Rashid Akmaev (USA), Gufran Beig (India), Gary Burns (Australia), Jorge Chau (Peru), Alexi Danilov (Russia), Rick Niciejewski (USA), Henry Rishbeth (UK), T. Ulich (Finland) and J. Lastovicka (Czech)

Capacity Building & Education

Co-Chairs: Marv Geller, S. T. Wu and Joe Allen

- CAWSES will hold meetings and provide specialized training courses for scientists from developing nations and help with computational and data resources
- Establish partnerships between developing & industrialized nations
- CAWSES – AOPR Center in Taipei will facilitate such activities



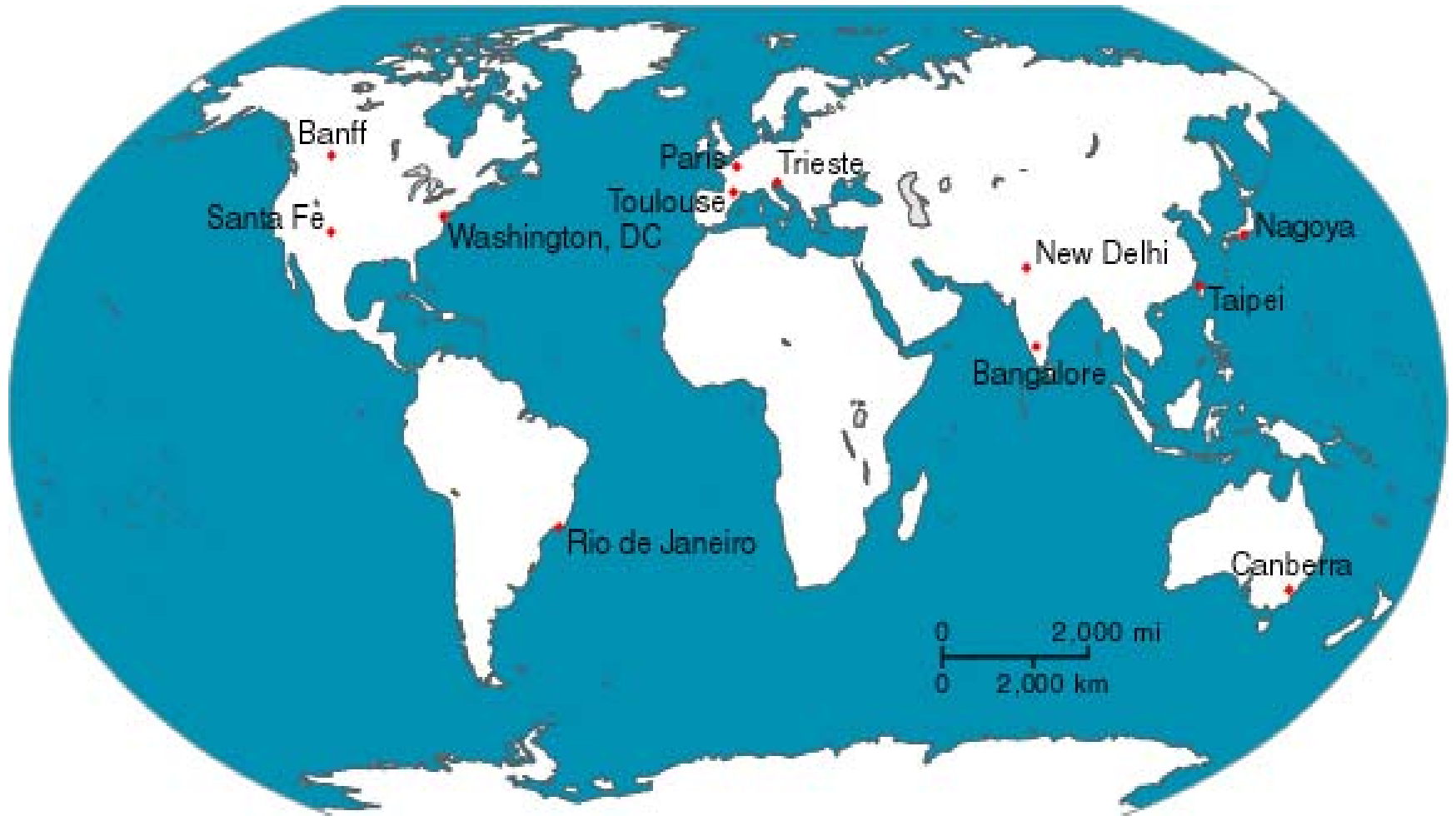


Busy first year for CAWSES



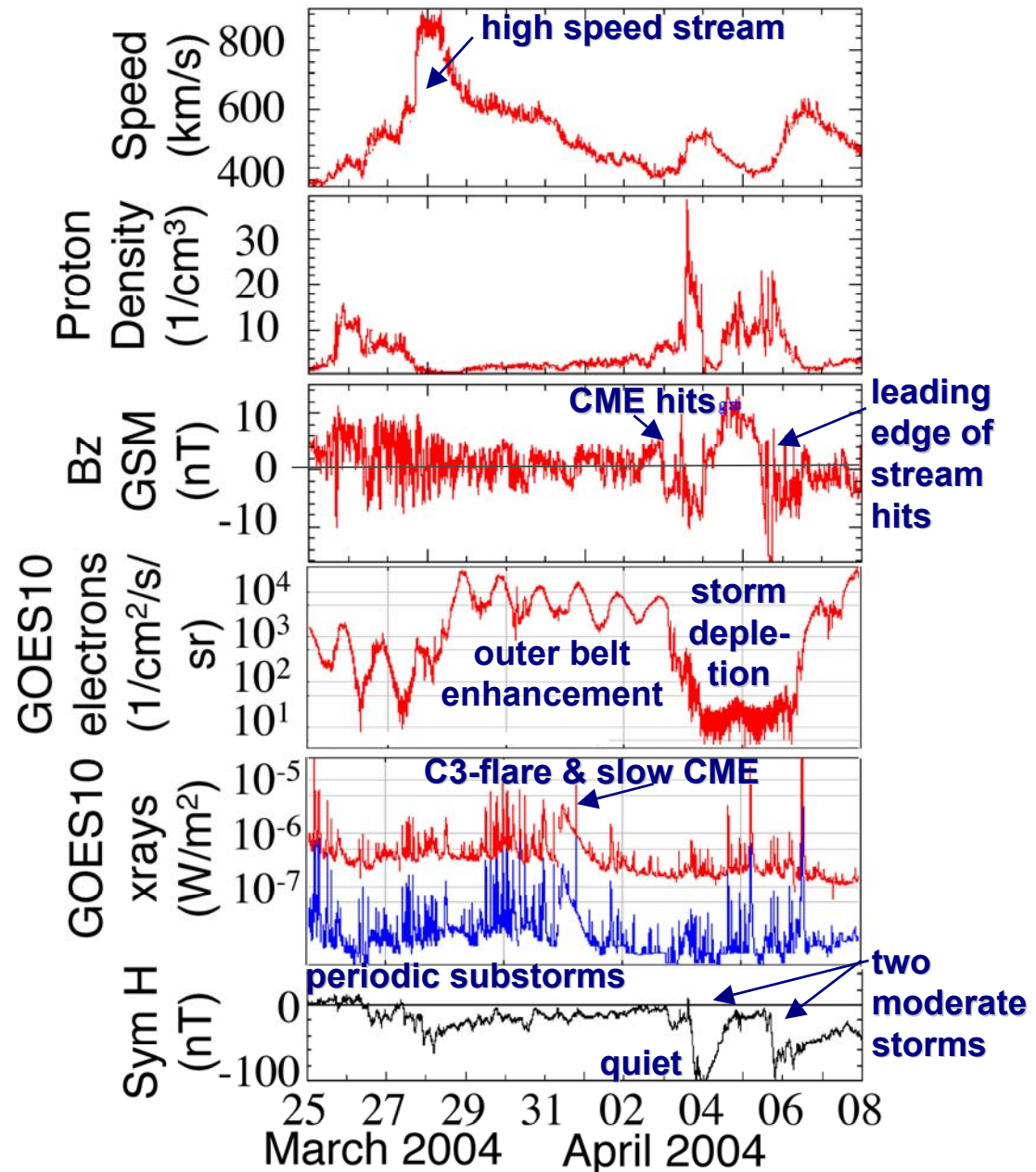
- **CAWSES Office established at Boston University, Jan 16, 2004, Webpage URL <http://www.bu.edu/cawses>**
 - **D. Pallamraju (Raju) appointed Scientific Coordinator**
- **Two Newsletters published in March and Sept, 2004**
- **Many Working Group members have been chosen**
- **First CAWSES Campaign organized in March -April, 2004 in conjunction with CPEA Campaign – data analysis continues**
- **Many CAWSES presentations given - including ILWS Meetings in Banff and Paris - shown on world map**
- **Special all-day CAWSES Meeting held at Observatoire de Paris, July 17, 2004**
- **Solar Irradiance Variability Session at COSPAR, 2004**
- **Atmospheric Coupling Group Meeting on July 22, 2004 at COSPAR**
- **CAWSES SW Workshop in Beijing, September 11-12, 2004**

Around the World for CAWSES in 2004-05



What happened during SW Campaign?

- High Speed Stream Activity (25-31 March 2004)
- 2 Extremely Quiet Days (1-2 April 2004)
- CME released on 31 March reaches Earth on 3 April. Why so slow?
- 2 Moderate Magnetic Storms (3-4 April & 5-6 April 2004). Both produce unusual auroral forms & triggered equatorial bubbles
- Unprecedented NO_x levels during April 2004. Links to superstorms in late 2003??

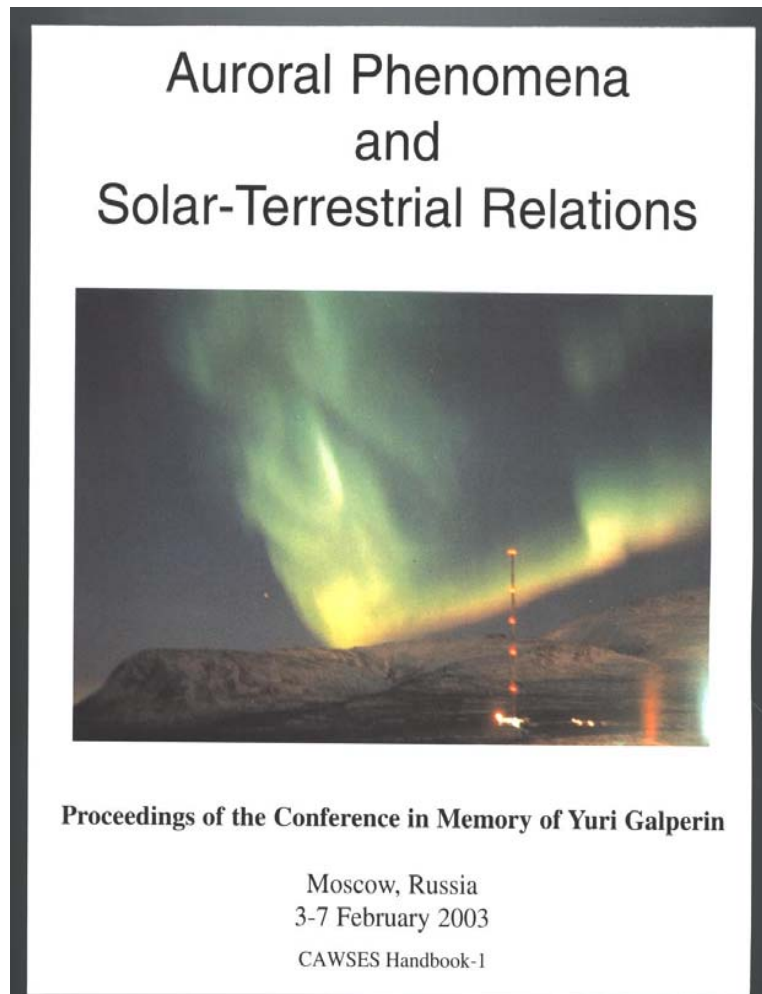




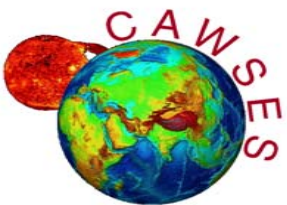
CAWSES – National and Regional Programs

- **CAWSES-India** has been approved by ISRO
– Workshop held in April, 2004
- **CAWSES** has been approved as a priority program by DFG in Germany
- **CAWSES-Japan** had its inaugural Workshop near Nagoya, Japan, June 16-18, 2004
- **CAWSES-AOPR (Asia Oceania and Pacific Rim) Center** discussed in Taipei on June 18, 2004
- **AOPR Center** established at National Central University, Chung-Li, Taiwan on July 1, 2004 with Lou Lee as Director & S-Y Su as Sci. Secy.
- **CAWSES-US Workshop** held on June 29, 2004 at CEDAR Meeting in Santa Fe to discuss campaign results

First CAWSES Handbook Published



- **Proceedings of the Yuri Galperin Memorial Meeting, Moscow, Russia, Feb 3-7, 2003, Editors, L. Zelenyi, M. A. Geller, and J. H. Allen**
- **Yuri Galperin was member of SCOSTEP Bureau from 1997-2001**
- **62 papers by 143 authors**
- **Publication funded by NASA**



Continuing Progress in 2005

- **US NSF decided to fund CAWSES Office at BU for 2005-07 on the basis of peer-reviewed proposal**
- **German Science Foundation (DFG) has funded CAWSES as a priority program for 2005-11 with first year funding of 3 Million Euros covering 18 Institutions**
- **Third issue of CAWSES News published in Mar 05**
- **Paper on CAWSES presented at ILWS, Paris accepted for publication in Advances of Space Research**
- **Presentation to SCOSTEP Bureau in Taipei, May 11, 05**
- **Team Meeting on Influence of Solar Variability (Lesley Gray, PI) to be held at ISSI, Bern, June 6-10, 2005**
- **General Planning Meeting at Toulouse on July 23, 05**
- **Association Lecture on CAWSES at IAGA, July 27, 05**



Upcoming CAWSES Workshop

- Provide forum for initiating & developing collaborations – To be held with ISEA, Taipei on May 14, 2005 (5 graduate students from developing countries are supported by CAWSES for attending this Workshop)
- Discuss ITM observations during space weather (25 March - 6 April) & atmospheric coupling (March - April 2004) portions of the CAWSES campaign
- Collect science issues for focused community efforts, discuss future & retrospective campaigns (possibly on past superstorms)
- Discuss the value of initiating campaign efforts in:
 - assimilative modeling
 - worldwide maps of atmospheric quantities (e.g., gravity waves, mesospheric winds, etc.)
 - worldwide maps of ionosphere/thermosphere quantities

Future Plans – to come!

- **30 day campaign in September 2005**
 - All 8 worldwide ISR radars will operate on best effort basis
 - Investigate global ionospheric variability
 - Special focus on modeling of this variability
 - Extend observations sun-to-Earth to look at solar drivers and geospace responses
- **2005 Campaign on Ice Layers in the Summer Mesosphere**
- **Joint ICESTAR/CAWSES coordinated effort on analysis of the Jan 2005 solar flare effects**