

Proposal for new program from Japanese SCOSTEP committee

Tatsuki Ogino,

Chair of Japanese SCOSTEP committee, Science Council of Japan

Members: Toshitaka Tsuda, Kazunari Shibata, Yoshiharu Omura, Kan-ya Kusano, Taro Sakao, Kazuo Shiokawa, Iku Shinohara, Yukihiro Takahashi, Naoki Terada, Takuji Nakamura, Tsutomu Nagatsuma, Toshihiko Hirooka, Masahiro Hoshino, Mamoru Yamamoto, Toshifumi Shimizu (guest member) , Nozomu Nishitani (guest member)

Scientific motivation

The current CAWSES-II program has been of great success in both pursuing individual themes of Task-Groups and interdisciplinary researches between Task-Groups for atmospheric, ionospheric, magnetospheric, and heliospheric studies. However, in order to achieve a better understanding of the whole solar-terrestrial system further experimental, modeling and theoretical investigations are and will be of great importance. As the CAWSES model has proven to be very successful in providing context and support for these activities it is proposed that the current activity of the CAWSES-II program be continued although with more emphasis on (1) climate, weather and impact and (2) extreme/severe space weather (storms) as a new topic to be studied. Thus the new program will build on the organizational and scientific heritage of CAWSES (BUT with different naming from CAWSES) and will expand that research into areas of increasing current and future significance. Based on the experience from the two CAWSES programs it is proposed that the duration of the new program should be 5 years.

Topics for the new program

The following are topics which the Japanese SCOSTEP community suggests to be included in the new program.

1. SOLAR VARIABILITY

- Earth-affecting solar transients (see Appendix)
- Extreme events in the solar-terrestrial system
- Solar maximum and declining phase(e.g. 2014-18 will be the maximum and declining phase of solar activity)
- Discrimination of global trends and solar activity

2. COUPLINGS

- Latitudinal coupling in atmosphere and geospace

- e.g. energy transfer from high to low latitude during geomagnetic storms
 - Coupling between equatorial and mid-latitude/polar ionosphere
 - Atmospheric coupling between different latitudes and hemispheres
 - Whole atmosphere and geospace coupling
 - Expansion of TG-4/CAWSES-II to global scale and into geospace
 - Effect of geospace disturbance to the atmosphere
 - Teleconnections in the Earth system
3. OTHER IMPORTANT ISSUES
- Turbulence/small scale processes in solar-terrestrial phenomena
 - A new issue arising from high-resolution observation and modeling
 - Combination of observation and modeling (in space weather)
 - Data assimilation for precise forecasting
 - Atmospheric dynamics for ground-ionosphere electric current
4. INFRASTRUCTURE
- Capacity Building
 - Informatics including big data.

Should the structure of CAWSES II be adopted for the new program items 1 to 4 could form new Task Group.

Related Activities in Japan in 2014 – 2018

The following activities/projects related to solar-terrestrial physics and the proposed program will be carried out in Japan for 2014-2018.

- Solar Telescope (Kyoto Univ.)
- ERG satellite for investigation of radiation belts (launch: 2015)
- Hinode satellite will continue its operation
- IUGONET (Inter-university Upper atmosphere Global Observation NETWORK: database development activity)
- PANSY radar will be in full operation in Syowa station, Antarctica
- EISCAT-3D will be in operation (international collaboration)
- Equatorial atmosphere radar (Equatorial MU radar) is newly proposed.
- Multi-point ground network will expand to sub-auroral latitudes and over Asia and Africa
- International school activity will be kept by Kyoto Univ. and Kyushu Univ.

Appendix:

International Study for Earth-Affecting Solar Transients (ISEST)

SOC Members: Jie Zhang (USA), B. Vr?nak (Co-Chair, Croatia), A. Asai (Japan), P.Gallagher (Ireland), A. Lara (Mexico), N. Lugaz (USA), C. Mostl (Austria), A. Rouillard (France), N. Srivastav (India), Y. Yermolaev (Russia), Y.-M. Wang (China), D. Webb(USA)

An international effort including observations, data analysis , modeling, and transition from science to prediction operation. The ISEST tasks are

- (1) Create a comprehensive database of Earth-affecting solar and heliospheric transient events
- (2) Characterize and quantify the kinematic and morphological properties of transient events
- (3) Develop advanced theoretical models of the propagation and evolution of heliospheric transients
- (4) Develop advanced 3D numerical models of prediction of ICME arrival and the expected strength of space weather impact
- (5) Prediction tool development
- (6) Public outreach and education