Issue7, March 2017

We hope the AOSWA framework helps
our activities for improving space weather activities.

http://aoswa.nict.go.jp/

AOSWA *Link*

In this Issue...

Your contribution is always welcome!

If you should wish to submit an article, you are greatly appreciated. The articles should be approximately 500 words and contain either figures or pictures. Also It is available for use as a means of spreading information, such as upcoming conference and so on. Your feedback is always welcome.

Contact : sw-project-office@ml.nict.go.jp

Space Weather Research in the KMA/NMSC

Jiyoung Kim, National Meteorological Satellite Center (NMSC), Korea Meteorological Administration (KMA), Republic of Korea

The KMA/NMSC started the operational space weather service in April 2012 to administrative agencies, public institutions, mass media, and the public. The main purpose of the service is 1) to safely operate meteorological satellites, 2) to improve the KMA's aviation weather service through providing radiation dose information for polar airways, and 3) to provide some information on the ionospheric condition. The NMSC's research and development program has been performed to support and improve the operational service as well as to more fundamentally understand the space weather impact on the terrestrial weather and climate.

Some numerical or statistical models for predicting solar flare, solar proton event, geomagnetic indices (Kp and Dst), magnetopause, and ionospheric total electron density have been developed to support the KMA's operational space weather service. The model developments, including model validation and inter-comparison, have been done with the Kyung-Hee University as the KMA's Research to Operation (R2O) program. A model to estimate the radiation dose effect for any aviation routes (KREAM, Korean Radiation Exposure Assessment Model for aviation route dose) has been developed as the R2O program with the KASI (the Korea Astronomy and Space Science Institute). The model validation was done by using Liulin measurements from the Czech Republic. The model intercomparisons with other radiation dose models such as CARI-6 and NAIRAS are also planned. The KREAM model is currently operating to support the KMA's aviation weather service.

A technique for estimating near real-time local K-index, which is based on the measurement data at the Cheongyang magnetic observatory, has been developing to provide the information of the locally-characterized geomagnetic disturbances. After the comparison of the estimation result with the observed K-index, the estimated local K-index is planned to be operationally serviced. As a research for understanding how space weather may influence on any adverse terrestrial weather phenomena, an statistical relationship between high speed solar wind stream (HSS) and tropospheric lightning has been investigated through the superposed epoch analysis. We found the significant enhancement of hourly lightning rate over South Korea during the HSS events.

In order to start the space-born space weather observation at the eastern side of the geostationary orbit (128°E), the KSEM (Korean Space Environment Monitor) mounted on the second geostationary meteorological satellite of the Republic of Korea (GeoKOMPSAT-2A, GK-2A) will be launched in 2018. Three space weather monitoring sensors, including particle detector (PD), charging monitor (CM), and magnetometer (MG), will be employed (please refer to Figure 2). PD will measure the distribution of energetic particles in magnetosphere. CM is for monitoring the satellite internal charging that maybe occurred by energetic electrons and sometimes can cause system failures on satellite operation. The fundamental requirements and specifications are described in Table 1. The MG mounted on the GK-2A, the first and only magnetometer on the eastern geostationary orbit, will monitor continuously magnetosphere. The MG will enable monitoring asymmetric magnetic field phenomena from

from the both of eastern and western hemispheres simultaneously. The observation data from the KSEM are expected to contribute the advancement of space weather models as well as our scientific understanding.

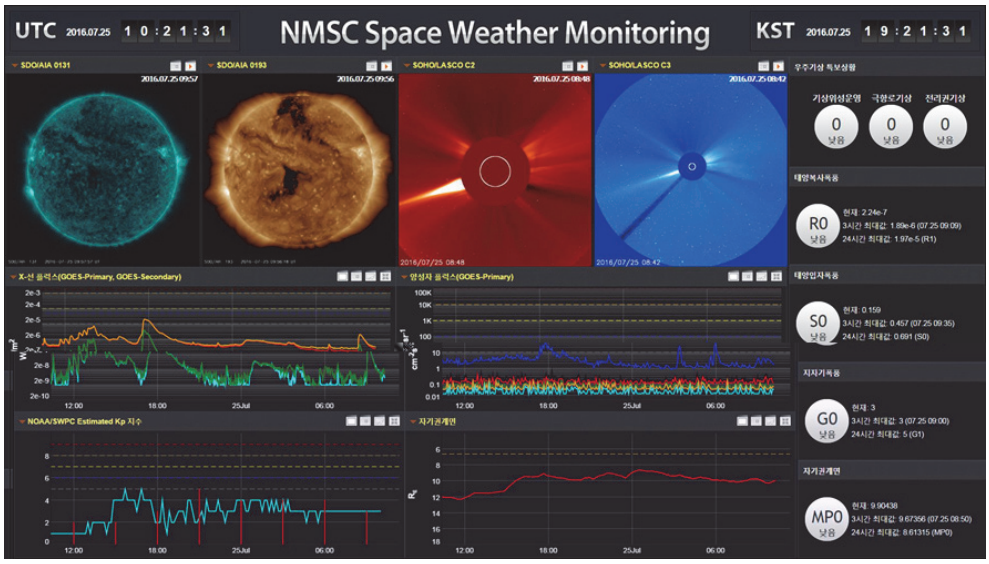


Figure 1. Operational space weather monitoring system of the KMA/NMSC

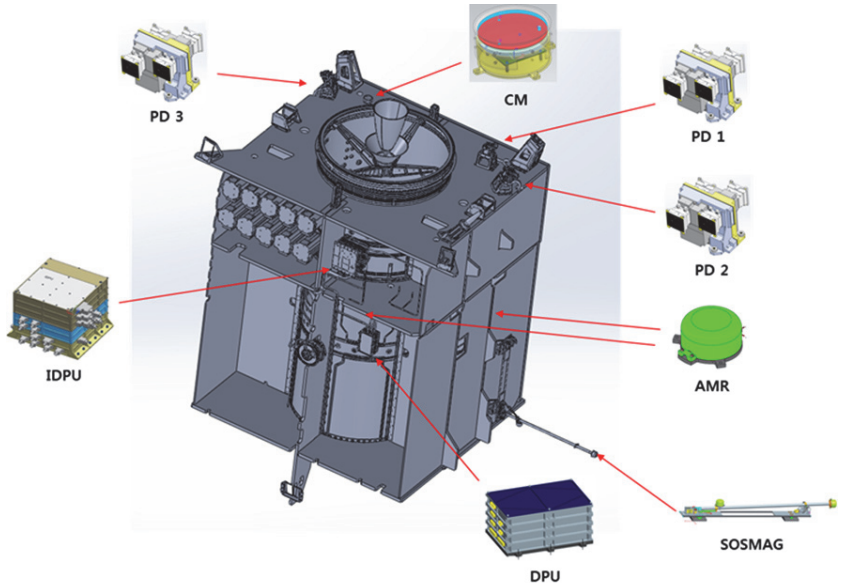


Figure 2. Three sensors of the Korea Space Environment Monitor (KSEM) to be mounted on the GK-2A geostationary satellite

Table 1. Sensor specification of the KSEM

Sensor	Parameter	Requirement	Specification	Remark
PD	Energy Range	100 keV ≤ E ≤ 2 MeV	100 keV ≤ E ≤ 2 MeV	
	Energy Resolution	ΔE/E ≤ 30%	ΔE/E ≤ 30%	
	Time Resolution	≤ 0.33 sec	≤ 0.33 sec	
	View Direction	5-direction	6-direction	
	Geometric Factor	≥ 10^{-3}(cm²·sr)	≥ 10^{-2}(cm²·sr)	
	Background Contamination	≤ 3%	≤ 3%	
	Count Resolution	≥ 8 bit	8 bit	
MG	Range	-350 nT ~ +350 nT (3-Axis)	Variable up to +/- 64,000 nT	
	Accuracy	≤ 1nT	≤ 1nT	Deployable Boom
	Time Resolution	≤ 0.1 sec	0.1 s	
	Type	Non-Deployable	Non-Deployable	ECR-4
CM	Range	-3 pA/cm² to +3 pA/cm²	-3 pA/cm² to +3 pA/cm²	
	Accuracy	≤ 0.01 pA/cm²	≤ 0.01 pA/cm²	
	Time Resolution	≤ 1 sec	≤ 1 sec	

Project for Solar-Terrestrial Environment Prediction (PSTEP)

Kanya Kusano, Leader of PSTEP
Professor, Vice Director
Institute for Space-Earth Environmental Research, Nagoya University

The globalization and informatization of society has progressed rapidly and our lives are now strongly tied to advanced information systems and space technology in various ways. Consequently, solar activity and the dynamics of space are now known to significantly impact human socio-economic systems as well as the global environment. However, the mechanisms for the onset of solar flares and the subsequent processes have not yet been fully explained. Therefore, modern society is at a risk from severe space weather disturbances. In addition, although many proxy data suggest that the solar activity affects the terrestrial climate, the physical processes by which solar activity affects the climate variations are unclear; moreover, the influence of the Sun on climate change is still controversial. Therefore, understanding and predicting the variation of the solar-terrestrial environment is both a scientific subject and a crucial issue in modern society.

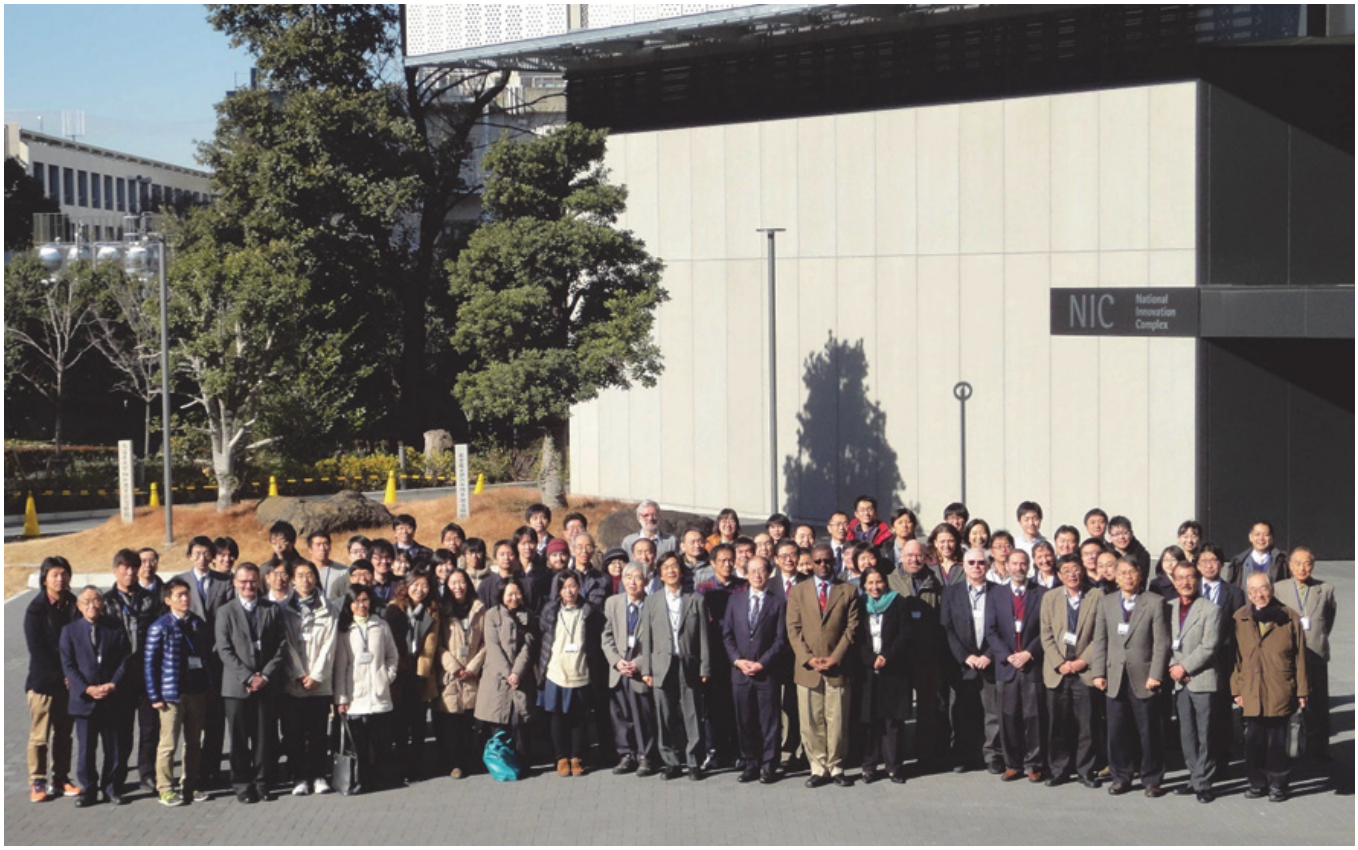
To tackle those problems, Project for Solar-Terrestrial Environment Prediction (PSTEP) was established with the support of a Grant-in-Aid for Scientific Research on Innovative Areas from Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan. PSTEP is a nationwide research collaboration based on the cooperation of more than 100 researchers and 20 institutes of various fields. PSTEP aims to develop a synergistic interaction between predictive and scientific studies of the solar-terrestrial environment and to establish the basis for next-generation space weather forecasting using state-of-the-art observation systems and advanced physics-based models. By this project, we seek to answer some of the fundamental questions such as the mechanisms for the onset of solar flares, the mechanism for radiation belt dynamics in the Earth's magnetosphere, and the physical process by which solar activity affects the climate.

The organization of PSTEP consists of four research groups (A01-A04), the proposed-based research units, and the steering committee. The group A01 led by Mamoru Ishii from NICT develops the space weather forecast system, which can work for bridging the basic researches performed by the other groups and the operational system of space weather forecast, which should meet to the requirement of society. The group A02 led by Kiyoshi Ichimoto from Kyoto University studies the prediction of solar storm. In this group, the physics-based numerical prediction of solar flares and CME is developed using the photospheric magnetic fields data observed by the space solar observatories Hinode and SDO at the highest precision. Also the ground-based optical and radio telescopes observe the occurrence and propagation of CME, and the precise numerical modeling is being developed to predict the disturbance of solar wind and interplanetary magnetic field in this group. The group

A03 led by Yoshizumi Miyoshi from Nagoya University aims at developing models and forecast systems to evaluate how space radiation environment, ionospheric density disturbances, and geomagnetically induced current (GIC) vary along with the variations of the solar dynamics using the new observations, such as the Japanese geo-space probe ARASE (ERG) observation. The group A04 takes charge of the long-term prediction of solar cycle and its impact on the climate. In particular, this group develops the physics-based prediction of the next solar cycle (Cycle 25) activity. In addition, the seventeen proposal-based research units are now working for PSTEP on various topics of solar-terrestrial environment prediction.

The international collaboration is crucially important as the activities of PSTEP, and we carry out more than fifteen joint research programs with the international partners and organize the international annual symposium. Under this wide range of domestic and international cooperation, we hope significantly contribute to both science and society by exploring the future of the solar-terrestrial environment.

(PSTEP-WEB) http://www.pstep.jp/



Participants of International Symposium PSTEP-1 at Nagoya University on January 13-14, 2016.

Report of 4th Asia-Oceania Space Weather Alliance Workshop

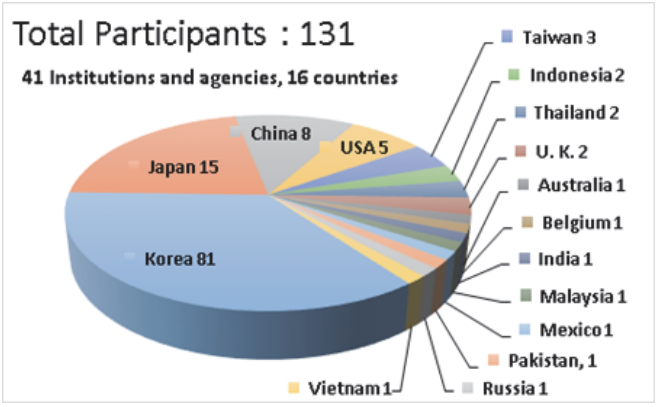
CHOI Jangsuk, Researcher / Research Planning Team, Korean Space Weather Center

The 4th Asia-Oceania Space Weather Alliance (AOSWA) workshop was successfully held on October 24-27, 2016 in Jeju, Republic of Korea. The workshop was hosted and sponsored by the Korean Space Weather Center of National Radio Research Agency (RRA) and was co-organized by the Korean Space Science Society (KSSS)

The workshop began with the opening address by Dr. HAN Wonyong, the president of KSSS, followed by the greeting by Mr. CHOI Younghae, the General Director of Radio Policy Bureau, MSIP, and Dr. Kazumasa Taira, the General Director of Applies Electromagnetic Research Institute, NICT.

The main theme of this workshop is “The Risk of Space Weather, Regional Action”. The space weather can affect on our daily lives severely and it can be mitigated through global cooperation. This is the reason we select regional action as the theme of this 4th AOSWA

Under this topic, total 52 oral and 56 poster presentations were announced on 3 different sessions: Special Sessions for national policies and plans, General Sessions for research activities and Poster Sessions. 131 experts and scholars from 46 institutions and agencies, 16 countries attended the workshop.



During the workshop, we had three special events, the performing art, the banquet and the excursion. The performing art which was a Korean traditional show, “Baram Yuhiu” (The play of the wind) was shown during the first dinner at the workshop place, Shineville Resort. The banquet was held on the second evening at the Sanghyowon Botanical Garden, located on southern Jeju.

SOC had 2 business meetings to discuss future business of AOSWA and presented the result of

discussions in the last session. It was about the suggestion to improve AOSWA more efficiently and the plan for next 5th AOSWA. The next workshop was confirmed to be held in LAPAN, Indonesia and the exact date will be determined.

We had the excursion after the last session. About 42 people attended to climb Seongsan Ilchulbong (Sunrise Peak) and visit KSWC. Seongsan Ilchulbong is a tuff cone formed when an underwater volcano erupted in the middle of the ocean. It was designated national monument No.40 in 2000 and a UNESCO World Natural Heritage Site in 2007. At KSWC, we have looked around the forecasting and observation facilities.

We KSWC appreciate cooperation and contribution from all attendee. Thank you very much and see you in Indonesia on the next meeting!

The 4th AOSWA workshop program, presentation materials and photos can be downloaded from the website until March 31.

(http://aoswa4.spaceweather.org)

Report of business meetins during AOSWA-4

Mamoru Ishii, Director, Space Environment Laboratory
Applied Electromagnetic Research Institute, NICT

AOSWA-4 was held on Octber 23 -26 at Shine-Ville Luxury Resort, Jeju. We had two business meetings during the workshop. Pre-business meeting was held on 16:00-17:00 October 23 and nine people from five institutes/countries attended. Following it, business meeting was held on 20:30-21:30 October 24 and 17 people from 12 institutes, 10 countries.

The main issue to be discussed was the host institute of next AOSWA workshop. After the discussion, LAPAN Indonesia kindly accept to undertake the host of AOSWA-5.

Another big agenda is the style of AOSWA meeting. In the present style, the host's task is too heavy to continue the present activity. For example, the host institute needs to prepare big budget for the meeting and to work both of substance and logistics. After the discussion, all attendees agreed to make the style more healthy. The detailed conclusions are as follows:

- The host's facilities should be used for conference, not a deluxe hotel
- Price of registration fee should be adjusted appropriately for keeping the conference
- The number of supported speakers should decrease
- Meal and Excursion should be option
- Non-host institutes should support the host institute
- SOC should contributes to the management of the conference more
- We should looking for financial sponsors

In addition, we discussed the following issues

- Frequency of the workshop: many attendees prefer to biannual meeting. We try to have an AOSWA session in AOGS on non-AOSWA year
- Location of the workshop: some member prefer to have meetings in the center of Asia (e.g., Indonesia, Malaysia, Thailand). We discussed to fix the location but it was not accepted
- Collaboration with other organizations: For example, it is a good opportunity to connect AOSWA-5 to the ISES meeting for showing Asian space weather research activities
- Permanent steering organizing committee: we do not conclude this issue and still open to discuss in the temporal SOC for AOSWA-5

Editor's notes

Yuko Uchida, Editor of AOSWA LINK

The AOSWA-4 ended in a great successes. First of all, I really appreciate the support of LOC, staffs of KSWC and KyungHee Univ.

As I was the LOC of AOSWA-3 before, I can easily imagine the hard work of organizing the workshop. Also AOSWA is still young alliance, therefore the firmed regulation is not established yet, so the host organization has to owe a lot things to do. But they created really warm welcome atmosphere and lead the fruitful sessions with their great hospitality.

Beside this, lots of members including SOC came together at the business meeting and discussed about the future style of AOSWA. We could make the draft and LAPAN stood for next AOSWA host, which was meaningful decision for our future.

Again, I would like to give many thanks to support of AOSWA friends:)

Members of KSWC

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