



National Institute of Information and Communications Technology

# ACTIVITY FOR SPACE WEATHER RESEARCH & OPERATION IN NICT

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Web access : 160,000/month  
No. of e-mail address : 10,000  
And also on Facebook, twitter

## Forecasting Parameters

- Flare forecast
- Magnetic field forecast
- High-energy particle forecast
- HF propagation forecast

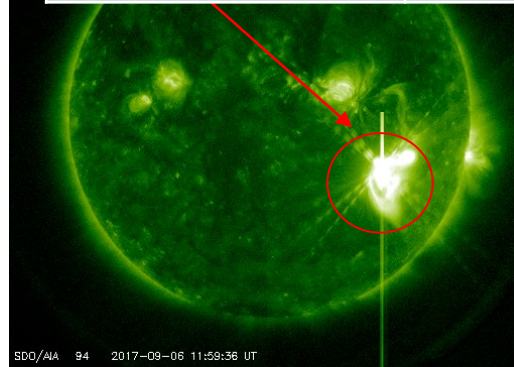
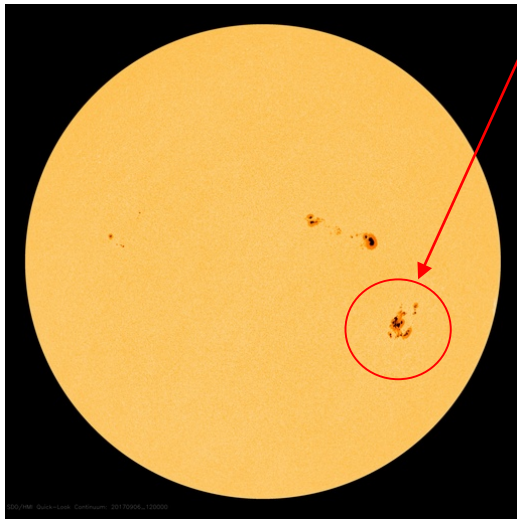
Domestic users: satellite operator, aviation office and companies, power plant companies, HF telecommunicators / broadcasters, resource survey, Univ. and research institutes, amateur radio operators

# The Solar Flare on Sep. 6, 2017

## Detail of the event

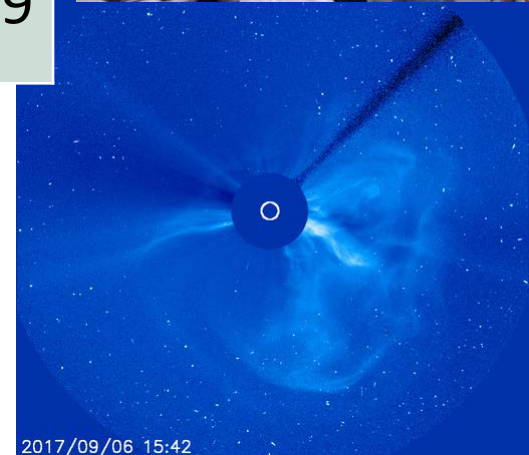
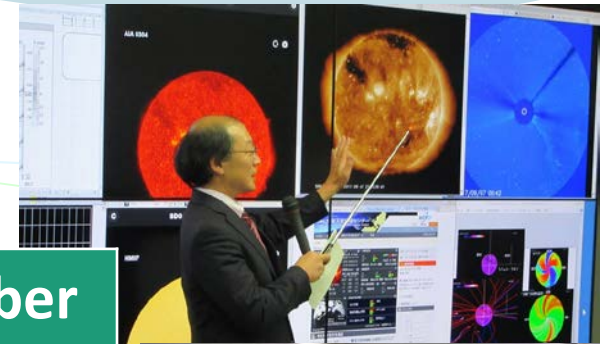
- ◆ A large scale solar flare (X9.3) was observed on 20:53JST Sep. 6, 2017, which has been 11 years since similar size event occurred.
- ◆ Coronal gas ejected simultaneously would be forecasted to arrive
- ◆ The impact on GNSS, HF-cor grid from geomagnetic and ion observed.

Sun spot No.



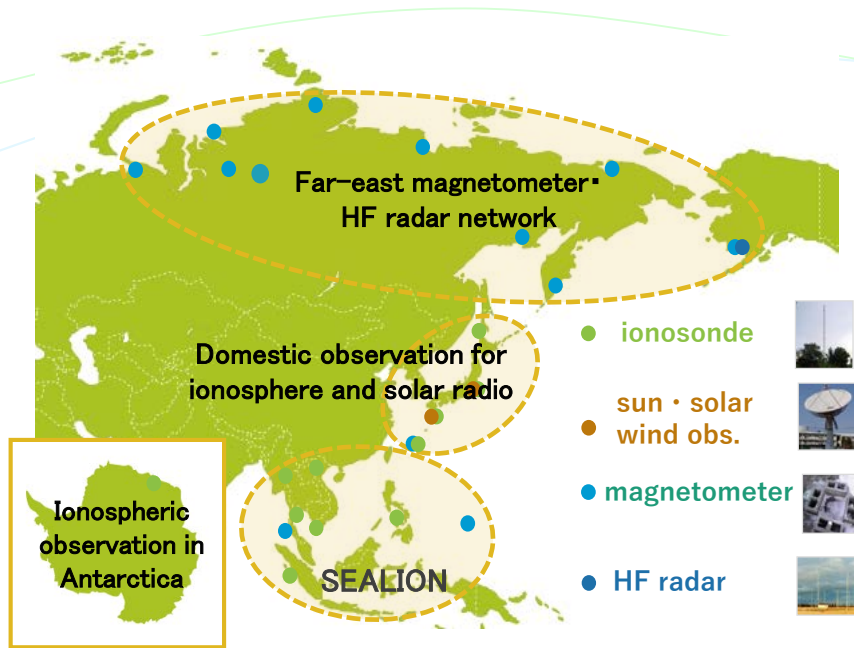
Solar images observed by SDO satellite(Left:visible, Right:UV)

Media	Number
TV	60
Newspaper	271
Web news	779

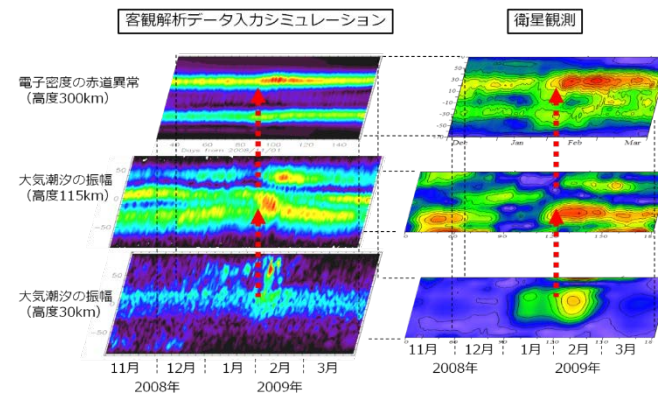
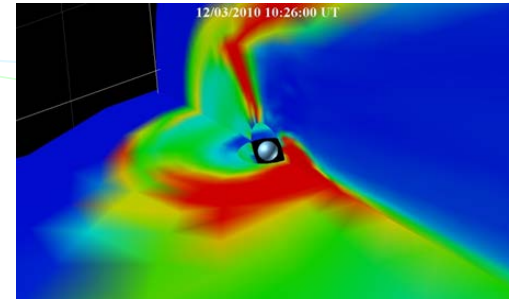


Colonal gas observed by SOHO satellite

# Research activities in NICT for improving the precision of Space Weather forecast



Space Weather observing network

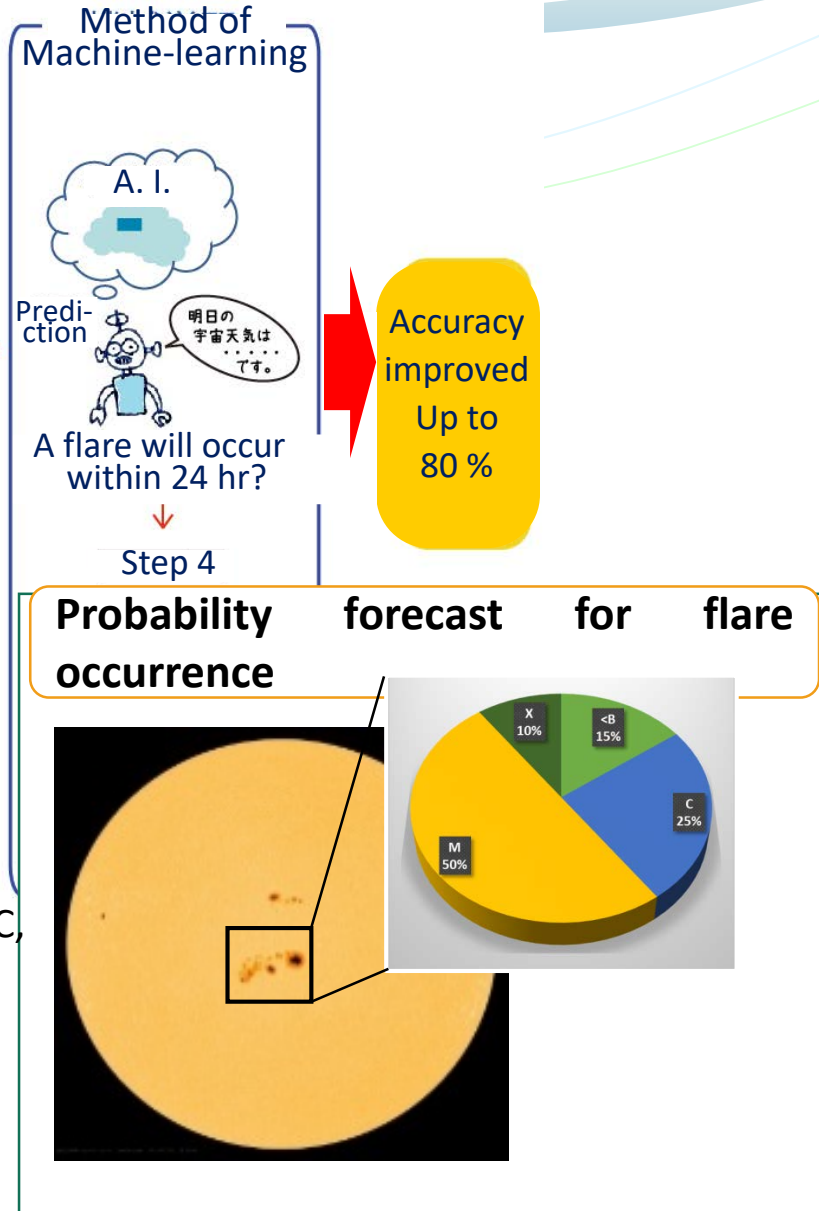
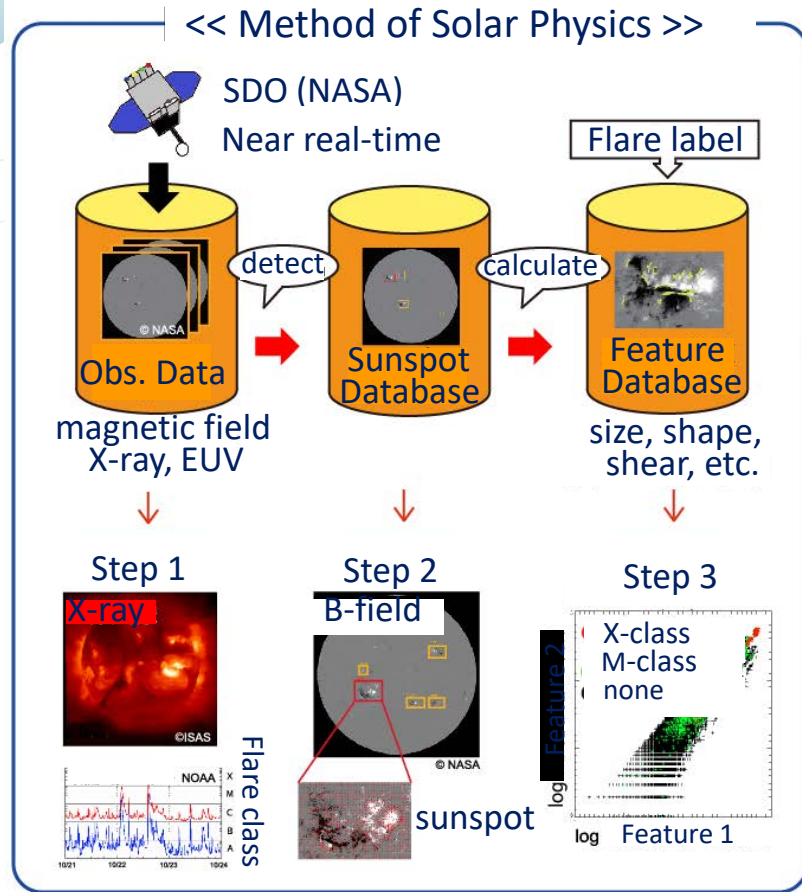


Space Weather simulation techniques

## Advantages of NICT Space Weather forecast research

- Observing network over the western Pacific region : one of the largest in the world
- Simulation techniques : GAIA model is unique in the world
- Development of empirical models with AI : some of them are already used in the operation

# Solar flare prediction model with AI



- The output is not only categorical prediction (X, M, C, non) but also the probability of flare occurrence at each region available.
- The real-time operation using **Deep Flare Net (DeFN) model** based on deep-learning method will start since September 2018.

# Asia-Oceania Space Weather Alliance (AOSWA)

- The Asia-Oceania Space Weather Alliance (AOSWA) established on 2010 for information exchange among Space Weather organizations in Asia and Oceania.
- Members: 27 organizations from 13 countries
- AOSWA workshop is held every one and a half years. The last one was hosted by RRA in Jeju island, Korea on October, 2016.
- Electric newspaper “AOSWA link” is circulated

Issue 5, March 2015

We hope the AOSWA members like the contents for improving space weather activities.  
<http://www.nict.go.kr>

**AOSWA**  
*Link*

**In this Issue...**

▶ **KASI's contributions to Space Weather**

Kyungsook Cho,  
Group Leader Solar and Space Weather Group,  
Korea Astronomy and Space Science Institute, Korea

▶ **An Introduction to ANGKASA, UKM**

Muhammad Haydar Hair & Mardiana Abdullaah,  
Space Science Centre (ANGKASA), Institute of Climate Change,  
Universiti Kebangsaan Malaysia, Malaysia.

▶ **Internship Trainee Program at NICT**

Sufiana M. Buhari,  
Universiti Kebangsaan Malaysia, Malaysia

▶ **United Nations / Japan Workshop on Space Weather**

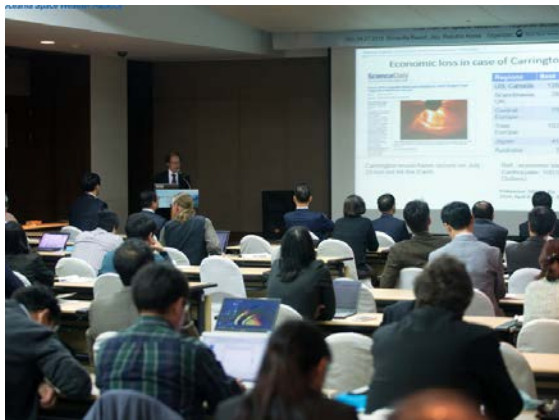
Akimasa Yoshikawa, Lecturer,  
International Center for Space Weather Science and Education, ICSWSE,  
Department of Earth and Planetary Sciences, Kyushu University

▶ **Domestic Collaborative Symposia**

supported by the Solar-Terrestrial Environment Laboratory,  
Nagoya University, Japan

**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 : [ee-project-office@nict.go.jp](mailto:ee-project-office@nict.go.jp)



AOSWA-4 @ Jeju on Oct. 24-27, 2016 hosted by RRA, Korea

# Japan-US Collaboration on Space Weather Research

- ◆ Receiving the Solar wind data obtained with ACE/DSCOVR satellites
- ◆ Discussion in “Space Weather as a Global Challenge”
- ◆ Discussion in multi-national frameworks

## Receiving ACE/DSCOVR solar wind data

- ◆ Receiving the Solar wind data obtained with ACE/DSCOVR satellites at Koganei, Tokyo
- ◆ Contribute to 24/7 observation of solar wind



ACE/DSCOVR Receiver in Koganei

## Space Weather as a Global Challenge

- ◆ “Space Weather as a global Challenge” symposium has started on 2016
- ◆ The 3<sup>rd</sup> symposium will be hosted by Japan and held on July 24 at the Embassy of Japan



2<sup>nd</sup> Space Weather as a Global Challenge

## Multi-national framework

- ◆ ISES (International Space Environment Service) is a consortium of operational space weather forecast organization led by NOAA. NICT is one of the original member of ISES
- ◆ Japan-US collaboration in UN framework: WMO, ICAO, UN/COPUOS, ITU



UN/COPUOS

# Conclusion

- NICT has a long history for space weather forecast research and operation.
- We have both activities of observation and development of models for improving Space Weather forecast precision.
- We had large-scale solar flares on Sep. 2017, which has been 11 years since similar size event occurred. Fortunately no severe impact on social activities were reported.
- We have close communication and collaboration with US partners for improving Space Weather research and operations.