

Space Weather Workshop 2012

NATIONAL RADIO RESEARCH AGENCY

KOREAN SPACE WEATHER CENTER



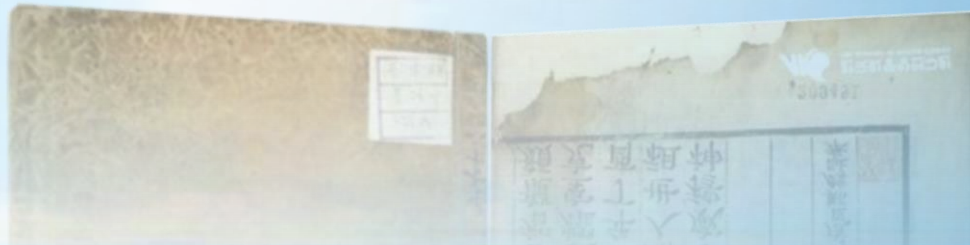
Jae-hyung Lee, Sun-hak Hong, Jin-wook Han, Young-kyu Kim

Early SWX Records in Korea

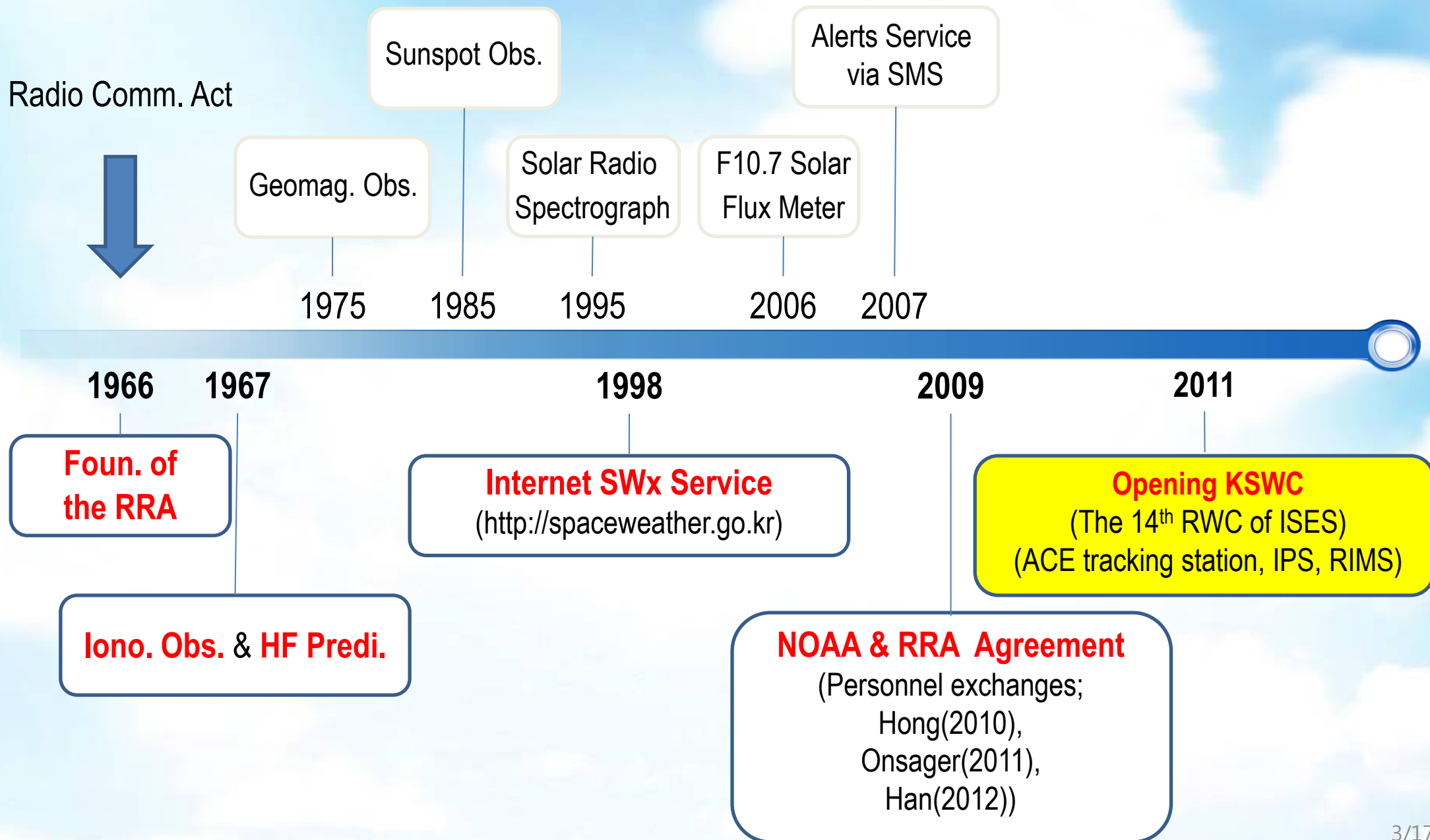


“There is a black spot in the sun as large as an egg” (1151, Goryeo-Sa)

“It spread across the sky like a piece of silk cloth and then dispersed” (1770, Chan-jip-cheong)



History & Origin of KSWC



Its' Launch & Orbit On



Dec 2010

**Building
Completion**



Nov 2011
**Ceremony
for Opening &
ISES member**

Aug 2011
**Foundation
of the Center**

Dec 2011
**Forecast
System
Completion**



Feb 2011
**Starting
ACE tracking**

Mar 2012
**User
Conference**



Organization Chart



Key Message

- Joint operation by RRA and KAF
- Begin with 23 staff and 4 teams (15 Gov. + 2 AF(July 2012) + 2 Researchers + 4 Technicians)
- 24x7 operations in the near future

Forecasting Office

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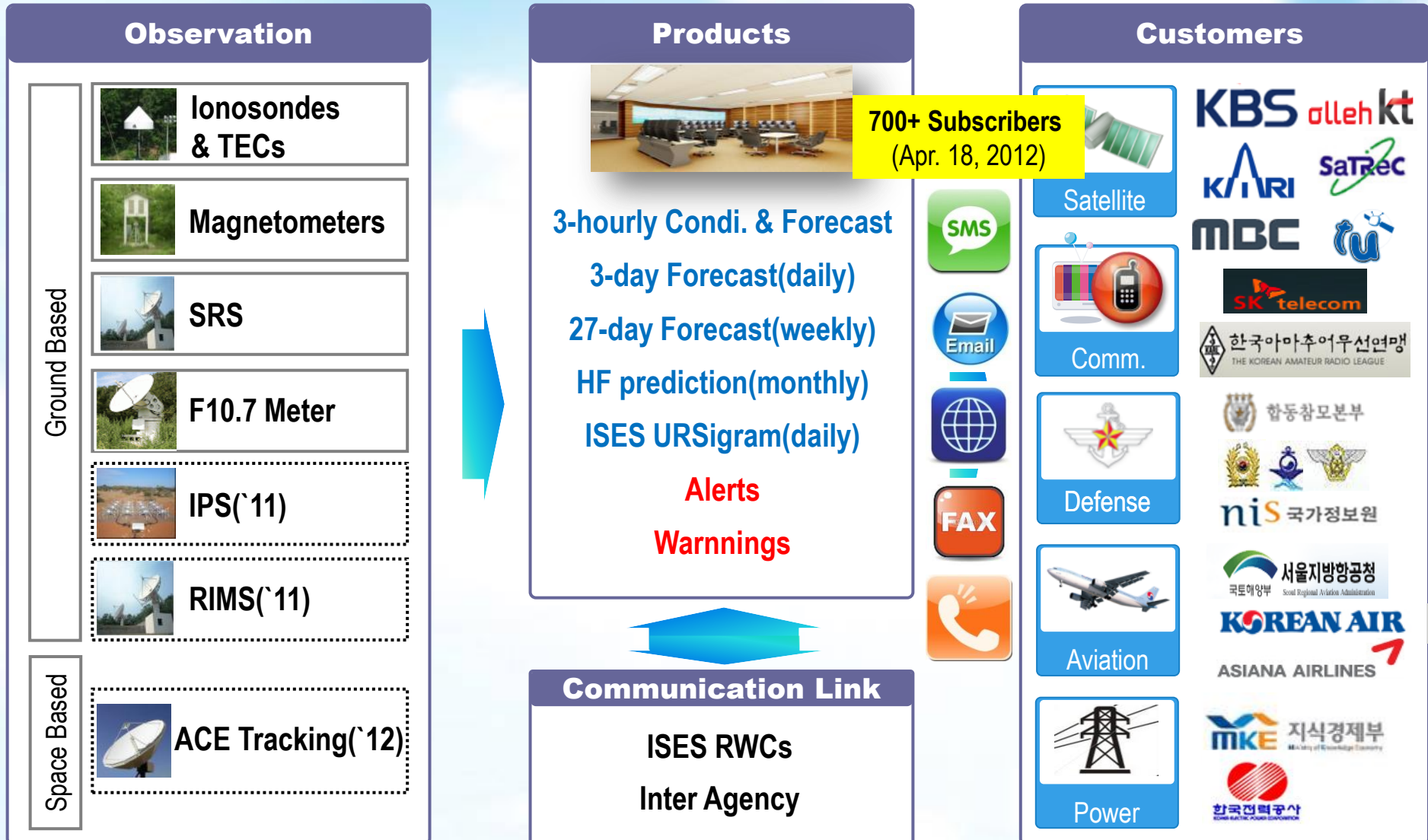
**KOREAN SPACE
WEATHER CENTER**



Key Message

- Monitoring space weather conditions and data collecting networks
- Producing daily forecast and issuing Alerts and Warnings
- 9hr/weekday in norm days, 24hr in SWx critical days

Operational Flow



Observation Networks in Korea



Alerts & Forecasts

Real Time Data

Space Weather and Effects

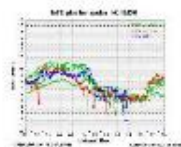
Instruments

About the Center

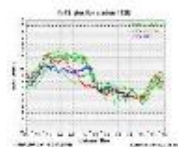
Real time data

[Click the images for a larger one]

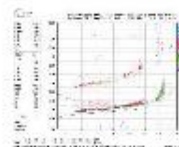
• Ionosphere



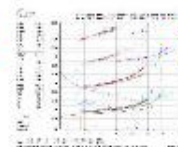
Icheon Ionosphere (foF2)



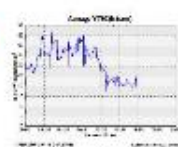
Jeju Ionosphere (foF2)



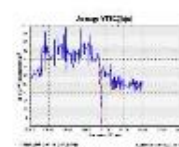
Icheon Ionosphere (ionogram)



Jeju Ionosphere (ionogram)

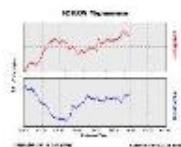


Icheon TECs

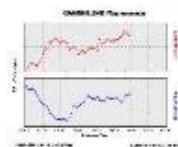


Jeju TECs

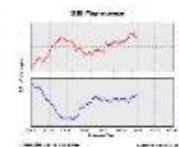
• Geomagnetic activity



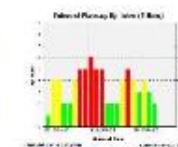
Icheon geomagnetic



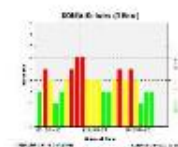
Gangneung geomagnetic



Jeju geomagnetic

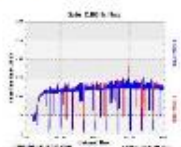


K_p Index

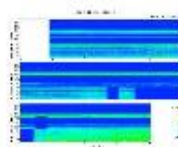


K_s Index

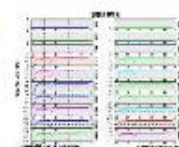
• The Sun



Sunspot activity (28GHz)

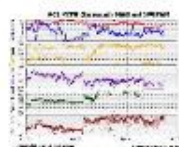


Solar radio activities

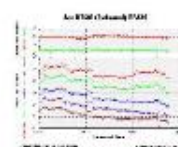


Solar Radio Noise Monitor

• Solar Wind



SOLAR WIND: Mag field & Plasma



Low Energy Electrons & Protons



Solar Wind Ground scope for Solar Wind



What does the space radio affects the Earth?

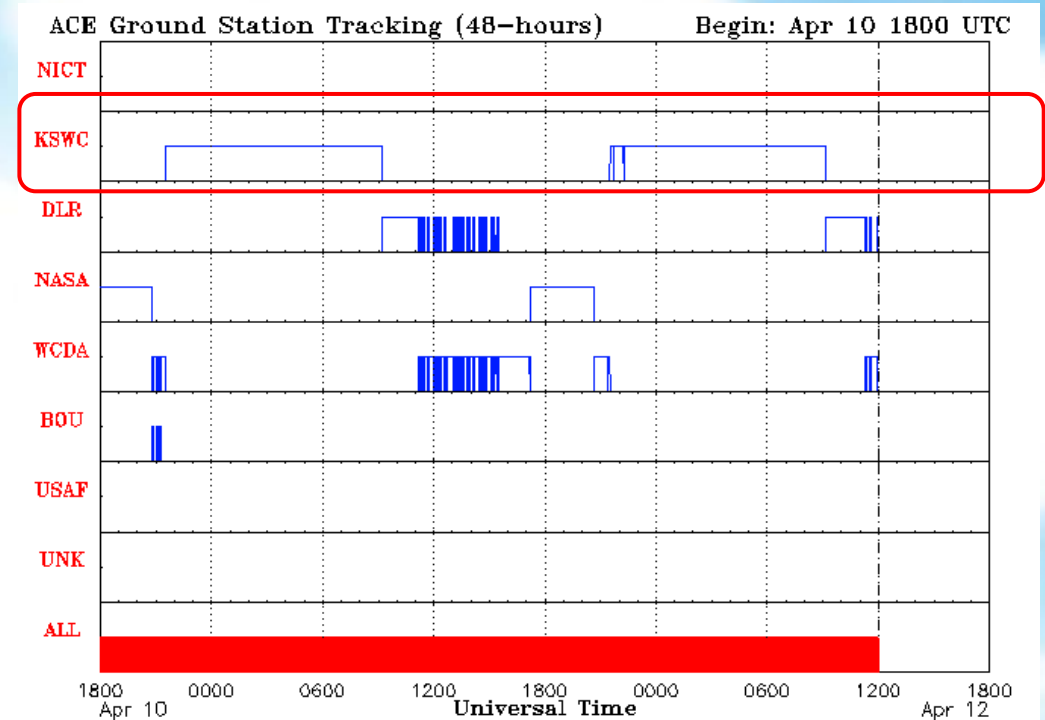
Provides information on HF-Communication, satellites, and solar activities to the public. [GO](#)

Cartoons about space weather for Children. [GO](#)

Observation Data [Go](#)

Space Weather Report [Go](#)

ACE Satellite Tracking Station



Updated: 2012 Apr 12 12:00 UTC

NOAA/SWPC Boulder, CO US

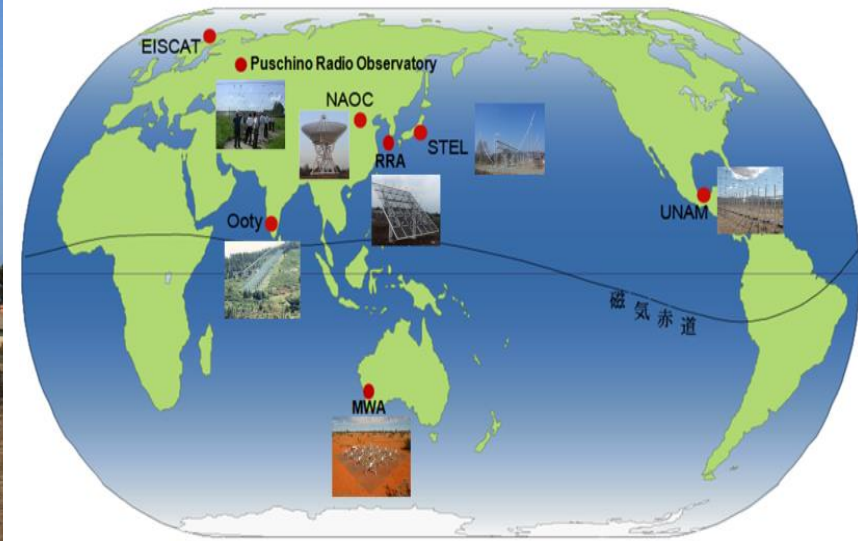
Key Message

- A 13-meter dish for receiving ACE's real-time solar wind data
- Serving the East Asia region starting Feb 2012
- Ready for ACE follow-on (DSCOVR)

Interplanetary Scintillation Monitor

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Key Message

- 32 tiles × 24 array elements (768 antennas, Active aperture $\approx 760 \text{ m}^2$)
- Digital beam formers for tracking 80 radio sources (327 MHz)
- Providing CME's speed, direction & density

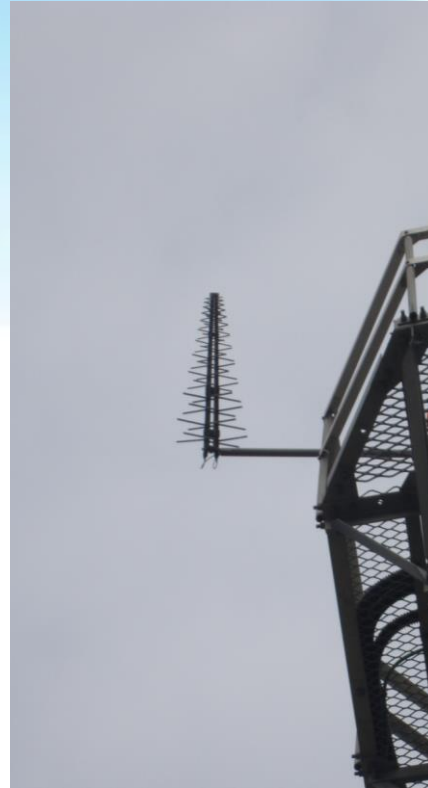
Solar Radio Interference Measurement System

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20~500 MHz



0.5~1 GHz



1~8 GHz

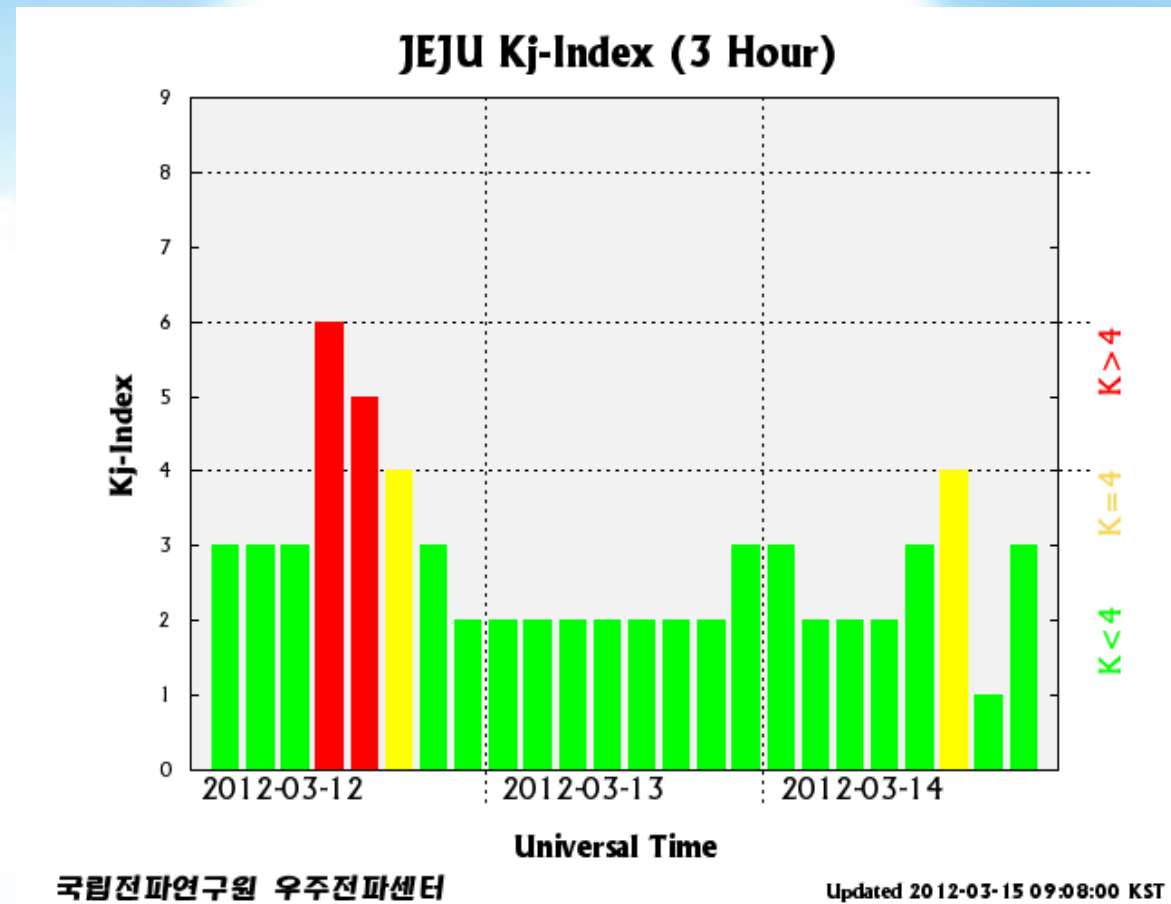
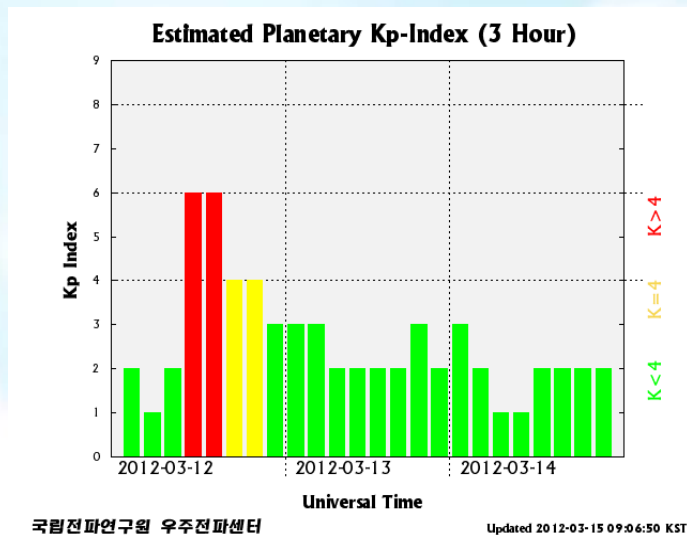


8~18 GHz

Key Message

- 20 points selectable, 20 MHz ~ 18 GHz
- Monitoring SRI on critical communication bands
- Validation is needed by comparing with USAF's RIMS

Real-time Local K-index



Key Message

- Using SWPC(Dr. Christopher Balch) algorithm
- Expecting to be added in SWPC's estimated Kp calculation

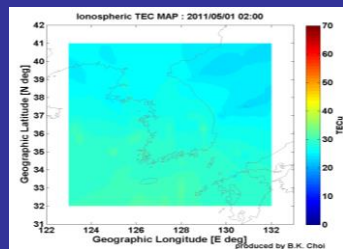
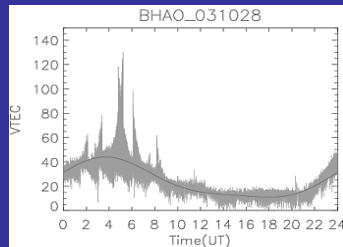
Migration to Customer Oriented Services

**Alerts & Warnings
for Global Disturbance**



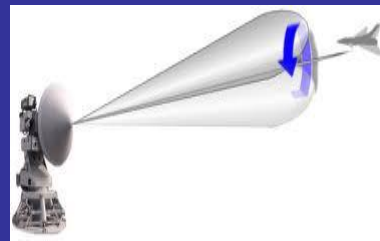
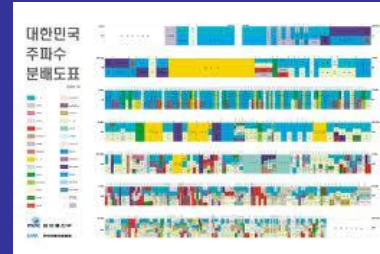
**Customized Alerts & Warnings
to Each User**

**Ionospheric
Disturbance Effect
Prediction**



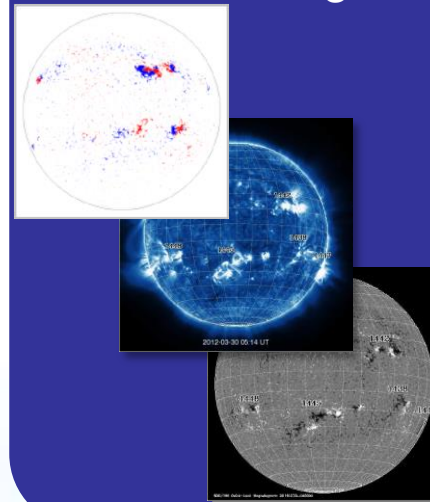
KASI

**Solar Radio Noise
Effect
Prediction**



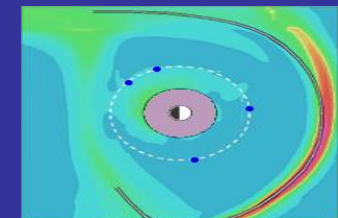
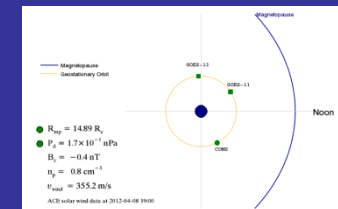
SET

**Solar Activity
Prediction
using Image
Processing**



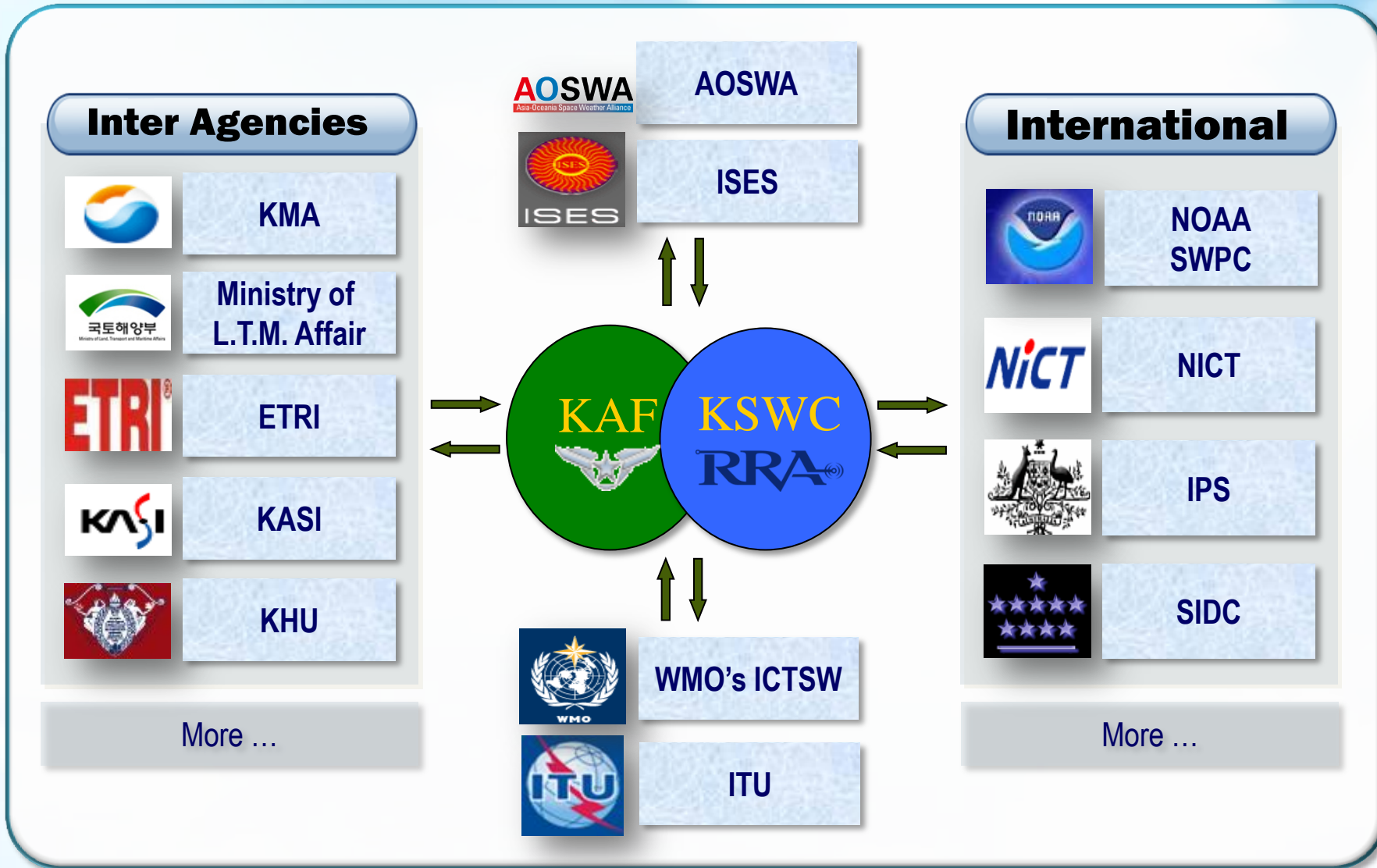
SELab

**GEO Satellite
Environment
Prediction**



SELab

Strong Partnership



The 14th RWC of ISES

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Thank you