Implementation plan for space weather operation by Korea Meteorological Administration

Seung Jun Oh¹, Do-Hyung Kim², Jae-Gwang Won², Jeong-Deok Lee¹, Sang Woo Lee¹ and Yong Ha Kim³

¹: SELab, Inc., Seoul, 2: Korea Meteorological Administration, 3: CNU, Daejon, Korea.

Overview

• What does KMA prepare the SWx operation for?

• How does KMA make implementation plan for SWx operation?

• What is the implementation plan of SWx operation by KMA?
What does KMA prepare the SWx operation for?
Motivation

- The Relevance of SWx to Meteorological services (WMO, 2008)
  - SWx relevance to the observing function
    - SCOPE of integrating SWx and meteorological observations
  - SWx relevance to the delivery of meteorological services
    - SCOPE for integrated services
- SWx operation is urgently required in Korea for KMA to be prepared for launching and operating Communication, Oceanic and Meteorological Satellite (COMS) scheduled in 1st half 2010
- Recently, space weather is increasingly being considered as an extension of terrestrial weather.
How does KMA make implementation plan for SWx operation?
**Strong**
Observation and public service infrastructure and experiences

**Weak**
No organization or resources allocated to SWx operation until 2008

**Opportunities**
SWx operation with public service responding to emerging needs of various customers

**Threatening**
Late Comers in SWx communities

---

**Preliminary research for Implementation plan**

**Collaborative works (2009)**

- **Analysis**
- **Workshop**
- **Potential role**
- **Panel Discussion**
- **Planning**
- **Documentation**
Strong
Observation and public service infrastructure and experiences

Weak
No organization or resources allocated to SWx operation until 2008

Opportunities
SWx operation with public service responding to emerging needs of various customers

Threatening
Late Comers in SWx communities

Preliminary research for Implementation plan

Collaborative works (2009)

Analysis + Workshop
Potential role + Panel Discussion
Planning + Documentation

Researcher group
Analysis

• Internal Circumstances
  • MT vision 2040
  • organization and resources
  • Infrastructure of public service (forecast, nowcast, severe weather alert)

• Current status and plans in SWx activities by relevant organizations in Korea

• International collaboration activities for SWx operation
Workshop

During the preliminary research period, workshop was held at KMA to promote the basic understandings of SWx phenomena and to share the information of SWx activities by the relevant organization in Korea.

It consists of 3 sessions:

- Invited talk by SWx researchers
- Presentation for introduction of SWx activities from relevant organization
- Panel discussion about the coordination of collaboration among SWx related organization.
Summary of Panel Discussion

- Participants from almost all SWx-related organization in Korea shared their current status and position with each other.

- Panels and participants basically reach consensus on the need for coordination of collaboration in Korea, for instance, SWx council which represents all the SWx related organization. However, the concrete way on framing the collaboration remains pending issue.

- All the SWx relevant organization should try to make an effort to increase public awareness of the need for SWx activities in Korea.
What is the implementation plan of SWx operation by KMA?
• Solar Flare Tel.
• Solar Imaging Spectrograph
• All sky cam
• GNSS-station(6)
• VHF coherent scatter Radar

KASI

• VHF meteor Radar
• SATI, F-P Interferometer
• GNSS receiver
• All-sky camera
• DIGIsonde

KOPRI

• Flare+magnetic observation system
• GNSS-station(6)

KIGAM

• Ionosonde
• Solar Tel.
• Solar Radio Tel.
• Geomagnetic Monitor

RRA

• GNSS-station(16)
• GNSS-station(30)
• GNSS-station(5)

GPS Stations (91)

Defense

• Incorporation of SWx modeling capabilities
• Establishment of Firm ground for the development of operational services.
• Communization of SWx forecasting in public domain

International Organization

• Assembling Domestic/International SWx information
• Coordination of Collaboration with relevant organization
• Public release of SWx information

Hub for SWx information
Platform for SWx forecast technology

Endusers

Expert Group
Vendor
Customers
Organization of KMA

• The coordination of plan is carried out by Director general for Planning & Coordination

• Currently SWx operation planned is assigned to Korea Meteorological Satellite Center

• The Korean Aviation Meteorological agency is expected to play an part to deliver the SWx information to the aviation relevant customers.

• National institute of Meteorological research plays a part to support SWx research activities.
Organization of KMA

- The coordination of plan is carried out by Director general for Planning & Coordination.

- Currently SWx operation planned is assigned to Korea Meteorological Satellite Center.

- The Korean Aviation Meteorological agency is expected to play a part to deliver the SWx information to the aviation relevant customers.

- National institute of Meteorological research plays a part to support SWx research activities.
Roadmap

**SWx Monitoring & Forecasting**
- 2009: SWx Monitoring & Forecasting
- 2010: Infrastructure & Testbed
- 2014: Operation & Public Service
- 2017: SWx Prediction Service

**SWx Data Archive & Service**
- 2009: SWx Data Archive & Service
- 2010: Assembling & Common Data Base
- 2014: SWx Data Center Operation
- 2017: SWx Data Distribution

**Space Observation**
- 2009: Space Observation
- 2010: Feasibility Study Mission definition
- 2014: Critical Design Application Development

**Research & Development**
- 2009: Research & Development
- 2010: Basic Research (Modeling/Application)
- 2014: Leverage Technology

**Coordination of Collaboration**
- 2009: Coordination of Collaboration
- 2010: Dispatching a research
- 2014: SWx Forecasting Training Program
What is going on in KMA right now?
Ongoing activities in 2010 -1

- KMA has launched a 4 year project for integration of GNSS data from nation-wide GNSS stations.

- The targeted number of stations for integration is 91 stations from KASI and National Geographic Information Institute (NGII) to get regional TEC map with approximately 1°x1° spatial resolution.

- The TEC and the precipitable amount will be derived aiming at being archived and distributed to users in real-time basis with 30min cadency.
Ongoing activities in 2010 -2

• The development of space weather monitoring test bed is launched.

• The objective of the project is the trial operation after launching and operating KMA’s meteorological Geo-stationary satellite.

• Applications of real-time monitoring data and incorporating modeling capabilities from the SWx research communities will be tested and challenged to assure to help a successful mission.

Testbed for SWx monitoring system

High energy particle and geomagnetic field
• The preliminary and feasibility study for meteorological mission of the follow-on satellite was finished in 2007 and 2008, respectively.
• COMS follow-on satellite program is scheduled to begin in 2011, and to be launched in 2017.
• KMA is planning to develop the payload for space weather as well as the high performance MI of the next generation satellite is now actively on proceeding.
Summary

• KMA has established the implementation plan for space weather operation carrying out preliminary research in collaboration with research communities.

• The implementation roadmap of the operation was planned considering the coordination of the activities and the time-lines of launching COMS & designing COMS-follow-on.

• In 2010, 1st year of implementation, KMA is actively on the way to perform the action items according to the implementation plan.
KMA and relevant organizations in Korea are on the way to make their best efforts to coordinate to enhance collaboration.