Korea Meteorological Administration

Australian Government
Bureau of Meteorology

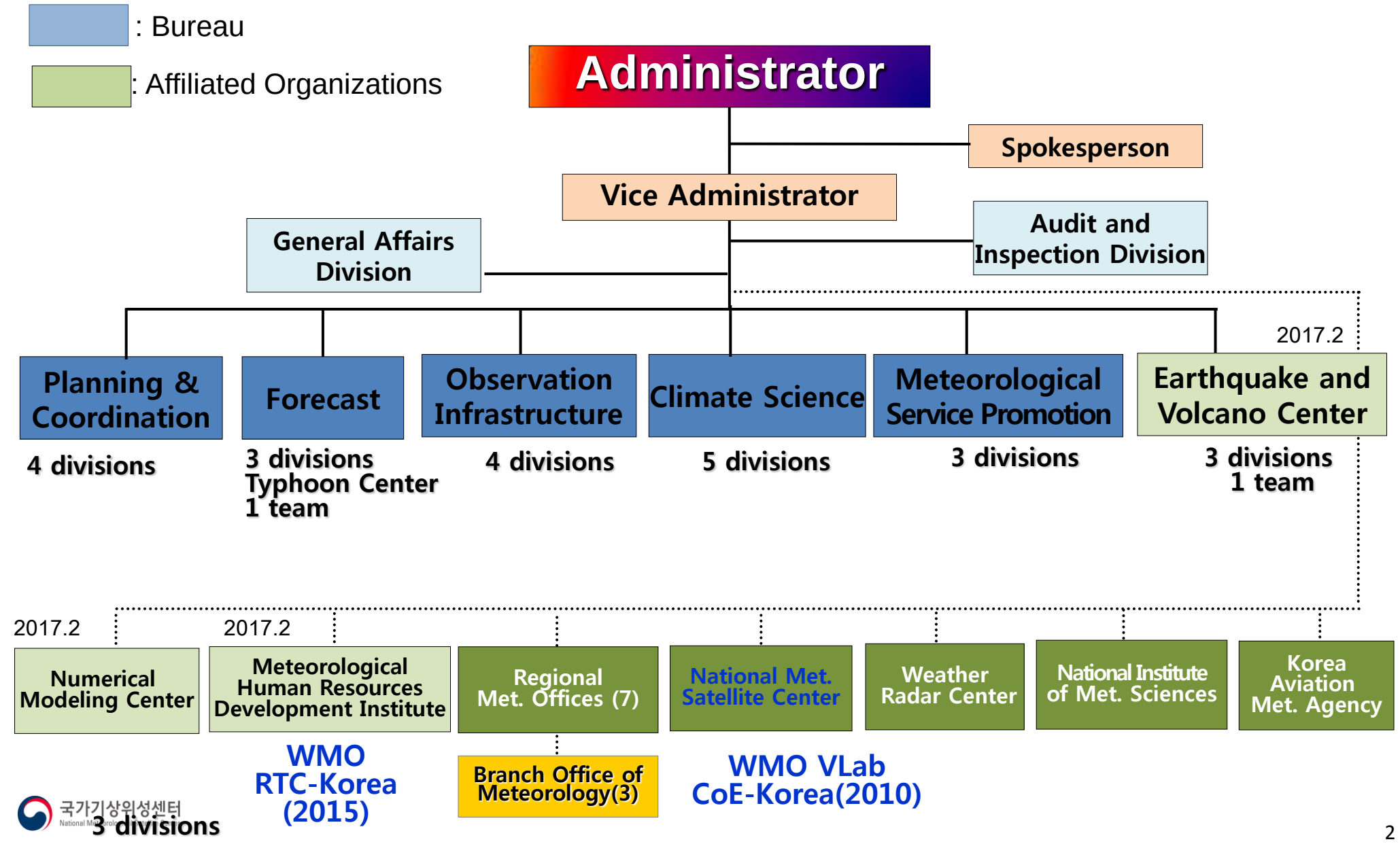
WMO RTC KOREA (in Seoul)

May 2017

Hye-Sook PARK
(hyesookpark@korea.kr)

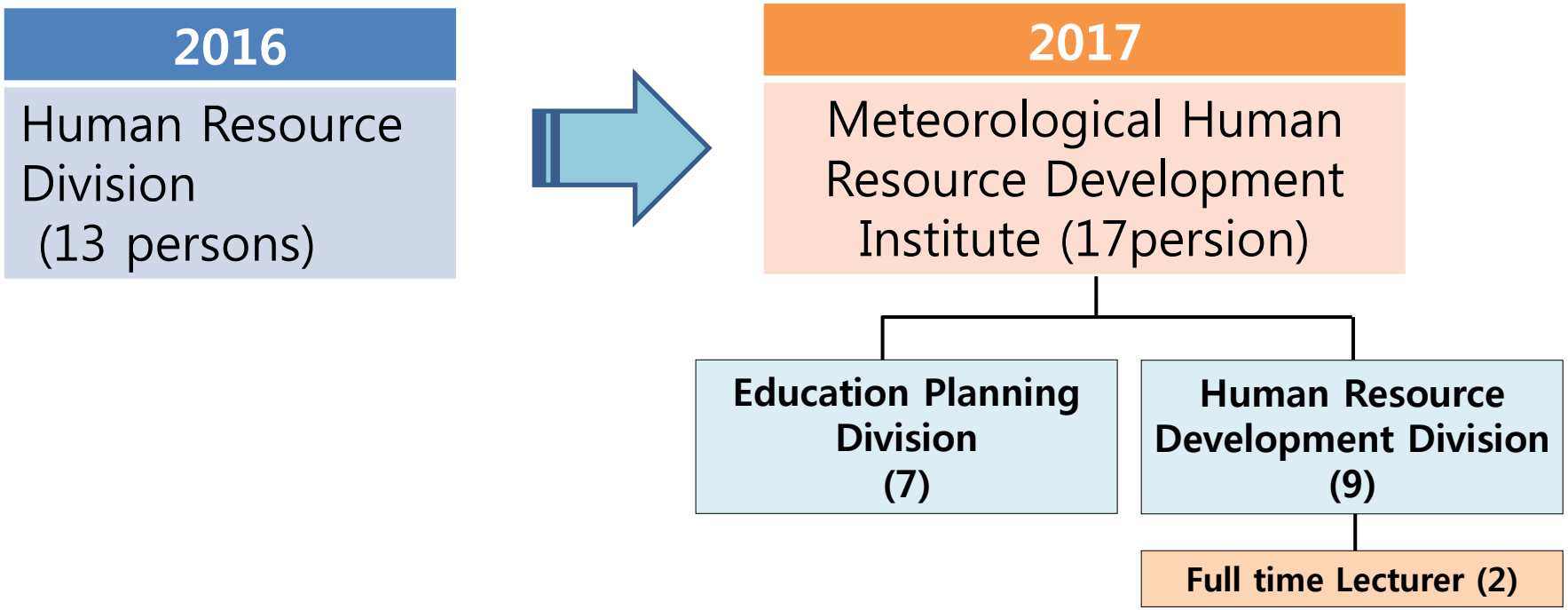
National Meteorological Satellite Center (NMSC)
Korea Meteorological Administration (KMA)

Organization of KMA (2017)



Meteorological Human Resources Development Institute (MHRDI)

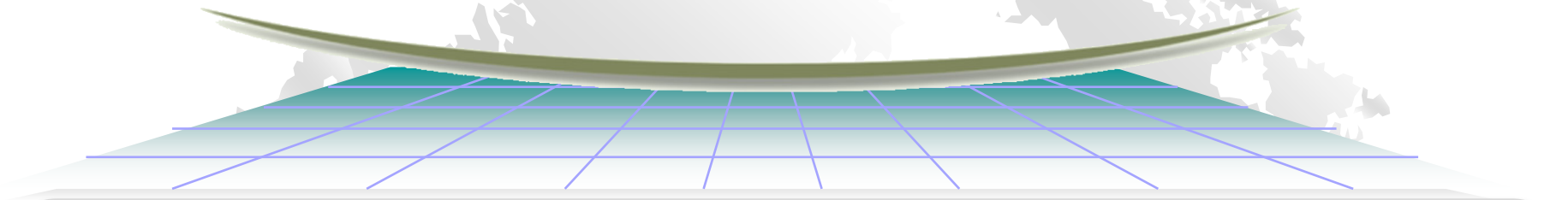
- MHRID was established in Feb. 2017 as affiliated organizations for national higher education and training in Meteorology



- MHRID has become a member of WMO Regional Training Center in 2015

Vision and Goals of RTC-Korea

To realize advanced meteorological service



- **To enhance the professional capabilities of KMA personnel**
- **To popularize weather-related knowledge to the public**
- **To contribute to the development of international meteorological technologies**

Classification of KMA Education and TRaining Programme (ETRP)

Classified to 3 categories by the target trainees

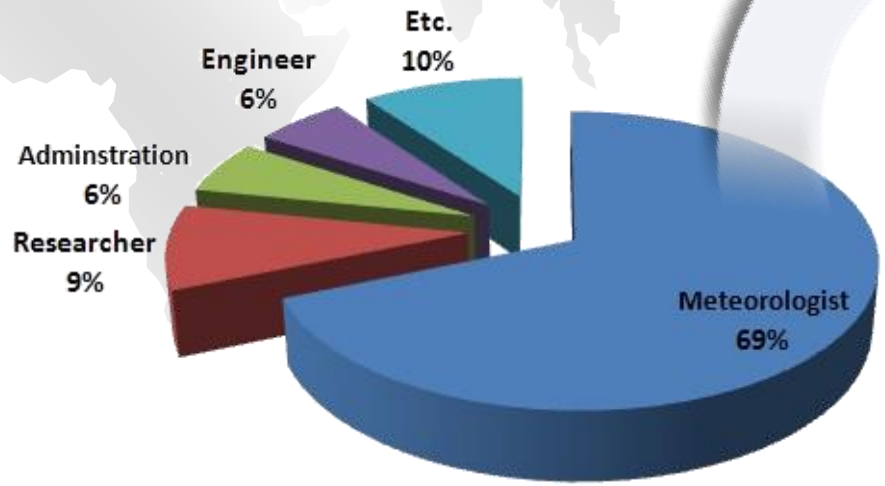
1. Training for KMA personnel
2. Education for the Public
3. International Programmes

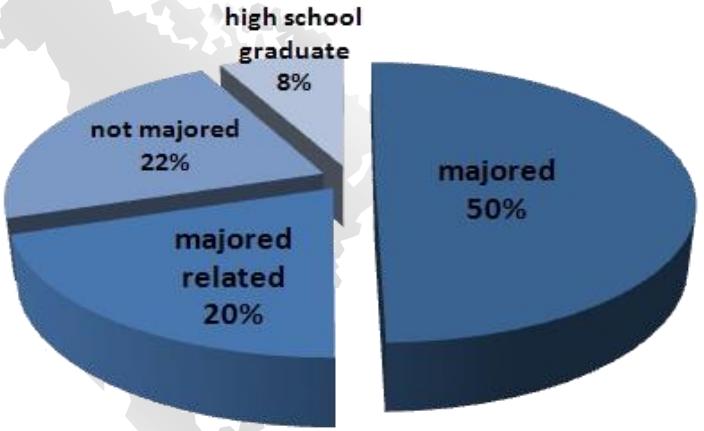
Training for KMA Personnel

Composition of KMA personnel

Total 1,326

- **Meteorologists 912**
- **Researchers 123**
- **Administration 78**
- **Engineers 77**
- **Etc 136**





- **92%** of Meteorologists a bachelor's degree or over
- **76%** of these majored in meteorology or related fields

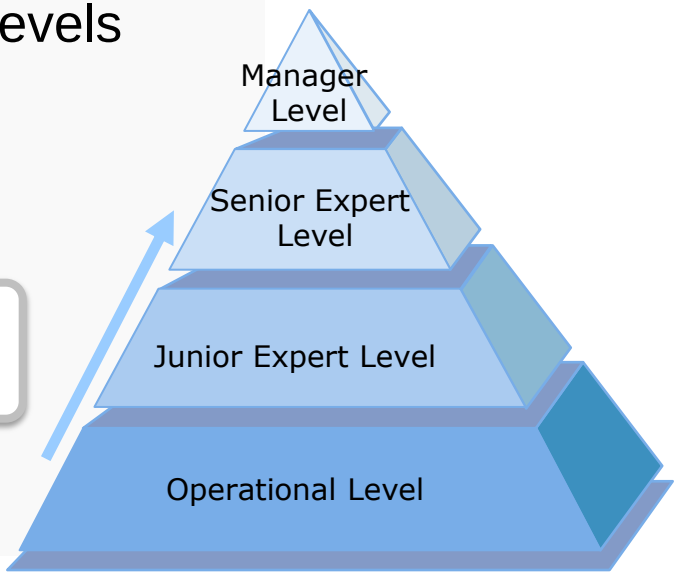
Training for KMA Personnel

Design of Education and Training

Conjunction with CDP (Career Development Programme)

- Design training programmes tailored to position levels and specialized occupational fields

1 Classified by position levels



2 Classified by Specialized Fields

Forecast Group			Observation Group			Admin. Support Group	
Mid- & Long Term Forecast	NWP	Climate & Ocean Met.	Met. observation	Remote Sensing (Radar, Satellite)	Earthquake	Info. & Telecom.	Planning & Admin.

Training for KMA Personnel

Training Volume in 2016

- Attendance : 33 courses, 1157 staff, 10232 person-day
  - Tailor made : 29 courses, 1097 staff
  - 4 international courses, 60 foreigners
- E-learning : 55 courses, 2897 staff and citizens
- Special Lectures for staff : 20 times, 1149 staff
- Public : 16 courses, 11962 citizens

Training for KMA Personnel

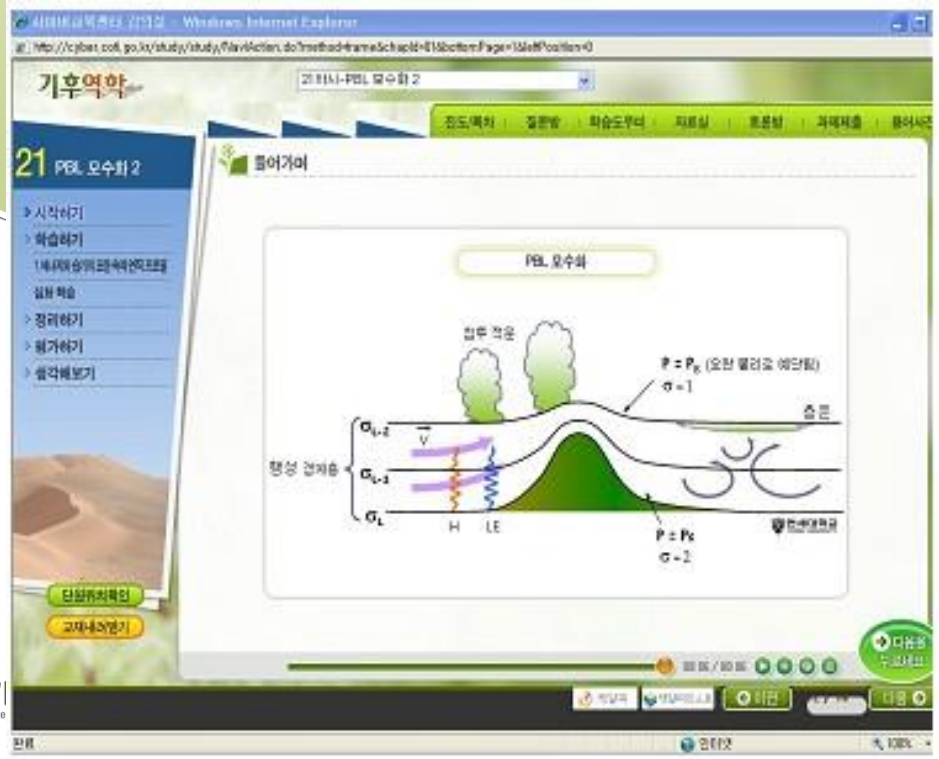
Long-term course for Forecasters

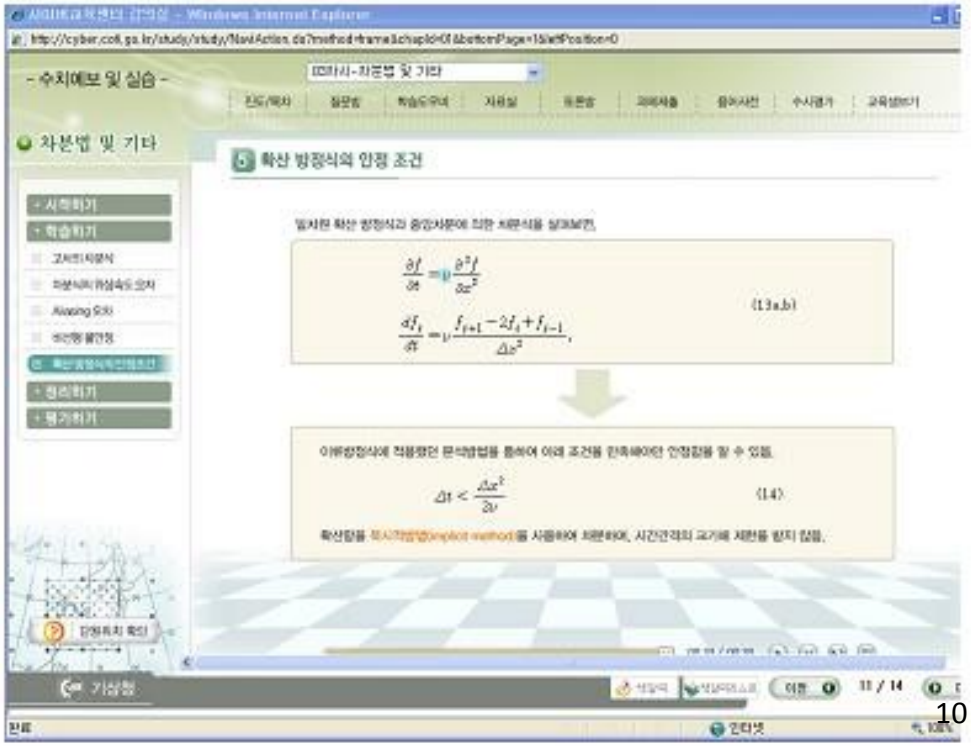
- **To cultivate situational awareness and decision making skills of forecasters**
- **5 months (Distance Learning 1 month + Attendance 1 months + OJT 3 month)**
  - Distance learning: study meteorological theories by self-directed learning
  - Attendance classes: focus on theoretical training
  - On the job training such as case study

Training for KMA Personnel

E-Learning education(domestic, Korean)

- New trend for education
- KMA has developed 32 on-line contents and system
- Self-directed learning that study at any time wherever internet is available
- Opened 52 courses for KMA staff members in 2016

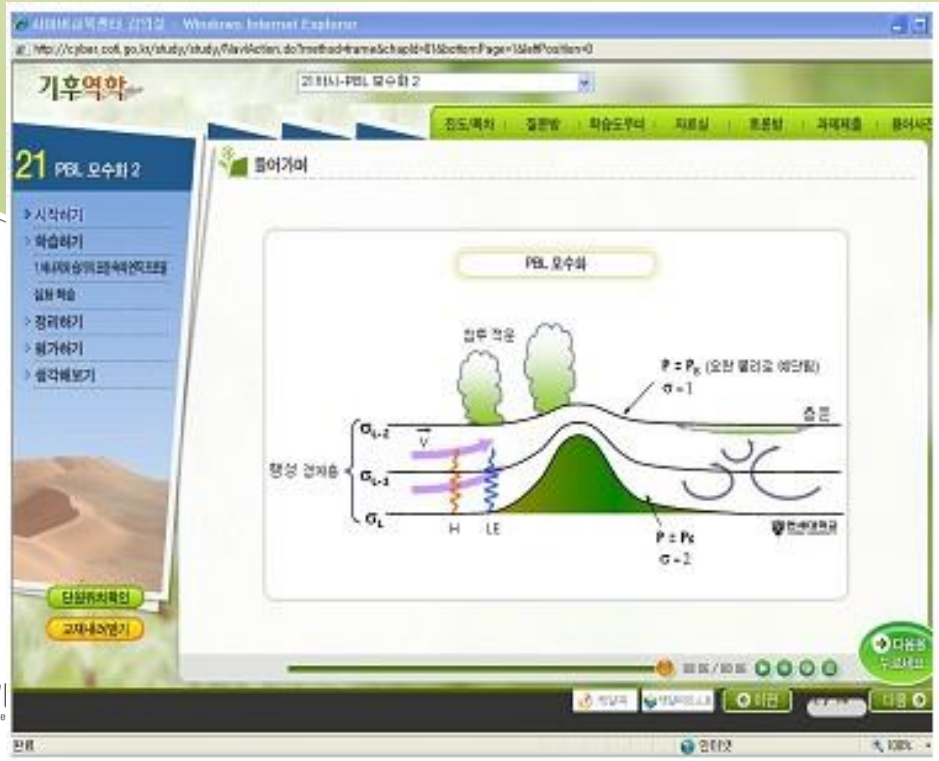


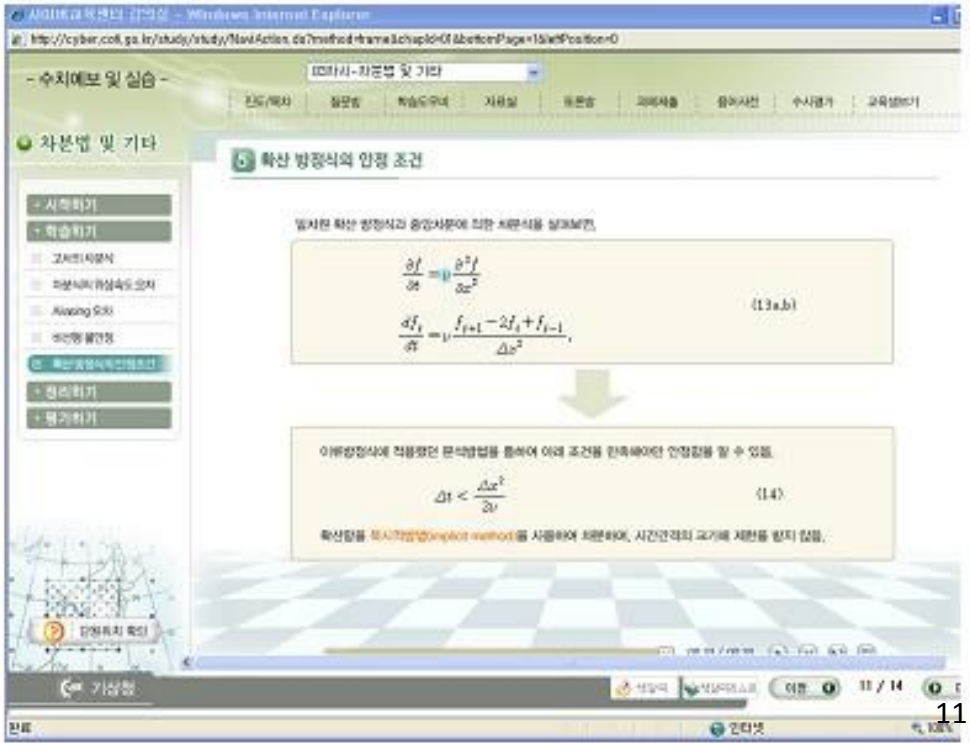


Training for KMA Personnel

E-Learning education(domestic, Korean)

- New trend for education
- KMA has developed 32 on-line contents and system
- Self-directed learning that study at any time wherever internet is available
- Opened 52 courses for KMA staff members in 2016





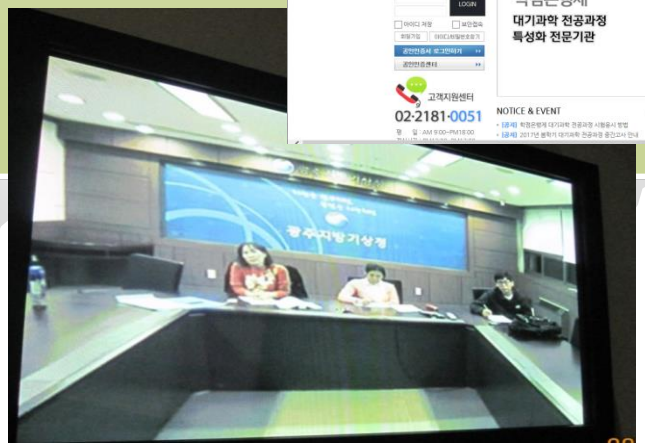
Training for KMA Personnel

KMA Met. College

- On-line for KMA staff and the public
  - on-line + remote real-time lecture + attendance class
  - Spring semester(Mar-June), Fall semester(Sept-Dec)
- Base on **Credit Bank System** implemented by the Ministry of **Education**
  - By earning appointed credits through this course,

    Bachelor of Science can be given
    - A graduate holder : 48 credits for science
    - No Bechelor : 140 credits(60 credits for meteorology)
    - Evaluation : exam(60%), homework(20%),

      Attendance(25%) , participation(5%)



Training for KMA Personnel

KMA Education Library(on-line, Korean)

- On-line for KMA staff and the public
  - Meteorology, quality(leadership, language, etc), Information
  - Courses are opened once a month to the registered person
- Course for Meteorology
  - Basic course : 4 courses (Weather, Marine, radar, satellite)
  - Specialized courses (25 course)

Data processing and practice(1), Climate change (4), Climate(1), Earthquake(1), Typhoon(3), Tropical Meteorology(1), Micrometeorology(1), Forecasting(2), Synoptic Meteorology(1), air pollution(1), thermodynamics(1), Atmospheric radiation(1), Observation and practice(1), Agricultural meteorology(1), Aeronautical meteorology(3), Marine Meteorology

Education Programmes for the Public

➢ **Targeting weather-related workers**

- Civil workers, weather-sensitive workers, teachers, weather casters, etc
- Disaster prevention, climate change, observation standardization

Education Programmes for the Public

- **Weather experience camp for students to foster younger generations**

- Visit to the school in the backwoods or invite students to KMA

- prepared a bus for moving weather class in 2011

International Programmes

Representative ETR Courses

Courses	Period	Contents
ICT	3 weeks	ICT for weather business and NWP model operation
Satellite	3~4 weeks	Satellite data processing, data analysis, application and utilization
Radar	2/3 weeks	Weather radar purchasing, installation, operation and data analysis
Forecast	3 weeks	Education and training for weather forecasters
NWP	2 months	Data assimilation, NWP processing, post processing
Climate Prediction	3 weeks	Seasonal prediction, climate analysis and application

ICT : Information, Communication Technology

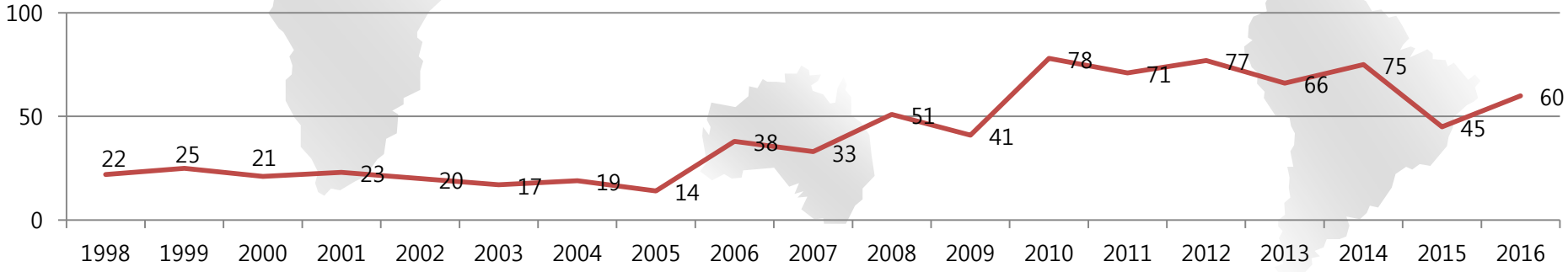
International Programmes

Training Title	Year	Duration	Size	Region	Participants
ICT for Meteorological Services	2006~	21 days	15 persons	RA Ⅱ	**190 persons**
Meso-scale Numerical Weather Prediction	2007~	60 days	1~3 persons	RA Ⅱ	**10 persons**
Analysis of COMS data	2007~2013	28 days	13~19 persons	RA Ⅱ, RA Ⅴ	**93 persons**
Improvement of Meteorological Satellite Data Analysis and Application Capacity	2016~2018	24 days	13~19 persons	RA Ⅱ, RA Ⅴ	**22 persons**
Weather Radar Operation and Data Utilization	2012~	14 days	16~19 persons	RA Ⅱ, RA Ⅴ	**80 persons**
Weather Forecast	1998~2005	26 days	14~25 persons	RA Ⅱ, RA Ⅴ	**196 persons**
Improvement of Meteorological Disaster Responsiveness	2009~2012	21 days	10~17 persons	RA Ⅰ	**50 persons**
Others					**155 persons**
Total					**796 persons**

International Programmes

International Training Course from 1998 to 2016

- Total 796 **people** from 79 **countries**
  - RA Ⅰ (116 people, 26 countries) : Kenya, Ethiopia, Tanzania, Ghana, etc.
  - **RA Ⅱ (474 people, 31 countries) : Mongolia, Vietnam, Bangladesh, Sri Lanka, etc**
  - RA Ⅲ (27 people, 9 countries) : Peru, Chile, Cuba, Honduras, Ecuador, etc.
  - RA Ⅳ (2 people, 2 countries) : Jamaica, Federated States of Micronesia
  - RA Ⅴ (175 people, 10 countries) : Indonesia, Fiji, Philippines, Malaysia, etc.
  - RA Ⅵ (2 people, 1 country) : Belarus



Future Plans of RTC - Korea

Establishment of Capacity-based ETR courses for 10 fields

- Forecasting, NWP, Satellite, Radar, Typhoon, Marine Meteorology, Climate, Aeronautical Meteorology, Hydrology, Earthquake

구분	Weather Forecasting	Satellite, Radar, NWP	Earthquake, Climate, Typhoon, Aeronautic, hydrology, Marine
1 Level	Basic ('17 ~)	Basic('17 ~)	Basic('17 ~)
2 Level	Foundation('17 ~)	Foundation('17 ~)	Foundation('18 ~)
3 Level	Advanced('17 ~)	Advanced('18 ~)	
4 Level	Specialized('17 ~)		

Development e-learning contents (English) and Expanding e-learning service to Mobile phone

Open more various training courses for the Public

- To raise the awareness of weather information utilization to mitigate disasters caused by severe weather

Secure full-time lecturers for 10 fields step by step

- (2016) 2 person → (2020) 10 person

Training Courses in 2017 by RTC-Korea

- Attendance : 44 courses, 1287 staff
  - Tailor made : 40 courses, 1227 staff
  - 4 international courses
- E-learning : 53 courses, 2750 staff and citizens
- Special Lectures for staff : 16 times, 1130 staff
- Public : 21 courses, 12730 citizens

Korea Meteorological Administration

Australian Government
Bureau of Meteorology

Activities of CoE-KOREA

May 2017

Hye-Sook PARK
(hyesookpark@korea.kr)

National Meteorological Satellite Center (NMSC)
Korea Meteorological Administration (KMA)

Introduction of NMSC

NMSC

Organization & Personnel

- Composed of 3 divisions and 1 team (Satellite Planning Division, Satellite Operation Division, Satellite Analysis Division, Next-generation Satellite Developing Team)
- More than 120 staffs and researchers are working

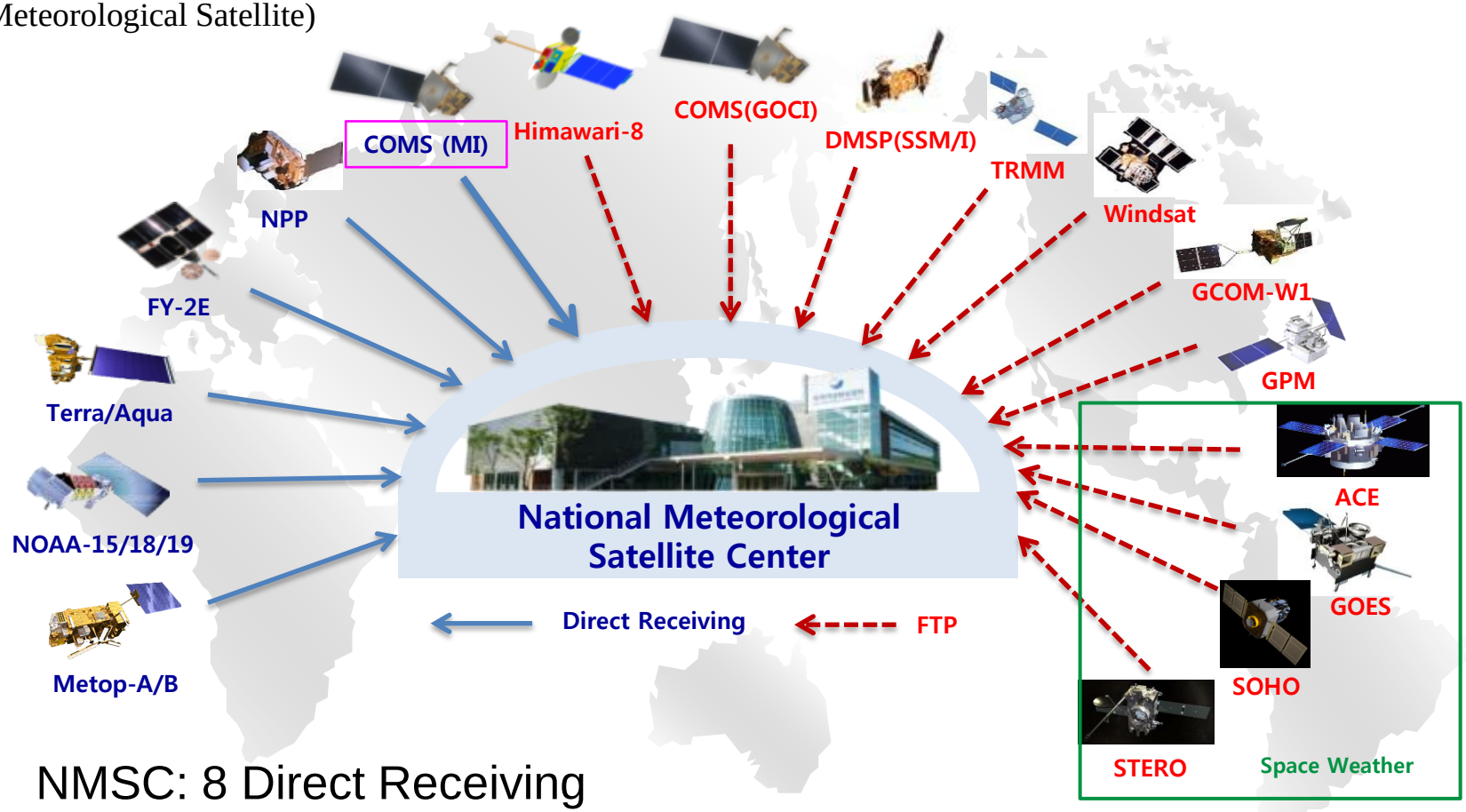
Mission

- To support KMA mission : prompt, more accurate and valuable meteorological services for public safety and climate adaption

☞ **To ensure the continuity of the satellite observations that are vital inputs to the weather, climate and environmental services for the benefits of the citizens and the economy**

Satellite data at NMSC : Reception

COMS(Communication, Ocean, and Meteorological Satellite)



NMSC: 8 Direct Receiving
Land-Line : 12

COMS Dissemination

COMS

HRIT/LRIT

MDUS
(Korea6, Foreign:7)

AFUS(Guam), Taiwan, Sri Lanka, Laos, Philippines, Australia, Japan

SDUS
(Korea5, Foreign:6)

Japan(JAMSTEC, Nippon Hakuyo Electronics, KaiyoMaru, Univ of Tokyo), Thailand, Vietnam

Raw data

HRIT/LRIT

NMSC

FTP

Real time

Korea(24) : Agencies

Foreign(3) :
Univ of Wisconsin(SSEC Data Center)
Univ of Colorado(CIRA)
Hong Kong Meteo Agency

DCPC

Internet

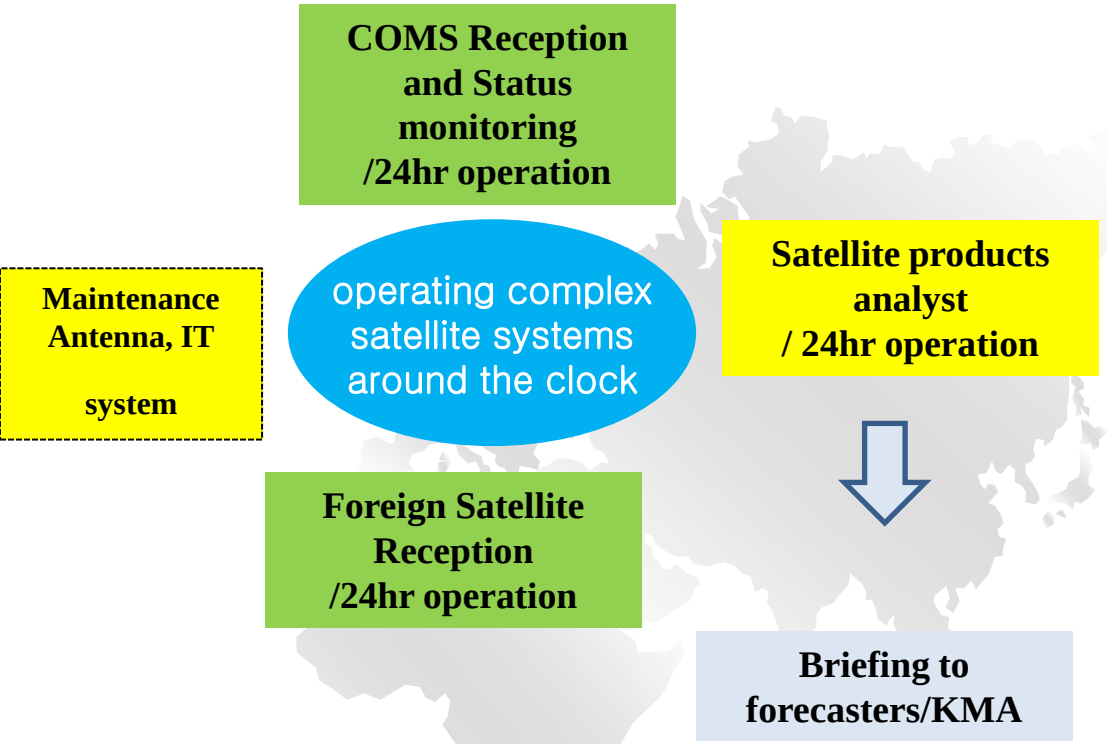
Korea

Foreign Country

HRIT(High Rate Information Transmission)

LRIT (Low Rate Information Transmission)

Our Goals



Major Research & Developments('15~'16)

- Improvements using COMS data
- Climate & Hydrology using COMS, foreign Satellite
- Data preprocessing for NWP Model
- GK-2A Development
  - payloads, ground station, algorithms etc
- Planning the new Satellite (LEO)

- To develop a broad range of products from the satellite observations based on innovative algorithms for timely warning and support public and private decision making for our social and economic wellbeing as a science-based services agency.

WMO VLab CoE-Korea

- NMSC/KMA was approved as a **Centre of Excellence (CoE) in satellite meteorology and its supporting Satellite Operator and Agency in 2010** and has been a member of WMO/CGMS VLab group, in accordance with the successful launch and operation of COMS.

- NMSC is mainly involved in the continuing education and training to the forecasters in KMA to improve weather forecasting and environmental services by using the various satellite data.

- NMSC gives short-term lectures related to effective application of Geo and Leo satellite products to support domestic users relevant to climate, hydrology, aviation, marine, land etc.

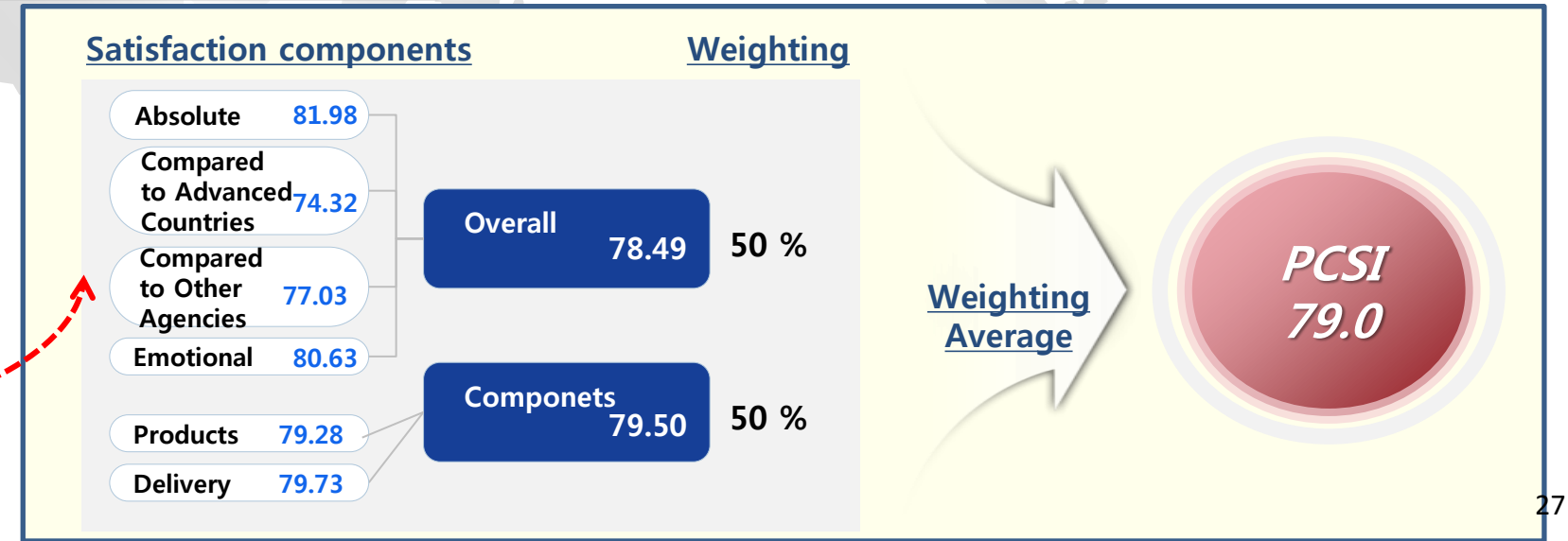
- NMSC also run an international inviting training course for the Asia-Pacific Regions since 2007

Satisfaction Survey Result for Satellite information Service (2016)

Targets(373 persons)	PCSI	Weighting
Public users(195)	75.61	0.35
Related Agencies(55)	77.20	0.25
International Users(37)	79.00	0.15
KMA Users(86)	76.52	0.25

Weighting average

PCSI 76.74



International Requests for the Improvements of Satellite Information Services

- Providing shareware software for the satellite data processing and analysis
- International collaboration Projects
- Sharing new satellite information (Geo-Kompsat-2A etc)
- Easy accessibility for satellite data
- Enlarge international training programmes
- Improve the training environment (ex. Free Wi-Fi, internet, scheduler etc)

Education and Training Programme For Satellite Data Analysis

1. Training for KMA forecasters
2. Education for the Public
3. International Users

Training for KMA Forecasters

- Annual training course on “Satellite image analysis and exercise” for the forecasters
  - Initial forecasting course : forecasters with 2~3 years’ experience,
    Understanding of satellite image to monitor of meteorological phenomena for 6hours
  - Foundational forecasting course : junior forecasters with 3~6years experience
    Practice of Satellite image and various products to analysis the atmospheric characteristics such as upper level trough/ridge, jet steam, cyclone, the change of upper level pressure systems for about 16 hours
  - Advanced forecasting course : Senior forecasters with more than 6years experience
    Understanding the conceptual model of cyclogenesis and apply the satellite image to the NWP products for nowcasting and validation of NWP results for about 10 hours

- Satellite course on “Tropical cyclone analysis”
  - basic theory and practice for tropical cyclone monitoring and analysis of cyclone center, intensity, strong wind area with 15m/s using subjective and objective Dvorak’s Technique (SDT & ADT)
  - targets/period : typhoon forecasters / 2~3days

Training for the Public

- Run the "Summer camp for COMS Meteorological Satellite" for 6 years since 2011 to secure future human resource by providing education of basic remote sensing theories, satellite image interpretation and exercise, science exhibition, exam etc
  - Duration : 4days
  - Size : 30 graduate or undergraduate students
  - Related fields : Meteorology, environment, physics, earth science, oceanography, geography etc.
  - Total participants : 201 persons for 6 years

Year	Periods	Participants
2011	22 Aug~25 Aug	30
2012	26 June~29 June	30
2013	25 June~28 June	30
2014	24 June~27 June	57
2015	25 Aug~28 Aug	24
2016	28 June~1 July	30

Training for the Public

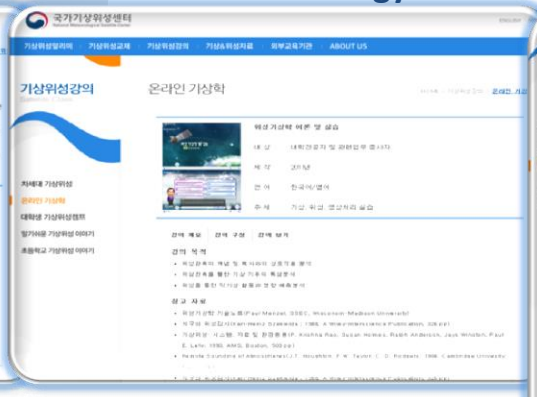
(http://cyber.nmsc.kma.go.kr)
(Korean only)

Online Lecture

Interpretation of satellite image

Next Generation Satellite

Satellite Meteorology



Camp for (under)graduate

Elementary students

Training for International Users

- 1st phase : "**Analysis of COMS Data**" for 9 years from 2007 to 2015 by inviting foreign users in the Asia-Pacific regions through the support of KOICA (Korea International Cooperation Agency).
  - COMS data receiving and processing system, ground system, satellite image interpretation and their application on the forecasting

Year	Duration	participants	Region	Countries
2007	16 days (9.2~9.17)	13 persons	RA Ⅱ, RA Ⅴ	**13**
2008	22days (9.18~10.9)	13 persons	RA Ⅱ, RA Ⅴ	**12**
2009	22days (9.3~9.24)	14 persons	RA Ⅱ, RA Ⅴ	**14**
2010	24 days (8.26~9.18)	19 persons	RA Ⅱ, RA Ⅴ	**11**
2011	14days (11.20~12.3)	4 persons	RAII	**1(Sri Lanka)**
	14days (6.10~6.23)	4 persons	RAII	
2012	21 days (9.2~9.22)	19 persons	RA Ⅱ, RA Ⅴ	**13**
2013	31 days (6.30~7.30)	15 persons	RA Ⅱ, RA Ⅴ	**8**
2015	7 days(3.1~3.7)	8 persons	RAII	**1 (The Philippines)**
	14days (5.31~6.13)	10 persons	RAII	
119 persons				

Major Achievement in 2016 (I)

- **2nd phase : International training course on "Improvement of Meteorological Satellite Data Analysis and Application Capacity" from 2016 to 2018 through the support of KOICA for the timely utilization of next generation satellite, Geo-KOMPSAT-2A data.**

- 1st course : 10. Oct. – 2. Nov. 2016 (24days)
- Participants : 22 persons from 14 countries over RA II & RA V

  * Nepal, Bangladesh, Solomon Islands, Timor-Lest, Cambodia, Laos, Sri Lanka, Vietnam, Myanmar, Mongolia, The Philippines, Indonesia, Uzbekistan, Bhuta

- Invited Lecturers : Mr. Bodo Zeschke(BMTC), Mr. Graeme Martin(CIMSS), Liam E. Gumley(CIMSS)
- Contents : 7 Modules(20 lectures and practices), Countries reports, Action plan building

Module 1	KMA's Meteorological Satellite Development Policy
Module 2	Meteorological Satellite Data processing & Products
Module 3	Understanding of Satellite images (exercise & practice)
Module 4	Application of Various GEO and LEO products (Nowcasting, Hydrology & Climate, Environment)
Module 5	Next Generation Satellites (GEO & LEO)
Module 6	2days' training events of AOMSUC-7
Module 7	Understanding of Korean Culture, Industries

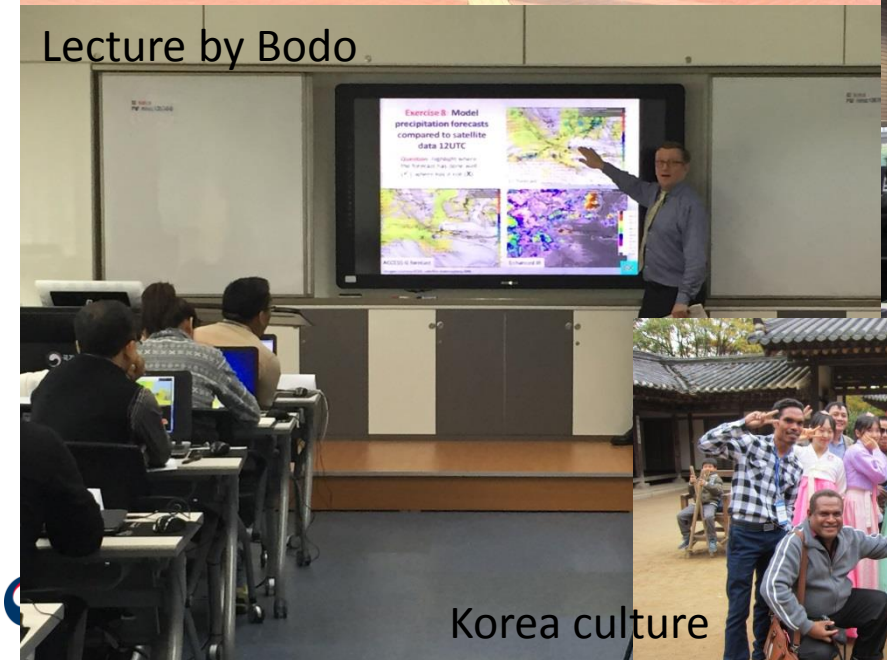
Training course activities in 2016

Group photo

Country reports

Korea Meteorological Industry exhibition


Exercises



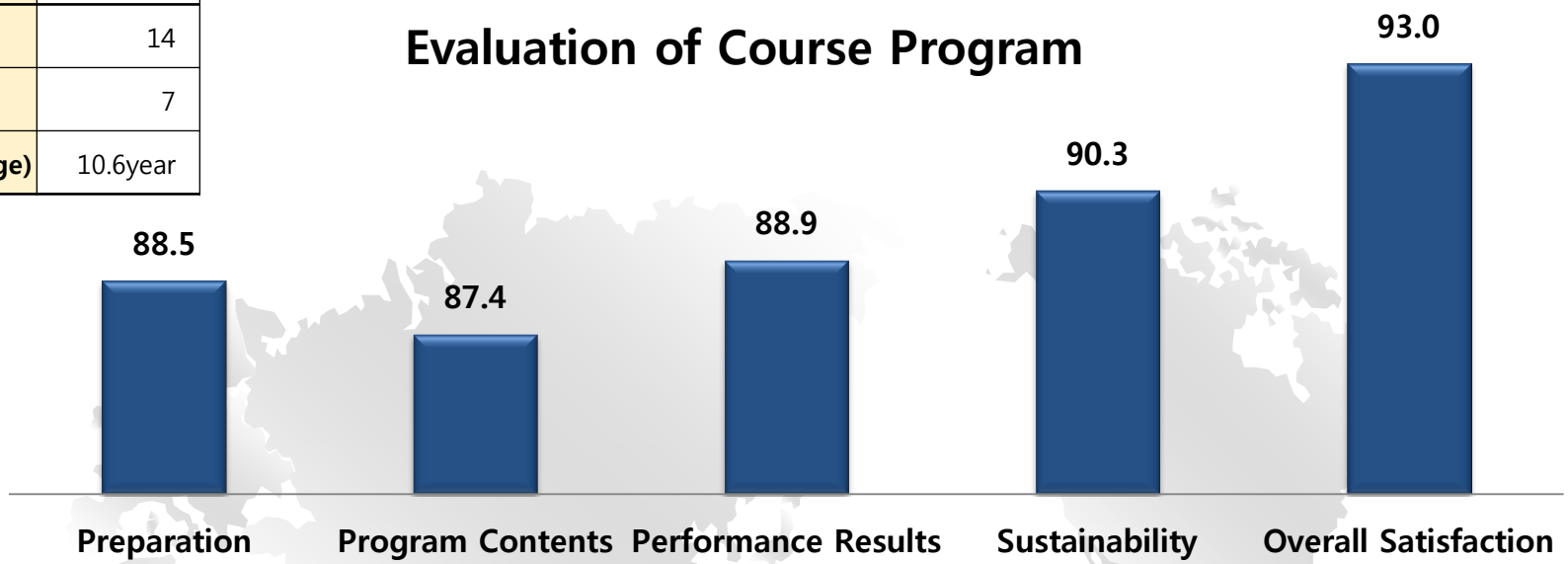
Lecture by Bodo

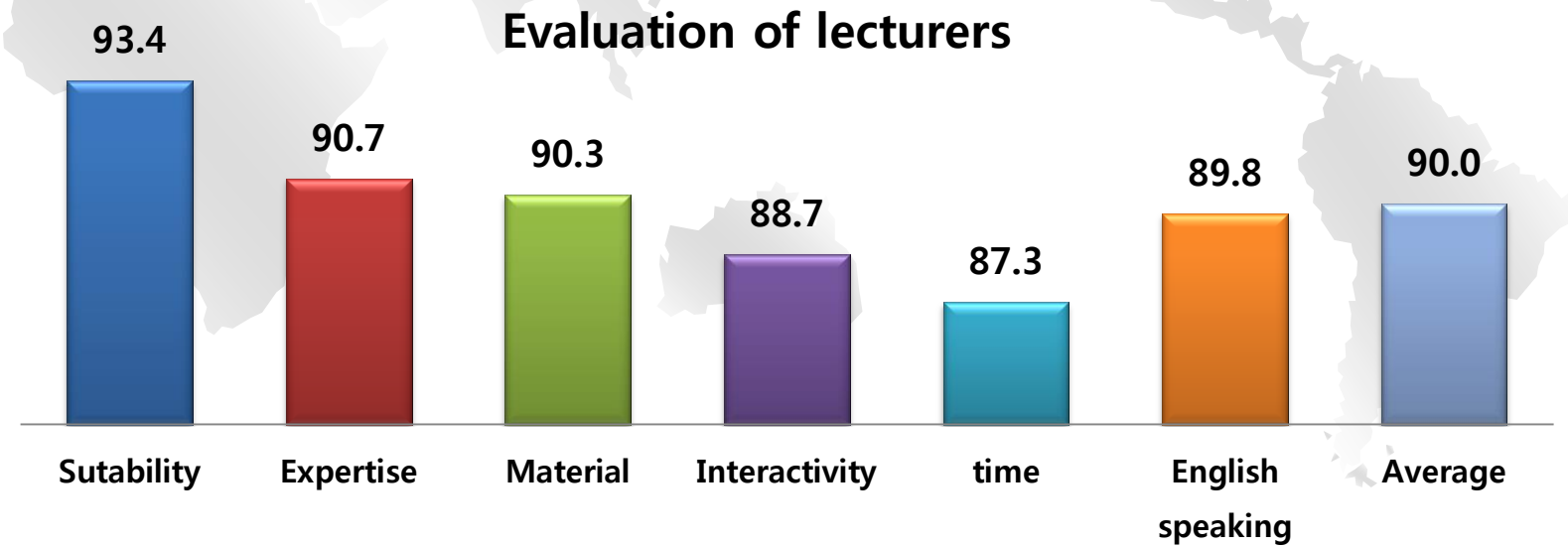

Korea culture


Practice

Satisfaction Survey for KOICA Global Training Course(2016)

Targets		21
sex	Male	14
	Female	7
Working year(average)		10.6year





국가기상위성센터
National Meteorological Satellite Center

Major Achievement in 2016 (II)

- **RA II & RA V High Profile Training Programme related to 7th Asia-Oceania Meteorological Satellite Users Conference(AOMSUC-7)**
  - Period : 21. Oct. – 22. Oct. 2016 (2days)
  - Participants : about 60 persons from 31 countries over RA II & RA V
    * invited foreign lecturers (6), foreign trainees (41)
  - Contents

Session 1	CSPP-LEO Satellite Data and Products using HYDRA (Mr. Liam E. Gumley)
Session 2	CSPP-GEO Satellite Data and Products using HYDRA (Mr. Graeme Martin)
Session 3	Satellite-based Rapidly Developing Thunderstorm(RDT) Detection and Tracking (KMA, JMA, CMA, BoM)
Session 4	Satellite Image Analysis & Practice using KMA's satellite data analysis system (Ms. Ok Hee, Kim)

2days' training events activities at AOMSUC-7

Group photo

Address by Dr. Wenjian Jhang

Lecture by Bodo

Ice Breaker

CSPP-GEO & LEO exercise

Future Plans of CoE - Korea

For Forecasters

- Produce guidances for meteorological phenomena analysis using various satellite data (Storms, fog, dust, snow etc)
- Expanding satellite contents for forecasters to meet the capability based ETR course by RTC-Korea

For Public Users

- Providing online modules(5) of basic satellite meteorology
- Run the “Summer camp for undergraduate & graduate student”
- Job experience programme for high school students

For International Users

- Inviting training course on “Improvement of Meteorological Satellite Data Analysis and Application Capacity” for RAII and RA V regions (second half of 2017)
- Joint RFG meeting with BMTC quarterly in 2017
- Renovate NMSC’s English homepage and open a VLab website

Thank you !

2016

http://nmsc.kma.go.kr

New homepage(English, 2017)