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VLab Status and Plans

(Submitted by VLab Co-Chairs)

Summary and Purpose of Document

This document reports on activities within the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) along with future plans. Since IPET-SUP-2, VLab members have offered a variety of training opportunities, with highlight to user preparation to the new generation of satellites, including training events on Himawari-8/9, GOES-R, MTG-I and FY4.

Furthermore, the VLab Management Group (VLMG) met in May 2016 and took key decisions in response to the VLab Strategy Plan 2015-2019, including:

- (i) Organization of a virtual roundtable on climate monitoring from space, to be offered in all WMO languages and Portuguese;
- (ii) Support user preparation in the Indian Ocean region, in connection with the IODC CGMS roadmap;
- (iii) Organize an expert workshop on RGB composites derived from multi-spectral (including new-generation) imagers.

ACTION PROPOSED

The second session is invited to note the important achievements of the VLab and to provide comments.

Appendices:

- A. Training Activities organized by VLab from January to December 2016
- B. Training Activities planned by VLab in 2017

VLab STATUS AND PLANS

1 INTRODUCTION

This document reports on the activities and plans of the WMO-CGMS Virtual Laboratory (VLab). Since IPET-SUP-2 the VLab has:

- Organized a total of 122 training events and 40 Regional Focus Group sessions, training more than 4600 people during the period January to December 2016;
- Taken key decisions at its May 2016 Management Group meeting in support of the VLab Strategy 2015-2019;
- Prepared users to the new generation of satellites, with highlight to training events on Himawari-8/9, GOES-R, MTG-I and FY4;
- Collaborated with WMO Education and Training Programme, ensuring training of trainers is provided for VLab partners.

The VLab Management Group (VLMG) has met three times in virtual meetings, and on 9-13 May 2016 for its 8th face-to-face meeting. Further details to VLab achievements over the reporting period, and plans is given below.

2 ACTIVITIES OF THE VIRTUAL LABORATORY SINCE IPET-SUP-2

The VLab Centres of Excellence (CoEs) and supporting Satellite Operators have recently reported on their training activities for the period January to December 2016. A general outline of regional training activities organized by CoEs is presented below. Full reports of activities from each VLab member as well as the VLab Summary Report 2016 can be downloaded from the VLab central website at <http://www.wmo-sat.info/vlab/coe-reports/>

CoEs, using both online and classroom training, offered a total of 122 training events and 40 Regional Focus Group (RFG) sessions during this reporting period. Training was offered in 5 of the WMO official languages (no event was carried out in Arabic) plus Korean and Portuguese. Participants from all WMO Regional Associations took part in training, which reached participants from 183 countries. A full list of events organised in 2016 can be seen in Appendix A.

Regarding the total number of participants attending VLab training events, the numbers exceeded the 4600 figure. This number excludes the number of participants using the online resources that are accessible via VLab member websites, such as the recorded lectures available from some VLab CoEs and Satellite Operator websites (e.g. Russian Federation, Brazil, Australia, EUMETSAT, JMA, and CIRA). Additionally, whilst great effort was made to report on the number of people trained in 2016, figures were not available for every event organised.

During 2016, 79 classroom courses and workshops were offered, compared to 69 online training events. The average number of participants in classroom events was also higher than in online training events (33 participants per classroom event compared to average of 24 participants per online event), making a substantial contribution to the total number of people trained. There was also an increase in the offering of courses in a blended format, where part of the content is delivered online and part face-to-face. Fourteen blended courses were offered, with a total of 299 participants trained.

Regional Focus Group discussions continue to take place on a monthly basis. These are the Americas and Caribbean Group, which is organised by CIRA/NOAA and counts on contributions from CoEs Barbados, Costa Rica, Brazil and Argentina; the RFG Australia, organised by CoE

Australia and counting on contributions from KMA, JMA and meteorological services in Indonesia; and the Monthly Weather Discussions organised by EUMeTrain/EUMETSAT, with contributions from various European national met services. Another two RFG offer sessions on demand: the Caribbean Weather discussion and the RFG South Africa. Consistent participation in RFG sessions continued in 2016, exceeding 1000 participants. Besides RFG sessions have been only offered in English and Spanish, participants on these sessions are from all WMO RA.

Besides the various regional activities that took place in the VLab CoEs (**Appendix A**), some major activities conducted by the VLab since IPET-SUP-2 can be summarised as follows:

2.1 VLMG-8 Meeting – May 2016

The VLab management group (VLMG) met at the Caribbean Institute for Meteorology and Hydrology in Bridgetown, Barbados, from 9 to 13 May 2016. The meeting, which counted on full support from BRCCC Programme (Programme for building Regional Climate Capacity in the Caribbean), had a total of 30 participants. With the exception of JMA and CONAE, the meeting had representation from all VLab partners.

VLab CoEs, Satellite Operators and Partner Programmes presented their latest achievements and planned activities that, together with the discussions that took place, generated actions and recommendations. Key decisions, in response to the VLab Strategy 2015-2019 included supporting user preparation in the Indian Ocean region, planning of training offerings in climate monitoring, organization of a workshop for experts on RGB and continuation of efforts to improve the availability of training material in languages other than English. More details about these initiatives are described in section 4 of this report.

Furthermore, VLMG decided to continue monitoring quality of training provided by the VLab network using biannual self-assessments, based on performance indicators developed by VLMG in 2012. This follows an Action from the WMO IPET-SUP-2, at its February 2016 session. To ensure coherence of VLab activities with the VLab Strategy 2015-2019, a VLab Action dashboard is planned to monitor performance against key themes of the Strategy, such as user preparedness to new-generation satellites, availability of training resources, and the delivery of training.

2.2 Preparing users for the new generation of satellites

A good number of courses offered in 2016 included the preparation of users for the new generation of satellites. Of particular importance were those totally dedicated to the topic, such as:

- Training on Himawari-8/9 Satellite Analysis using SATAID, offered in various occasions and locations by JMA;
- GOES-R workshops, offered by NOAA in May and November;
- Training course on the next generation satellites, offered by KMA in October;
- Event Week on MTG-I Satellite, offered by EUMETSAT/EUMeTrain in November;
- Training Course on the FY4 Satellite Products, offered by CMATC in November;

In the context of the second meeting of the WMO Coordination Group on Satellite Data Requirements in Region III and IV, NOAA delivered a training session on GOES-R including a comprehensive overview of instrument capabilities, applications, data access mechanisms, the 2017 data release schedule, and training resources (<http://www.wmo.int/pages/prog/sat/meetings/RA-3-4-SDR-2.php>). The Group also started developing a Region-specific two-year training plan, taking into account training needs of the Region (at the level of forecasters, IT personnel, trainers and researchers), and building on existing resources and events.

In addition, the Himawari-8 Training Campaign, which is organised by the CoE in Australia to help WMO Region V and stakeholders elsewhere to prepare for the effective use of Himawari-8 data is still ongoing. The Campaign started in 2015, prior to Himawari-8 data availability, and has produced

a considerable amount of training resources since then. These are all available at <http://www.virtuallab.bom.gov.au/training/hw-8-training/>

2.3 Conceptual Models for the Southern Hemisphere Project

Conceptual Models for Southern Hemisphere (CM4SH) is a joint project between the southern hemispheric Centres of Excellence. Since its inception in 2013, the project was co-funded by WMO and EUMETSAT, until 2016. The first CM4SH project was completed in March 2014, with the second phase of the project completed in 2016.

The Conceptual Models produced by the project can be accessed from three places:

<https://www.wmo-sat.info/vlab/conceptual-models-southern-hemisphere/>

http://www.eumetrain.org/satmanu/index_conc.html

https://www.meted.ucar.edu/training_module.php?id=1152

The effort to translate the conceptual models prepared by CoE Brazil into Portuguese was also continued during 2016, being finalised early 2017.

On a smaller scale, a follow-up to this project will be carried out by SMN Argentina in 2017: the development of a training activity resource (workbook) in Spanish for improving training in the application of conceptual models in forecasting and enhance the effective use of satellite imagery in forecasting, based on four conceptual models specific to South America.

3 COORDINATION WITH PARTNER PROGRAMMES:

3.1 WMO Online Seminar for Trainers in RA III and IV

WMO Education and Training offered the Online Seminar for trainers from RA III and IV in 2016. The seminar was 12 weeks long and it was offered in English and Spanish.

VLab contributed to the seminar with facilitators and coaches from CoEs Argentina, Barbados, CIRA, EUMETSAT and the VLab Technical Support Officer. CoE Argentina played a considerable role in the Seminar in 2016, translating all the training resources to Spanish and facilitating and coaching participants in their native language.

4 FUTURE ACTIVITIES PLANNED

4.1 Training on climate monitoring from space

A Virtual Climate Roundtable (Climate VRT) is planned by CoE Barbados, as an introduction to satellite-based climate monitoring. The material produced is to be translated by VLab partners into six languages and presented by native speakers throughout 2017.

A collaborative online training event on the climate-agriculture nexus is in planning and by CoEs South Africa and Barbados, EUMETSAT, and NASA/ARSET. CoE South Africa is also planning a training event to be delivered in November 2017.

4.2 Supporting user preparation in the Indian Ocean region in connection with the IODC CGMS roadmap

Given the evolution of the regional geostationary satellite coverage over the Indian Ocean as described in the IODC CGMS roadmap (CGMS-43, EUMETSAT-WP-14), VLab Centres of Excellence (CoE) plan the following activities in 2016 and 2017 to support the use of the operational data and products:

- CoEs will establish user training requirements through the African and Asia-Oceanic user forums;

- The African Island states receive and have experience of the MSG and FY data already. No new additional readiness requirements are identified. The MSG-IODC data will be used in training from the Kenya and South African CoEs;
- The Russian CoE will explore the possibility of a blended course for the CIS countries. Covering the application of the FY and MSG data. Ideally this will also include INSAT and Electro-L data if relevant training resources are available;
- The Omani CoE will continue to host blended courses on MSG applications for the Middle East area, this will include the application of MSG, INSAT and FY Indian Ocean data;
- The China CoE will continue to promote the application of the FY, MSG and potentially INSAT data in their international courses which draw participants from across the region. This includes participants from countries not covered by the CoE's in Oman and Russia.

CGMS members were invited (CGMS-44, May 2016) to share product information, dissemination information and training resources with the CoEs and users to support the training activities highlighted above. Additionally, as training will be conducted in English, Arabic and Russian, CGMS members were invited to support the translation of information materials and training resources to enable wider adoption of the products and data.

4.3 RGB Experts and Developers Workshop

This workshop will be timely to discuss lessons learned from applying the WMO/EUMETSAT RGB standard to new-generation imagers (Himawari-8 AHI, GOES-R ABI, and the upcoming FY-4A AGRI). It will discuss potential review of the standard, and implications for operational forecasting and training, building upon results of the 2012 Seeheim (Germany) workshop hosted by EUMETSAT. JMA are hosting the workshop on 7-9 November 2017, tentatively in Tokyo, Japan.

4.4 Plans for regional training events

Based on the reports submitted by VLab CoEs, a list of planned courses for 2017 was drafted and is available in **Appendix B**. This list is by no means a final plan of events, as many CoEs are still adding events to the list as they become confirmed.

5 CONCLUSION

VLab continues to make great progress towards achieving the goals set in its strategy for 2015-2019. This will be accomplished through strong collaboration between the VLab office members, supporting Satellite Operators and Centers of Excellence.

It is also important that IPET-SUP support to VLab continues, so that initiatives such as the Climate Virtual Round Table events, the Preparation for the Next Generation of Satellites and many others can be built upon as we bridge the gap between satellite data providers and users.

APPENDIX A

Training Activities organized by VLab from January to December 2016

Name of training event	Type	Language	CoE or Sat Op involved	Participants	
				Number	WMO RA
Meteorología Aeronáutica (Aviation meteorology)	classroom	Spanish	Argentina	NA*	NA*
Sensoramiento de la Atmósfera desde el Espacio	classroom	Spanish	Argentina	NA*	NA*
Pronóstico en Meteorología del Espacio (Space Weather)	classroom	Spanish	Argentina	25	III
Principios y Aplicaciones de Radars meteorológicos	classroom	Spanish	Argentina	NA*	NA*
Estructuras Lagrangianas coherentes en fluidos geofísicos	classroom	Spanish	Argentina	27	III, IV
Teledetección Ambiental (Environmental Remote Sensing)	classroom	Spanish	Argentina	15	III
2016 Train the Trainer Workshop	classroom	Spanish	Argentina	30	III, IV
Meteorología Descriptiva	online	Spanish	Argentina	8	III, VI
Meteorología General	online	Spanish	Argentina	10	III
Volcanic Ash (forecasters)	online	Spanish	Argentina	NA*	NA*
METAR	online	Spanish	Argentina	40	III
2016 OMM Formación de Instructores RAIII en línea (2016 online WMO TRAIN THE TRAINER RAIII)	online	Spanish	Argentina	34	III, IV
Basic Satellite Meteorology	Classroom course	English	Australia	20	II, V
Advanced Satellite Meteorology	Classroom course	English	Australia	20	II, V
The 9th International Training Course on the Application of Meteorological Satellite Products	Classroom	English	Beijing	22	I, II, IV
The 17th domestic Training Course on the Application of Meteorological Satellite Products	Classroom	Chinese	Beijing	33	II
The 1th Training Course on the FY4 Satellite Products	Classroom	Chinese	Beijing	43	II
The 43th-50th pre-post Series training events of satellite application for initial forecaster	Classroom	Chinese	Beijing	390	II
Workshop on aerosol-cloud-precipitation interactions in amazonia during the acridicon chuva campaign	classroom course	Portuguese	Brazil	20	III
Training for GEONETCast-Americas Reception Station, Products and SIGMACast Software	classroom course	Portuguese	Brazil	23	III
Fire Detection and Monitoring by Satellite	classroom course	Portuguese	Brazil	20	III
GNU/Linux for atmospheric scientists.	Classroom/Lab	Spanish	Costa Rica	16	IV
Scientific programming for atmospheric scientists	Classroom/Lab	Spanish	Costa Rica	16	IV
On-line course on Aeronautical Meteorology for Weather Observers	Online	Spanish	Costa Rica	10	IV
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream	Blended course	English	EUMETSAT	16	VI
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream	Blended course	English	EUMETSAT	15	I
Assimilation of satellite data (EUMETSAT/ECMWF NWP SAF Training Course)	Classroom course	English	EUMETSAT	31	II, III, VI
Baltic+ 2016	Classroom course	English	EUMETSAT	23	VI
Advanced SEEMET Training Course on Flash-floods and floods	Classroom course	English	EUMETSAT	36	VI
Third IOCCG Summer Lecture Series 2016	Classroom course	English	EUMETSAT	22	I, II, III, IV, V, VI
Use of satellite products for drought monitoring and agro-meteorological applications	Classroom course	English	EUMETSAT	28	I

Expert Exchange on EUMETSAT's Copernicus Marine Data Stream Workshop	Classroom course	English	EUMETSAT	16	I, IV, V, VI
48th International Liège Colloquium on Ocean Dynamics	Conference	English	EUMETSAT	5	VI
12th EUMETSAT User Forum in Africa	Conference	French, English	EUMETSAT	5	I
2016 EUMETSAT Meteorological Satellite Conference	Conference	English	EUMETSAT	5	VI
Baltic+ 2016 Online Phase	Online course	English	EUMETSAT	39	VI
Eumetrain Satellite Skills Course	Online course	English	EUMETSAT	25	II, VI
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream	Online course	English	EUMETSAT	45	I, V, VI
Synoptic and Mesoscale Analysis of Satellite Images 2016	Online course	English	EUMETSAT	52	VI
Expert Exchange on EUMETSAT's Copernicus Marine Data Stream Workshop	Online course	English	EUMETSAT	29	I, V, VI
Expert Exchange on EUMETSAT's Copernicus Marine Data Stream Workshop	Online course	English	EUMETSAT	24	VI Europe
EUMeTrain Event Week on MTG-I Satellite	Online course	English	EUMETSAT	62	VI
Environment Event Week 2016	Online Event week	English	EUMETSAT	24	I, III, V, VI
Use of satellite products for drought monitoring and agro-meteorological applications	Online Event week	English	EUMETSAT	NA*	NA*
OSTST Meeting, SAR Altimetry Workshop and International Doris Service Workshop (IDS)	Workshop	English	EUMETSAT	NA*	NA*
Applications of Satellite Climate Data Records in Numerical Modeling	Workshop	English	EUMETSAT	26	IV, V, VI
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	9	V
Training on Himawari-8 Satellite Analysis using SATAID	Classroom	English	JMA	22	V
Collaborative development of RDCA product for Indonesia	Classroom	English	JMA	2	V
Satellite Rainfall Estimation Workshop	Classroom	English	JMA	25	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	10	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	10	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	14	II
The Third Country Training	Classroom	English	JMA	10	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	7	V
Training on meteorological satellite data usage	Classroom	English	JMA	60	II, V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	20	II
Collaborative development of RDCA product for Indonesia	Classroom	English	JMA	1	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	19	V
Training on SATAID/ Himawari 8/9	Classroom	English	JMA	5	V
Meeting of the Satellite Enhancement Team of NOAA and its partners	online	English	JMA	8	IV
Weather Simulator Building Workshop	Blended	English	Kenya	6	I
Forecaster Satellite Applications in Africa (SAC-XIV-E)	Classroom	English	Kenya	18	I
Forecaster Satellite Applications in Africa (SAC-XIV-E)	Online	English	Kenya	29	I
Advanced Satellite Meteorology	Classroom	English with Korean Interpreter	Korea	42	II
2 nd KMA international Meteorological Satellite Users' Conference(KIMSC)	Classroom	English	Korea	230	II, IV, V
Improvement of Meteorological Satellite data Analysis and Application Capacity	classroom	English	Korea	22	II, V
RA II & RA V High Profile Training Programme for 2days related to AOMSUC-7	classroom	English	Korea	41	II, V
Training event : Monitoring and improving aeronautical production	Online Event week	French	Morocco	117	I

Using RGB products to improve aeronautic and marine forecasting – Online Workshop	Online Event week	French	Morocco	46	I, VI
Training Course on Surface Meteorological Observation, Macao, China	Blended course	English	Nanjing	12	II
Seminar on Climate Change and Climate Information Service for Developing Countries	Blended course	English	Nanjing	28	I, II, IV
Seminar on Earthquake and Disaster Prevention and Mitigation for Armenia	Blended course	English	Nanjing	20	VI
Training Course on the Use and Maintenance of Meteorological Instruments for Developing Countries	Blended course	English	Nanjing	35	I, II
Seminar on Meteorological Disaster Mitigation and Rescue for Developing Countries	Blended course	English	Nanjing	42	I, II, IV, V
Seminar on Emergency Rescue of Earthquake Disaster for Developing Countries	Blended course	English	Nanjing	39	I, II, IV
International Training Course on Agro-meteorology	Blended course	English	Nanjing	5	I
Training Course on Technological Transfer in Coping with Climate Change for Developing Countries	Blended course	English	Nanjing	27	I, II, III, IV, V
Training Course on Meteorology for Uganda	Blended course	English	Nanjing	20	I
International Training Course on Radar Meteorology	Blended course	English	Nanjing	21	I, II, V, VI
International Training Course on Tropical Cyclone	Blended course	English	Nanjing	13	I, II, V
Stage Prévision/Protection N°7	Classroom	French	Niger	17	I
ESAC	Classroom	French	Niger	NA*	NA*
Stage Exploitation Stations et Images Satellitaires Niveau II	Classroom	French	Niger	3	I
MESA Systems Administration Training for Station Users	Classroom	French	Niger	19	I
PUMA 2015 System Administration Training for Station Users	Classroom	French	Niger	NA*	NA*
PUMA 2015 System Application Training for Station Users	Classroom	French	Niger	15	I
Stage VMA	Classroom	French	Niger	17	I
ESAC	Online	French	Niger	28	I, VI
Four-month Forecaster Training at the WPC International Desks	Classroom/Lab	English, Spanish	NOAA	13	III, IV
Advanced Topics in Hydraulics, Hydrological Sciences and Hydrometeorology	Online	English	NOAA	23	II
Winter Weather Course	workshop	English	NOAA	18	IV
GOES-R	workshop	Spanish, a few talks in English	NOAA	80	IV
GEONETCast-Americas	workshop	Spanish, a few talks in English	NOAA	38	IV
Numerical Weather Prediction and Quantitative Precipitation Forecasting Techniques	workshop	Spanish	NOAA	42	III, IV
GEONETCast workshop as part of AmeriGEOSS	workshop	Spanish, a few talks in English	NOAA	38	III, IV
Satellite Data Training	workshop	English	NOAA	26	IV
Significant Meteorological Information (SIGMET)	workshop	Spanish	NOAA	20	III
Olympic Forecaster Training Course	workshop	English with Korean interpreter	NOAA	12	II
Winter Weather Course	workshop	English	NOAA	18	IV
GOES-R Workshop as part of the XXV Mexican Congress in Meteorology and X Mexican International Congress in Meteorology.	workshop	Spanish	NOAA	50	IV
Weather Analysis Course	workshop	English with Korean interpreter	NOAA	12	II

Monitoring and Forecasting Severe Weather with Remote Sensing Technology	workshop	English	NOAA	25	II
Weather Analysis Course	workshop	English with Korean interpreter	NOAA	12	II
Satellite Application Course (Convection)	classroom	English	Oman	15	I, II, VI
Satellite Application Course	online	English	Oman	21	II and VI
WMO Train-the-Trainer course	Online	Russian	Russia	42	II, VI
Aviation meteorology for meteorology technicians	Online	Russian	Russia	203	II, VI
Aviation meteorology for meteorologists	Online	Russian	Russia	273	II, VI
Trends and international experience in weather forecasts	Workshop for PhDs	English	Russia	10	VI
Satellite Met for BSc Honours (UP)	classroom course	English	South Africa	11	I
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream	Online Course	English	South Africa	45	I, V, VI
EUMETSAT MSG satellite workshop	Online Event week	English	South Africa	8	I
EUMETSAT Marine workshop	Online Event week	English	South Africa	15	I
EUMETSAT MSG satellite online workshop	online workshop	English	South Africa	26	I
Americas and Caribbean Regional Focus Group (monthly)	RFG	English and Spanish	NOOAA and CIRA **	320	III, IV
Australian Regional Focus Group (monthly)	RFG	English	Australia	347	II, V
South African Regional Focus Group (4 sessions)	RFG	English	South Africa	NA*	NA*
Monthly Weather Discussion (monthly)	RFG	English	EUMeTrain and EUMETSAT	338	VI

* No information available.

** Organised by CIRA/NOAA in collaboration with VLab CoEs in Argentina, Barbados, Brazil and Costa Rica.

APPENDIX B

Training Activities planned by VLab to take place in 2017

Name of training event	Type	Language	CoE or Sat Op involved
Meteorología Aeronáutica (Aviation Meteorology)	classroom	Spanish	Argentina
Fundamentos de la Variabilidad Climática Global y en Sudamérica	classroom	Spanish	Argentina
Sensoramiento de la atmósfera desde el espacio (Space Weather)	classroom	Spanish	Argentina
Cambio Climático	classroom	Spanish	Argentina
Meteorología Descriptiva	Distance Learning	Spanish	Argentina
Meteorología General	Distance Learning	Spanish	Argentina
Avances en Bioclimatología	classroom	Spanish	Argentina
Principios y aplicaciones de los radares meteorológicos (Met radar-applications)	classroom	Spanish	Argentina
Caracterización de las sequías y su variabilidad espacio temporal	classroom	Spanish	Argentina
Basic Satellite Meteorology	Classroom course	English	Australia
Advanced Satellite Meteorology	Classroom course	English	Australia
Virtual Round Table on Climate , Climate Change and Climate Variability	Online	English	Barbados
Aeronautical Continuing Professional Development Course 07	Classroom/online	English	Barbados
International Training Course on the Application of FY4 Satellite Product	Classroom	English	Beijing
The 2 th training activities on FY4 satellites products	Classroom	Chinese	Beijing
The 18 th domestic Training Course on the Application of Meteorological Satellite Products	Classroom	Chinese	Beijing
The pre-post Series training events of satellite application for initial forecaster	Classroom	Chinese	Beijing
The distance training on FY4 satellite data application	online	undetermined	Beijing
Training Access and Use of JPSS and GOES-R Imagery for Environmental Applications	classroom course	Portuguese	Brazil
Fire Detection and Monitoring by Satellite	classroom course	Portuguese	Brazil
GeoNetCast Products for Weather Forecasters	classroom course	Portuguese	Brazil
Monthly Webseminars	online course	Portuguese	Brazil
Programming for Professionals in Meteorology	Blended	Spanish	Costa Rica
Operational Meteorology Professional Master Degree Program	Major part online with short visits from students	Spanish	Costa Rica
Introduction to Satellite Imagery	Classroom	Spanish	Costa Rica
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream - Online Phase	Online course	English	EUMETSAT
Baltic+ 2017 - Online Phase	Blended course	English	EUMETSAT
Workshop on the Use of Gridded Satellite Data for Climate Services - Online Phase	Blended course	English	EUMETSAT

Workshop on the Use of Gridded Satellite Data for Climate Services - Classroom Phase	Blended course	English	EUMETSAT
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream - Classroom Phase	Classroom course	English	EUMETSAT
NOMEK 2017	Classroom course	English	EUMETSAT
Basic Satellite Meteorology course for South Eastern European countries (SEEMET)	Classroom course	English, Other	EUMETSAT
Satellite Application Course (SAC-XV) - Online Phase	Classroom course	English	EUMETSAT
Satellite Application Course (SAC-VI) - Online Phase	Classroom course	English	EUMETSAT
Satellite Application Course (SAC-VI) - Classroom Phase	Classroom course	English	EUMETSAT
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream - Online Phase	Online course	English	EUMETSAT
Using the Copernicus Marine Data Stream for Ocean Applications - Online phase	Online course	English	EUMETSAT
Application of Gridded Climate Data sets for Agro Meteorological Applications - Online Phase	Blended course	English	EUMETSAT
Using the Copernicus Marine Data Stream for Ocean Applications	Classroom course	English	EUMETSAT
Satellite Application Course (SAC-XV) - Classroom Phase	Classroom course	English	EUMETSAT
Autumn School on the use of satellite data on nowcasting high impact weather	Classroom course	English	EUMETSAT
International Summer School on Applications with the Newest Multi-Spectral Environmental Satellites	Classroom course	English	EUMETSAT
Operational Marine Surface Analysis using EUMETSAT's Copernicus Marine Data Stream - Classroom Phase	Classroom course	English	EUMETSAT
Using the Copernicus Marine Data Stream for Ocean Applications	Classroom course	English	EUMETSAT
Application of Gridded Climate Data sets for Agro Meteorological Applications - Classroom Phase	Blended course	English	EUMETSAT
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Collaborative development of RDCA product for Malaysia	Classroom	English	JMA
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Training on SATAID/ Himawari 8/9	Classroom	English	JMA
Training conjunction with AOMSUC-8	Classroom	English	JMA
Advanced Satellite Meteorology	Classroom	English with Korean Interpreter	Korea
3 rd KMA international Meteorological Satellite Users' Conference(KIMSC)	Classroom	English	Korea
Improvement of Meteorological Satellite data Analysis and Application Capacity	classroom	English	Korea
Use of satellite data for marine forecasting: case study 'Extreme High Swell Events on the Moroccan Atlantic Coast	1 days online training	French	Morocco
The use of satellite data for climate service: case studies	2/ 3 days online training	French	Morocco
Forecasting dangerous phenomena for aeronautical meteorology (turbulence, low visibility).	2 days online training	French	Morocco
WMO International Workshop on Climate Services Information System Operations and Coordination	classroom, blended,	English	Nanjing
Seminar on the Early Warning of Meteorological Disasters for Developing Countries	classroom, blended,	English	Nanjing

Seminar on Meteorological Forecasts for Developing Countries	classroom, blended,	English	Nanjing
Seminar on Management for Meteorological Officials from Developing Countries	classroom, blended,	English	Nanjing
Training Course on Agrometeorology for Developing Countries	classroom, blended,	English	Nanjing
Seminar on Climate Change and Climate Information Service for Developing Countries	classroom, blended,	English	Nanjing
Training Course on the Use and Maintenance of Meteorological Instruments for Developing Countries	classroom, blended,	English	Nanjing
Training Course on Radar Meteorology for Developing Countries	classroom, blended,	English	Nanjing
Seminar on International Cooperation in Coping with Climate Change for English-speaking Countries in Africa	classroom, blended,	English	Nanjing
2017 Seminar on Emergent Rescue of Earthquake Disasters for Developing Countries	classroom, blended,	English	Nanjing
Seminar on Meteorological Disaster Management for the Bahamas	classroom, blended,	English	Nanjing
Seminar on the Capacity Building of Urban Search and Rescue Teams from Countries along the Belt and Road	classroom, blended,	English	Nanjing
Seminar on the Application of Astronautics and Satellites for Developing Countries	classroom, blended,	English	Nanjing
The 1st Overseas Seminar on the Operation and Management of Industrial Parks for Ethiopia	classroom, blended,	English	Nanjing
The 2 nd Overseas Seminar on the Operation and Management of Industrial Parks for Ethiopia	classroom, blended,	English	Nanjing
International Training Course on Tropical Cyclone	classroom, blended,	English	Nanjing
MESA Systems Application Training for eStation2.0 Users	Classroom	French	Niger
MESA Systems Administration Training for Station Users	Classroom	French	Niger
Stage Prévision/Protection N°8	Classroom	French	Niger
Météorologie tropicale niveau I n°6	Classroom	French	Niger
Météorologie tropicale niveau II n°6	Classroom	French	Niger
Exploitation images satellitaires niveau II	Classroom	French	Niger
Exploitation de la Prévision numérique du Temps n°1	Classroom	French	Niger
ESAC-XV-F	Blended	French	Niger
WMO/NIWA RA-V Hydrology Technicians Course 2017	online		NOAA
GOES 16	online and workshop	Spanish	NOAA
NOAA/WMO Train the Trainer Workshop on Satellite Data Usage	workshop	English and Spanish	NOAA
WMO African Region Distance Learning Course in Hydrology: Basic Hydrologic Sciences	online		NOAA
MSC/COMET Winter Weather Course	workshop		NOAA
KMA-COMET Olympic Forecaster Training Course	workshop		NOAA
Basic Satellite Course	classroom (internal)	English/ Arabic	Oman
Lectures on reliable satellite products to use in Oman DGMET (operational and research)	classroom	Arabic	Oman
Pytroll Seminar	Face-to-face	Russian, English	Russia
Hail suppression operations management	Face-to-face	Russian	Russia
Eumetsat Information days	Lecture	Russian, English	Russia
Trends and international experience in weather forecasts	Workshop for PhDs	English	Russia
Aviation meteorology for meteorology technicians	Online	Russian	Russia
Aviation meteorology for meteorologists	Online	Russian	Russia
Climate Services Round Table	Online	Russian	Russia
Aviation meteorology for meteorologists	Online	English	Russia
Satellite data and product applications	Face-to-face	Russian, English	Russia

Avalanche protection operations management	Face-to-face	Russian	Russia
EUMETSAT MSG satellite online workshop	online workshop	English	South Africa
EUMETSAT MSG satellite workshop	Event week	English	South Africa
Satellite Met for BSc Honours (UP)	Course	English	South Africa
EUMETSAT Climate workshop	Event Week	English	South Africa
Australian Regional Focus Group meetings	RFG	English	Australia and Korea*
Caribbean Tropical Cyclone Weather Discussion	RFG	English	Barbados
Weather Briefing	RFG	English	EUMETSAT
RFG: Remote sensing data for climate studies: what are the needs?	RFG	French	Morocco
RFG of the Americas and the Caribbean	RFG	English, Spanish	NOAA
Monthly Weather briefing	RFG	English, Arabic	Oman
Weather Briefings	RFG	English	South Africa

* CoE Korea plans to contribute with presentations in four RFG sessions.