THE VLAB GLOBAL INFRASTRUCTURE FOR EDUCATION AND TRAINING: NEW 2015-2019 STRATEGY AND ACTIVITY UPDATE

Related to Action 42.08
HLPP reference: 4.2.3

SUMMARY AND PURPOSE OF DOCUMENT

This document reports on activities within the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) along with future plans and directions. Since January 2014, VLab Training Centres of Excellence offered a total of 66 courses and 41 Regional Focus Group sessions.

Furthermore, important developments have taken place since CGMS-42, including the change in VLab co-chairmanship, the Seventh Virtual Laboratory Management Group meeting (VLMG-7) in July 2014 in Saint Petersburg, Russian Federation, and the elaboration of the new Five-year Strategy document for VLab activities 2015-2019.

The focus of the new VLab strategy is on preparing users to the new generation of meteorological satellites, and on training on the use of satellite data and products on a broadening range of weather, climate and related environmental applications. The VLab is a solution in addressing key challenges in satellite-related training, capacity building, satellite applications development and operational services.

The VLab as an experienced, versatile and cost-effective global infrastructure will strive to deliver training in line with WMO and GFCS strategic priorities and GEO societal benefit areas, while also strongly engaging in the areas of climate monitoring; marine, ocean and coastal monitoring; dust, ash and smoke monitoring; and space weather.

An update on the WMO VLab Trust Fund shows that although contributions to the WMO VLab Trust Fund are matching expenses through 2015, the Fund's reserves are low and little progress has been made in the level and spread of funding by CGMS Members following the call for contributions sent by CGMS and WMO Secretariats in September 2014 (Action 42.08).

Actions proposed:

- CGMS to endorse the proposed VLab Strategy for the period 2015-2019.

- CGMS members to respond to the CGMS/WMO call for contributions letter sent in September 2014 regarding their support to the VLab Trust Fund.

- CGMS to proceed with action VLMG7.12, once receiving the revised expectations documents in August 2015.

THE VLAB GLOBAL INFRASTRUCTURE FOR EDUCATION AND TRAINING: NEW 2015-2019 STRATEGY AND ACTIVITY UPDATE

1 INTRODUCTION

This document reports on the activities and plans of the WMO-CGMS Virtual Laboratory (VLab). Since CGMS-42 the VLab management group (VLMG) has met twice in virtual meetings (March and November 2014) and had one face-to-face meeting in Saint Petersburg, Russian Federation (VLMG-7, July 2014). VLMG-7 was a successful event with representations from almost all VLab Centres of Excellence (CoEs) presenting achievements and planning future activities. Also during VLMG-7, the co-chairmanship of VLab was transferred from Volker Gärtner (EUMETSAT) to Prof Grigory Chichasov (Director of the WMO Regional Training Centre in the Russian Federation), who is assisted by Mr Eduard Podgaiskii (Russian State Hydrometeorological University) in order to share chairing responsibilities with Kathy-Ann Caesar (CIMH). A new Five-year Strategy Document was drafted and discussed during VLMG-7. A final version of the document is available in **Appendix A**. Regarding the most recent activities of VLab (since May 2014), a short review of achievements and plans is given below.

2 ACTIVITIES OF THE VIRTUAL LABORATORY SINCE CGMS-42

The VLab Centres of Excellence (CoEs) have recently reported on their training activities for the period January to December 2014. A general outline of regional training activities organized by CoEs is presented below. Full reports can be downloaded from the VLab central website at

http://www.wmo-sat.info/vlab/coe-reports/

CoEs, using both online and classroom resources, offered a total of 66 courses and 41 Regional Focus Group (RFG) sessions during this reporting period. Training was offered in all 6 WMO official languages plus Portuguese and had participants from all WMO Regional Associations. A full list of events organised in 2014 can be seen in **Appendix B**.

Regarding the total number of participants attending VLab training events, the numbers exceeded the 3000 figure. This number excludes the number of participants using the online resources that are accessible via VLab partner 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).

Fifty three classroom courses were offered, compared to only 13 online. Nevertheless, the number of participants in online courses was still slightly superior when compared to classroom events (about 1300 compared to 1000). This highlights the importance of online training activities as a way to reach a larger number of people from a wider area.

Countries Reached by VLab Training Events in 2014 (classroom and online)

The number of RFG sessions organized by CoEs has increased, with three groups now offering sessions on a monthly basis (RFG Americas and Caribbean, Australia and South Africa) and an additional group (Caribbean Weather discussion) offering sessions on demand. Most importantly, participation in RFG sessions increased substantially, reaching more than 1000 participants during 2014. 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 Centres of Excellence (CoEs), the major activities conduced by the VLab within the last 10 months can be summarised as follows:

2.1   VLMG-7 Meeting 22-25 July 2014, Russian Federation

The VLMG-7 meeting took place at the Russian State Hydrometeorological University (RSHU) in Saint Petersburg, Russian Federation, 22-25 July 2014. The meeting, which counted on full support from Roshydromet, had a total of 30 participants. With the exception of CoE Brazil and JMA, which could only participate remotely, the meeting had representation from all VLab partners.
VLab CoEs, Satellite Operators and Agencies, and Partner Programmes presented their latest achievements and planned activities which, together with the discussions that took place, generated actions and recommendations that were captured in the VLMG-7 report (available at http://www.wmo-sat.info/vlab/meeting-reports/).

Main issue of concern:
During presentations, many CoEs had stressed that the number of personnel and support available at their VLab CoEs is often below the limits necessary to meet the

agreed expectations for the various VLab activities and increasing demands for weather, climate and related information from NMSs. In some cases, support to CoEs by sponsoring satellite operators is insufficient. VLMG would like to highlight this fact as this is endangering the effectiveness and success of the VLab in several areas of the world. In many of the CoEs, the focal point is the only one person working or involved in the VLab.

Important outcomes from VLMG-7:
It was suggested that Satellite Operators should be reminded of their supporting role in the VLab. This is especially important at this moment, as VLab CoEs are preparing users for the upcoming new generation of satellites. The continuous funding of a Technical Support Officer (TSO), who coordinates the CoEs network, is also critical. The status of the WMO VLab Trust Fund is provided in section 6.2 of this report.
CoEs need an effective counterpart in the Satellite Operators' organization. This focal point should help in addressing the CoE resource needs (these could include data, computer facilities, lecturers and other technical personnel). International desks and internships hosted by operators are examples of a way to achieve this objective.
Also during VLMG-7, Dr. Volker Gärtner, whose long-term contribution to VLab is highly commended by all partners, passed the co-chairmanship of VLab to Prof Grigory Chichasov.

2.2   AOMSUC-5 Training Workshop

This training workshop was offered on the 17-18 November 2014, just before the Fifth Asia Oceania Meteorological Satellite Users Conference (AOMSUC-5) in Beijing. The workshop was organised by VLab CoE China-Beijing, and was designed to inform participants about the next generation of meteorological satellites. Trainers from CMA, JMA, KMA EUMETSAT and NOAA contributed to the event, which had 81 participants from 9 countries (WMO RA II and V). This event was also broadcast for remote participation.

2.3   Conceptual Models for the Southern Hemisphere Project

Conceptual Models for Southern Hemisphere (CM4SH) was a joint project between four southern hemispheric Centres of Excellence: Argentina, Australia, Brazil and South Africa. The project was co-funded by WMO and EUMETSAT. The first CM4SH project was completed in March 2014 (full report available at http://www.wmo-sat.info/vlab/conceptual-models-southern-hemisphere/). Participants in the project were very positive about the outcomes and commented that the CM4SH connected different areas of the meteorological services, such as research and development, training, forecast, data processing and systems. The project was deemed successful and inspirational.
The new CM4SH project was launched in January 2015, this time reinforced with the expert group from The Agency for Meteorology, Climatology and Geophysics, Indonesia (BMKG). The main task of the project team is to prepare full Conceptual Model descriptions, and stepwise add more CMs into the online catalogue (also available at the link mentioned above). Along with this, the project team will record and update a literature list and inventory of existing CMs on Southern Hemisphere and collect interesting Cases.

3 COORDINATION WITH PARTNER PROGRAMMES

3.1 Cooperation with COSPAR

The joint COSPAR and WMO Capacity Building Workshop on Satellite remote sensing, water cycle and climate change took place at Tver State University in Tver, Russian Federation, from 20th July to 1st August 2014. 40 MSc and PhD students, postdocs and young scientists attended the event, with more than 40% from NMHSs. They were from Russia, Armenia, Azerbaijan, Bangladesh, China, Ethiopia, Iran, Malawi, Nepal, Pakistan and Uzbekistan. The objective of the Workshop was to provide the participants with basic knowledge on satellite remote sensing, satellites, satellite instruments, databases and formats, data access, processing software, methods of processing and analysis of satellite data. Taking the advantage of VLMG-7 scheduled in St Petersburg in parallel, VLab contributed to the workshop programme with 5 lecturers and used its information channels to promote the event.

3.2 WMO Train the Trainer Online Seminar for WMO RA VI

WMO Education and Training is offering a Train the Trainer Online Seminar for trainers from WMO RA VI in 2015. The seminar, which started in February and is taking place during 10 weeks, has participants from VLab CoE in RA VI (Russian Federation). Also participating in the seminar are trainers and training managers from CoEs Argentina and Barbados. The concession for participants from VLab CoEs in RA III and IV is based on the idea that these might help to facilitate the course in 2016, when the TtT online Seminar will be offered in their regions.
This year, VLab is collaborating in the event with one course facilitator (VLab Technical Support Officer), who was also responsible for the development of some training material and activities.

3.3 Train the Trainer Workshop on GEONETCast Americas

VLab has again conducted a WMO/NOAA sponsored Train the Trainer Workshop on GEONETCast Americas, on 25-26 April 2015, prior to the NOAA Satellite Conference (27 April to 01 May). The TtT workshop was a follow up to the successful 2013 workshop at the same conference. The workshop highlighted resources for GEONETCast: the system, installation guidelines, what data the system has, and software to visualize the data. There was an update on the progress of the Satellite Data Requirements group and how these efforts link in to preparations for GOES-R. Hands on software activities highlighted case examples that demonstrated RGB capabilities for GOES-R using VIIRS and MODIS imagery.   The VLab participants also took part in the WMO Satellite Data Requirements Coordination Group meeting at the beginning of the conference. As part of the Conference session was devoted to International training, a presentation about VLab was made by the VLab co-chair to highlight its role in International Training in satellite meteorology.

4   FUTURE ACTIVITIES PLANNED

4.1   Plans for regional training events

Based on the reports submitted by VLab CoEs, a list of planned courses for 2015 was drafted and is available in **Appendix C**. This list is not yet a final plan of events, as many CoEs are still adding events to the list as they become confirmed.

5   VLAB NEW STRATEGY 2015-2019

The VLab Five-year Strategy document (2009-2014) was reviewed during the VLMG-7 meeting and a new strategy was drafted for the next period: 2015-2019. This document was circulated within members of the Coordinating Committee of Heads of Training Institutions of National Meteorological Services (CO-COM), receiving comments and suggestions that were considered.
The new VLab strategy for the period 2015-2019 was then revised by the WMO Inter-Programme Expert Team on Satellite Utilization and Products (IPET-SUP) in March 2015. This revised version is given in **Appendix A** of this report, for endorsement by CGMS.

The focus of the new VLab strategy is on preparing users to the new generation of meteorological satellites, and on training on the use of satellite data and products on a broadening range of weather, climate and related environmental applications.
VLab will strive to deliver training in line with WMO and GFCS strategic priorities and GEO societal benefit areas, while also strongly engaging in the areas of climate monitoring; marine, ocean and coastal monitoring; dust, ash and smoke monitoring; and space weather.
Collaboration with partner programmes will be continued and where possible, extended. VLab will also monitor the development of the WMO Global Campus initiative and explore ways to contribute and benefit from it.

Action proposed:
CGMS is invited to endorse the proposed VLab Strategy document for the period 2015-2019.

6   SUSTAINABILITY OF THE VLAB

6.1   Concerns regarding support to VLab CoEs

Some VLab CoEs, while keeping up an impressive array of activities, face challenges both internally through reduction of staff and available capacity, and externally through reductions in support by the agreed sponsoring satellite operators. CGMS members that are sponsoring VLab CoE (as described here: http://www.wmo-sat.info/vlab/centres-excellence/) can alleviate some of these concerns, and are strongly encouraged to augment their level of support to these Centres.

6.2 Concerns regarding support to VLab TSO

An update on the WMO VLab Trust Fund shows contributions by KMA and EUMETSAT to the WMO VLab Trust Fund over the period 1 Sep 2014 to 28 Feb 2015 which covered obligations for the first half of 2015. NOAA through NESDIS are providing direct support to CIRA at Colorado State University (the TSO host institution). Little progress has been made in the total level and the diversity of funding by CGMS members, in spite of the request from CGMS and WMO Secretariats per Action 42.08 (CGMS/WMO letter sent in September 2014 with a call for contributions). There are indications that NOAA through the National Weather Service plans to provide additional support to the Fund through 2015 but this needs yet to materialize. At the current level of resources, the Fund could not meet its obligations as from September 2015.

Action proposed:
CGMS members to respond to the CGMS/WMO call for contributions letter sent in September 2014 regarding their support to the VLab Trust Fund.
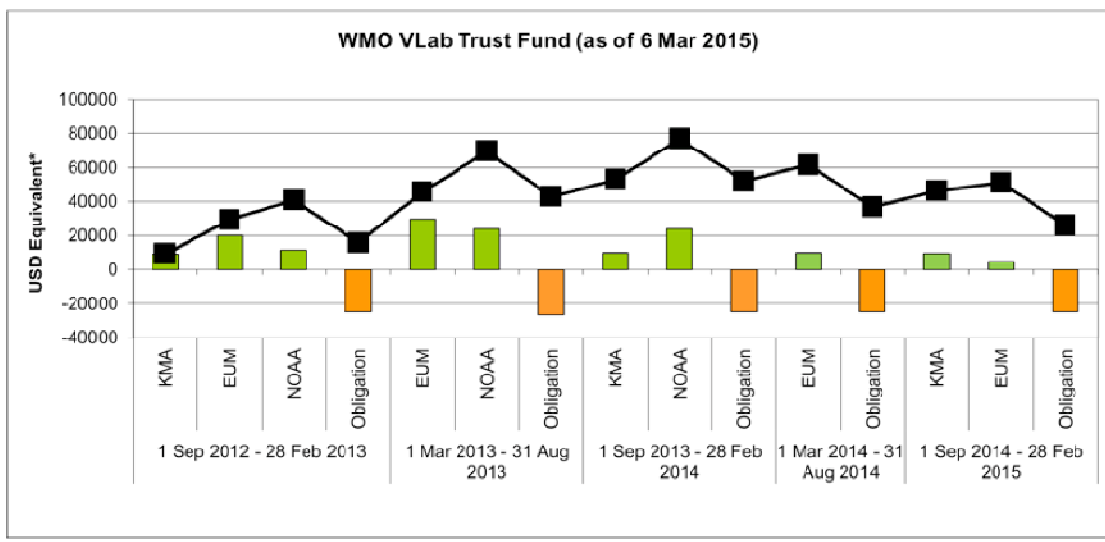

Fig. 1: Overview of the WMO VLab Trust Fund: income by CGMS members is shown in green; obligations related to funding the VLab Technical Support Officer (TSO) are shown in orange, these are charged to the Fund at the beginning of each half-year (e.g., on 1 Sep 2014 to pay TSO services for the period 1 Sep 2014 to 28 Feb 2015).

6.3 Call for recommitment of CGMS Members to VLab

With the concerns identified by some VLMG members over the lack of support to VLab CoEs and the insufficient contributions to the Trust Fund, during VLMG-7 the management group agreed to an action calling for the confirmation of commitment of satellite operators to VLab as follows:

Action VLMG7.12: WMO and CGMS to write a letter to all satellite operators in VLab

to (i) recall the urgency for more training giving increasing service reliance on satellites, and the upcoming generation of new satellite technology, (ii) recall expectations from operators,(iii) mention results of a VLab internal evaluation indicating that some expectations are better met than others and that there are urgent needs for ramping up support, (iv) suggesting that effective technical focal point be nominated / confirmed that will help CoEs address issues, (v) recall the need for sustained financial support to the VLab Trust Fund.

VLMG is revising the "Expectations documents (for CoEs and Satellite Operators) and will inform WMO and CGMS of any updates made.

Action proposed:
CGMS is invited to proceed with action VLMG7.12, once the revised expectations documents has been received in August 2015.

7   ACTIONS FOR CONSIDERATION BY CGMS PLENARY SESSION

- CGMS is invited to endorse the proposed VLab Strategy document for the period 2015-2019.

- CGMS members to respond to the CGMS/WMO call for contributions letter sent in September 2014 regarding their support to the VLab Trust Fund.

- CGMS is invited to proceed with action VLMG7.12, once receiving the revised expectations documents in August 2015.

Appendix A

FIVE-YEAR STRATEGY FOR THE WMO-CGMS VIRTUAL LABORATORY
FOR EDUCATION AND TRAINING IN SATELLITE METEOROLOGY
2015-2019

Scope and Definition

The WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) is a global network of specialized training centres, named Centres of Excellence (CoEs), that are supported by one or more CGMS satellite operators (Ref: http://vlab.wmo.int). These CoEs, often co-located with WMO Regional Training Centres (RTCs), are established in the various WMO Regions to meet user needs for increased skills and knowledge in using satellite data within their Region.

Mission of VLab

To improve weather, water, climate and related environmental services by enabling WMO Members to utilize satellite data.

Objectives of VLab

1. To achieve better exploitation of data from the Space Based global observing system for services that are increasingly reliant on satellite data;
2. To globally share knowledge, experience, methods and tools related to satellite data, especially in support of WMO Members that have limited resources.

Strategic Drivers

The strategic drivers of VLab have been and will continue to be:
- the improvement of the quality of services offered by WMO Members, in particular those with constrained resources;
- the introduction of the new generation of satellites, with new data types and products as well as new dissemination systems
- communicate improved scientific understanding, technological advances and address new societal challenges;
- responding to new and emerging service demands for Weather, Climate and Water, such as in support of marine, land , and Global Framework for Climate Services (GFCS) applications;
- promoting and achieving the new competence and quality control requirements, and professionalism within WMO Services.

Current status and achievements of VLab

In its 15 years of existence, the VLab has demonstrated its capability to deliver global scale events on training and education in satellite meteorology. Each CoE is responsible for conducting training activities and normally supports one or more Regional Focus Groups involving NMHSs from its region.

The years 2010-2014 have seen more than 50 classroom and virtual training events organized on annual basis in all WMO regions and in all WMO languages. These included regular online weather briefings, Event Weeks, regional training events and Virtual Round Table events. There has been an increase in the organizing of online training activities, especially within the past two years, resulting in an increased number of participants from all over the world.

As a global virtual entity, the VLab has also provided education and training in other areas of relevance to WMO Members. As an example, the Virtual Round Table on the implementation of the aeronautical meteorological competencies was highly successful, with participants using 212 connections from 87 countries worldwide. The event was offered in 5 languages.

VLab has also seen the addition of two new Centres of Excellence since 2009. They are located in Casablanca (Morocco) and Gwanghyewon (Republic of Korea).

Strategy for the period 2015-2019

In the years 2015-2019, VLab intends to provide support to education and training in the use of satellite data and technology among WMO Members by developing and delivering training around the various competency frameworks through:

- active support to the introduction of the new generation of satellites;
- the delivery of Regional Focus Group (RFG) sessions;
- the creation and maintenance of a central library/repository for recorded RFG sessions and other online events;
- maximise the visibility of online information resources, such as OSCAR and SATURN
- the organization of Event Weeks on topics of particular interest (such as the new generation of satellites and the WMO priority areas);
- engaging directly with its co-sponsors WMO (through IPET-SUP) and CGMS;
- engaging increasingly with other international entities providing training
- supporting online capability in classroom events;
- the assurance of high quality of training using state-of-the-art educational tools and methods;
- encouraging the availability of more training material in WMO official languages other than English;
- encourage evaluation of the effectiveness of the training for the use of satellite data and products and its long term benefits

Through the experience acquired in the coordination and delivery of online training, the VLab will strive to meet the increasing demands of WMO Members in the period 2015-2019. These will be in line with:
- WMO Strategic Priorities;
- GFCS Priority Areas;
- GEO Societal Benefit Areas.

While providing training for weather forecasting, the VLab will also engage strongly in the areas of:
- Support to Climate monitoring;
- Marine, Ocean and coastal monitoring;
- Dust, ash and smoke monitoring;
- Space weather.

Delivery of training will rely on:
- Online techniques;
- Enhanced communication capabilities for data and training material;
- classroom and distance learning delivery of training where appropriate;
- Collaboration among CoEs.
- Cooperation with other entities providing training
- Continued support from CGMS members

VLab has proved it can reach every WMO Region and will strive to increase its reach to all WMO Members, in line with the WMO Education and Training Programme. To ensure quality of services provided by VLab, continuous internal quality evaluations will be put in place. These include undertaking evaluations of the training impact of its activities following the best available approaches, as well as establishing procedures to ensure the meeting of the VLab expectations from both partners: the CoEs and the Satellite Operators within CGMS. Annual reviews of achievements will also be carried out to ensure focus is kept in the provision of training in the main priority areas established in this document.

The VLab is an entity sustained by contributing CoEs and Satellite Operators. Technical support function is critical for the organization of online events and VLab coordination. Currently, VLab provides a broad support to CoEs activities with its central website (http://vlab.wmo.int) serving as a platform for collaboration and networking. The work of a dedicated Technical Support Officer (TSO), who also provides pedagogical advice to the VLab community, is mission-critical in this regard. VLab will seek to provide continuous instructional and technical support of its activities through the work of the TSO. However, this requires a long-term collaborative funding effort from CGMS Satellite Providers via the designated WMO VLab Trust Fund.

It is imperative that the strong collaboration between VLab CoEs and partner Satellite Operators is kept in order to maintain the development and delivery of training, with particular emphasis on national and regional specific demands and requirements. This will ensure the economic benefit of the large investments in the space based observing system.

The continuation of VLab collaboration with other training and education programmes in the subject of meteorology, such as EUMeTrain, EUMETCAL, CALMet, COMET and the WMO Training and Education Programme is essential for further success. VLab will further build on the partnership with the Committee on Space Research (COSPAR), and explore partnerships with the Working Group on Capacity Building and Data Democracy of the Committee on Earth Observation Satellites (CEOS WGCapD) and other programmes in areas of common or complementary interest. VLab will also monitor the development of the WMO Global Campus initiative and explore ways to contribute and benefit from it.

Appendix B

Training Activities organized by VLab from January to December 2014

Name of training event	Type	Language	CoE involved	Participants Number	WMO RA
Space meteorology forecast	Classroom	Spanish	Argentina	*	
Aeronautical Competency Workshop	Classroom	Spanish and English	Argentina	32	III and IV
Science Week 2014 - Advanced Forecaster Course	Event Week	English	Australia	360**	I, II and V
Basic Satellite Meteorology	Classroom	English	Australia	31	II and V
Advanced Satellite Meteorology	Blended	English	Australia	45	II, IV and V
CMO AeroCPD – 03	Online	English	Barbados	14	IV
CMO AeroCPD – 04	Online	English	Barbados	6	IV
The course for the application of the satellite image in weather forecasting	Classroom	Chinese	Beijing	47	II
28th Course for senior Forecaster	Classroom	Chinese	Beijing	39	II
21st Course for Pre-post Forecaster	Classroom	Chinese	Beijing	41	II
34th Course for senior Forecaster	Classroom	Chinese	Beijing	37	II
25th Course for Pre-post Forecaster	Classroom	Chinese	Beijing	43	II
Pre-post Forecaster Training Course for WMO Fellowship Students	Classroom	English	Beijing	2	I
Seminar on Meteorological Disasters Risk Management for Officials from Developing Countries	Classroom	English	Beijing	14	II, III and V
40th Course for senior Forecaster	Classroom	Chinese	Beijing	42	II
The 5th Asia/Oceania Meteorological Satellite Users Conference - Training Workshop	Classroom & broadcast	English	Beijing	81	II and V
CBMET Meteorologia por satélite: teoria e aplicações	Classroom	Portuguese	Brazil	16	III
Interpretação de Imagens de Satélite – SEVIRE/MSG	Classroom	Portuguese	Brazil	6	I and III
AMTC 14	Classroom	English	Kenya	7	I
AMTC 15	Classroom	English	Kenya	6	I
GIS and Remote Sensing	Classroom	English	Kenya	5	I
EISAC-XI-E	Online	English	Kenya	24	I
EISAC-XI-E	Classroom	English	Kenya	15	I
MMTC-10	Classroom	English	Kenya	3	I
International Training Course on Weather Radar Operation	Classroom	English	Republic of Korea	18	I and II
Information and Communication Technologies for Meteorological Services	Classroom	English	Republic of Korea	15	I, II, IV and V
International Training Course on Weather Forecaster	Classroom	English	Republic of Korea	12	I, II and V
Capacity Development of National Control System for Emergency and Disaster Risk Management - Fiji	Classroom	English	Republic of Korea	14	V
Training Course for Aeronautic Meteorological Observers	Classroom	English	Nanjing	6	II
Seminar on Climate Change and Climate Information Service for English-Speaking African Countries	Classroom	English	Nanjing	17	I
International Training Course on Tropical Cyclone	Classroom	English	Nanjing	12	I, II and V
Seminar on Philippine Disaster Mitigation and Relief	Classroom	English	Nanjing	12	V
International Training Course on Use of Meteorological Instruments	Classroom	English	Nanjing	21	I, II, III and V
Training Workshop on Synergized Standard Operating Procedures for Coastal Multi-Hazards Early	Classroom	English	Nanjing	47	I, II and V

Name of training event	Type	Language	CoE involved	Participants Number	Participants WMO RA
Warning System					
Seminar on Management for Meteorological Officials from English-Speaking African Countries	Classroom	English	Nanjing	13	I
Seminar on Meteorological Disaster Management and Weather Information Service for Latin-America, the Caribbean and the South Pacific	Classroom	English	Nanjing	18	III, IV and V
International Training Course on Agro meteorology	Classroom	English	Nanjing	21	I, II, III and V
Seminar on Pakistan Meteorological and Earthquake Forecast, Mitigation and relief	Classroom	English	Nanjing	20	II
The WCRP ESGF Training Workshop for CORDEX Asia	Classroom	English	Nanjing	18	II, V and VI
High Impact Weather in Arid and Semi-arid Regions: The Case of Dust Storms	Online	English	Niger	32	I, V and VI
ESAC-XIIF	Online	French	Niger	20	I and VI
ESAC-XIIF	Classroom	French	Niger	13	I
Introduction aux Prévisions harmonisées aux points de grille du givrage, de la turbulence et des Cb du Système Mondiale de Prévision de Zone (SMPZ)	Online	French	Niger	9	I
Satellite Application Course ESAC-ME-X	Classroom	English	Oman	*	II
Introduction to weather, climate and marine science	Classroom	Arabic and English	Oman	9	II
Satellite Application course	Classroom	English	Oman	10	II
Introduction to weather, climate and marine science	Classroom	Arabic and English	Oman	9	II
Introduction to weather, climate and marine science	Classroom	Arabic and English	Oman	10	II
NWP models - basics for operational forecasters - 08:00 UTC	Online	Arabic and English	Oman	17	II
Tropical Cyclones in the Arabian Sea - 08:00 UTC	Online	English	Oman	25	II
Weather Modification	Classroom	Arabic and English	Oman	*	II
Methods of hydrological forecasts. Provision of consumers with forecast-ting data. Generation of information resources of Roshydromet using the hydrologist-forecaster workstation	Classroom	Russian	Russian Federation	5	II and VI
Processing and use of the satellite data at drawing up the hydro-meteorological forecasts	Classroom	Russian	Russian Federation	3	II and VI
Methods of short-term, medium-term and long-term weather forecasting. Forecaster workstation	Classroom	Russian	Russian Federation	4	II and VI
Meteorological forecasting for aviation service	Classroom	Russian	Russian Federation	11	II and VI
Satellite remote sensing, water cycle and climate change	Blended	English	Russian Federation	40	I, II and VI
Methods of short-term, medium-term and long-term weather forecasting. Forecaster workstation	Classroom	Russian	Russian Federation	11	II and VI
Digital stations of reception and data processing of an artificial satellite of new generation: polarly - orbital series "METEOR -M", MetOp, geostationary "(ELEKTRO-L)"	Classroom	Russian	Russian Federation	12	II and VI
Meteorological forecasting for aviation service	Classroom	Russian	Russian Federation	37	II and VI
Application of satellite information in tasks of the analysis and a weather forecast (virtual satellite laboratory http://meteovlab.meteorf.ru)	Online	Russian	Russian Federation	601	II and VI
BSc Honours course (satellite Met)	Classroom	English	South Africa	11	I

Name of training event	Type	Language	CoE involved	Participants Number	Participants WMO RA
National certificate Forecasting (Satellite Met)	Classroom	English	South Africa	6	I
ASMET 8 Meeting	Classroom	English	South Africa	10	I
Commercial Satellite course	Classroom	English	South Africa	11	I
EUMETSAT/SAWS "Satellite application workshop for SADC" Online Phase	Online	English	South Africa	*	I
Australian Regional Focus Group (12 sessions)	RFG	English	Australia	499	II, IV, V and VI
Caribbean Weather Discussion (6 sessions)	RFG	English	Barbados	43	IV
South African Regional Focus Group (11 sessions)	RFG	English	South Africa	123	I, V and VI
Americas and Caribbean Regional Focus Group (12 sessions)	RFG	English and Spanish	*** Costa Rica and Barbados	*	III and IV

  * No information available.
  ** Approximate figure calculated with basis on the average participation in 18 online sessions.
*** Organised by CIRA/NOAA in collaboration with VLab CoEs.

Appendix C

Training Activities planned by VLab CoEs for 2015

Name of training event	Type	Language	CoE involved
Clave Metar/Speci	Online	Spanish	Argentina
Cenizas Volcánicas	Online	Spanish	Argentina
Oms Regional	Blended	Spanish	Argentina
Geomagnetismo Y Relaciones Terrestres Solares	Classroom	Spanish	Argentina
Taller De Evaluación De Radiación Solar	Classroom	Spanish	Argentina
Procesamiento E Interpretacion De Imágenes Satelitales Para Meteorologia Y Medio Ambiente	Classroom	Spanish	Argentina
Calibracion De Instrumentos Meteorológicos	Classroom	Spanish	Argentina
National Himawari-8 Training Campaign tutorial sessions	Online	English	Australia
Basic Satellite Meteorology	Classroom	English	Australia
Advanced Satellite Meteorology	Blended	English	Australia
Science Week	Event Week	English	Australia
NOAA/ WMO Train the Trainers event on GEONetCast.	Blended	English	Barbados
Virtual Roundtable on Climate	Online	English	Barbados
Training Course For The Application Of The Satellite Image In Weather Forecaster	Classroom	Chinese	Beijing
Training Course For Pre-Post Forecaster	Classroom	Chinese	Beijing
Training Course For Senior Forecaster	Classroom	Chinese	Beijing
Seminar On Nwp	Classroom	Chinese	Beijing
The Training Course For The Application Of Ep In Forecasting	Classroom	Chinese	Beijing
12th International Seminar On Climate System And Climate Change (Iscs)	Classroom	English	Beijing
Training Course For Pre-Post Forecaster	Classroom	Chinese	Beijing
Training Course For Pre-Post Forecaster For Wmo Fellowship Students	Classroom	English	Beijing
International Training Course On Meteorological Satellite	Classroom	English	Beijing
Seminar On Meteorological Disasters Risk Management For Officials From Developing Countries	Classroom	English	Beijing
Workshop For Chief Forecaster	Classroom	Chinese	Beijing
Meteorologia Por Satélite: Imagens, Produtos e Aplicações Meteosat Segunda Geração	Classroom	Portuguese	Brazil
Aplicações de Satélite para Análise Meteorológica	Online	Portuguese	Brazil
Satellite Meteorology Course - Fourth Edition	Online	Portuguese	Brazil
Aeronautical Continuous Professional Development	Online	Spanish	Costa Rica
Training Course for Aeronautical Meteorological Observers from Macao, China	Classroom	English	Nanjing
Training Course on Radar Meteorology for Developing Countries	Classroom	English	Nanjing
International Training Course on Numerical Weather Prediction	Classroom	English	Nanjing
Training Seminar on Climate Change and Climate Information Service for Developing Countries	Classroom	English	Nanjing
Training Seminar on Management for Meteorological Officials from the Asia-Pacific Countries	Classroom	English	Nanjing
International Training Course on Use of Meteorological Instruments	Classroom	English	Nanjing
Seminar on Meteorological Disaster Management and Weather Information Service for Developing Countries	Classroom	English	Nanjing

Name of training event	Type	Language	CoE involved
International Training Course on Agro meteorology	Classroom	English	Nanjing
Training Seminar on Meteorological and Earthquake Forecast, Mitigation and Relief for Developing Countries	Classroom	English	Nanjing
Applied Meteorology Course for Forecasters from Macao, China	Classroom	English	Nanjing
ESAC –XIIIF	Online	French	Niger
ESAC –XIIIF	Classroom	French	Niger
Methods of hydrological forecasts. Provision of consumers with forecasting data. Generation of information resources of Roshydromet using the hydrologist-forecaster workstation	Classroom	Russian	Russian Federation
Meteorological forecasting for aviation service	Classroom	Russian	Russian Federation
Processing and use of the satellite data for the hydrometeorological forecasts	Classroom	Russian	Russian Federation
Organization of the state observation network and its functioning in modern conditions	Classroom	Russian	Russian Federation
Modern methods and means of calibration. Regulatory base and documentation on metrology	Classroom	Russian	Russian Federation
Digital receiving stations and data processing of new generation satellites: polar-orbital series "METEOR -M", MetOp, geostationary "ELEKTRO-L"	Classroom	Russian	Russian Federation
Methods and means of data processing from the Russian hydrometeorological satellites	Classroom	Russian	Russian Federation
Space system of data collecting and transmission of Roshydromet via hydrometeorological satellites	Classroom	Russian	Russian Federation
Application of satellite information in tasks of the analysis and a weather forecast (virtual satellite laboratory http://meteovlab.meteorf.ru)	Online	Russian	Russian Federation
The normal training courses will be given as scheduled by University and CE@UP	Classroom	English	South Africa
MSG workshop	Classroom	English	South Africa
Climate workshop	Blended	English	South Africa
VLab Climate Trend Regional Focus Group (on demand)	RFG	Spanish	Argentina
Australian Regional Focus Group (monthly)	RFG	English	Australia
Caribbean Weather Discussion (on demand)	RFG	English	Barbados
South African Regional Focus Group (monthly)	RFG	English	South Africa
Americas and Caribbean Regional Focus Group (monthly)	RFG	English and Spanish	* Costa Rica and Barbados

* Organised by CIRA/NOAA in collaboration with VLab CoEs.