CGMS-51-VLab-WP-02
Discussed in Plenary
Agenda Item: User readiness for new satellite systems

VLab strategy 2024-2027 and New Centre of Excellence for endorsement; 2022 Progress Report

A new strategy for the Virtual Laboratory for Education and Training in Satellite Meteorology (2024–2027) was developed by VLab Management Group (VLMG) and adopted by the WMO Executive Council at its 76th session (27 February to 3 March 2023, Geneva). CGMS Plenary are invited to endorse the updated VLab Strategy, as provided in the Annex I to this working paper (action 1).

The Indonesia Agency for Meteorology Climatology and Geophysics (BMKG) proposed to establish a WMO-CGMS VLab Centre of Excellence (CoE) and was supported by JMA. The application was further endorsed by the WMO Standing Committee on Earth Observing Systems and Monitoring Networks (SC-ON). CGMS Plenary are invited to endorse the new CoE (action 2).

The VLab Management Group (VLMG) continued to coordinate its activities via quarterly online meetings. The Tenth meeting of VLMG was hosted by EUMETSAT at EUMETSAT HQ as a hybrid event on September 26-30, 2022.

Since CGMS-50, VLab members have offered a variety of training opportunities. These include training efforts addressing the new generation of satellites, which continues to be a major training need identified by VLab members. Stronger collaboration and coordination of efforts between VLab members resulted in increased opportunities for user training during the past year.

The VLab Trust Fund continues to receive yearly contributions from NOAA/NWS, EUMETSAT, and KMA. A larger number of contributing CGMS agencies is required to expand VLab activities to meet WMO-CGMS Members' requirements and needs for training and to improve the long-term sustainability of VLab activities. Regular financial contributions from CGMS Members are critical to maintain the VLab training activities.

Actions proposed:

1. CGMS Plenary are invited to endorse the updated Strategy for the Virtual Laboratory for Education and Training in Satellite Meteorology (2024–2027). The Strategy is provided in the Annex I to this working paper.
2. CGMS Plenary are invited to endorse the application of Indonesia Agency for Meteorology Climatology and Geophysics (BMKG) as a new VLab Centre of Excellence (BMKG application and a letter of support from JMA as a supporting Satellite Operator are provided in the Annex II).
3. CGMS members are invited to contact WMO to provide contributions to the WMO VLab Trust Fund to ensure the continuation of technical support to the VLab through the VLab Technical Support Officer as well as to the implementation of VLab projects.

CGMS-51-VLab-WP-02
Discussed in Plenary
Agenda Item: User readiness for new satellite systems

1 INTRODUCTION

This document reports on the activities of the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) in 2022. Since CGMS-50 the VLab has:

- Responded to training needs and user requirements by offering training on the new generation of satellites
- Organized a total of **109 training events**, training more than **2700 people** during the period from December 2021 to November 2022
- Collaborated with the WMO Training and Education Programme, the Community for the Advancement of Learning in Meteorology and related disciplines (CALMET), the COMET Program, the Applied Remote Sensing Training Program (ARSET), the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet), and other initiatives.

The VLab Management Group (VLMG) had three virtual meetings (June, December 2022, and March 2023), and had its Tenth hybrid meeting in Darmstadt, Germany, held from 26 to 30 September 2022.

2 NEW VLAB STRATEGY

The new Strategy for the Virtual Laboratory for Education and Training in Satellite Meteorology (2024–2027) was developed by VLab Management Group and adopted by the WMO Executive Council at its 76th session (27 February to 3 March 2023, Geneva). The new Strategy was proposed to be in line with the WMO standard four-year period beginning on 1 January of the calendar year immediately following a session of World Meteorological Congress and ending on 31 December of the fourth year.

CGMS members are invited to recommend the updated VLab Strategy to CGMS Plenary for endorsement. The strategy is provided in the Annex to this working paper. (action 1).

The focus of the new strategy continues to be on supporting training on the use of satellite data and products as well as building capacity for weather, climate, water and related application areas especially in support of WMO Members that have limited resources. The new strategy strives to be in line with a strategic shift to a more integrated “Earth system” approach taken by WMO, covering not only meteorology but also related fields. In addition, it is aimed at providing support for achieving user readiness for the new generation of satellites, which is considered a very important focus for VLab.

3 MAJOR ACTIVITIES OF THE VLAB SINCE CGMS-50

VLab Centres of Excellence (CoEs) and supporting Satellite Operators have recently reported on their training activities for the period December 2021 to November 2022.

VLab Centres of Excellence and Satellite Operators offered 109 training events during the reporting period. Training was offered in all the WMO official languages and Portuguese.

Participants from all WMO Regional Associations (RA) took part in training. The total number of participants attending VLab training events about 2700 people. This number excludes the number of participants using the online resources that are accessible via VLab members' websites, such as the recorded lectures available from some VLab CoEs and Satellite Operator websites.

WMO VLab Regional Focus Group (RFG) discussions continue to take place on a monthly basis.

The monthly weather and climate RFG sessions of the Americas and Caribbean continued to build on close cooperation with the NOAA/NWS/NCEP/WPC International Desks, CIRA, and WMO Centers of Excellence in Barbados, Costa Rica, Brazil, and Argentina, to conduct 12 regular bilingual (English and Spanish) sessions.

The Australian VLab Centre of Excellence held its 100th monthly RFG meetings during the session conducted on the 27th May 2022. Joint RFG meetings were conducted with CMA in April and November 2021.

The Monthly Weather Discussions organised by EUMeTrain/EUMETSAT with contributions from various European national meteorological services continued to be regularly held in the reporting period.

Additionally, the Monthly Weather and Climate Forum was established in August 2022 by the Oman Centre of Excellence. The events are divided into 2 parts: weather briefing (current weather/case study) and some other relevant topic of interest.

The following regional training activities were delivered by the VLab Centres of Excellence and satellite operators, as described by VLab members in the annual reports.

2.1 Training in the GOES and JPSS satellites series

- The Regional Focus Group of the Americas and Caribbean conducted 12 virtual bilingual (English and Spanish) weather and climate briefings. The number of countries participating each month ranged between 19 and 22; and the number of participants each month ranged between 32 and 61 (total number of participants is 606). All sessions were recorded and are available online at: http://rammb.cira.colostate.edu/training/rmtc/fg_recording.asp. This informal professional development and learning promotes application of

imagery and products from GOES and JPSS satellites;

- In collaboration with American Meteorological Society, NOAA/CIMSS, UMD/ESSIC/CISESS, and Universidade de São Paulo Brazil, four workshops "Using GOES-R and JPSS Remote Sensing Capabilities to Enhance Weather, Climate, Water and Environmental Security", "Accessing and Applying Geostationary Lightning Mapper (GLM) Observations", "Use of Environmental Satellite Data Products for Detecting Volcanic Eruptions, Forecasting Tropical Cyclones, and Nowcasting Severe Weather", and "Joint Satellite Lake Data and Products" were conducted in virtual and blended format.
- NOAA/CIRA and WMO in collaboration with CoEs Barbados, Costa Rica, Argentina, Brazil organized WMO VLab & NOAA Train the Trainers Workshop in a blended format.
- CoE Barbados (CIMH) in collaboration with CMO and NOAA/CIRA organized NOAA/WMO RA IV Virtual Satellite Applications Training Workshop in support of the Caribbean Weather Forecasting Initiative.

2.2 Training in the Himawari & GEO-KOMPSAT satellites series

- AOMSUC-12 Training Event (online, 11, 14 November 2022) hosted by JMA became a collaborative effort from multiple VLab partners. Trainers from BoM, BMKG, JMA, KMA conducted training sessions, presenting the information on Himawari-8 and GEO-KOPSAT data and products, covering various applications of these data (link).
- VLab CoE Australia continued organising monthly RFG meetings during 2022, with close collaborations from CoE Republic of Korea, JMA, BMKG and other partners (KMA, NOAA). This marks the 9th year of organising monthly RFG meetings in the Region. Recorded sessions are available at http://www.virtuallab.bom.gov.au/archive/regional-focus-group-recordings/;
- JMA in collaboration with ESCAP/WMO organized the 21st ESCAP/WMO Typhoon Committee Attachment Training course.

2.3 Training in the Fengyun (FY) satellite series

- AOMSUC-12 Training Event (online, 11, 14 November 2022). Trainers from BoM, BMKG, CMA conducted training sessions, presenting the information on FY-2, FY-4, and FY-3 data and products, covering various applications of these data (link);
- Two joint China Australia RFG meetings were organized in April and November (as part of AOMSUC-12) training event) 2022;
- Two International Distance Training Course on the Basic Principles of Satellite Remote-sensing and the Application of Meteorological Satellite Products (in English);
- CoE Nanjing conducted 9 online training events, attended by 325 participants. Those events covered a wide variety of areas for use of satellite data and remote sensing technology applications, from climate change, climate

information service, meteorological forecasts, technology transfer and aeronautical meteorological forecasting.

2.4 Training in the Meteosat and Metop satellite series

- EUMETSAT continued working closely with the training centres, Centres of Excellence in Oman, Casablanca, Niger, Kenya and South Africa to make sure that they have access to data and help them to develop expertise in the use of current and future satellite data. The following events were organized: online webinar on Nowcasting in Africa (in English), online RA-I Meteorological Satellite Applications for Nowcasting (in collaboration with Kenya CoE, Morocco CoE, and Niger CoE) in English and French, face-to-face workshop in satellite data processing with emphasis on desert dust (in collaboration with Morocco CoE and Météo-France) in French, online E-SAC Middle East (in collaboration with Oman CoE) in English and Arabic;
- African Satellite Meteorology Education and Training (ASMET) continues to be an effective initiative for collaboration between EUMETSAT, COMET, and the VLab CoEs South Africa, Niger, Kenya and Morocco. The ASMET website provides the information on training resources and courses for the African region. Access at https://asmet.africa/;
- The EUMeTrain Weather briefings conducted 12 online sessions. All sessions were recorded and are available at http://www.eumetrain.org/briefings.html

2.5 Training in the Electro-L and Meteor-M satellites series

- SRC Planta organized online training “Data collection system in Roshydromet” based on Electro-L data
- CoE Russian Federation (RSHU) conducted a number of training courses on Meteorological support of civil aviation for meteorological technicians (BIP-MT), meteorological forecasts (BIP-M), aviation forecasters (BIP-M) using various satellite data, including data from Electro-L and Meteor-M.
- CoE Russian Federation (ATI) conducted a number of online training courses on utilization of satellite data (incl. Electro-L and Meteor-M) for various application areas, including synoptic practice, hydrometeorology, hydrology, etc.

2.6 Collaboration between Centres of Excellence and Satellite Operators

The launching of a new generation of satellites is setting a growing demand on training needs for members of all WMO Regional Associations. Close collaboration between VLab CoEs as well as satellite operators is driving the response to address these training needs as they are identified.

The prime example of collaboration between Centres of Excellence and Satellite Operators can be the AOMUSC-12 Training Event (online, 11, 14 November 2022) hosted by JMA. The event resulted in close cooperation between Satellite Operators

(CMA, JMA, KMA, NOAA) and Centres of Excellence (BoM, BMKG) in Asia-Oceania region.

The RFGs of the Americas and Caribbean organised by NOAA/CIRA and the RFGs organised by the Australian CoE as well as RA-I Meteorological Satellite Applications courses conducted jointly by EUMETSAT and Centres of Excellence in Africa serve as other successful examples.

Another example of global partnership would be the RGB Developers and Users Workshop co-hosted by CIRA, NOAA, EUMETSAT, and WMO at CIRA in Fort Collins Colorado from 18 to 20 October 2022. The primary goal of this workshop was to share knowledge on RGB applications and to prepare for the upcoming MTG FCI and EPS-SG Metimage instruments.

2.7 Engagement with other Training Providers

VLab continues collaborating with various training providers and scientific committees. Training providers that have been most active in recent collaborations with VLab are WMO Education and Training Programme (ETR), NASA/ARSET, COMET, and the CEOS Working Group on Capacity Building and Data Democracy (WGCapD), in particular a newly launched project EOTEC DevNet (the Earth Observation Training, Education, and Capacity Development Network). Representatives of these programmes have been participating in VLMG meetings and engaging in discussions.

4 WMO VLAB TRUST FUND

The WMO VLab Trust Fund has received a stable level of contributions over the last years, i.e. 80K USD per year, from NOAA/NWS, EUMETSAT, and KMA. Although the current financial status of the Fund seems stable, a larger number of contributing CGMS agencies would be required to improve its resilience. Regular financial contributions from CGMS Members are critical to maintain technical support to the expanding range of VLab activities.

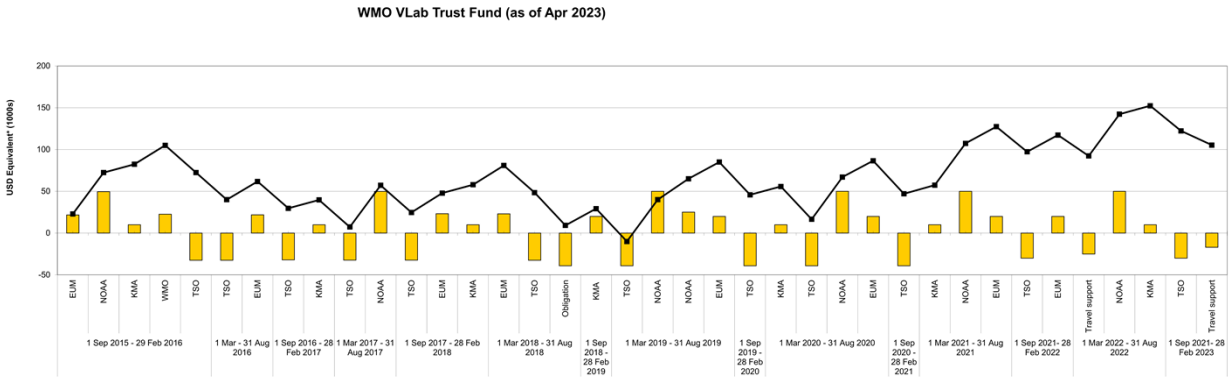

Figure 1. Overview of the WMO VLab Trust Fund. Figures in this chart are approximate, as it does not fully take account of exchange rates

5 VLAB MANAGEMENT GROUP

5.1 VLab Co-Chair to represent CGMS

Dr. Bernadette Connell from the Cooperative Institute for Research in the Atmosphere of Colorado State University, representing the CGMS space agencies, and Mr. Wen Bo, from the CMA Training Center, representing the VLab Centres of Excellence, are serving as VLab Co-Chairs. Dr. Marcial Garbanzo, Head of the Centre of Excellence in Costa Rica, serves as VLab Technical Support Officer.

5.2 VLMG Meetings and Plans

VLMG keeps meeting online and focusing on actions and discussions to ensure the implementation of the VLab Strategy. VLMG also intends to strengthen VLab regional communication through collaboration within the various Satellite Data Requirements groups (SDR).

The next face-to-face meeting of the VLab management group (VLMG-11) was proposed to be hosted by the Oman Centre of Excellence in Muscat, in February 2025. This was agreed to be explored in more details by the WMO Secretariat and the CoE Oman in terms of direct flights available and other logistics related issues.

6 CONCLUSIONS

This paper reports participation in VLab training opportunities worldwide, highlighting the increased visibility of the training activities organized by VLab. It also highlights the strengthening of collaboration between VLab Members, which allows for these training opportunities to be offered.

CGMS and its membership has been a strong sponsor of VLab. It is important that the level of support is now reviewed, as a renewed and stronger commitment of sponsors is needed to aid the training initiatives for the preparation of users of the new generation of satellites to continue.

Annex I

Strategy for the Virtual Laboratory for Education and Training in Satellite Meteorology 2024–2027

Scope and Definition

The WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) is an activity of the WMO Space Programme, based on a global network of specialized training centres, named Centres of Excellence (CoEs), that are supported by one or more Coordination Groups for Meteorological Satellites (CGMS) Satellite Operators (SatOps)
(see http://vlab.wmo.int).

The CoEs are established in the various WMO Regions to address user needs for increased skills and knowledge in using satellite data within their region. They are often co-located with WMO Regional Training Centres (RTCs).

VLab activities are implemented by CoEs in cooperation with CGMS SatOps.

Mission of VLab

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

Upholding WMO Core Values and Key Drivers

(1) Accountability for results and transparency;

(2) Collaboration and partnership;

(3) Inclusiveness and diversity.

Long-term Goals of VLab

1. Continuously improve the utilization of data from the space-based component of the WMO Integrated Global Observing System (WIGOS) for services that are increasingly reliant on satellite data;

2. Globally share knowledge, experience, methods, and tools related to access and usage of satellite data, especially in support of WMO Members that have limited resources.

Strategic Objectives that VLab Seeks to Support

Recognizing

The goal declared by the UN Secretary-General at the World Meteorological Day on 23 May 2022: "Within the next five years, everyone on Earth should be protected by early warning systems against increasingly extreme weather and climate change."

And

The need to address societal challenges and global development agendas put forth under the 2030 Agenda for Sustainable Development, the Sendai Framework for Disaster Risk Reduction 2015–2030, and the Paris Climate Agreement.

The VLab Strategy seeks to encourage members and partners to plan and deliver training that enhances the ability to:

- Objective 1.1 Improve the availability of Earth observation data to support operational service delivery in line with the expected growth of the space-based observing system component as outlined in the *Vision for the WMO Integrated Global Observing System in 2040* (WMO-No. 1243).

- Objective 1.2 Provide support to achieve readiness for the next generation of satellites, instruments, data and product dissemination systems, and processing hardware and software.

- Objective 1.3 Continue to support primary and "backup" data delivery for emergency preparedness and for WMO Members that have limited resources.

- Objective 2.1 Transfer the improved scientific understanding and technological advances that can lead to enhanced National Meteorological and Hydrological Services (NMHSs), and the evolution of the services they provide.

- Objective 2.2 Promote the uptake of satellite data in research and institutions.

- Objective 2.3 Respond to new and emerging service demands for weather, water and climate. These include impact-based decision support services (IDSS) and the application of the Global Framework for Climate Services (GFCS) in support of marine and land applications.

- Objective 2.4 Increase the diversity and quality of services offered by WMO Members in line with the WMO Earth System approach and efforts to enhance the quality of these services.

- Objective 2.5 Achieve the competence, quality control requirements, and professionalism within WMO Services, particularly noting the human resource management challenges facing many NMHSs.

- Objective 2.6 Work with WMO Education and Training Programme (ETR) to maintain and increase content and usage of the calendar of events and the library of satellite training resources, which will enable extending the reach and users to efficiently find and repurpose these resources.

- Objective 2.7 Grow social community projects to increase public user trust and confidence while also contributing to verification of remotely sensed observations (for example surface-based precipitation measurements confirming derived remotely sensed precipitation measurements).

Challenges and areas of improvement

During the past few years, members report shortages of both trainers and operational staff due to retirement, leaving for other employment, or lack of funding. VLab Trainer interaction with the Regional Satellite Data Requirements Groups and User Conferences further revealed limited available resources for organizing and participating in capacity development activities, lack of expertise in various satellite focus areas, and language barriers. Many members expressed a training need for discovery, utilization and visualization of various satellite data sets for local applications.

Translation of communications, documents, and real-time translation during meetings and events continues to be an issue for VLab progress. New technologies, including artificial intelligence translators, will continue to be explored and evaluated to improve in this area.

The pandemic forced all of us into a predominantly virtual mode. Many members reported challenges due to low Internet bandwidth of both instructors and trainees, limited access to learning management systems to deliver training materials and track participants, and challenges with trainers learning and adapting to online teaching and the software used.

Where the training was offered successfully, there was overwhelming participation that required a larger number of facilitators. Many organizations require certificates from employees who attend virtual trainings and, in a few cases, due to the challenges of increased participation and no digital certificates, the certificates were delayed.

Many VLab CoE and SatOp members are willing to share the lessons learned from the challenges and successes and collaborate on training. Two main areas identified include:

(1) Training material: Continue to identify and connect resources in formats that can be readily accessed by others to facilitate translations, as well as modifications and updates of training resources. The VLab Strategy seeks to enable VLab to continue to collaborate with WMO ETR to leverage their training resources library, learning management system, software advice, and techniques;

(2) Training personnel: Encourage interaction among the trainer operational and technical communities to participate actively in training events of other CoEs or SatOps. Promote members to invite speakers and lecturers from other CoEs and SatOps for specialized subjects.

VLab Strategy for the period from 2024 to 2027

The VLab Strategy describes the priorities for the WMO-CGMS VLab. It takes into account the drivers articulated in:

(1) WMO Strategic Plan;

(2) Capacity Development Strategy;

(3) The Statement of the 14th Symposium on Education and Training;

(4) Coordination Group for Meteorological Satellites (CGMS) High Level Priority Plan.

VLab will work towards its objectives by:

- Identifying regional training needs and prioritizing the organization of VLab training events.
- Developing, reusing, coordinating, and implementing training that links the enabling satellite skills to the competencies and qualification frameworks where they exist.
- Encouraging evaluation of the impact of the training on the use of satellite data and products to demonstrate the long-term benefits of training.
- Encouraging the availability of training materials in the official UN languages and other native languages.
- Encouraging exchange of information and enhanced communication between researchers, trainers, and operational users in developing new products from current and planned satellite missions that can lead to improved meteorological, hydrological, and environmental services.
- Promoting the benefits of using current and new satellite-based products and providing technical and training support, where possible, to make them available to users.
- Engaging directly with and reporting to its co-sponsors, which currently include the WMO Expert Team on Space Systems and Utilization (ET-SSU) and the Coordination Group for Meteorological Satellites (CGMS), and partner organizations.
- Engaging the next generation of students and early career researchers to utilize satellite data in applied research.
- Increasing efforts to engage interdisciplinary early career professionals by creating opportunities for them to participate in and contribute to WMO activities.
- Promoting mentoring and peer-to-peer learning opportunities for both students and instructors.

VLab will implement its overall strategy by:

- Developing and delivering training on user identified needs for access, display, and applications in the form of virtual, blended, and face-to-face events, Regional Focus Group discussions, and self-study resources.
- Supporting regional and cross-regional satellite user conferences and associated training workshops.
- Contributing to the regional satellite data requirement dialogues, and providing briefings on the regional data access to NMHSs to ensure they have the appropriate staff to support access, processing, visualization and application of satellite data.
- Providing feedback to satellite operators on the use of the available data, products, systems and services as well as the challenges associated with their full exploitation.
- Raising awareness on the available in-person/online training and distance-learning resources provided by WMO-CGMS VLab CoEs, Satellite Operators and other WMO Members in various regions.
- Advertising training events in the VLab Calendar of Training Events and WMO Global Campus Events Calendar.
- Encouraging VLab Members to add linkages to their training resources to the WMO Global Campus E-Library.
- Providing support via the VLab Trust Fund to promising and early career personnel to attend training events, conferences, or conduct scientific activities that contribute towards satellite product development, evaluation, and implementation.

In the period 2024 to 2027, VLab will pay particular attention to:

- Big data and cloud-computing platforms: noting that their utilization in data dissemination and online processing will increase, it will contribute towards improvements in data sharing and resource exchange and facilitate training efforts.
- Impact-based forecasting and IDSS: encourage NMHS personnel to continuously work with core partners, such as emergency personnel, public safety officials, and social scientists, on the production and dissemination of accurate and consistent forecast information for weather, water, climate, and other relevant areas of application that have a high impact.
- Technical capacity development: supporting the technical staff involved in primary and backup satellite data reception and processing, through training, provision of up-to-date information, and potentially a skills framework.

- Earth systems approach: Establishing interdisciplinary connections to ensure data interoperability and knowledge sharing for satellite-based application areas linking meteorology, climatology, hydrology, agrometeorology, oceanography, atmospheric composition, geology, and many other fields.

- Virtual Reality applications: explore utilization of Virtual Reality technologies to enhance the learning process and provide alternative satellite training delivery and learning tools in virtual spaces.

- Space weather: noting the growth in interest for space weather services around the world, VLab will engage and cooperate with relevant partners, including the Committee on Space Research (COSPAR), the International Space Environment Service (ISES), and the WMO Expert Team on Space Weather (ET-SWx), seeking to enhance the implementation of space weather services.

The delivery of training will rely on:

- Use of digital technology where appropriate, recognizing that in certain situations, the solutions may rely on simple technology and human intervention based on expertise.

- In-person and distance-learning delivery of training that uses a mixture of formal, semi-formal, and informal learning methods where appropriate.

Quality Control and Evaluation

To ensure quality of services provided by VLab, internal quality evaluations will be conducted. These include undertaking evaluations of the training impact, as well as establishing procedures to ensure that VLab expectations are met. Annual reviews of achievements will be carried out to ensure focus is kept on the provision of training in the main priority areas established in the VLab Strategy.

Collaboration

Enhance the regional and global coordination and collaboration between CoEs, SatOps, WMO RTCs, and other partners in order to maximize the efficiency of effort.

Maximize the discoverability and usability of resources. Foster the co-development of learning events and materials utilizing existing and emerging platforms, including social.

Promote good practice in the VLab training community and encourage collaboration with the WMO Global Campus network. Grow cross disciplinary relationships with other Earth observation training communities to explore opportunities to collaborate and to share tools and knowledge for the delivery of the VLab objectives. Encourage the other communities to use the WMO competency frameworks.

The development and delivery of training, with particular emphasis on national and regional specific demands and requirements, relies on the strong collaboration

between VLab CoEs and SatOps. An unexpected positive impact of the COVID pandemic was the strong collaboration and support between CoEs, RTCs and partner SatOps. It is the VLab belief that these collaborative activities have and will continue to contribute to the social and economic benefits of the large investments in the space-based observing system.

The continuation of VLab collaboration with other training and education programmes is essential for further success. VLab will continue to explore partnerships with the WMO Training and Education Programme, the Community for the Advancement of Learning in Meteorology and related disciplines (CALMET), the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet) and with other programmes in areas of common or complementary interest.

Resources

VLab is an entity sustained by contributing CoEs and SatOps. The technical support function is critical for 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) is mission-critical in this regard. VLab seeks to expand its reach by providing support via the VLab Trust Fund to promising and early career personnel to attend training events and conferences, or conduct scientific activities. Both of these activities require a long-term collaborative funding effort from CGMS Satellite Operators via the designated WMO VLab Trust Fund, as per section 7.2.3 of CGMS HLPP 2022–2026.

APPENDIX

STATUS AND ACHIEVEMENTS OF VLAB

In its more than 20 years of existence, VLab has demonstrated its capability to deliver local, regional, and global scale training events in satellite meteorology and related fields. All VLab activities support the objectives of the WMO Global Campus.

During the past 3 years (2019–2021), VLab conducted the following activities as reported by members (link to VLab reports: https://wmo-sat.info/vlab/documents/):

(1) Training activities:

(a) Annually delivered more than 25 Regional Focus Group discussions (RFGs) and more than 100 training courses in seven languages, that reached approximately 4 500 participants per year. During the pandemic in 2020, there was a dramatic decrease in the number of events (45%) and in the number of participants (66%) over 2019. The recovery in 2021 with virtual resources was tremendous with an increase in the number of events (88%) and number of participants (77%) almost back to pre-pandemic levels (compared to 2019);

(b) Supported achieving user readiness for the new satellite systems and facilitated a seamless transition to its operational utilization globally;

(c) Developed training materials based on training needs analyses that focused on access, processing, visualization and utilization of satellite data and products for various application areas;

(d) Collaborated on translation efforts to reach larger audiences in their native languages. In 2019, 2020, and 2021, 66%, 48%, and 51% respectively of training events were offered in English. The increase in training sessions offered in languages other than English is encouraging.

(2) Collaboration and sharing:

(a) Utilized WMO SP-12 Guidelines on Satellite Skills and Knowledge for Operational Meteorologists to inform training development, implementation, and assess impacts;

(b) Participated and contributed to WMO Global Campus activities and collaboration mechanisms;

(c) Maintained partnerships with the WMO Training and Education Programme, the Community for the Advancement of Learning in Meteorology and related disciplines (CALMET), the COMET Program, the Applied Remote Sensing Training Program (ARSET), the Earth Observation Training, Education, and Capacity Development Network (EOTEC DevNet), and others.

(3) Management and oversight:

(a) Held VLab Management Group (VLMG) quarterly online meetings to plan and oversee VLab activities. Due to the pandemic, no in-person meeting occurred;

(b) Maintained good communication between training centres and satellite data providers around the globe, bringing research products into operations and feedback from operations to enhance research via user conferences and surveys. Accelerated implementation of new products in operations and the development of short reference guides.

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Annex II

BADAN METEOROLOGI KLIMATOLOGI DAN GEOFISIKA
PUSAT PENDIDIKAN DAN PELATIHAN
Jl. Angkasa I No. 2, Kemayoran, Jakarta Pusat 10720
Telp. (021) 6586 7058, Fax. (021) 6586 7058, Website : http.www.bmkg.go.id

Our Ref: B/KP.02.00/149/KDL/V/2023 Jakarta, 22 May 2023

Ms. Natalia Donoho
Director, Space Systems and Utilization Infrastructure Department
World Meteorological Organization (WMO)
7 bis, Avenue de la Paix, Case Postale 2300
Geneva, Switzerland
Tel : +41 (0) 227308111
Fax : +41 (0) 22730818
Email : wmo@wmo.int

Subject: **Indonesia Application for Hosting the WMO Vlab Center of Excellence**

Dear Ms. Donoho,

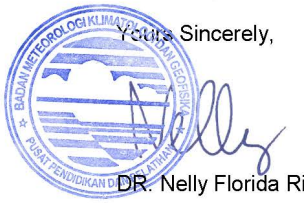
The Indonesia Agency for Meteorology, Climatology and Geophysics (BMKG) would like to apply to be a WMO Center of Excellence for training courses for English speaking countries, especially in WMO RA-II and RA-V. This center will be hosted by Indonesia Regional Training Center (InaRTC) BMKG, based on our experiences in conducting the capacity development program.

Kindly be informed that Indonesia RTC has expertise in Meteorology, Climatology, Geophysics, Remote Sensing, and related areas. Our experts are actively engaged and actively participated in international satellite communities. The training facilities and infrastructure also available to accommodate the satellite learning activities. In addition, to support weather-climate sensitive sectors such as the public weather, marine and climate services, BMKG also has close cooperation and collaboration with universities and institutions in national and global in the areas of remote sensing operation and research.

In this regard, BMKG will strongly support WMO's Center of Excellence, by offering its facilities, expertise and personnel to contribute in the education and training of meteorological and environmental satellite users.

Thank you for your attention and consideration. We are looking forward to your continuous support.

Yours Sincerely,



DR. Nelly Florida Riama
Director of Indonesia Regional Training Center

CC.
Permanent Representative of Indonesia with WMO

JAPAN METEOROLOGICAL AGENCY
3-6-9 Toranomon, Minato City, Tokyo 105-8431, Japan
Phone: +81-3-3584-8603
Email: iao-jma@met.kishou.go.jp

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Ms. Natalia Donoho
Head, Space Systems and Utilization Division
Infrastructure Department
World Meteorological Organization
7bis, Avenue de la Paix,
Case Postale 2300
CH-1211 Geneva 2
Switzerland

Dear Ms. Donoho,

I refer to your letter 08857/2023/I/SSUVLab dated 18 April 2023 requesting our support as a satellite operator for the Meteorological, Climatological, and Geophysical Agency of Indonesia (BMKG) as a Center of Excellence (CoE) in satellite training as a part of the Coordination Group for Meteorological Satellites (CGMS)/World Meteorological Organization (WMO) Virtual Laboratory (VLab).

The Japan Meteorological Agency (JMA) would be pleased to support BMKG as a CoE in satellite training in this context. BMKG has the required technical capabilities, appropriate staff and facilities, and links to neighboring National Meteorological and Hydrological Services in the South-West Pacific region. In recent years, BMKG has clearly demonstrated its training abilities by providing satellite courses using data from JMA's Himawari units and other sources.

JMA's role as a supporting Satellite Operator will be to assist BMKG in fulfilling its responsibilities as a CoE and achieving the VLab goals, rather than to provide funding. Contributions include providing up-to-date training information on current and future meteorological and other environmental satellite systems, data, products and applications, and facilitating/fostering R&D on socio-economic application at the local level by National Meteorological and Hydrological Services via effective training and linkage to related scientific groups.

We look forward to continuing to work with BMKG to further the use of satellite data and products in the region.

Yours sincerely,

(HAMADA Osamu)
Director, Satellite Program Division
Information Infrastructure Department
Japan Meteorological Agency