

Status report and progress since 2025

This working paper reports on recent activities of the WMO–CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) and outlines planned actions for the coming period.

Since CGMS-53, VLab members have delivered a wide range of training activities, with a particular emphasis on capacity development related to new generations of satellite systems, identified by members as a major training priority. In addition, targeted training initiatives have supported the implementation of the Early Warnings for All (EW4All) initiative.

Sustained funding remains a critical issue for the VLab. While the VLab Trust Fund has historically benefited from regular contributions from several satellite operators, a recent decline in contributions has created challenges in maintaining the current level of support for coordination activities and training delivery. Continued and additional voluntary contributions from CGMS members are therefore essential to safeguard the long-term sustainability and effectiveness of the VLab.

VLab members have initiated work to update the VLab Strategy for the 2027–2030 period, with the objective of submitting it for approval to INFCOM-4 in November 2026. A draft version of the strategy is presented to the CGMS Plenary for information and discussion, while the final version will be circulated to CGMS members for endorsement via correspondence prior to INFCOM-4.

The VLab Management Group (VLMG) has continued to coordinate VLab activities and support training delivery through regular online meetings. A key milestone was the Eleventh VLMG Meeting, held in Muscat, Oman, from 20–23 January 2024, hosted by the Directorate General of Meteorology under the Civil Aviation Authority (CAA). The next VLMG meeting is planned for 2027, with the host organization and timing to be confirmed. CGMS members active in VLab are encouraged to attend VLMG-12 meeting in person.

Actions proposed:

1. CGMS space agencies are invited to contribute to the WMO VLab Trust Fund to support the continuation of VLab technical coordination activities and training delivery, including travel support for WMO Members with limited resources.
2. CGMS space agencies to take note of the draft revised *VLab Strategy for Education and Training in Satellite Meteorology (2027–2030)* and the planned endorsement process prior to submission to INFCOM-4.

1 INTRODUCTION

This document reports on the activities and plans of the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). Since CGMS-53, VLab has undertaken several key initiatives to address training needs and user requirements, particularly in support of the new generation of satellite systems.

Key Highlights:

- Delivered training on new satellite capabilities, including preparations for and operational use of Meteosat Third Generation (MTG) geostationary data.
- Organized about 140 training activities, engaging more than 6,000 participants between December 2024 and November 2025.
- Training was conducted in all UN official languages, as well as Portuguese, supporting wider accessibility.
- Engaged with partner training providers as well as the WMO Education and Training Programme (ETRP), exchanging expertise and resources.
- The VLMG convened five virtual meetings in March, June, September, and December 2025, as well as March 2026.
- Finalized the revision of the Guidelines on Satellite Skills for Operational Meteorologists and Specialists in Related Application Areas.

2 MAJOR ACTIVITIES OF THE VLAB SINCE CGMS-53

The VLab Centres of Excellence (CoEs), in collaboration with supporting Satellite Operators, reported on their training activities conducted during the period December 2024 to November 2025.

2.1 Regional Focus Group (RFG) Discussions

The VLab RFG discussions continued to play an important role in strengthening regional collaboration and sustaining engagement beyond formal training activities.

- Monthly RFG discussions were held regularly across multiple regions worldwide.
- These informal, interactive sessions enabled instructors and participants to remain connected, exchange experiences, and apply skills acquired during formal training in an operational context.

2.1.1 Americas and the Caribbean (RA III & RA IV)

- Regular monthly bilingual (English and Spanish) weather and climate discussions were conducted.
- The sessions were organized in close collaboration with:
 - NOAA / NWS / NCEP / WPC International Desks
 - WMO Centres of Excellence in Barbados, Costa Rica, Brazil, and Argentina
- All sessions are recorded and available online: [Regional and Mesoscale Meteorology Branch WMO-CGMS VLab Regional Focus Group of the Americas and Caribbean](#).

2.1.2 Asia and the Pacific (RA II & RA V)

- The Australian VLab Centre of Excellence conducted regular RFG sessions in collaboration with:
 - Japan Meteorological Agency (JMA)
 - Korea Meteorological Administration (KMA)

- China Meteorological Administration (CMA)
- University of Wisconsin–Madison, and
- other regional partners
- Recorded sessions are available at: [Course: Australian VLab Centre of Excellence | The Bureau Learning Portal](#).
- The Indonesia VLab Centre of Excellence also conducted regular RFG sessions, alternating its sessions with those offered by the Bureau of Meteorology, thereby ensuring continuous regional engagement.
- Materials are available at: [Pusat Pendidikan dan Pelatihan BMKG: Log in to the site](#).

2.1.3 Arabic-speaking Countries (RA I & RA II)

- The Oman VLab Centre of Excellence, in collaboration with EUMETSAT and regional NMHSSs, organized monthly Weather and Climate Forums in Arabic, supporting regional capacity building and peer exchange.

2.1.4 English-speaking Countries in Africa (RA I)

- The South Africa Centres of Excellence, in collaboration with EUMETSAT and other partners in the region, conducted quarterly Weather Discussions in English, facilitating continued regional engagement and operational knowledge exchange.
- Materials are available at: <https://coemct.met.gov.om/course/index.php?categoryid=13>

2.2 Regional satellite-focused trainings

2.2.1 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, along with six virtual training sessions on forecasting tools, demonstrating their use with an emphasis on satellite product applications for verification. These activities supported informal learning and reinforced the practical application of data and products from the GOES and JPSS satellite series.
- Brazil CoE organized two in-person nowcasting workshops (December 2024 and October 2025) focusing on satellite applications, and delivered a three-phase virtual nowcasting course throughout 2025, which also covered satellite-based applications.
- Barbados CoE organized the WMO Marine Services Course and an operational workshop on Severe Weather Forecasting for the Caribbean (SWFP-C).
- Costa-Rica CoE organized a training focused on Satellite products and applications in Central America and the Caribbean.
- NOAA Satellites Hackathon 2025 (Training Days), in collaboration with CIRA, CIMSS, UMD, INPE, UCR
- NOAA Satellite Products and Applications for Marine Meteorology and Oceanography (Satellite Book Club)
- WMO-CGMS VLab Regional Training Event on the Utilization of Satellite Data

for CIS and Central Asian countries, delivered by CIMSS/UW (along with EUMETSAT and CMA).

2.2.2 Training in the Himawari, FY, GEO-KOMPSAT satellites series

- AOMSUC-15 Training Event (26-27 October 2025) hosted by CA became a collaborative effort from multiple VLab partners. Trainers from CMA, JMA, and KMA conducted training sessions, presenting the information on FY, Himawari, and GK-2A data and products, covering a wide range of topics: <https://www.nsmc.org.cn/conference/fysuc/2025/index.html>
- VLab Australia CoE and Indonesia CoE continued organising regular RFG sessions during 2025, with close collaborations from supporting satellite operators and University of Wisconsin-Madison.
- Indonesia CoE organized an online WMO Marine Services Course for Southeast, covering satellite data applications.
- JMA conducted the training on Himawari Image Interpretation and SATAID operation for Nepal.
- CMA Training Centre (Beijing CoE) conducted the International Training Course on the Application of Meteorological Satellite Products (22-30 October 2025), in conjunction with AOMSUC-15.
- Nanjing CoE conducted a number of international training events (in English):
 - International Training Course on Disaster Prevention and Reduction Technologies with Fengyun Meteorological Satellite Data
 - Seminar on Applied Technologies of Satellite Remote sensing for China-ASEAN Countries
 - Training Course on Satellite Ground Data Reception Stations and Processing Systems for Namibia
- WMO Virtual Workshop on Python for the User Community in Asia and the South-West Pacific, 10 December 2025.
- WMO-CGMS VLab Regional Training Event on the Utilization of Satellite Data for CIS and Central Asian countries, delivered by CMA (along with EUMETSAT and CIMSS/UW).

2.2.3 Training in the Meteosat, Metop, and Sentinel satellites 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. In 2025, special focus was put on the preparation for MTG.
- In this context, the following training activities were conducted:
 - EUMETSAT–IMTR Satellite Application Course (EISAC), Kenya CoE (English)
 - Use of ClimSA Stations for Climate, Kenya CoE (English)
 - Two face-to-face training courses on the use of PUMA 2025 stations for weather forecasting, Kenya CoE (English)
 - Two face-to-face training courses on maintenance of PUMA 2025 stations, Kenya CoE (English)
 - MTG Arabic Course (26–30 January 2025), Oman CoE (Arabic)

- MENA Satellite Application Course (SAC 20), Oman CoE (Arabic and English)
- RA-I Satellite Applications Course 2025, South Africa CoE (English)
- Two face-to-face training courses on capacity building for PUMA 2025 stations for African Union Member States (forecasters), Niger CoE (French)
- Face-to-face training course on capacity building for PUMA 2025 stations for African Union Member States (IT and admin staff), Niger CoE (French)
- The 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/>.
- South Africa CoE conducted quarterly Weather briefings in collaboration with EUMETSAT and other partners in the region.
- Oman CoE conducted Monthly Weather and Climate Forums in collaboration with EUMETSAT and other partners in the region.
- EUMETSAT course on Satellite Products and Applications in Central America and the Caribbean for Region III and IV.
- WMO-CGMS VLab Regional Training Event on the Utilization of Satellite Data for CIS and Central Asian countries, delivered by EUMETSAT (along with CMA and CIMSS/UW).

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

CoE Russia hosted by the Russian State Hydrometeorological University conducted a number of training course (online, blended, and classroom), covering utilization of satellite data and products for a wide range of application areas.

2.3 Training in support of the EW4All initiative

VLab members have dedicated significant efforts to supporting the Early Warnings for All (EW4All) Initiative through a variety of specialized training initiatives. Some notable examples include:

- Capacity Building Program in Climate Services for Food, Energy, Water, and Health Sectors to Close the Early Warning Gap in Climate Resilience (Indonesia CoE)
- Weather and Climate Information Services Early Warning for Southern Africa (WISER-EWSA) and SAWS Online Training (South Africa CoE)
- WISER Project Early Warning Pre-Testbed Training (South Africa CoE)
- 2025 AMS Annual Meeting Satellite Short Course: Satellite Applications for Rainfall Rates and Flood Prediction
- 2025 AMS SatMOC Short Courses: Satellites and Fire
- Introduction to GR02T: A Forecasting Tool to Detect Environments Favorable for Hail and Severe Convection

EW4All Regional Pilot Training Initiative for the Americas and the Caribbean - VLab

Centers of Excellence in Barbados (CIMH), Brazil (INPE), Argentina (DCAO/SMN), and Costa Rica (UCR) collaborated to develop multilingual, regionally tailored training materials to support the EW4All initiative. The trainings focused on the use of satellite and related data for detection, monitoring, analysis, and forecasting of priority hazards such as floods, heatwaves, hail, tropical cyclones, squall lines, fog, volcanic ash, and lightning.

2.4 Use of AI/ML in training

In June 2025, a Community of Practice (CoP) on the use of Generative AI (GenAI) in education and training was launched by Eumetsat in collaboration with VLab to support educators, trainers, and training managers in integrating AI tools into their work. The initiative aims to facilitate knowledge exchange through webinars and an online communication platform, with initial sessions focusing on applications such as AI-generated videos and AI-enhanced Earth Observation training. The CoP also encourages community engagement through sharing practical experiences, identifying use cases, and fostering global collaboration on AI/ML applications in capacity development.

2.5 RGB Developers and Users Workshop 2025

The RGB Developers and Users Workshop 2025 ([meeting page](#)) was co-hosted by SMHI, EUMETSAT, and WMO, and held at SMHI, Norrköping, Sweden, from 1 to 3 April 2025. The objectives of the workshop were to consolidate current GEO-ring RGB composite standards and publish them in a workshop report; identify novel RGB products; demonstrate RGB applications using new-generation imagers (e.g. FCI); and identify common platforms for sharing RGB recipes and related materials.

One of the key outputs of the workshop was the document *Recommended WMO Standards for RGB Composite Recipes from Geostationary Meteorological Imagers*. The document provides guidance on the generation of WMO-recommended standard RGB composites using data from new-generation imagers aboard geostationary meteorological satellites operated by the United States, Europe, China, and Japan. RGB composites for other geostationary meteorological satellites can also be derived by adapting the standard recipes.

The document will be submitted for approval to the fourth session of the Commission for Observation, Infrastructure, and Information Systems (INFCOM-4), scheduled for 23-27 November 2026, for approval by INFCOM Members.

3 ENGAGEMENT WITH OTHER TRAINING PROVIDERS

VLab continues to collaborate with a range of training providers and scientific committees to strengthen education and training in satellite meteorology. Key partners in recent collaborations include the WMO Education and Training Programme (ETR), NASA ARSET, COMET, the CEOS Working Group on Capacity Building and Data Democracy (WGCapD), EOTEC DevNet (the Earth Observation Training, Education, and Capacity Development Network) and others.

Representatives from these programmes regularly participate in VLab Management Group (VLMG) meetings and actively contribute to discussions and coordination efforts.

4 WMO VLAB TRUST FUND

Sustained funding remains a critical issue for the VLab. While the VLab Trust Fund has historically benefited from regular voluntary contributions from several satellite operators, a recent decline in contributions has created challenges in maintaining the current level of support for coordination activities and training delivery.

Continued and additional voluntary contributions from CGMS space agencies are therefore essential to ensure the long-term sustainability and effectiveness of the VLab, including the continuation of technical coordination support provided through the VLab Technical Support Officer, as well as the delivery of training activities and travel support for WMO Members with limited resources.

Action 1. CGMS space agencies are invited to contribute to the WMO VLab Trust Fund to support the continuation of VLab technical coordination activities and training delivery, including travel support for WMO Members with limited resources.

5 REVISION OF THE GUIDELINES ON SATELLITE SKILLS AND KNOWLEDGE FOR OPERATIONAL METEOROLOGISTS

The *Guidelines on Satellite Skills for Operational Meteorologists and Specialists in Related Application Areas* have been developed by the WMO–CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). The purpose of the Guidelines is to enhance the effective use of satellite data by operational meteorologists and specialists in the delivery of climate and agrometeorological services, by supporting training centres in the development of appropriate learning objectives for the satellite-related components of their courses.

The first version of the *Guidelines on Satellite Skills and Knowledge for Operational Meteorologists* (published as SP-12 in 2017 and revised in 2018) covered the skills associated with operational meteorology. This new version updates satellite skills for operational meteorologists and adds new skills for specialists in the provision of climate and agrometeorological services.

HLPP 7.2.2 Update and develop new training material through the WMO-CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) and in partnership with the WMO Training and Education Programme. Link training materials to the 2025 update of ‘Guidelines on Satellite Skills for Operational Meteorologists and Specialists in Related Application Areas’

6 REVISION OF THE VLAB STRATEGY

The VLab community has initiated the revision of the *Strategy for the Virtual Laboratory for Education and Training in Satellite Meteorology* for the period 2027–

2030. The revised document aims to reflect evolving user needs, technological developments, and emerging priorities in satellite meteorology education and training, while ensuring alignment with WMO strategic objectives and relevant initiatives.

A draft version of the revised strategy is submitted to the CGMS-54 Plenary for information and discussion (please refer to: *CGMS-54-VLab-WP-03-p*). Following further refinement and consultation with the VLab community and CGMS Members, the finalized document is planned for submission to INFCOM-4 for approval in November 2026.

Prior to its formal submission to INFCOM-4, the revised strategy will be circulated to CGMS Members for endorsement through correspondence.

Action 2. CGMS space agencies to take note of the draft revised *VLab Strategy for Education and Training in Satellite Meteorology (2027–2030)* and the planned endorsement process prior to submission to INFCOM-4.

7 VLAB MANAGEMENT GROUP

7.1 VLab Office

Since the CGMS-53 Plenary, Mr Xian Di (National Satellite Meteorological Center, CMA) has been serving as VLab Co-Chair representing CGMS satellite operators, while Ms Zamzam Hamed Al-Rawahi (Directorate General of Meteorology, Oman Centre of Excellence) serves as VLab Co-Chair representing WMO Centres of Excellence.

In addition, Mr Diego Souza (INPE), Focal Point for the Brazilian Centre of Excellence, has started as VLab Technical Support Officer since 2026.

7.2 VLab Training Calendar

The VLab training calendar shows the upcoming satellite training events, workshops, conferences and online sessions organized by VLab partners and many other training providers around the globe. The calendar can be accessed at: <https://trainingevents.eumetsat.int/trui/>.

7.3 VLMG Meetings

The VLab Management Group (VLMG) meets quarterly online and focuses on actions and discussions to ensure the effective implementation of the VLab Strategy. The VLMG also strengthens regional communication within VLab through collaboration with the Satellite Data Requirements (SDR) groups across regions.

The Eleventh meeting of the VLab Management Group (VLMG-11) was hosted by the Oman Centre of Excellence in Muscat from 20 to 23 January 2025. The Twelfth meeting (VLMG-12) is planned for 2027 to be hosted by CMA in China (dates and location are to be confirmed).

8 CONCLUSIONS

The Virtual Laboratory for Education and Training in Satellite Meteorology (VLab) continues to play a central role in strengthening global capacity for the effective use of satellite data, in close alignment with WMO priorities and in support of CGMS objectives. Through sustained collaboration with CGMS Members and partner training providers, VLab contributes to the development, coordination, and delivery of high-quality education and training activities worldwide.

Key achievements during the reporting period include progress on regional capacity development initiatives, strengthened engagement with other training providers, active coordination through the VLab Management Group, and technical advancements such as the consolidation of RGB composite standards. In parallel, the VLab community has initiated the revision of its Strategy for the 2028–2031 period.

Continued support and engagement from CGMS Members, including participation in VLMG meetings, contributions to the WMO Space Programme VLab Trust Fund, remain essential to sustaining and further enhancing the impact of VLab in support of operational satellite meteorology and related applications.