

VIRTUAL LABORATORY TRAINING STRATEGY

The document presents a report on the new training strategy of the Virtual Laboratory for Education and Training in Satellite Meteorology for the next five years. The Virtual Laboratory (VL) has undergone considerable growth since its formal inception in 2001. WMO and CGMS members have become increasingly aware of the importance of the use of satellite data for a number of Societal Benefit Areas. Because of the VL's growth and scope of activity, it was deemed important that the VL develop a five-year training strategy.

The new strategy was developed by the Virtual Laboratory Management Group after its third meeting (VLMG-3) in June 2007, was discussed at VLMG-4 in September 2008 and presented for the first time to the WMO Expert Team on Satellite Utilization and Products in September 2008. The strategy was subsequently adopted at the WMO CBS Open Programme Area Group on Integrated Observing Systems Implementation and Coordination Team later that month. It is the intent of the CBS OPAG-IOS to take this strategy forward to the Commission for Basic Systems (CBS) for adoption.

Proposed Actions:

The CGMS is invited to review the VL training strategy and comment as necessary;

The CGMS, as a sponsor of the VL, is invited to adopt the new VL training strategy for the next five years.

VIRTUAL LABORATORY TRAINING STRATEGY FOR 2008-2013

1 BACKGROUND

1.1 The following briefly describes the activities that preceded the development of the new training strategy for the CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VL).

CGMS-28 placed Action 28.14 on WMO and the CGMS Secretariat to initiate the establishment of a Focus Group on satellite data utilization and training within the Virtual Laboratory framework that reported back to CGMS-29 on its findings and need for future activities in this area.

CGMS-29 formally adopted the Virtual Laboratory for Satellite Data Utilization, with continued reporting through the Virtual Lab Focus Group (renamed Virtual Lab Management Group by CGMS-33).

CGMS-30 requested that the VL [Management] Group convene before CGMS-31 and report back on activities and status with regard to the implementation plan.

CGMS-31 was informed that important milestones were being met: all centres were utilizing the VL.

CGMS-32 enthusiastically supported the VL goal of staging a Global High-Profile VL Training Event that would link all Centres of Excellence;

CGMS-33 strongly endorsed and supported the specific recommendations for the High Profile Training Event. CGMS was informed of the success of the Regional Focus Groups and looked forward to the development of similar Regional Focus Groups at all CoEs prior to the High Profile Training Event (HPTE).

CGMS-34 endorsed the growth of the VL confirming new Centres of Excellence in Argentina and Brazil sponsored by NESDIS. CGMS-34 was pleased to learn of the success of the HPTE that had taken place during the two weeks before CGMS and looked forward to a more complete report at CGMS-35.

CGMS-35

- Endorsed the proposal that the Virtual Laboratory (VL) and its management group (VLMG) shall continue for the foreseeable future;
- Agreed upon the revised goals and objectives, terms of reference and expectations of partners agreed by VLMG-3;
- Noted the synergy, noted by the VLMG, between the topics already addressed in VL training events and eight of the nine GEO Societal Benefit Areas and endorsed the proposal that this shall be reflected in future development of a widely used training syllabus;
- Noted the proposal that the WMO Space Programme Office explore all options to develop a full time support officer position covering satellite meteorology training and utilization. It commented that this should be further explored at the fourth VLMG meeting in 2008.

2 RATIONALE FOR A NEW STRATEGY

2.1 The VL has undergone considerable growth since its formal inception in 2001. That growth has occurred in several areas:

Increased number of Centres of Excellence and Sponsors;
Increased number of people trained through a variety of venues;
Use of new and more sophisticated training methods and training tools; and
Expansion of topical areas of training.

2.2 WMO and CGMS Members have become increasingly aware of the importance of the use of satellite data for a number of Societal Benefit Areas. Inspection of WMO satellite training activities within the VL indicated that various training activities intersected eight of the nine GEO Societal Benefit Areas.

2.3 Because of the VL's growth and scope of activity, it was deemed important that the VL develop a new five-year training strategy. Key elements of that strategy are in the section below. The detailed five-year strategy document is presented in Annex 1, with a draft version of the corresponding Implementation Plan in Annex 2.

3 KEY ELEMENTS OF THE NEW FIVE-YEAR STRATEGY FOR THE CGMS VIRTUAL LABORATORY FOR EDUCATION AND TRAINING IN SATELLITE METEOROLOGY

Expanded training needs

- There is a wider range of users beyond classical weather forecasting, e.g. for environmental services.
- Increased satellite capabilities result in increased training needs in new application areas, e.g. climate change.
- As a consequence:
 - o Training should address exploitation of both operational and R&D satellite data and products;
 - o Training will involve increasingly use of satellite data in combination with other data as, for example, radar, NWP, lightning detection.

Expanded training areas

Resulting from the ongoing establishment of the various elements of the GEOSS and the emphasis being placed upon GEO capacity building efforts, especially for developing countries, the VL training activities may in the future have to address the training needs of some other relevant GEO Societal Benefit Areas e.g. climate, disasters, ecosystems, energy, health and water.

In the short-term, the first focus of VL training activities should be on satellite remote sensing, meteorology and climate. Where appropriate and user requirements exist, VL training activities could be widened to support training in: ocean and land

applications, hydrology and water management, atmospheric chemistry and air quality, environmental quality.

Implementation aspects

- Enlarging the VL network:
 - o Additional sponsoring satellite agencies,
 - o More Centres of Excellence (CoE);
- Access to the Virtual Resource Library (VRL) through a centralized Web portal;
- Increased e-learning and blended learning;
- Strengthening of the Regional Focus Groups (RFGs) established by each CoE (Centre of Excellence);
- Regular Regional Training Events.

Fundamental principles to implement the strategic goals:

- Commitment: to put effort and resources into the VL;
- Cooperation: building relationships, e.g. via setup of RFGs;
- Collaboration: jointly developing, delivering and exchanging training resources.

Assessment of benefit

- Assessment and demonstration of benefit resulting from training, in terms of improved services.

4 CONCLUSION

4.1 The CGMS is invited to review the proposed VL training strategy and comment as appropriate.

4.2 The CGMS, as a sponsor of the VL, is invited to adopt the new VL training strategy for the next five years.

ANNEX 1

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

1. INTRODUCTION

1.1 Scope and definition

The CGMS Virtual Laboratory for Education and Training in Satellite Meteorology (VL) was established to help improve the world wide utilization of satellite data and products by WMO Members.

The CGMS Virtual Laboratory (VL) is a global network of specialized training centres, named "Centres of Excellence in Satellite Meteorology (CoE)", that are supported by one or more CGMS satellite operators. These CoE, often co-located with WMO Regional Training Centres (RTC), are established in the various WMO Regions to meet user needs for increased skills and knowledge in using satellite data within their Region. Each CoE is responsible for conducting training activities and normally supports one or more Regional Focus Groups involving NMHSs from its region.

1.2 High-level goals

Current top-level goals of the VL are:

- i) To provide high quality and up-to-date training and supporting resources on current and future meteorological and other environmental satellite systems, data, products and applications;
- ii) To enable the Centres of Excellence to facilitate and foster research and the development of socio-economic applications at the local level by the NMHS through the provision of effective training and links to relevant science groups.

The VL activity aims at achieving these top-level goals through providing access to:

Case study material and near real time data,

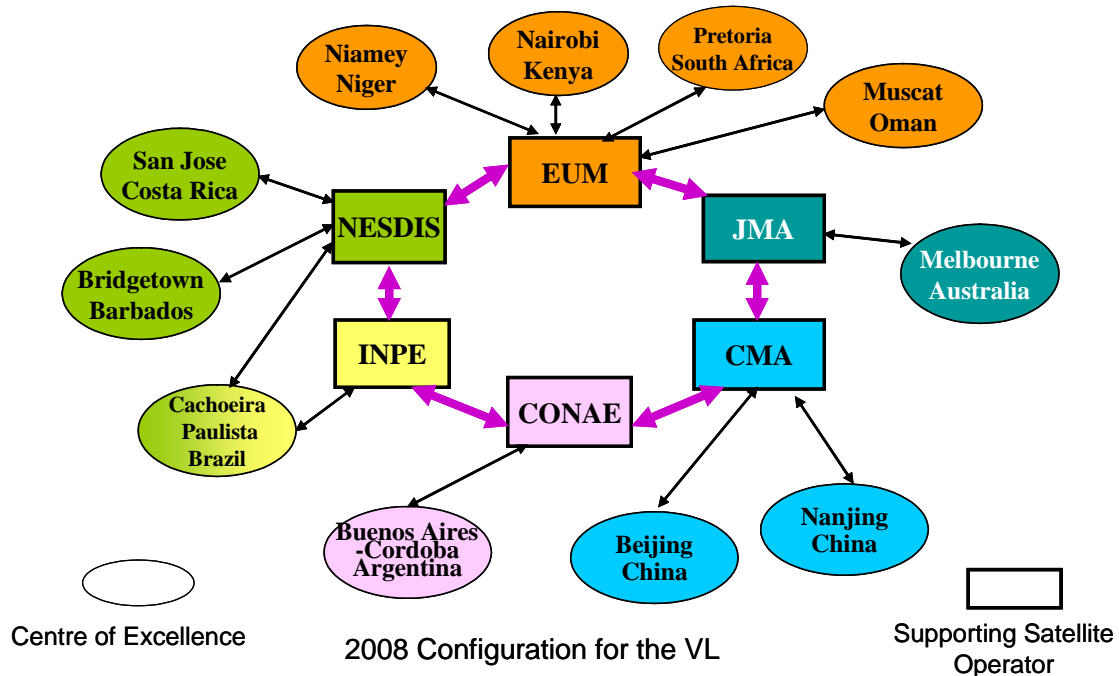
Training and educational resources, and

Software and expertise on how to best utilize satellite data and products.

1.3 Current status

At the present time, the VL is a collaboration between CMA, EUMETSAT, INPE, JMA and NOAA, as concerns the satellite operators; and nine CoEs that are located in Argentina, Australia, Barbados, Brazil, China, Costa Rica, Kenya, Niger, and Oman.

The figure below shows the various linkages within the VL between CoEs and their supporting satellite operators in September 2008. The continuing growth in the VL community is seen with the recent additions of INPE/CPTEC in Brazil; CMATC in Beijing, China; SAWS in South Africa; CONAE, SMN and UBA in Argentina.



1.4 Evolving user needs

In the coming years there will be significant changes in the user community requiring training, the way teaching and learning is carried out and the subject matter of the training. There will be significant advances in e-learning technology and increased availability of high speed low cost communications across the globe. Increased satellite capabilities will lead to new data and product application areas, over and above the traditional weather forecasting, which will become increasingly important. For example, the ability to measure precisely and understand climate change and its impact is now a global priority.

As more NMHSs take advantage of automated services, weather forecasters will require regular training to provide an expanded set of products that meet the needs of a wider range of users including for instance environmental scientists, software engineers and developers of new user-driven services. It is clear that with new satellite technologies, advanced training will become an imperative to ensure full utilization of this valuable resource.

1.5 New strategy

Building upon the experiences and successes of the VL over recent years, and taking into account the evolving user needs, this document presents a five-year strategy for the VL. It is complemented by a plan for implementing this strategy.

2. STRATEGIC OBJECTIVES FOR THE VL

2.1 Target users

The VL will aim at providing training and training resources for NMHS staff, noting that this includes a diversity of profiles from core synoptic weather forecasting to a wide range of applications to related fields, as the activity of NMHSs tends to expand.

2.2 Training areas

First of all, the VL will provide training that exploits the full potential of satellite data and products from both operational *and* several R&D satellites and, in so doing, prepare the various user communities for the next generation of space-borne Earth observing systems.

Secondly, and bearing in mind the ongoing establishment of various elements of the GEOSS and the emphasis now being placed upon GEO capacity building efforts, especially for the developing countries, VL training activities may in the future consider the training needs of some other GEO Societal Benefit Areas in addition to Weather and Climate: Agriculture, Biodiversity, [Disasters](#), Ecosystems, [Energy](#), Health and [Water](#).

The training programmes of the CoEs and satellite operators comply with the principles and recommendations described in the satellite meteorology component of WMO publication 258 "Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology". This document places major emphasis on the training of trainers and sets the standard for competence training. Therefore, VL training activities will have to closely follow any evolution in WMO publication No. 258 to meet new training needs.

Building upon the currently available expertise within the VL network, training activities should first focus upon the following topics:

- (i) Satellite Remote Sensing
 - Satellite capabilities
 - Spectral bands and their applications
 - Cloud analysis and image interpretation
 - Microwave applications
 - Products – Precipitation, Winds, Soundings, etc.
 - Resolution, calibration, product quality
- (ii) Meteorology
 - Severe convective systems
 - Heavy rain and floods
 - Winter storms
 - Tropical storms
 - Impact on transportation (land, aviation, water, space, etc.)
- (iii) Climate
 - Inter-calibration issues

- Radiation budget
 - Ocean and cryosphere
 - Aerosols and ozone
- (iv) Hydrometeorological and other natural disasters
- Fire, wind, etc.

Where satellite observations are of benefit, and there is a user requirement, then the focus of VL activities could be widened to support training related to:

- (v) Ocean applications
- (vi) Land applications
- (vii) Hydrology and water management
- (viii) Atmospheric chemistry, air quality
- (ix) Environmental quality

Applications and Service-based training will increasingly involve the use of satellite data *in combination* with other data sets such as weather radar, NWP, lightning, precipitation, land information, etc., and may well be carried out in partnership with other Institutes where the relevant expertise exists.

2.3 The Virtual Resource Library

The Virtual Resource Library (VRL) is a key asset of the VL. A key goal is to ensure that this valuable repository of training resources is secured, maintained and configured in such a way that effectively supports both the contribution and use of resources. To this end, it is proposed that the VRL should be accessible through a centralized Web portal. The host of such a portal must have experience in maintaining and managing such a system. Examples of such sites might be the Environmental Satellite Resource Centre (ESRC) hosted by COMET and the CEOS Educational Resources Portal maintained by EUMETSAT.

2.4 Role of the CoE

Each CoE is responsible for conducting international training activities, in one or more WMO working languages, for the benefit of NMHSs from its Region, along the lines of the Virtual Laboratory.

For that purpose, and considering the expanding training needs within the regions, the CoE is expected to survey and maintain a list of training requirements for its Region, to organize and run training events, to develop and maintain proficiency in providing online training using tools such as VISITView, and to establish and support one or more Regional Focus Groups holding regular online sessions.

The CoE, through a nominated focal point and an alternate, will maintain coordination with the VL Management Group and provide the Co-chairs with a brief annual report outlining the relevant past training activities, the priority training needs for the region, their plans to meet these needs in the coming twelve months, their overall situation and other information as appropriate.

2.5 Regional Focus Groups

For the VL to realize its potential and become a global provider of training, each CoE will need to establish and/or strengthen the Regional Focus Groups (RFG).

The RFG is a virtual meeting that is convened by the CoE on a regular basis through online sessions, using VisitView or equivalent tools, in order to maintain an active sharing of experience and know-how within the Region in between training events. The primary scope of RFG sessions can be to hold weather briefings. It also allows highlighting significant recent situations to keep abreast of new developments, and to ask and answer questions. Through this mechanism, the CoEs play an important networking role and help build a strong community of practice.

2.6 Tools and techniques

A key component of the advanced training will be greater use of blended learning, a training concept successfully implemented in recent years by a number of training centres. Blended learning combines online and traditional methods for training and is a very cost effective means of expanding the access to training materials while preserving many of the benefits of traditional training approaches. Its wider use should be regarded as a key goal of the VL. Conferencing and audio/video-supported training tools are now emerging and these developments will be assessed and incorporated by VL partners in their training programmes, as appropriate.

The course management system, [Moodle](#), and distance learning tools like CENTRA are being adopted among the VL partners. The progression to new “tools” for use by trainers is important to the growth of the VL.

The quality of Internet connectivity is very important to support the use of video, voice and other high quality training tools in the VL environment. To provide effective training, CoEs need to have an Internet connection with a **minimum** data rate of 1 Mbs **specifically dedicated** to CoE training activities. Such a data rate is the absolute minimum needed. Status of Internet connection needs to be included in the CoE annual reports to VLMG every September.

2.7 Feedback mechanism

Increasingly, it is necessary to demonstrate the tangible benefits coming from human and financial resource investments in training. In particular, how training leads to an improvement in services provided by the NHMS. The VL will develop systematic feedback and reporting mechanisms that will lead to continuous improvement ensuring that this key objective is met.

2.8 Outreach

Past enquiries indicate that many users are not yet fully aware of the resources that the VL can provide. Information actions shall be considered to raise the awareness of WMO Members through the VL website; and at the regional level through the Centres of Excellence, the WMO Regional Associations and the Regional Rapporteurs for the Space Programme.

3. SECURING AND ENHANCING THE VL NETWORK

To implement the VL strategy in the coming years, the following three fundamentals of the VL have to be fully supported by the partners:

- ❖ Commitment = by all the partners to put effort and resources into the VL;
- ❖ Cooperation = building relationships, e.g. via the set up of Regional Focus Groups;
- ❖ Collaboration = jointly developing, delivering and exchanging training resources.

3.1 Commitment

As noted earlier, the long term effectiveness of the VL relies on the long-term commitment of the CoEs and the satellite operators to meet training requirements coming from their various user communities. In turn, the effectiveness and success of the CoEs is highly dependent on five factors; the support from their sponsoring satellite operator, the support from local management, the availability of trained personnel, the quality of the training technical infrastructure, and political stability.

3.2 Expansion of CoEs

While the VL has existed for less than a decade, both its growth and positive impact have been dramatic. This was recognized by the WMO Congress. We expect the growth of the VL to continue with sponsorship from additional satellite agencies and inclusion of more CoEs. This growth should ensure that all countries in a particular Region can benefit from VL training activities and that training can be provided in all WMO official languages. These additional CoEs will facilitate intercontinental cooperation in training and the development and exchange of training resources in additional languages, as well as provide a risk reduction measure should a nearby CoE need assistance.

3.3 Partnership

The Eumetcal Project of EUMETNET is addressing the meteorological training needs of much of WMO Region VI (RA VI). It is reasonable to consider that the VL network could take advantage of Eumetcal satellite related training activities in RA VI. The expansion of the VL network in this manner will be carried out in partnership with established European Training Centres and others in RA VI such as Russia with its WMO Training Centres in Moscow and St. Petersburg.

3.4 Coordination

Taking into account the dynamic expansion of the VL in terms of new CoEs, future Regional Focus Groups, wider scope of applications covered, and larger audiences, there is a clear need for strong project coordination. Given the decentralized nature of the VL, this can only be efficiently achieved if coordination is ensured by a dedicated person assigned to this function.



4. IMPLEMENTATION PLAN

An Implementation Plan should be developed for the five-year period and include tasks, actions, responsibilities, deadline and deliverables, directly related to the strategic goals mentioned above. Progress in the implementation should be monitored on a yearly basis by the Virtual Laboratory Management Group (VLMG) and the Plan updated as appropriate.

ANNEX 2

VIRTUAL LABORATORY IMPLEMENTATION PLAN FOR 2009 TO 2012 (DRAFT, SEPTEMBER 2008)

Task	Ref. to strategy	Action	Responsibility	Deadline for action	Deliverable(s)
1. The CoEs will strive to have more people actively involved in the development, review and incorporation of local training material within the VRL	2.2	Refer to Action 3. CoEs to report on the level of effort available for the development, review and incorporation of local training material.	CoEs	Report progress to VLMG meeting, Sept 2009.	Part of new style of annual report to VLMG
2. Establish centralised VRL portal with unified web access to its content, and long term commitments for hosting, managing and quality controlling its resources.	2.3	VRL Task Team to evaluate possibilities to transfer the current (distributed) elements of the VRL to a centralised site, for example, the ESRC, hosted by COMET and CEOS. Report to VLMG.	VRL Task Team	Initial report to VLMG by 15 March 2009. Report to ET/SUP- Next Sept 2009.	Recommendation and demonstration for evaluation by VLMG (virtual) meeting.
3. Standardised annual reporting from CoEs to VLMG.	2.4	To prepare a template for the CoE annual reports to VLMG.	VLMG Chairs and Tony Mostek	For discussion at virtual VLMG in March 2009.	Document template for reports to VLMG from CoEs
4. Improving the inter-regional effectiveness of training events through the global coordination of the Regional Focus Groups (RFG).	2.5	All COEs to provide their RFG focal point to VLMG. Participate in regularly scheduled RFG coordination meetings.	All COEs and VLMG and satellite operators	1 October 2008 for the focal points.	1 st coordination meeting of RFG in December 2008.

<p>5. Bringing the physical infrastructure of the VL network up to a universally agreed minimum standard that is necessary for the effective delivery of training.</p>	<p>2.6</p>	<p>WMO Secretariat, in consultation with VLMG Co-Chairs, Tony Mostek and OPAG Chair, to send a letter to all COE Principals and sponsoring satellite agencies informing them of the updated VL strategy document, the related expectations, and calling upon their commitment to implement this strategy</p>	<p>WMO Sect, VLMG and CoEs and the satellite operators</p>	<p>Preparation and mailing of letter by 15 December 2008.</p>	<p>Updated infrastructure achieved by end 2009.</p>
<p>6. CoEs and Regional Focus Groups will manage their own training activities and information exchange systems, within the context of an agreed Course Management System, such as Moodle;</p>	<p>2.6</p>	<p>Refer to Action 4 above. RFG focal points to become familiar with and regularly use course management tool Moodle.</p>	<p>CoEs, RFGs and supporting satellite operators</p>	<p>Report progress to VLMG meeting, Sept 2009.</p>	<p>COEs and their RFG become familiar with use of Moodle.</p>
<p>7. Effort should be spent on trying to achieve VISITview and CENTRA lessons, webcasts, or similar, with audio capability, either for real-time presentation, or recorded for later re-use and/or translation</p>	<p>2.6</p>	<p>COEs and supporting satellite operators to carry out training event covering the use of training tools such as VISITview, CENTRA lessons, webcasts, or similar with audio capability, either for real-time presentation, or recorded for later re-use and/or translation</p>	<p>COEs and supporting satellite operators</p>	<p>Report successful completion of training to VLMG in Sept 2009.</p>	<p>COEs and their RFG receive at least one training course in the use of VISITview CENTRA lessons, webcasts, or similar with audio capability.</p>
<p>8. Periodic review of VL.</p>	<p>2.7</p>	<p>Conduct periodic reviews of the VL performance and achievements against goals. Look for remedies and enhancements, as appropriate.</p>	<p>ET-SUP-Next</p>	<p>Every 2 years commencing 2008.</p>	<p>ET-SUP provides report for use at CGMS and CBS.</p>

<p>9. VL Outreach – inform all WMO Members about the existence of the VL and its capabilities.</p>	<p>2.8</p>	<p>Create flyer on the VL and its VRL for the WMO SP web site, the CoE web sites, distribution by the Space Programme Office plus other methods as appropriate</p>	<p>EUMETSAT , INPE, NOAA, Costa Rica CoE & WMO Sect</p>	<p>1 Feb 2009 in time for WMO CBS (initial distribution)*</p>	<p>Digital flyer in multiple formats</p>
<p>10. Each Regional Focus Group should have its own (common design and functionality) web pages which should include a schedule of Regional Focus Group Meetings with application areas being addressed through training. These pages will be linked to the centralised VL web site:</p>	<p>2.8</p>	<p>Web site Task Team to recommend format for common design and functionality of RFG web sites.</p>	<p>Web site Task Team</p>	<p>October 2009.</p>	<p>Document and demonstration for consideration by VLMG</p>
<p>11. Completion and approval of the VL strategy by time of the WMO CBS in 2009.</p>	<p>3.1</p>	<p>After finalization by the VL Strategy Task Team, and approval by VLMG, the VL Strategy and Implementation Plan shall be submitted for approval to CGMS-36 as a WMO Document, then to for CBS-XIV.</p>	<p>Strategy Task Team for final draft to VLMG. WMO Secretariat for final doc to CGMS and to CBS.</p>	<p>1 October 2008 (WMO doc for CGMS)</p>	<p>Approved 5-year VL Strategy and Implementation Plan</p>
<p>12. Enhancing and securing the network of the VL, to include new CoEs and addressing the needs of other WMO Regions not currently well covered.</p>	<p>3.2</p>	<p>VLMG to evaluate the need and feasibility of enhancing and securing the network through the analysis of annual CoE reports.</p>	<p>VLMG and CoEs through regular meeting agenda item.</p>	<p>Next regular meeting of VLMG in Sept 2009.</p>	<p>Evaluation of CoE reports sent to ET-SUP-Next and CGMS.</p>



CGMS-36, WMO-WP-19
v1, 16 October 2008

<p>13. Noting the need to maintain a centralised VL web site and tremendous growth in VL activities as noted by WMO Congress, additional human resources (fulltime VL Support Officer) are essential;</p>	<p>3.4</p>	<p>Chair OPAG to bring to the attention of CGMS-36 for implementation. VLMG to supply supporting information to OPAG Chair.</p> <p>The central VL web site will be dynamically maintained by this Officer who will also act as a comprehensive focal point for all VL activities.</p>	<p>Chair OPAG and VLMG</p>	<p>VLMG by 4 Sept 2008. OPAG Chair by November 2008 (CGMS meeting).</p>	<p>Job description, recruitment and placement of VL Technical Support Officer.</p>
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