CGMS

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VIRTUAL LABORATORY FOR TRAINING IN SATELLITE METEOROLOGY AND NEW CENTRES OF EXCELLENCE

The paper presents a report of training activities within the Virtual Laboratory (VL) since CGMS-35 along with future plans and directions.

The outcome of the fourth meeting of the VL Management Group (VLMG) in September 2008 is described with recommendations presented to CGMS for endorsement or comment.

Actions proposed:

- CGMS confirm the South African Weather Service training division as a Centre of Excellence (CoE) pending endorsement by EUMETSAT;
- CGMS confirm the Russian plan for a CoE pending further clarification and endorsement by Roshydromet;
- CGMS discuss the need for a technical support officer for support of the planned training and education activities as elaborated through the new Virtual Laboratory (VL) strategy and the ET-SUP work plan. The technical officer could be located at a CoE and sponsored by satellite operators.

VIRTUAL LABORATORY FOR TRAINING IN SATELLITE METEOROLOGY AND NEW CENTRES OF EXCELLENCE

1 BACKGROUND

The following briefly describes the discussions held at previous CGMS meetings on the subject of the Virtual Laboratory (VL) are summarized in CGMS WMO-WP-19.

2 ACTIVITY IN THE VIRTUAL LABORATORY SINCE CGMS-35

2.1 Virtual Laboratory Management Group Meeting

The Fourth Meeting of the Virtual Laboratory Management Group (VLMG-4) was held on 1 September 2008 in Langen, Germany and the final report is available on the WMO Space Programme web site.

The VLMG reviewed activities within the VL over the period since its third meeting which took place in Boulder Colorado in 2007. The third meeting found that the VL continued to perform at an exceptional level. The meeting reviewed major achievements over the period and was pleased with the growth of the VL and training and outreach activities that had taken place within the various CoEs. The meeting took note of the growth of scope of the activities within the VL and reviewed and agreed upon a new training strategy for the next five years (See CGMS-36 WMO-WP-19).

The VLMG found that the great success of the VL Focus Group of the Americas (reported at CGMS-34 and 35) had greatly aided in training and utilization of satellite data and that such groups carry out an important function within the VL mandate. The VLMG therefore strongly recommended that CGMS satellite operators that sponsor a Centre or Centres of Excellence work closely with them in the formation of Regional Focus Groups in all areas similar to the VL Focus Group of the Americas.

2.2 New CoE endorsed by VLMG: The VLMG reviewed the capabilities of the South African Weather Service (SAWS) training centre, Pretoria, South Africa and found them to be outstanding. The VLMG requested that their nomination be taken forward to WMO and CGMS to become a CoE for the VL, This was confirmed by the Expert Team on Satellite Utilization and Products (ET-SUP) at their September 2008 meeting which immediately followed the VLMG meeting.

2.3 Potential new CoE endorsed by VLMG: The VLMG received a presentation by Roshydromet concerning the Russian version of a VL. During 2008, the initial version of a Russian web site aimed at distance training in satellite hydrometeorology was developed and started its operation in the Russian Federation. In essence, it is a Russian contribution to the Virtual Laboratory (VL). The site has been developed on the basis of the WMO Regional Training Centre (WMO RTC) in the Russian Federation by the specialists of the Institute of Skill Improvement of the managerial staff and leading specialists of Roshydromet (SEI IIS - State Educational Institution

the Institute of Skill Improvement, Zheleznodorozhny) with participation of the Russian State Hydrometeorological University (RSHU, St. Petersburg).

The Russian version of the Virtual Laboratory is to be used for training specialists in satellite meteorology both at the national and international levels, mainly for a Russian speaking audience. The complex will be enhanced in the future through additional training and methodological material. Leading scientists and specialists of scientific and research institutions of Roshydromet and higher educational institutions of Russia and the countries of the Former Soviet Union will be involved in the preparation of lectures covering a wide range of subjects in hydrometeorology and environmental monitoring.

The VLMG reviewed the capabilities and had discussions concerning the Russian proposal, and pending further confirmation by CGMS, suggest this activity move forward within the VL. This was agreed upon by the ET-SUP when it met following the VLMG meeting.

2.4 Resource Issues within the VL

(a) Some CoEs have bandwidth and connectivity problems. These problems are affecting the ability of the CoEs to function in a virtual environment and support NMHSs and others within their WMO regions. Satellite operators are encouraged to review this problem with their respective CoEs and to seek effective remedies.

(b) The VL is continuing to grow. Requirements for training and interaction within the VL are expected to further increase greatly in the future as more complex satellites are launched and training expands to cover various GEO Societal Benefit Areas (SBAs). New activities that need focus include managing the establishment and routine functioning of regional Focus Groups, maintenance of the Virtual Resource Library, handling the input from questionnaires, follow-up of course effectiveness, maintenance of the VL web page and links, etc. Furthermore, the WMO Space Programme is currently not adequately resourced to properly support the planned training and education activities as elaborated through the VL strategy and ET-SUP work plan, and this is unlikely to change.

(c) Current members of the VL Management Group have other commitments that make undertaking the role of VL coordinator impossible. Furthermore, as was pointed out at CGMS-35, the activity needed requires a full time support position. This position can exist anywhere within the VL. A more detailed justification for such a position is included as Annex 1.

2.5 Activities within the CoEs

Satellite operators and CoEs reported on their training activities at the VLMG-4 for the period since VLMG-3. Highlights are given below; complete reports can be obtained from the VL Management Group meeting documentation on the WMO Space Program web site (http://www.wmo.int/pages/prog/sat/meetings/VLMG-4.html) .

Argentina CoE
The Argentina COE has devoted a lot of efforts in providing a two-week long Regional Training Course on the Use of Environmental Satellite Data in Meteorological Applications for RA III and RA IV that took place from 22 September to 3 October 2008. Twenty-four participants attended this event, 12 from Argentina and 12 from other South or Central American countries. Besides the direct involvement of CONAE, the National Meteorological Service, and the University of Buenos Aires; the course received important support from the Brazilian CoE, CIRA, COMET, EUMETSAT and NOAA. It was conducted in Spanish and focused on aeronautical meteorology and environmental applications. It used a blended learning approach, including a number of laboratory sessions and online weather discussions. The major lectures will be recorded after the event and will be made widely available. A live interaction was established during the course with the GEOSS in Americas Symposium taking place in Panama during the same time frame. The Argentina CoE plans to establish a Regional Focus Group for South America in the coming months.

Australia CoE
Given the move of Jeff Wilson to WMO Secretariat, Dr Philip Riley has agreed to take on the role of focal point for the Bureau of Meteorology Training Centre VL. Gordon Jackson has been nominated as the Darwin RSMC focal point for VL activities.

Darwin RSMC is an important focal point for conducting regional tropical weather briefings. The Darwin RSMC successfully trialled tropical weather discussions with the BMTC Graduate Diploma in Meteorology course utilizing Visitview software in 2007. VOIP remains an issue for the Bureau as many "social software" audio solutions such as Skype and Yahoo messenger are not allowed within the Bureau. Alternative solutions will need to be sought. Ongoing weather discussions conducted by Darwin RSMC and BMTC for regional focal groups will occur as resources and priorities allow.

BMTC recognizes the importance of the APSATS course as a vehicle for satellite related training in the region. The next course is tentatively scheduled for 2010.The ability of BMTC to conduct a course in 2010 will largely be determined by whether the Bureau implements a new forecast system nationally over the next three to five years. If such an implementation is to occur the APSATS course would not be run prior to 2012.

Barbados CoE
Virtual Laboratory training resources have been used at CIMH in both the online and classroom forums using the VISITview programme. Available online lectures have been utilized as well. The VISITview programme is a good tool for classroom lectures. The programme is used for lecture courses including Introduction to Meteorology, Synoptic Meteorology I and Synoptic Meteorology II. It is mainly used to demonstrate analysis techniques from scalar analysis to satellite weather interpretations. The Lecture D from the HPTE on the development and evolution of deep convection has been used in lectures in Physical Meteorology and Synoptic Meteorology.

The Caribbean Weekly Weather Discussions (described below) were also included in the teaching arena. Students in the current Senior Level Meteorological

Technicians (SLMT) course were occasionally in attendance and encouraged to participate in a 'question and answer' session. The students appreciated the feedback from the regional forecasters who gave them an insight into their future duties. In the future SLMT students will be occasionally assigned to lead the discussions. The main activity has been the Caribbean Weekly Weather Discussion (CWWD) online forum. The CWWD began in June 2007 headed by Ms Kathy Ann Caesar (Meteorologist) and is comprised of forecasters and meteorologists from the Regional National Forecast and Warning Offices (NFWOs) and staff from the CIRA satellite work group. The goal of the forum is to promote satellite weather discussions and scientific collaboration among the regional NFWOs using the VISITview programme and the Regional and Mesoscale Meteorology Team (RAMMT) Advanced Meteorological Satellite Demonstration and Interpretation System (RAMSDIS) online database of real-time data. The discussions were attended with much enthusiasm from the participating NFWOs which included forecasters from Antigua, Bahamas, Barbados, the Cayman Islands, Guyana, Jamaica, St. Vincent, and Trinidad and Tobago. Many productive observations and debates were developed in the online collaborations.

The following were among the topics covered during CWWD 2007:

- *The African Monsoon Trough*;
- *Hurricane Dean*;
- *MM5 and WRF numerical models products;*
- *Screaming eagle pattern*;
- *Local climatology*;
- *The use of VISITview as a briefing* tool;
- Introduction of other products on the VISITview web site.

As a result of a request from the participants, the online discussions continued after the end of the 2007 hurricane season and were changed to bi-weekly weather discussions.

CIMH will continue to integrate the Virtual Library concept into its curriculum and it is expected to play a vital role

Brazil CoE
The WMO Centre of Excellence (CoE) in Cachoeira Paulista is a joint venture between the Brazilian Weather Service (INMET) and the Brazilian National Institute for Space Research (INPE)/Centre for Weather Forecast and Climatic Studies (CPTEC).

The main objective of the CoE is to provide education and training in satellite meteorology for Portuguese-speaking countries in order to maximize the exploitation of satellite data across these countries.

Face to Face Training Events:

- *GEOSS Americas/Caribbean Remote Sensing Workshop - Transforming Data into Products (Nov. 2007);*
- *EUMETCast System: Data Reception and Processing for South America (June 2008);*

- *The Use of Satellite Data for Land-Surface Monitoring (Nov. 2008, to be confirmed).*

Contribution to other training events:

- *Iberoamerican Course (Cartagena, October 2007);*
- *Regional Training Course on the Use of Environmental Satellite Data in Meteorological Applications for RA III and RA IV (Argentina, Sept-Oct. 2008)*.

Online Training Events

- *The Use of Satellite for Environment Monitoring;*
- *Satellite Training using Moodle;*

The VISITview Lab Lab has been used daily to discuss the weather forecast between CPTEC/INPE and INMET and in the monthly climatic meeting between different Brazilian institutions (e.g., CPTEC/INPE, INMET and regional meteorological centres).

China CoE
CMATC functions as a higher educational and training body, a national continuing education and on-the-job training base for higher-level trainees. In 2007 alone, 88 residence courses were run by CMATC with 4,283 participants and 75,174 person-days. Seven distance training courses were in operation, accumulating 128 study hours with 59,921 registered staff.

Operational Meteorology Training is targeted to professionals at medium and senior levels. tiered distance education system adopts 3 training modalities as multimedia CDs, satellite one-way broadcasts and video weather-discussion conferences oriented to the self-learners of local weather stations across the country in an asynchronous or synchronous fashion via Internet.

CMATC is CMA's only national training base, under the guidance of which are the regional and provincial training centres. More than 7,400 CMA staffs including about 6,600 by the means of distance training and 13 participants from other developing countries received satellite related training in CMATC, and such training events are held every year in the Centre.

Satellite meteorology is also touched in meteorological courses whenever necessary in CMATC. In the nearly 90 courses every year, satellite meteorology knowledge is presented in management courses, weather forecasting operational courses, weather disaster prevention and mitigation courses even international courses when it is The 2006 HPTE hard disk was put in the CMATC internal training material resource server. It is shared and used as a reference in CMATC's training courses.

Costa Rica CoE
The CoE Costa Rica continued participating in:

- Coordinating the Latin American Focal Points in Satellite Meteorology during the VL international monthly weather discussions;

- Fostering the participation of newcomers in weather discussions, like the RTC in Venezuela which became involved in March 2008;
- Fostering and facilitating the use of multimedia training modules, either online or on disk, particularly through the cooperation with COMET.

Concerning the question: "Which VL resources did you find the most valuable in the last 12 months?" The most valuable resources in the past 12 months have been:

- The international weather discussions;
- The training material available at www.meted.ucar.edu in Spanish;
- The DVD with the HPTE presentations;
- Archives of digital satellite products and images (started by CIRA in 1995);
- VL homepage links.

Niger CoE
The main EAMAC VL activities during 2008 have essentially been oriented towards:

- Pursuing the recommendations formulated at VLMG-3 in June 2007;
- Organizing a workshop on VISITview and MOODLE at EAMAC;
- Setting up a Regional Focus Group for West Africa (RFGWA);
- Recognition by ASECNA's schools Educational Council of the VL activities as new methods and techniques of distance learning that can be integrated into the CoE teaching programmes

.
The translation of HPTE VISITview presentations hasn't been completed. This is mainly due to a lack of funds and it has not been planned in the EAMAC budget. The main VL activity was a VISITview and Moodle training workshop in March 2008, initiated and supported by EUMETSAT, which was organized at the same time as a Regional Focus Group for Southern Africa. Since EAMAC had no expertise in Moodle, an instructor was trained at a workshop at EUMETSAT headquarters in January 2008. During the March 2008 workshop, a Regional Focus Group of West Africa was set up. It is composed of the representatives from Benin, Burkina Faso, Mali, Niger, Togo and the responsible of the VL, who will be in charge of coordinating all the Focus Group activities. The Focus Group is hosted by the EUMETCAL site for its MOODLE activities.

Nairobi CoE
The HPTE from 23 to 27 October 2007 was attended by 11 participants from Burundi, Djibouti, Ethiopia, Kenya, Rwanda, IAO-Somalia, and Tanzania. The CoE held a VISITview session live from the PUMA laboratory with South Africa and Darmstadt; it also held successfully a live session with Oman Training School. The first Regional Focus Group (RFG) was established and continued for four months communicating through Skype on the seventh day of each month; but then dwindled down, likely due to lack of reliable Internet connectivity.

The yearly EUMETSAT Satellite Application Courses have been greatly appreciated and provided satellite data application skills for most English speaking countries in the last seven years.

The IMTR training courses have remote sensing and data analysis integrated in the courses, hence improving on the number of students exposed to satellite data

applications. Courses such as integrated water resources management, remote sensing and GIS for hydrologists, advanced meteorological training, Meddle meteorological technician, and AFC have attracted a number of participants. The problem arises on sponsorship.

Two five-day MOODLE training sessions were held at IMTR in 2007 and a one-day in 2008 (August 12). A server was set up for MOODLE and one resource person trained on this field. It is anticipated that it will take the next three years to automate and digitize our training programmes since not every instructor in our establishment has a personal computer to enable lessons development in MOODLE format or otherwise.

IMTR in partnership with the University of Reading (UK) have been holding E-learning training projects for the region named E-SIAC (E-Learning on Statistics in Applied Climatology Course) the last three years. The last course ran from 18 August to 12 September 2008 with participants from more than 20 countries. The course started more than 3 months before. Each student registered in the course in his/her home country through the web and then came to IMTR to sharpen their skills.

IMTR, through the Kenya Meteorological Department, is hoping to upgrade its LAN infrastructure with a band width of 2 Mb/s but there are still concerns about network robustness and security, as well as power supply.

There is a great demand for more persons trained in remote sensing and satellite meteorology. VL support would be of very helpful.

We have benefited a lot from the use of ASMET CAL modules on satellite meteorology and EUMETSAT training materials. Further CAL modules on other meteorological fields, would be helpful.

Oman CoE
The Centre has hosted five training events which were sponsored by EUMETSAT and one sponsored by the UK Met Office. EUMETSAT has been very supportive in helping the Oman CoE in all its training activities. Some specific training activities provided for trainers include:

- Training of meteorologists as training experts on satellite meteorology and keeping their knowledge up-to-date;
- Yearly one or two-week training courses for Middle Eastern countries;
- Provision of training materials;
- Advice on the establishment of a training laboratory linked to a Meteosat Second Generation (MSG) receiving station which allows training with real-time data;
- Advice on how to organize distance learning courses through Internet using software packages such as Visitview.

EUMETSAT, VL Sponsor
This should be reported by EUMETSAT at CGMS-36.

Japan, VL Sponsor
This should be reported by JMA at CGMS-36.

NOAA, VL Sponsor
This should be reported by NOAA at CGMS-36.

Others
The Indian representative from ISRO made it clear that ISRO was now the satellite operator in India and that IMD's status was that of a user. Therefore, ISRO would hereafter represent India within the VLMG. He further indicated that IMD was considering sponsorship of a CoE in India and that he would clarify India's co-support role for the Oman CoE through ISRO.

3 CONCLUSIONS AND RECOMMENDATIONS

Considering the reported outcomes of the recent Virtual Laboratory Management Group meeting (VLMG-4) including a review of the new VL Training Strategy, CGMS are invited to consider the following VLMG recommendations:

(1) CGMS Members to endorse the addition of a new Virtual Laboratory Centre of Excellence in South African Weather Service (SAWS) sponsored by EUMETSAT;

(2) CGMS Members to endorse the addition of a new Virtual Laboratory Centre of Excellence under the Russian framework located at Russian institutes and sponsored by Roshydromet;

(3) Satellite operators that sponsor a Centre or Centres of Excellence are urged to work closely with them in the formation of Regional Focus Groups similar to the WMO VL Focus Group of the Americas reported on at CGMS-34 and 35;

(4) There is a need for a technical support officer for support of the planned training and education activities as elaborated through the new Virtual Laboratory strategy and the ET-SUP work plan, who could be located at a CoE and sponsored by satellite operators.

ANNEX

THE NEED FOR A TECHNICAL SUPPORT OFFICER FOR THE VL

(From the conclusions of the fourth joint meeting of the Expert Team on Satellite Utilization and Products and Expert Team on Satellite Systems, Langen, Germany, 2-5 September 2008)

1. Background to the need for additional support

The Virtual Laboratory for Education and Training in Satellite Meteorology (VL) started with four satellite operators and five CoEs. As of 2008 the numbers have increased to six satellite operators and 11 CoEs. A global High Profile Training Event (HPTE) proved that training can reach a large number of countries with participants from a variety of entities such as forecasters and meteorologists from NMHSs, university students and lecturers, scientists in private and state water management organizations; a population beyond the target of WMO “train the trainers” strategy.

When the WMO Space Programme opened two positions in 2005/6 it was envisaged that one of the positions would support user activities including the VL. However, only one position was filled due to budget constraints. The VL has proved to be a very dynamic concept and it is still growing, but it will not be able to subsist and continue growing without a person solely dedicated to support VL activities. The HPTE is an example where experts contributed as much time as they could afford in addition to their normal work. However it was impossible to do some of the planned actions by utilizing such part-time resources in a somewhat uncoordinated way.

Taking into account the dynamic expansion of the VL in terms of new CoEs, future Regional Focus Groups, a 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 coordination can only be effective if ensured by a dedicated person assigned to this function. Experience shows that previous VL activities, especially the HPTE, whilst acknowledged as a clear success, could have brought even greater benefits with increased coordination of the efforts of all the contributing parties. Further training events will be conducted in the near future in Argentina in September 2008 and in Brazil in December 2008; and it is planned for these and other events to capitalize on the efforts and maximize the benefits in recording lectures, retransmitting them to remote students to enlarge the outreach, finalizing lecture material for further usage and possible translation in multiple languages. However, the full potential benefits of these valuable initiatives will only be achieved with an appropriate level of resources allocated to the coordination of the efforts of individual participating organizations and efficient project management.

2. Main tasks of the person in the position to assist the VL

2.1 High level areas of responsibility are as follows:

- Work with the establishment of Regional Focus Groups;
- Work with the planning of regional training events by:
    - Ensuring that these events have a virtual component;

  - Ensuring that the proper material is distributed prior and after the events;
  - Interacting with participants prior to and after the event;
- Undertake follow-up actions related to the analysis of the questionnaire.

This person could be collocated with one of the co-chairs and occasionally spend some time at a specific CoE.

2.2 Some typical specific tasks are as follows:

1. Monitor CoE activities;
2. Support CoE activities;
3. Assist in the establishment of Regional Focus Groups (RFG) and the building up of user communities;
4. Assist the existing RFGs;
5. Coordinate activities between RFGs;
6. Assist technically in the set up and use of tools such as MOODLE, Visitview, CENTRA, webcasts;
7. Keep continually updated regarding evolving training technologies;
8. Take care of a regular newsletter;
9. Establish constant communication with people involved;
10. Assist the RFG coordinator with the distance sessions;
11. Maintain a centralized web page;
12. Maintain the training schedules;
13. Assist the VLMG Co-chairs monitoring activities;
14. Produce relevant reports for use by CGMS, ET-SUP, VLMG;
15. Help in the organization of training events in coordination with WMO;
16. Produce assessments based on the annual reports of the CoEs;
17. Help in the analysis of the personnel (the training component);
18. Assure that relevant materials are in the VRL;
19. Stay up-to-date with new materials for the VRL;
20. Report to VLMG Co-chairs;
21. Ensure that training events have a virtual component for people who want to participate and cannot travel;
22. Take care of the evaluation of training events;
23. Provide advice on future developments.