

VIRTUAL LABORATORY FOR TRAINING IN SATELLITE METEOROLOGY

The paper presents a report of training activities within the VL since CGMS-34 along with future plans and directions. It also provides an updated report on the outcome of the highly successful HPTE of 2006.

The third meeting of the VL Management Group (VLMG) in June 2007 is described with recommendations from the VLMG meeting presented to CGMS for endorsement or comment. These include the important issues of:

- The proposed continuation of the VL and its Management Group under slightly modified terms of reference;
- The intention to request a reconfirmation of the commitment of VL partners (as sponsors and/or) CoEs in light of the amended terms of reference and slightly revised expectations;
- The proposal that further Regional Focus Groups be established along the lines of the highly successful Focus Group of the Americas;
- The proposal that Dr Volker Gaertner (EUMETSAT) shall be the new Satellite Sponsors' Co-chair of the VL Management Group taking over from the outgoing Co-chair, Dr James Purdom (USA);
- The proposal that the Beijing component of the Nanjing RTC, the China Meteorological Agency Training Centre (CMATC), be accepted as a new Centre of Excellence with sponsorship by China;
- The need for additional resources to be identified to support and coordinate the VL activities.

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1 BACKGROUND

The following briefly describes the discussions on the subject of the Virtual Laboratory (VL) at previous CGMS meetings:

- CGMS-28
 - CGMS 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
 - The Virtual Laboratory for Satellite Data Utilization was formally adopted by CGMS-29, with continued reporting through the Virtual Lab Focus Group (renamed Virtual Lab Management Group by CGMS-XXIII).
- CGMS-30
 - 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
 - CGMS-31 was informed that important milestones were being met: all centres were utilizing the VL.
- CGMS-32
 - CGMS Members endorsed and supported the specific recommendations of the second VL Focus Group Meeting paying particular attention to recommendations within sections that addressed Servers; Tools; Virtual Resource Library; Connectivity; Future Training Event Guidelines; and Electronic Workbook;
 - CGMS enthusiastically supported the VL Goal of staging a Global High-Profile VL Training Event that would link all Centres of Excellence;
 - CGMS was enthusiastic about the establishment of new Caribbean Focus Group and requested information concerning its progress at CGMS-33.
- CGMS-33
 - CGMS endorsed the growth of the VL confirming a new Centre of Excellence in Oman sponsored by EUMETSAT;
 - Electronic notebooks: CGMS was pleased to hear about the success of the Costa Rica training event that was held in February 2005, and the successful trial of electronic notebooks at that event.
 - CGMS Members strongly endorsed and supported the specific recommendations for the High Profile Training Event, in particular the requests for assistance in the development and translation of the core lectures
 - 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.

- CGMS-34
 - CGMS endorsed the growth of the VL confirming new Centres of Excellence in Argentina and Brazil sponsored by NESDIS.
 - CGMS 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.

2 ACTIVITY IN THE VIRTUAL LAB SINCE CGMS-34

2.1 VIRTUAL LAB MANAGEMENT GROUP MEETING

The Third Meeting of the Virtual Lab Management Group (VLMG-3) was held on 7-8 June 2007 in Boulder, USA and the final report is available on the WMO Space Programme web pages at <http://www.wmo.int/pages/prog/sat/Reports.html#VLMG>.

The VLMG reviewed activities within the VL over the period since its second meeting which took place in Barbados in December 2003. Although not all VL sponsors and Centres of Excellence (CoE) were able to attend, the third meeting found that the VL had performed at an exceptional level, exceeding all expectations. 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 particular note of the great success of the 2006 High Profile Training Event (HPTE), noting that over two-thirds of WMO Members had participated in the event and that over 2000 people had received HPTE lectures (initial information and results from the HPTE were reported at CGMS-34 which occurred immediately after the HPTE). The VLMG noted that the HPTE Core Lectures had been translated from English into Spanish and Portuguese and that plans were underway to translate the lectures into all official WMO languages. A DVD containing the HPTE resource material in English, Spanish and Portuguese is in the final stages of production at EUMETSAT and should be distributed in the near future. The lectures also include English and Portuguese audio and future plans call for other languages to be included. More information on the HPTE is given in Annex 4.

VLMG-3 reviewed and revised the goals and objectives, terms of reference and expectations of partners, and made slight modification to the expectations from the Centres of Excellence, satellite operators and WMO/CGMS (see Annexes 1, 2 and 3) and asked that CGMS satellite operators that sponsor a Centre or Centres of Excellence re-affirm their commitment to the VL by confirming their intentions to meet the revised expectations, terms of reference and principles statements.

The VLMG nominated new Co-chairs: Dr Volker Gaertner (EUMETSAT) taking over as the new Satellite Sponsors' Co-chair of the VL Management Group from the outgoing Co-chair, Dr James Purdom (USA) and Dr Luiz Augusto Toledo Machado (Brazil) taking over the CoE Co-chair role from the outgoing Co-chair, Mr Jeff Wilson (Australia).

The VLMG found that the great success of the VL Focus Group of the Americas (reported at CGMS-34) 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 reported on at CGMS-34.

The VLMG recommended that satellite VL sponsors install an Abstract Distributed Data Environment (ADDE) server to provide online access to digital data for the standard VL tools (McIDAS, SATAID, RAMSDIS).

The VLMG reviewed the capabilities of the China Meteorological Agency Training Centre (CMATC) 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, noting that they are the Beijing component of the Nanjing Regional Training Centre, which is an existing CoE, and so the process would be one of merely amending the geographical location of the CMA CoE. This was confirmed by the Expert Team on Satellite Utilization and Products (ET-SUP) at their September 2007 meeting.

2.2 TRAINING ACTIVITIES

Satellite operators and CoEs reported on their training activities at the VLMG-3 for the period since VLMG-2. In some cases these reports also included experiences from the HPTE. Brief highlights are given below with the full reports available on the WMO web site via the URLs shown.

Argentina CoE

The report describes the recent change of governance of the Argentinean NMHS from military to civilian authority. It goes on to mention the strong collaboration between the NMHS and the University of Buenos Aires that has recently been established. The change of governance is seen as a positive indicator for Argentina's continued involvement with the VL. The report notes that the Argentinean VLMG representative is also a member of the IPWG, a fact that should enable a closer working relationship between the VL and that group. The full report from the Argentina CoE may be found at:

http://www.wmo.int/pages/prog/sat/meetings/documents/Report_CoE_Argentina.pdf

Australia CoE

The report from the Australian CoE describes APSATS 2006, a major training event, co-hosted by WMO, JMA and the Australian Bureau of Meteorology, that ran in parallel with the HPTE. It included a potentially important interaction with the IPWG. The HPTE itself is described along with some experiences and recommendations. The implementation of the Internet-based SATAID data server as well as a VISITview weather discussion server, both focussing on the Asia/Pacific region was also noted. The report highlights how resource (staffing) difficulties experienced by the CoE have impacted on their ability to run regular Regional Focus Group discussions in the Asia/Pacific region prior to mid 2007, regular discussions are expected to commence in August 2007. The full report from the Australian CoE may be found at:

http://www.wmo.int/pages/prog/sat/meetings/documents/VL_Australia.pdf

Barbados CoE

The report describes the CoE support to the Regional Focus Group monthly weather discussions and notes initial telecoms problems, most of which have been solved. It also notes an apparent decrease of interest from Caribbean participants in recent months. It goes on to describe the use made of VL material by the CoE and their participation in HPTE. An initiative is described through which some dedicated

computer hardware has been installed to receive satellite data, routinely downloaded from RAMSDIS, and on which an archive of these data is maintained. The CoE report plans to introduce weekly Caribbean weather discussion sessions during the current hurricane season. The full report from the Barbados CoE may be found at: <http://www.wmo.int/pages/prog/sat/meetings/documents/barbados.pdf>

Brazil CoE

The report gives a detailed description of the facilities available at the CoE for training events. It describes both the face-to-face and also the online training events that have taken place in 2006/7 and those planned for 2007/8 (including an HPTE-type event in October 2007). The report also contains a very comprehensive description of the CoE involvement in the HPTE including a very useful questionnaire response analysis. The full report from the Brazil CoE may be found at: http://www.wmo.int/pages/prog/sat/meetings/documents/Brazilian_VL.pdf

China CoE

Although no representative from CMA was present at the meeting, a report from the Nanjing CoE was received in advance of the meeting. The report describes the two major satellite training events that have taken place at Nanjing since VLMG-2, namely the event in June/July 2004 and the HPTE in 2006. It mentions that academic exchanges and cooperation with NSMC in Beijing have increased and that these have included the provision of expert lecturers from Beijing for training courses in Nanjing. The training facilities at the RTC in Nanjing are described and the usefulness of the VL training material is also mentioned. The report describes how the CoE encourages presentations from participants at training events on their own studies, ideas and experiences. The full report from the Nanjing CoE may be found at: <http://www.wmo.int/pages/prog/sat/meetings/documents/VL-Nanjing-2005-2007.pdf>

Costa Rica CoE

Although no representative from Costa Rica was physically present at the meeting, a report from them was received in advance of the meeting and they participated remotely via audio conference. The report describes their continued involvement with the VL regional monthly weather discussions and those that took place during the HPTE. They have been fostering the participation in the VL of Hydrology groups from the region. The report describes the translation of the core HPTE lectures into Spanish and notes the enormity of that task. The report also describes how enthusiastically electronic notebooks were received by course participants and how valuable they have proven to be. The CoE plans to cooperate with the organization of the South American HPTE in October 2007 and will participate in the event. The report mentions a few problems experienced by the CoE, the most significant being the lack of staffing resources. The full report from the Costa Rica CoE may be found at: <http://www.wmo.int/pages/prog/sat/meetings/documents/VL-CostaRica-REPORT07.pdf>

Niger CoE

The report from the EAMAC CoE describes some outcomes of the 13th Meeting of ASECNA Schools Teaching Council in 2004 which were of significance to the VL. It also mentions the efforts of EAMAC to improve their internet connectivity but notes only very limited success. The involvement of the CoE in the HPTE is described, including measures taken to prepare for the event as well as the engagement in the event itself. Considerable technical problems were experienced and remain a concern to the effectiveness of VL activities at this CoE. The absence of French versions of the core lectures was a significant hindrance to the participants. The CoE

representative proposed to investigate the options for coordinating the translation of the four core HPTE lectures into French. The CoE is committed to engage in the creation of a Regional Focus Group. The full report from the EAMAC CoE may be found at: http://www.wmo.int/pages/prog/sat/meetings/documents/EAMAC_Report.pdf

Oman CoE

The report explains that Oman has been a VL CoE since 2006. It describes the impressive facilities available to the CoE for training purposes and lists the training events that have recently taken place or are planned. It goes on to describe the participation of the CoE in the HPTE. The CoE is committed to the establishment of a Regional Focus Group with the assistance of EUMETSAT and is planning to introduce a live VL web page September this year. The full report from the Oman CoE may be found at: <http://www.wmo.int/pages/prog/sat/meetings/documents/oman.pdf>

EUMETSAT, VL Sponsor

The report mentions the developments of EUMETCAL and EUMETTrain, two initiatives closely related to the VL objectives. It describes how USB hard drives are regularly distributed to training course participants. The report draws attention to the workshop on the use of satellite data for climate applications that took place in Croatia in December 2006. It also includes a comprehensive report on the experiences from the HPTE. It details plans for 2007/8 including the promoting of Regional Focus Groups in Africa. The report contains some expressions of concern over the maintenance of the VL web site. The full report from the EUMETSAT satellite operator may be found at:

<http://www.wmo.int/pages/prog/sat/meetings/documents/eumetsat.pdf>

Japan, VL Sponsor

Although no representative from JMA was present at the meeting, a report from JMA was received in advance of the meeting. The report describes the annual training event hosted by JMA which includes satellite meteorology lectures involving the SATAID tool. It also describes recent updates and enhancements to SATAID including the capability to display microwave imager data and to overlay ocean surface scatterometer winds on satellite imagery. The full report from the JMA satellite operator may be found at:

<http://www.wmo.int/pages/prog/sat/meetings/documents/jma.pdf>

NOAA, VL Sponsor

The report lists the many activities undertaken since VLMG-2. It describes the involvement of NOAA in the HPTE and also the sponsorship to the new CoEs in Brazil and Argentina. It mentions the move of GOES-10 to 60°W, a very important element of the support to satellite meteorology training in the region. It goes on to report its continued involvement in the Americas/Caribbean Focus Group. In addition the report includes news of several interesting developments in COMET and VISIT training activities which together represent a significant addition to the resources available to the VL. The full report from the NOAA satellite operator may be found at:

<http://www.wmo.int/pages/prog/sat/meetings/documents/noaa.pdf>

Others

There were no reports received from the representatives of the satellite operators in India and China or from the CoE in Kenya. The Oman CoE informed the VLMG that no official ties have been established between that CoE and India in a co-sponsor

role. In light of the comments of the representative from Oman, the VL Rapporteur to CGMS agreed to clarify India's participation within the VL.

3 CONCLUSIONS AND RECOMMENDATIONS

Considering the reported outcomes of the recent Virtual Laboratory Management Group meeting (VLMG-3) including i) a review of lessons learnt from the HPTE along with other recommendations and actions raised by the VLMG; ii) the importance of the role of Regional Focus Groups; iii) the status of other training activities, both past and planned, taking account of the progress towards routine involvement of VL materials, tools and techniques, CGMS are invited to consider the following VLMG recommendations:

- (1) CGMS Members to endorse the proposal that the Virtual Laboratory (VL) and its management group (VLMG) shall continue for the foreseeable future;
- (2) CGMS Members to endorse the addition of a new Virtual Lab Centre of Excellence in China located at the China Meteorological Agency Training Centre (CMATC), being the Beijing component of the Nanjing RTC. Note that this is, in effect, merely a change of location of an existing CoE;
- (3) CGMS to endorse the appointment of Dr Volker Gaertner (EUMETSAT) to take over as the new Satellite Sponsors' Co-chair of the VL Management Group from the outgoing Co-chair, Dr James Purdom (USA);
- (4) CGMS to note and comment as appropriate on the revised goals and objectives, terms of reference and expectations of partners agreed by VLMG-3 (see Annexes 1, 2 and 3);
- (5) CGMS to note and comment as appropriate on the intention that satellite operators that sponsor a Centre or Centres of Excellence should be asked to re-affirm their commitment to the VL by confirming their intentions to meet the revised expectations, terms of reference and principles statements (and that the WMO Space Programme circulate the revised Terms of Reference, Objectives and Partner Expectation documents to the various VL partners seeking their agreement to continue under the new arrangements);
- (6) IMD to clarify their plans as co-sponsor of the VL Centre of Excellence in Oman;
- (7) CGMS to note and comment as appropriate that 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;
- (8) CGMS to note and comment as appropriate on the proposal that satellite operators who are VL sponsors should install an ADDE server;
- (9) CGMS to note and comment as appropriate on 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;
- (10) CGMS to note 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 to further note and comment as appropriate on the proposal that this shall be reflected in future development of a widely used training syllabus;



- (11) CGMS to note and comment as appropriate that the VLMG will investigate options for creating a comprehensive learning environment for online satellite courses using software such as MOODLE.

ANNEX 1**TERMS OF REFERENCE FOR
WMO/CGMS VIRTUAL LABORATORY MANAGEMENT GROUP (VLMG)**

The Virtual Laboratory Management Group (VLMG) is responsible for the direction and evolution of the VL. It reports to the VL Sponsors through the WMO CBS OPAG/IOS/ET-SUP and the CGMS VL Rapporteur respectively.

The VLMG shall ensure that the following VL Strategic Goals are met:

- To provide high quality and up-to-date training resources on current and future meteorological and other environmental satellite systems, data, products and applications;
- To foster the use of satellite data and products by conducting classroom and online training sessions as well as regular weather discussions primarily for NMHS staff on a regional basis;
- To enable the “Centres of Excellence” to facilitate and foster research and the development on the use of satellite data for societal benefit applications at the local level by NMHSs and other organisations through the provision of effective training, resource materials, including links to relevant CGMS science groups.

The VLMG shall provide an effective Management structure for the VL and shall be comprised of:

- Two Co-chairs, being one satellite operator and one representative from the “Centres of Excellence” ;
- Secretariat from WMO Space Programme Office;
- Representatives from all remaining sponsoring satellite operators and “Centres of Excellence”;

Membership may also include:

- Representatives of CGMS science teams as appropriate;
- Other interested parties as deemed appropriate by the Co-Chairs.

One member of the VLMG shall be appointed as Focus Group Coordinator who shall be responsible for:

- Providing help and advice on the establishment of new Regional Focus Groups;
- Providing help and advice on the activities of established Regional Focus Groups;
- Promoting and facilitating interaction between Regional Focus Groups.

The VLMG shall conduct the following activities:

- Work with the WMO Space Programme and CGMS Satellite Operators to ensure that the VL Strategic Goals are accomplished;
- Formally review the VL and update the implementation plan every five years;
- Every year produce an Annual Report related to the Strategic Goals and make recommendations for consideration by the sponsors;
- Meet at the five-year planning cycle and at least once within the five-year cycle, as appropriate;
- Recommend VLMG Co-Chairs to the VL Sponsors when appropriate ⁽¹⁾.

⁽¹⁾ The selection of Co-Chairs is the responsibility of CGMS for the satellite operators, and of WMO for Centres of Excellence.

ANNEX 2

OBJECTIVES OF VLMG

Over the next five years the main activities of the VL will embrace the following ideas:

1. We will increase our emphasis on remote training;
2. We will expand our focus into the GEO Societal Benefit Areas;
3. We will be globally active through our Regional Focus Groups (RFGs) by:
 - a. Conducting ongoing training in the use of satellite data and products in the regular sessions of the RFGs;
 - b. Instituting regional HPTEs that incorporate classroom and online sessions;
 - c. Co-ordinating RFG activity.
4. We will exploit the full complement of satellite data and products from current operational and R&D satellites in order to:
 - a. Provide a richer set of satellite data and products for today's users;
 - b. Prepare users for the next generation of operational satellites.
5. We will contribute to the development of training materials and resources.

VL Continuing Goal

- (1) To maintain a baseline VL and to foster its logical growth.

VL Connectivity

- (1) To assure links between the "Centres of Excellence" (and supporting satellite operators) with a minimum data rate of 1 Mbs, to support communication (email, voice), the exchange of software and limited image data sets (e.g., case studies and some near real-time data sets);
- (2) "Centres of Excellence" to consider means to increase link capacity over the next 5 years.

Virtual Resource Library (VRL)

- (1) To maintain and update a selection of training resources (includes image data sets, s/w, tools);
- (2) To maintain a structure for the depository of training resources which will allow easy access by the "Centres of Excellence" trainers;
- (3) To provide ready and easy access to all relevant users;
- (4) To consider the provision of additional (enhanced) material to address satellite related training materials for the GEO Societal Benefit Areas.

VL Utilization

- (1) To maintain and enhance (such as adoption of a learning management system) VL user tracking and feed-back mechanism;
- (2) To keep abreast of user requirements for the VL with the baseline being WMO Pub No. 258, but also relying on feedback from the WMO SP questionnaire and regional Focus Group input;

- (3) To provide a mechanism for training meteorological students to an operational level of expertise;
- (4) Allow for the use of daily weather discussions during training events based around near real time data;
- (5) Near real-time data are needed to train forecasters on the effective use of new satellite reception and processing systems. Depending on the application, the need for near real-time data availability may not be as stringent.

ANNEX 3

EXPECTATIONS FROM THE CENTRES OF EXCELLENCE, SATELLITE OPERATORS AND WMO/CGMS

Expectations from the Centres of Excellence

Whilst recognizing that each “centre of excellence” has different administrative and financial structures, relationships with the sponsoring satellite operator and links with neighbouring NHMSs, the VLMG recommended the following:

- Nominate a focal point and an alternate within the CoE as the primary contact for all VL business:
 - This person should have some authority to make decisions regarding the use of the VL within the CoE.
- Run international training events that conform with the VL guides for organising and running training events;
- Develop and run regular (at least monthly) weather discussions for Regional Focus Groups;
- Maintain an up to date list of priority training needs for that region:
 - Links to ET-SUP for coordination.
- Develop and maintain proficiency in providing online training using tools such as VISITView;
- Maintain regular contact with the other members of the VL Management Group:
 - Co-chair responsibility to coordinate sessions.
- Provide the Co-Chairs (or designated people) a brief annual report at the end of August each year, relevant to the VL, outlining the training activities for the past 12 months, anticipated training activities for the next twelve months, priority training needs for the region for the next 12 months and their ability to meet the training needs, and other information they feel is relevant to the VL:
 - Co-chairs responsibilities to report to constituent bodies after receipt of information.

Expectations from the satellite operators

- Nominate a focal point and alternate for VL business:
 - This person should have some authority to make decisions about VL matters within the satellite operator and some delegation to assist the CoEs on a case by case basis.
- Make near real time data, products and/or selected case study data available for education and training purposes to CoE’s in the correct data formats for use with the agreed VL tool sets;
- Assist the CoE with the regular weather discussions with the Regional Focus Group;
- Maintain regular contact with the CoE(s) that the satellite operator is sponsoring, focusing in particular, but not solely on communications and data access issues. As appropriate, provide an alerting role for the CoE(s) on new training resources and material generated within or for the satellite operator;

- Maintain regular contact with the other VL satellite operators on data access and format issues and other matters as appropriate;
- Provide the Co-Chairs (or designated people) a brief annual report at the end of August each year, relevant to the VL, outlining the activities that the satellite operator has undertaken in the past 12 months for their sponsored CoE(s) and the VL in general, and plans relevant to the CoE and the VL for the next 12 months;
- Assist the CoE(s) to overcome resource constraints on VL related matters through advice, championing with other funding bodies and direct assistance as appropriate.

Expectations from WMO and CGMS

- Provide long term guidance and advice, and where appropriate, direction regarding global and regional priorities;
- Represent the VL partners at appropriate policy and resource fora;
- Assist with resource issues.

ANNEX 4

FINDINGS AND RECOMMENDATIONS REGARDING HPTE SINCE CGMS-34

- HPTE met or exceeded most of its objectives and goals. The one area that wasn't fully met was the provision of all of the lectures in the six WMO languages;
- Work has begun on translating the HPTE lectures into Arabic, Russian and French. When these translations are completed the HPTE lectures will be available in all WMO languages, plus Portuguese;
- The WMO Space Programme Secretariat has recently distributed "Certificates of Participation" to all those people who returned the post course evaluation;
- A DVD containing the HPTE resource material in English, Spanish and Portuguese is in the final stages of production at EUMETSAT and should be distributed in the near future:
 - The lectures also include English and Portuguese audio;
 - There are plans to include other language versions to the DVD.
- All WMO Regions participated in HPTE;
- Preliminary results indicate that and at a minimum 125 of 187 WMO Members received HPTE lectures;
- Many of the sites logged into the lectures had multiple participants and counts indicate that well over 2000 people received the lectures;
- Participant evaluations very positive:
 - Central and South America requested more sessions on a regular basis.
- The Fifteenth WMO Congress:
 - HPTE received high praise from Members.
 - Requested that "... further initiatives along the lines of the HPTE be undertaken during the next intersessional period".
- VL develop and maintain a central website with links to each of the Regional Focus Groups to allow users to quickly identify relevant courses;
- Enable registration and provide contact details etc. for upcoming events;
- Establish and Expand the scope of future events to include more of the GEO Societal Benefit areas;
- Create a series of regionally focused and tailored training events, rather than one event organized on a global basis;
- Continue the use of Project Development Plans for each training event clearly indicating goals and objectives, responsibilities, time lines and ensure that the event is well publicized in the target region;
- Limit lectures to less than 60 minutes - allow time for question and answers;
- Include practice sessions prior to the event to allow participants to be familiar with the equipment and identify and system issues;
- Investigate alternative low cost audio systems;
- Don't have presenter simultaneously presenting a classroom session and an online session;
- Investigate options for providing the classroom lectures as webcasts.