

**WORLD METEOROLOGICAL ORGANIZATION**

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**WORLD METEOROLOGICAL ORGANIZATION (WMO)  
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## Training or Focus Group– Virtually there with VISITview

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### ABSTRACT

The World Meteorological Organization (WMO) has encouraged satellite operators to take the lead in providing training to other countries in their hemisphere by collaborating with their Regional Meteorological Training Centers of Excellence (CoE). The National Oceanic and Atmospheric Administration (NOAA) has done this in the Western Hemisphere through its Cooperative Institutes by collaborating initially with the existing CoE in Costa Rica and Barbados and recently with the newly formed CoE in Brazil and Argentina. The progression of training activities focused on satellite meteorology has gone from classroom-based instruction to virtual instruction and initiation of a focus group. The teletraining and real-time collaboration tool used in the instruction and focus group is called VISITview and has come out of the Virtual Institute for Satellite Integration Training (VISIT). VISITview was developed for the National Weather Service of the United States and is now being used worldwide.

The trainings and focus group have been highly successful, but they have also had their share of challenges – particularly in connecting so many people from many different countries with varying Internet bandwidth capabilities, different languages, and politics. This presentation will give an overview of the invaluable contributions from the various supporting agencies and the participants themselves, the capabilities of the VISITview software, as well as the challenges and solutions to date. The framework for this training and focus group is directly applicable to the Volcanic Ash community.

### INTRODUCTION

According to the online Wikipedia, “Training refers to the acquisition of knowledge, skills, and

competencies as a result of the teaching of vocational or practical skills and knowledge that relates to specific useful skills.” It is not a new concept, but usually not the first area to receive attention or funding when there is significant growth in a particular field of science. A dramatic explosion of satellite and communication technology over the last 15-20 years has resulted in an abundance of information available to utilize for all sorts of weather and hazard related forecasts, and so has the need to train users on how to better utilize the information. We often look for inexpensive means to accomplish this. The volcanic ash hazard for many is not an everyday issue, but when it occurs, its effects are far reaching. Within this paper, we present the framework for training that has developed among a large group of people. Some of the keys to a successful program include: motivation on the part of the trainers and participants; cooperation and collaboration, input from experts as well as users, and building long-term capacity.

### BACKGROUND

The WMO recognized the explosion of satellite products and information early on and in 1996 its executive council recommended that “each satellite operator ... cooperate with at least one of the specialized satellite applications training centres (“centres of excellence”) strategically located around the globe with regard to the satellite programme, facilities and expertise required” (Purdom, 1997). Under this recommendation, NOAA, through the Cooperative Institute for Research in the Atmosphere (CIRA) and the Cooperative Institute for Meteorological Satellite Studies (CIMSS) partnered with the CoE in Costa Rica and Barbados.

The CoE in Costa Rica is closely associated with the Universidad de Costa Rica, and the CoE in Barbados is closely associated with the Caribbean Institute of Meteorology and Hydrology. The project was designed around the concept of the virtual laboratory, which focused on using Personal Computers (PCs), case data sets, and Internet connections to demonstrate the invaluable use of digital satellite imagery. Back in 1997, this was indeed a challenge because Barbados had no Internet and Costa Rica had limited Internet capabilities fortunately capabilities have increased dramatically over the past 10 years. The project started with PCs, sent data through (ground) mail and additionally for Costa Rica sent imagery overnight through the Internet. The group organized and participated in WMO sponsored two-week satellite training workshops, the first of which occurred in Barbados in October 1998 and the second in Costa Rica in December 1999. Hurricane Mitch occurred near the end of October 1998 creating a natural disaster in Central America. Since the group already had a presence in Central America, it was able to direct training and recovery efforts for the meteorological services in Central America. In a few words, we were readily able to build capacity starting with a centralized CoE and expanding to include the National Weather Services in the surrounding countries.



**Figure 1. Participants and instructors at the WMO Satellite Training Workshop held in Barbados in December 2003.**

The idea for the satellite weather briefings, was born at the (WMO) Satellite Training Workshop held in Barbados in December 2003. At that time, a WMO Virtual Laboratory Focus Group was formed with support from NOAA, CIRA, CIMSS, the Virtual Institute for Satellite Integration Training (VISIT), and the CoE in Costa Rica and Barbados. During the first year, the focus group was composed of participants

and workshop instructors; the sessions were conducted in English and occurred on a monthly basis. After the WMO Workshop held in Costa Rica in March 2005 the focus group expanded exponentially and evolved to include monthly bilingual and Spanish only sessions.

It is pertinent to note that besides the overwhelming interest from participants in the focus group generated at the March 2005 workshop, the group leadership expanded to include the NOAA's International Desk at the Hydrometeorological Prediction Center (HPC). The mission of the HPC International Desk is to provide visiting scientists with meteorological training with an emphasis on the operational use and application of numerical model products. They brought with them an extensive history of positive interaction with countries in Central and South America and the Caribbean and hence a strong following of participants. As a side note, the International Desk formed in response to assistance offered to South American countries after suffering a severe drought during the 1988-1989 La Niña episode.

Just prior to the 2005 Costa Rica Workshop, the concept for HPTE was introduced to WMO. The Virtual Laboratory Management Group proposed that four core lectures be presented simultaneously through the Internet throughout the globe by the various regional focus groups.

### **SOFTWARE "RECYCLING"**

The VISITview tool utilized for the weather briefings and the training activities was developed for the United States (US) National Weather Service (NWS) under the well established VISIT program (<http://rammb.cira.colostate.edu/visit/visithome.asp>). The primary mission of VISIT (Mostek et al. 2004) is to accelerate the transfer of research results based on atmospheric remote sensing data into NWS operations using distance education techniques. It was created in response to training requirements outpacing available travel funds as well as increased internet bandwidth and reliability. VISITview is a teletraining and real-time collaboration tool which provides a "slideshow" format that allows image animations, zooming, and chalkboard capabilities, and connects one or more instructors to many students via the internet (<http://www.ssec.wisc.edu/visitview/>) VISITview has and continues to function extremely well and provide excellent training for the NWS. It is

being “recycled” and expanded for use by the international community.

It is worthwhile noting that VISITview is being used in two similar but different capacities for the training and the focus group sessions. VISITview was designed to be a complete lecture that is downloaded onto a remote computer. During a session, students and teachers are connected to a single server. The controls in the lecture are transmitted through the server to individual participants and allow the teacher to advance pages, point out features of interest, and draw on the imagery. This approach uses minimal bandwidth during the session. For the VISITview real-time online sessions, the imagery resides on the server and is downloaded when requested for viewing. Being able to draw on the imagery or point out features is also available. This approach requires a larger bandwidth during the session.

**COOPERATION**

**Weather Briefings**

In order to have success at running the monthly sessions, the workload is distributed among the many partners so that it is “doable” by all involved. For a typical monthly session, one person is responsible for scheduling and moderating the session and making sure the

announcement and summary gets sent out to all participants. A VISITview server at CIRA (link) provides the framework and real-time geostationary and polar orbiting imagery and products for viewing. Imagery are created automatically from a RAMSDIS (Molenar et al. 2000) system. Initially, only “standard” geostationary satellite images (visible, short and long wave infrared, and water vapor) were made available on the site. This has evolved to including specialized polar orbiting products such as total precipitable water from the Advanced Microwave Sounding Unit, rain rate and wind speed from the Special Sensor Microwave/Imager, sea surface temperature and anomalies derived from Advanced Very High Resolution Radiometer, and potential vorticity anomalies for Madden-Julian Oscillation analysis. Each month, special interest topics, products, or imagery of significant events can be added to the standard suite of images and products to customize the session.

The Yahoo Conference feature is used to provide voice-over-Internet. A session is initiated by a person from either CIRA or the CoE in Costa Rica. all participating persons need to be sent an invitation to join a session. The CoE helps out tremendously by inviting participants and providing assistance during the session. HPC provides invaluable guidance (in both English and Spanish).

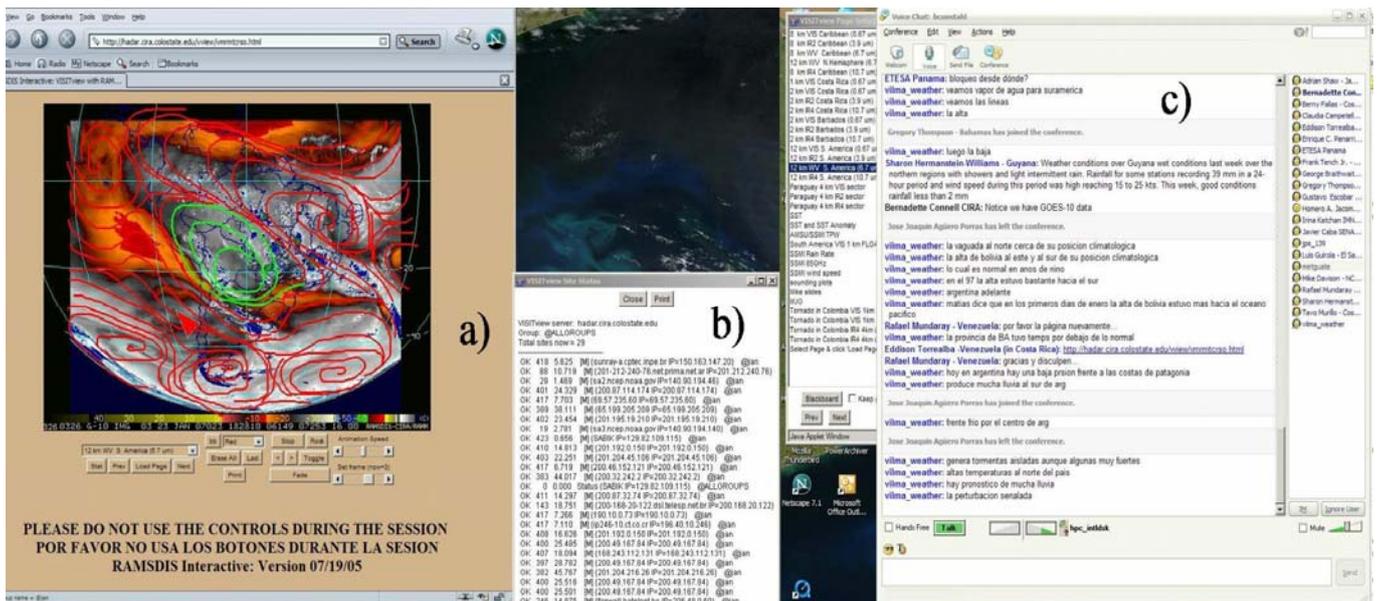


Figure 2. Computer screen grab of a monthly weather briefing session showing a) the VISITview window depicting water vapor imagery with contours drawn on during the session, b) the VISITview status window, and c) the Yahoo messenger conference window with chat display on the left and participant list on the right.

Text messaging is used during the conference as a backup to voice communications. Following each session, the CoE in Costa Rica prepares a summary of the session. The sessions have proven to be a very powerful training tool. The use of real time weather data/imagery, as well as reference to "canned data", allow us to keep the sessions interesting and the participants engaged. People learn how to use new and existing satellite products in real time situations. They also get to discuss the evolving weather patterns and local impacts, for a better feeling to the long term effects and forecasts. Having pauses for translations between English and Spanish have also proven beneficial – it gives people time to digest what has been said and formulate new questions.

### **High Profile Training Event**

The HPTE provided four core online lectures which were designed to give an overview of 4 important topics: how WMO operates within the realm of satellites to help us all, basic characteristics of environmental satellites and applications, examples of creating satellite products, and applications of satellite products for analysis of severe convection. The lectures were created in PowerPoint format, reviewed by VL members, and then converted to VISITview format. The HPTE also offered 2 weather briefings with a format similar to the monthly weather briefings.

The HPTE was designed to encourage participation in the lectures offered and provide a certificate of completion to the participants. Since a similar process occurs with the VISIT program (Mostek et al. 2004), the HPTE event for our focus group followed their activities. A web page (<http://rammb.cira.colostate.edu/training/wmo/vl/>) in both English and Spanish was created and provided a summary of the event, calendar and registration, and student guides. Some of the lectures were large (135MB) because they included imagery animations. Many countries did not have sufficient bandwidth to download the lectures, so they were written to CD and express mailed to those that had registered.

Because the focus group had regular monthly sessions, the implementation of the individual sessions went rather smoothly. Sessions

were offered in English only or Spanish only. Two of the lectures – lectures B and D were translated to Spanish prior to the sessions. The other lectures were translated afterwards and made available.

One of the combined weather briefing/lecture drew 128 participants from 21 countries (Antigua and Barbuda, Argentina, Bahamas, Barbados, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guyana, Guatemala, Honduras, Panama, Paraguay, Peru, Trinidad and Tobago, and Venezuela). This was the largest session to date with 40 computer connections and multiple participants at many sites.

VISITview also has the capability to record voice and annotations on imagery for later playback. Many of the sessions from the HPTE are also available to those who were unable to participate.

## **CHALLENGES**

### **Weather Briefings**

The weather briefings have been highly successful, but they have also had their share of challenges – particularly in connecting so many people from many different countries with varying Internet bandwidth capabilities. In terms of bandwidth, there are two issues to deal with: viewing the images and hearing voice. To help with download capabilities for the images, loops are (generally) limited to 4 images with the largest ones at 160KB and with many images less than 90KB. VISITview comes with a component to check the status of participants connected to the server. For a group of 24 participants, 75% are able to load the standard 4 image loop within 30 seconds. Generally 99% of participants view imagery within 1 minute. The software utilizes the Java 2 Runtime Environment. One of the more common problems of not being able to view the imagery results when the participant does not have the Java 2 Platform running on his system.

For voice, the conference feature under Yahoo Messenger has been used. For the most part, it has been fairly reliable. Over the past three years, only one session has been canceled due to unexplained difficulties with connecting to the Yahoo server. We have found that we are less likely to have problems with groups that have fewer than 20

participants. With groups of more than 20 participants, those with less bandwidth will experience dropped connections. As with any computer or software connecting to the Internet – Yahoo security vulnerabilities are being exposed on a regular basis. A certain amount of time needs to be dedicated to making sure everyone is using the same version of Yahoo Messenger to reduce compatibility issues between participants and to prevent malicious interruptions.

It is interesting to note that we have had a small number of participants with high motivation to participate but with insufficient bandwidth available in their office. They have creatively participated from near-by Internet cafes.

### **High Profile Training Event**

The main challenges are similar to those faced with the weather briefings and deal with internet bandwidth. In the case of training events, the bandwidth poses the most problems for download of the session and for voice through the Internet. Sending CD's via mail is a viable alternative to downloading, but allowing sufficient time for the material to get to its destination is a high priority. Remember that where people are volunteering their time, expertise, and energy, not everything goes according to schedule.

Although it is thrilling to see high participation for a specific lecture or weather briefing, until voice over the Internet improves, limiting the number of participants to fewer than 20 for a session will help overcome voice dropouts. The sessions would also be more conducive to interactions between the teacher and student. This is currently done with VISIT sessions offered to the US NWS, where they use a phone line for conference calls.

### **RELEVANCE TO VOLCANIC ASH**

Volcanic eruptions are relevant hazards to be addressed by weather services worldwide. In the Americas and the Caribbean, a virtual conduit for training has been established. The capability also exists in other parts of the world. A live presentation will be given during the meeting through VISITview to demonstrate its functionality.

Some words to keep in mind: collaboration, cooperation, capacity building, and everyone has something to contribute. This paper did not address the finer details of training and/or collaboration such as various levels necessary, review of materials, or evaluations. Future plans include incorporating training on volcanic ash hazards. Anyone interested in contributing their expert advice are encouraged to contact the authors.

### **ACKNOWLEDGMENTS**

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