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3.2 VISIT -- PROVIDING TELETRAINING FOR OPERATIONAL FORECASTERS

Daniel T. Lindsey[1*], Dan Bikos[1], Anthony Mostek[2], Scott Bachmeier[3], Tom Whittaker[3], John Weaver[4], Brad Grant[5], Jim LaDue[5]

[1]Cooperative Institute for Research in the Atmosphere
Fort Collins, Colorado

[2]National Weather Service - Office of Climate, Water, and Weather Services
Boulder, Colorado

[3]Cooperative Institute for Meteorological Satellite Studies
Madison, Wisconsin

[4]NESDIS - RAMM Branch
Fort Collins, Colorado

[5]National Weather Service - Warning Decision Training Branch
Norman, Oklahoma

1. INTRODUCTION

The Virtual Institute for Satellite Integration Training (VISIT) program provides distance learning for operational forecasters in the National Weather Service (NWS) via teletraining. Began in 1999, the VISIT program is comprised of staff from the Cooperative Institute for Research in the Atmosphere (CIRA), the Cooperative Institute for Meteorological Satellite Studies (CIMSS), the Warning Decision Training Branch (WDTB), and other NWS training centers. Teletraining topics are varied, but tend to stress the use of multi-sensor data types with a focus on satellite. Some examples of VISIT teletraining sessions are discussed in Section 3.

An interactive training tool called VISITview (Whittaker, 1999) was developed by the VISIT program. VISITview is a platform-independent distance learning and collaboration software program that allows multiple users to view and manipulate the same series of pages containing images, animations, graphics and text. Section 2 provides a detailed description of VISITview.

*Corresponding author address: Daniel T. Lindsey, CIRA/Colorado State University, 1375 Campus Delivery, Ft. Collins, CO 80523-1375; email: lindsey@cira.colostate.edu

Based on the extensive feedback received from the operational forecast offices, the strength of the VISITview teletraining instructional approach is the ability to put the instructor directly in touch with the students. Increasing travel costs and decreasing budgets have produced the need for an economical alternative to costly residence training. The direct interaction between instructors and students establishes an active link with the student that is a comparable alternative to face-to-face instruction. The benefits of this direct interaction are well worth the effort involved in developing and using the teletraining approach. Section 4 contains a summary and results of the VISIT program.

2. VISITVIEW – AN EVOLVING TELETRAINING TOOL

The VISITview teletraining software (www.ssec.wisc.edu/visitview/) is designed to provide instructors and students with a set of easy to use tools for creating, conducting and taking teletraining sessions. VISITview is written in Java and can be used in two modes: with the data files located on a central server or with these files residing on a local disk drive. In the former case, only the VISITview commands are sent over the Internet.

Most NWS offices have reliable bandwidth connections but they usually are congested moving large data files. The high volume of data restricts the amount of information that can be transmitted in real-time to support live teletraining

sessions. To avoid this limitation, the files used for the sessions are put into a zip archive file and distributed via FTP to the training sites. These files can be large (over 200 MB for some sessions). Once at the training site, the zip archive file is expanded into a local directory. The session may be previewed at the convenience of the office staff to ensure that the lesson runs properly. The students can view the session at any time after the live-interactive session to review the materials or for local training. There is a user's guide available on the web for each session.

The VISITview software provides the following functions (see Figure 1):

- a complete set of animation controls
- image zoom
- multiple panel displays with animation
- drawing tools with various color choices
- change enhancement or colorization of images
- add/remove overlays
- chat window
- quiz questions with feedback
- view status of all session participants
- recorded audio/graphics for future playback
- open web browser with link to selected site
- and image combinations with fade between images

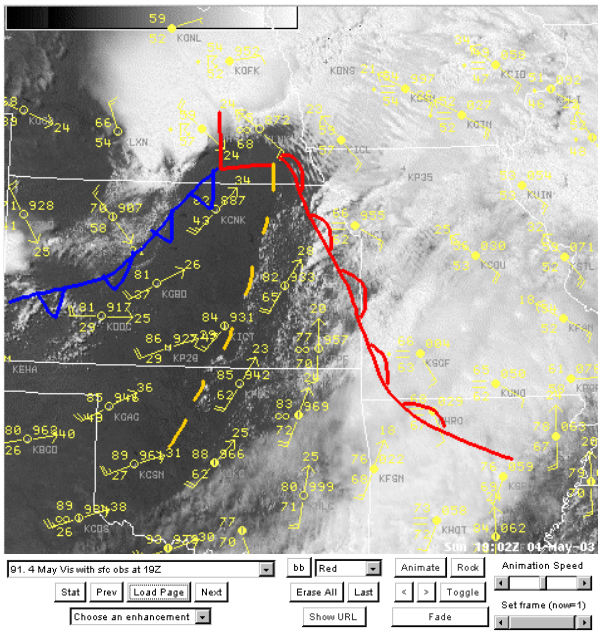

Figure 1. VISITview panel from a VISIT teletraining session showing the instructor's annotations displayed on top of a visible satellite image with station plots overlaid. The VISITview control panel is below the image.

In Figure 1, the low pressure and frontal symbols were drawn on the slide by the instructor using VISITview's drawing tools. During a live session, the annotations appear on each participating offices' screens as they're drawn by the instructor. Additionally, to add instructor/student interaction, any participant can draw on the slide when prompted by the instructor.

Another new VISITview feature is the ability to include recorded audio and annotations with the session file. This asynchronous option allows the lessons to be played back in virtual real time with the voice and annotations of the instructor. For examples of sessions with instructor audio and annotations, choose the "training sessions" link on the VISIT homepage and select a session with the microphone icon next to the course title.

3. TELETRAINING SESSION EXAMPLES

Ten to thirty teletraining sessions are administered each month (see example of calendar in Figure 2). Each session lasts between 30 minutes and 2 hours, depending on the subject. The majority of the sessions focus on satellite product interpretation, but data from a wide array of sensors are examined and discussed. Topics are chosen based on the development of new products, new research results, and occasionally requests from the field. Some of the most recent teletraining sessions are briefly described below.

October 2003

Monday	Tuesday	Wednesday	Thursday	Friday
		1 RSO III Part 1 1:30 PM MDT 19:30 UTC SPC, PBZ, LZK, LMK, OYX, JAN, LSX	**2** Mesoanalysis RSO 9:30 AM MDT 15:30 UTC GJT	**3** Navigating CPC's Website 9:00 AM MDT 15:00 UTC EHU, TSA, ALY, SHV, CRP, MEG, GGW
6	**7** RSO III Part 1 9:30 AM MDT 15:30 UTC ABR, IWX, RLX, CAR, SGF	**8**	**9** RSO III Part 2 2:00 PM MDT 20:00 UTC IWX, PBZ, ILM, BOI, LMK, JKL, SGF	**10**
13	**14** Navigating CPC's Website 12:00 PM MDT 18:00 UTC ======FULL====== TUA, ABQ, LUB, JAX, OHX, MLB, BRO, PIH, GYX, ORN	**15** RSO III Part 2 9:30 AM MDT 15:30 UTC ABR, SPC, LZK, RLX, GYX	**16** ACARS weather data 10:00 AM MDT 16:00 UTC GYX	**17** Water Vapor Imagery 8:00 AM MDT 14:00 UTC ======FULL====== EPZ, OHX, ABR, IND, AKQ, IWX, GJT, DLH, OKX, EHU

Figure 2. Portion of VISIT's October 2003 scheduling calendar, as it appears on the VISIT website.

3.1 Use of GOES/RSO imagery with other remote sensor data for diagnosing severe weather across the CONUS (RSO 3)

This is the third in a series of VISIT teletraining sessions on GOES Rapid Scan Operations (RSO) Imagery. The first session is titled Using GOES Rapid Scan Operations (RSO) Imagery in AWIPS and concentrated on what RSO is and how to call it. The second session is titled Mesoanalysis of convective weather using GOES RSO imagery and concentrated on incorporating satellite data in the short-range forecast, nowcasting, and warning decision making processes. The objectives of the session are to identify different air masses, analyze storm scale features, demonstrate how RSO imagery is used most effectively with other datasets such as lightning, radar, etc., and present severe weather cases that encompass a variety of regions across the CONUS. Figure 3 is an example slide from this session showing how a visible satellite image can be used to discern wind direction at different levels, atmospheric stability, and the locations of different air masses.

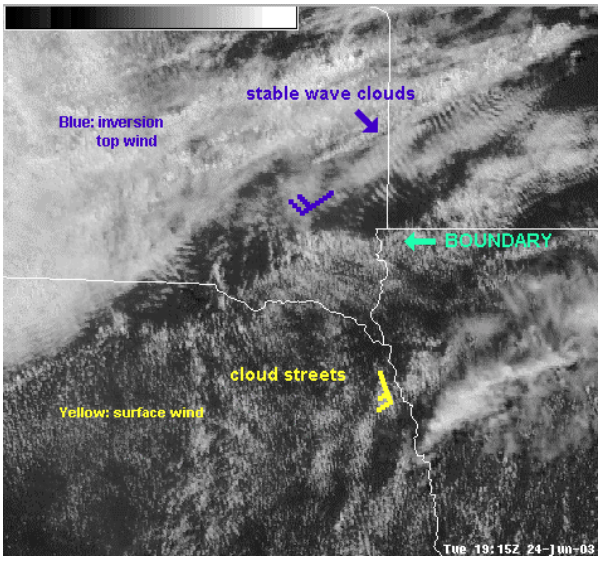

Figure 3. Example slide from the RSO 3 teletraining session showing a visible satellite image with different cloud types and air masses labeled.

Since VISIT training began on RSO satellite imagery, RSO calls by the NWS have risen dramatically. For example, there were 79 RSO calls for GOES-east in 1998, while in 2002 the total rose to 147. This is partly due to an automatic RSO call whenever the Storm Prediction Center (SPC) issues a moderate risk or greater of severe weather. This began shortly after a tornado outbreak in Oklahoma on May 3, 1999 (Bikos, et al., 2002). It was this event, along with pressure from CIRA/NESDIS, which helped initiate these automatic RSO calls for severe weather potential.

3.2 Introducing GOES-12

This teletraining session highlights the changes made to the GOES-12 imager, with an emphasis on the 6.5 micrometer water vapor channel and the new 13.3 micrometer carbon dioxide absorption channel. Figure 4 is an example slide from the session showing a 3-panel comparison of the water vapor band from GOES-8, GOES-12, and MODIS. Increased resolution in the GOES-12 channel 3 band allows mountain wave clouds to be better resolved.

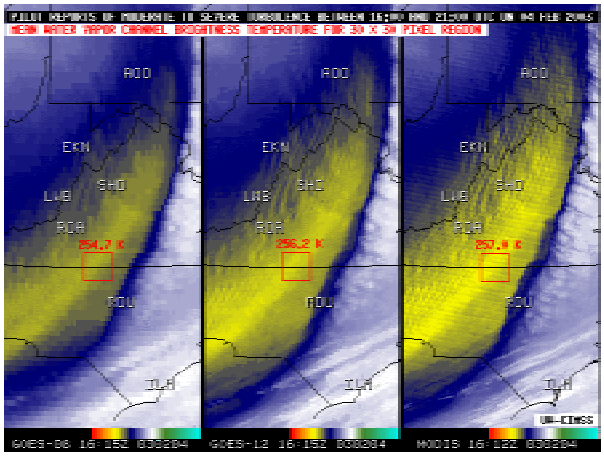

Figure 4. Example slide from the GOES-12 teletraining session showing a 3-panel comparison between a water vapor band from GOES-8 (left), GOES-12 (middle), and MODIS (right).

3.3 Wildland fire detection using satellite imagery

This session focuses on the detection of fires using satellite imagery, particularly channel 2 GOES imagery. The objectives of the session are to briefly review the available NWS fire weather forecast products, establish where satellite imagery fits in the forecast/nowcast process, learn to utilize satellite imagery to augment spotter reports and increase probability of detection, and present examples and a case study of wildland fire detection using GOES satellite imagery. Figure 5

shows a GOES visible image from 9 June 2002 over Colorado. Multiple fires are ongoing and their smoke plumes are quite evident. This VISIT session came about in response to a paper which has been accepted to *Weather and Forecasting* (Weaver, et al., 2003).

More information on these and many other VISIT teletraining sessions is available on the VISIT homepage: http://www.cira.colostate.edu/ramm/visit/visithome.asp

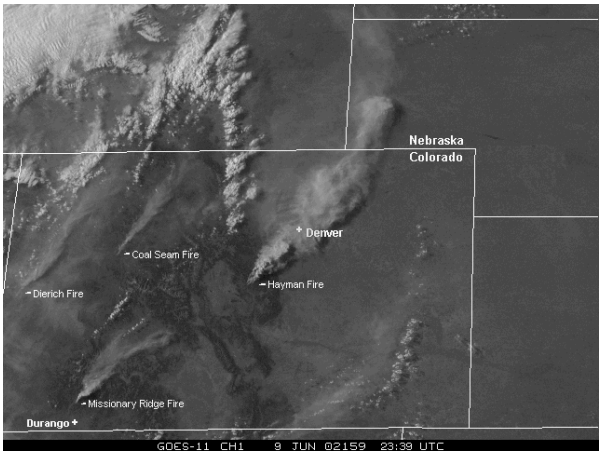

Figure 5. Example slide from the Fire Detection teletraining session showing a visible satellite image over Colorado with ongoing fires labeled.

4. TELETRAINING SESSIONS - RESULTS

From April 1999 through September 2003, the training provided by the VISIT program has resulted in the following (see Figure 6):

- **711 sessions conducted**
- **Over 3500 participating offices**
- **Over 11,500 certificates issued**

The 3500 participating offices include the many offices that have participated in multiple sessions. All 121 NWS forecast offices have participated. The NWS offices include the 115 locations in the CONUS, plus San Juan, Puerto Rico, three offices in Alaska region and two in Pacific region. Most of the NWS National Centers for Environmental Prediction, River Forecast Centers and Central Weather Service Unit offices have participated along with other organizations (Navy, NESDIS, Emergency Managers, and the Meteorological Service of Canada).

Beginning in late 2000, the VISIT teletraining program experienced a rapid rise in the number of sessions offered and the number of certificates issued. Evaluations for the teletraining sessions are sent via e-mail to all offices upon completion of the session and are also available on the Web. The large number of evaluations received is the result of an incentive. Upon receipt of the evaluation, training certificates are sent to all students that participated in the session. The linkage of the evaluation to the certificates helps to explain the large number of evaluations received and the large number of certificates issued.

Figure 6. Cumulative number of VISIT training certificates issued from April 1999 through September 2003.

The evaluations have provided many useful insights into the teletraining program, including:

- High quality graphics are a big plus
- Interactions between instructors and students are very important
- Animations are very useful
- VISITview-based sessions are easy to install and use
- Make sure the training materials are at appropriate level of difficulty
- Scheduling is a challenge with 24x7 forecast operations that span several time zones, but it can be done
- Using phone conference call for audio works well but the audio quality and volume need to be monitored
- Linking the training to specific forecaster problems and cases is very positive
- Overall, most agree that VISITview is an effective tool and teletraining works

Student feedback also is provided via the open-ended questions. This feedback has helped to improve the teletraining approach, the scheduling, the content and the delivery of the sessions. Some specific quotations received from the three recent teletraining sessions discussed above: "[RSO 3 was] another great session! Am really looking forward to Part 2 this Thursday. I just might want RSO for Denver International Airport fog events and northeastern Colorado snowstorms and thunderstorms. Great job, guys!!" "The information [in the Fire Detection session] was very timely for our fire situation at the moment. I could apply knowledge learned immediately." "[GOES-12 was] a good length of session to get us up to date on the new stuff. Timely too, with the data just flowing in AWIPS. Thanks."

5. SUMMARY

The National Weather Service training program has moved from the traditional classroom setting to an integrated distance learning approach to provide cost-effective training. Some of the training materials require an active component to allow the student to interact directly with an instructor. To meet this need, the VISIT program developed VISITview, a new teletraining software tool that is flexible, platform independent, and extensible. VISITview allows for the continuing expansion of teletraining functionality needed in today's environment of rapidly evolving technology and tight training budgets. The VISIT program has been a great success and will continue to provide training for the NWS.

6. REFERENCES

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